Standard Bidding Document

Construction of SECP Head Office Building Mauve Area G-11 Islamabad (Package -2A Architecture, Electrical & Plumbing Works) (Works)

National

Single Stage-Two Envelope

October 03, 2026

Securities & Exchange Commission of Pakistan (SECP),Engr. Anwar Ghani - Project Director
Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474
Phone: +92-519-195551, Email: procurement.info@secp.gov.pk

Table of Contents

REQUEST FOR BIDS 1

Instructions to Bidders 3

Bid Data Sheet 31

Eligibility Criteria 36

Evaluation Criteria 37

Jobs/Lots 42

Work Specifications and Market Rates 43

Scope of Work 430

Price Schedule 431

General Conditions of Contract 433

Special Conditions of Contract 435

Bid Securing Declaration 453

Contract Form 455

DAAB Agreement 458

Retention Money Security Demand Guarantee 1

Integrity Pact 463

Performance Guarantee Form 465

Annexure 468

Adjustment Data 469

Tender Drawings 469

Financial Submission Form for BoQ 469

Annexure 468

Technical Specification (Electrical) 470

Technical Specifcation (Plumbing) 470

Technical Specification (Arch & Interior) 1

Approved Manufacturer List (Architecture) 471

Annexure 3.1 (i) 471

Annexure 3.1 (ii) 471

Procurement Forms 472

Past Construction Experiences 1

Contractor's Key Personnel Representative and Their Schedules 1

Financial Resources 1

Past Experience and Completed Contracts 1

Historical Contract Non-Performance, and Pending Litigation and Litigation History 1

Current Contracts and Their Progress 1

Financial Capacity and Net Worth Evaluation Form 1

Average Annual Turnover 1

Additional Forms and Documents 475

REQUEST FOR BIDS

PROCUREMENT OF CIVIL WORKS

1. The **Securities & Exchange Commission of Pakistan (SECP)** has reserved Funds for the procurement planned for FY **2026-27**. The **Securities & Exchange Commission of Pakistan (SECP)** intends to apply part of the proceeds of this Fund to cover eligible payments under the contract for the " **Construction of SECP Head Office Building Mauve Area G-11 Islamabad (Package -2A Architecture, Electrical & Plumbing Works)**" with the reference of "**P78769**".

2. The **Securities & Exchange Commission of Pakistan (SECP)** invites electronic Bids from eligible Bidders for procurement of Works **(Construction of SECP Head Office Building Mauve Area G-11 Islamabad (Package -2A Architecture, Electrical & Plumbing Works))** described in the bidding documents on **EPADS v2.0**.

3. **Single Stage-Two Envelope** will be used by adopting **Least Cost Based Selection (LCBS)** Technique for the subject procurement, in line with the Public Procurement Rules, 2004 and any Regulations, Regulatory Guides, Procurement Guidelines or Instructions issued by the Authority from time to time.

4. All Bids must be accompanied by a Bid Security amounting described in Bid Security Section in Bidding Document in the form of **Pay Order, Banker's Cheque, Call at Deposit, Bank Guarantee, Demand Draft**. Or all bids must be accompanied by bid securing declaration in the format specified in the Bidding documents

5. E-Bidding documents, containing detailed terms & conditions, specifications and requirements etc. are available on **e-Pak Acquisition and Disposal System (EPADS)** at **https://epads.gov.pk/opportunities/federal/procurements/78769** for all the interested bidders registered on **EPADS v2.0**. Bidders are required to get themselves registered on **EPADS v2.0** to participate in Bidding process.

6. The e-bids, prepared in accordance with the instructions in the e-Bidding documents, must be submitted through **EPADS v2.0** on or before **Wednesday, November 4, 2026 11:00 AM**. E-bids will be opened by using **EPADS v2.0** on the same day at **Wednesday, November 4, 2026 11:30 AM**. Manual submission of Bids shall not be entertained. Those vendor who have not yet registered on the new version of **EPADS v2.0**, may register themselves on **https://pa.epads.gov.pk/**. A tutorial to explain the registeration process is available at **https://www.youtube.com/watch?v=MNW6T38v7tc.**

In terms of Rules 48 of Public Procurement Rules, 2004 Grievance Redressal Committee (GRC) is notified for the subject procurement and notification copy is available on the procuring agency's website and on Authority's website at (**www.ppra.org.pk**).

Securities & Exchange Commission of Pakistan (SECP), Engr. Anwar Ghani - Project Director
Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474
+92-519-195551
procurement.info@secp.gov.pk

Instructions to Bidders

A. INTRODUCTION

1. **Scope of Bid**

1.1. The Procuring agency/Employer (PA), as indicated in the **Bid Data Sheet** (BDS) invites Bids for the execution of Works as specified in the BDS and **Section V- Works Requirements**. The name, identification, and number of lots (contracts) of this National/ International Competitive Bidding process are specified in the BDS.

2. **Source of Funds**

2.1. Source of funds as referred in Clause 2 of Bid Data Sheet.

3. **Eligible Bidders**

3.1. A bidder may be natural person, company or firm or public or semi-public agency of Pakistan or any foreign country, or any combination of them with a formal existing agreement (on Judicial Papers) in the form of a joint venture or consortium. In the case of a joint venture or consortium, all members shall be jointly and severally liable for the execution of the Contract in accordance with the terms and conditions of the Contract. The joint venture or consortium shall nominate a Lead Member as nominated in the BDS, who shall have the authority to conduct all business for and on behalf of any and all the members of the joint venture or consortium during the Bidding process, and in case of award of contract, during the execution of contract. Verifiable copy of the agreement that forms a joint venture, consortium or association shall be required to be submitted as part of the Bid.

Any bid submitted by the joint venture, consortium or association shall indicate the part of proposed contract to be performed by each party and each party shall be evaluated (or post qualified if required) with respect to its contribution only, and the responsibilities of each party shall not be substantially altered without prior written approval of the Procuring Agency and in line with any instructions issued by the Authority.

(The limit on the number of members of JV or Consortium may be prescribed

in BDS, in accordance with the guidelines issued by the PPRA).

3.2. The invitation for bids is open to all prospective bidders subject to any provisions of incorporation or licensing by the respective national/ international incorporating agency or statutory body established for that particular trade or business. Procuring agencies shall specify the registration/licensing requirements for the foreign bidder keeping in view the requirement of that business.

3.3. A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidders may be considered to have a conflict of interest with one or more parties in this Bidding process, if they:

3.3.1. are associated or have been associated in the past, directly or indirectly with a firm or any of its affiliates which have been engaged by the Procuring agency/Employer to provide consulting services for the preparation of design or technical specifications of the works that are the subject of the bid; or

3.3.2. have controlling shareholders in common; or

3.3.3. receive or have received any direct or indirect subsidy from any of them; or

3.3.4. have the same legal representative for purposes of this Bid; or

3.3.5. have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another bidder, or influence the decisions of the Procuring agency/Employer regarding this Bidding process; or

3.3.6. Submit more than one bid in this bidding process.

3.4. A Bidder may be ineligible if –

3.4.1. he is declared bankrupt or, in the case of company or firm, insolvent;

3.4.2. payments in favor of the bidder is suspended in accordance with the judgment of a court of law other than a judgment declaring bankruptcy and resulting (in accordance with the national laws) in the total or partial loss of the right to administer and dispose of its property;

3.4.3. the bidder is convicted, by a final judgment of a Court of Law or relevant Professional Statuary Body, of any offence involving professional conduct;

3.4.4. The bidder is debarred/ blacklisted by a national level Procuring agency/Employer and hence debarred due to involvement in corrupt and fraudulent practices, or performance failure or due to breach of bid securing declaration.

3.5. As and when required, bidders shall provide to the Procuring agency/Employer evidence of their eligibility, proof of compliance with the necessary legal requirements to carry out the contract effectively.

3.6. Bidders shall submit proposal relating to the nature, conditions and modalities of sub-contracting wherever the sub-contracting of any elements of the contract is envisaged.

4. **Eligible Material and Equipment**

4.1. All the material and equipment to be mobilized under the contract shall have their origin in eligible source countries, and all expenditures made under the contract will be limited to such materials and equipment. For this purpose, ineligible countries are stated in the section-IV titled as “Eligible Countries”.

B. BIDDING DOCUMENTS

5. **Contents of Bidding Documents**

5.1. The scope of Works, bidding procedures, and terms and conditions of the contract are prescribed in the bidding documents. In addition to the Invitation for Bids, the bidding documents which should be read in

conjunction with any addenda issued in accordance with ITB 7.1 include:

i. Section I -Invitation for Bids

ii. Section II Instructions to Bidders (ITBs)

iii. Section III Bid Data Sheet (BDS)

iv. Section IV Eligible Countries

v. Section V Evaluation and Qualification Criteria

vi. Section VI Works Requirements Technical Specifications & Schedule of Requirements

vii. Section VII Standard Bidding Forms

viii. Section VIII General Conditions of Contract (GCC)

ix. Section IX Particular Conditions of Contract (PCC)

x. Section X Contract Forms

5.2. The bidder is expected to examine all instructions, forms, specifications, terms and conditions prescribed in the bidding documents. Failure to furnish all the information required in the bidding documents will be at the bidder's risk and may result in the rejection of his bid.

6. **Clarification of Bidding Document, Pre-bid Meeting**

6.1. A prospective bidder requiring any clarification of the bidding document may notify the Procuring agency/Employer through **EPADS v2.0**.

6.2. The Procuring agency/Employer shall respond to the request for clarification in accordance with the Public Procurement Rules 2004, Rule No.31 i.e. **Clarification of bids**.

6.3. Should the Procuring Agency deem it necessary to amend the BIDDING document as a result of a clarification, it shall do so following the procedure under **ITB 7**.

6.4. If indicated in the **BDS**, the bidder's designated representative is invited at the bidder's cost to attend a pre-bid meeting at the place, date and time mentioned in the BDS. During this pre-bid meeting, prospective bidders may request clarification of the schedule of requirement, the evaluation criteria or any other aspects of the bidding documents.

6.5. Minutes of the pre-bid meeting, if applicable, including the text of the questions asked by bidders, including those during the meeting (without identifying the source) and the responses given, together with any responses prepared after the meeting will be uploaded on **EPADS v2.0**. Any modification to the bidding documents that may become necessary as a result of the pre-bid meeting shall be made by the Procuring agency/Employer exclusively through the use of an Addendum pursuant to **ITB 7**. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

6.6. The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the bidder's own expense.

6.7. The bidder and any of its authorized personnel will be granted permission by the Procuring agency/Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the bidder and its personnel will release and indemnify the Procuring agency/Employer from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.

7. **Amendment of Bidding Documents**

7.1. The procuring agency may issue notification of any change, addition, modification or deletion in accordance with the PP Rules 2004, rule no. 23 i.e. **Bidding Documents**.

7.2. To give prospective bidders reasonable time in which to take an addendum/corrigendum into account in preparing their bids, the Procuring

agency/Employer may, at its discretion, extend the deadline for the submission of bids:

Provided that the Procuring agency/Employer shall extend the deadline for submission of bid in pursuance of PP Rules 2004, rule no. 27 i.e. ***Extension of time for submission of bids****, if such an addendum is issued within last three (03) days of the bid submission deadline.*

C. PREPARATION OF BIDS

8. Language of Bid

8.1. The bid prepared by the bidder, as well as all correspondence and documents relating to the bid exchanged by the bidder and the Procuring agency/Employer shall be written in the English language unless specified in the **BDS**. Supporting documents and printed literature furnished by the bidder may be in another language provided they are accompanied by an accurate translation of the relevant pages in the English language unless specified in the **BDS**, in which case, for purposes of interpretation of the bidder, the translation shall govern.

9. **Documents Constituting the Bids**

9.1. The Bids prepared by the Bidder shall constitute of all the documents required in the **BDS**.

10. **Documents Establishing Eligibility of Material, Equipment and Works, their Conformity to Bidding Documents**

10.1. The bid prepared by the bidder shall constitute the following components: -

10.1.1. Documentary evidence established in accordance with **ITB 10** that the material and equipment to be utilized by the Bidder for the executions of works are eligible material and equipment and conform to the Bidding Documents;

10.1.2. Documentary evidence established in accordance with **ITB 11** that the bidder has been authorized to carry out the Construction works;

10.1.3. Documentary evidence established in accordance with **ITB 11** that the bidder is eligible and/or qualified for the subject bidding process;

10.1.4. Form of Bid and Bid Prices completed in accordance with **ITB 12** and **13**;

10.1.5. Completed schedules as required, including priced Bill of Quantities in accordance with **ITB 13**.

10.1.6. Technical Proposal completed in all aspects in accordance with **ITB-15**.

10.1.7. Bid security or Bid Securing Declaration furnished in accordance with **ITB 17**;

10.1.8. Any other document required in the **BDS**.

10.2. In addition to the requirements, bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all members and submitted with the bid, together with a copy of the proposed Agreement.

10.3. The bidder shall furnish, as part of its bid, all those documents establishing the eligibility in conformity to the terms and conditions specified in the bidding documents for all material, equipment and works which the bidder proposes to execute.

10.4. The documentary evidence of conformity of the material, equipment and works to the Bidding Documents may be in the form of literature, drawings, and data, and shall consist of:

10.4.1. a detailed description of the work methodology, approach, schedule and resources to be mobilized at site;

10.4.2. an item-by-item commentary on the Procuring agency/Employer's Technical Specifications demonstrating substantial responsiveness of the material, equipment and works to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications;

10.4.3. any other procurement specific documentation requirement as stated in the **BDS**.

10.5. The required documents and other accompanying documents must be in English. In case any other language than English is used the pertinent translation into English shall be attached to the original version.

11. **Documents Establishing Eligibility and Qualification of the Bidder**

11.1. The bidder shall furnish, as part of its bid, all those documents establishing the bidder's eligibility to participate in the bidding process and/or its qualification to perform the contract if its bid is accepted.

11.2. The documentary evidence of the bidder's eligibility to bid shall establish to the satisfaction of the Procuring agency/Employer that the bidder, at the time of submission of its bid, is from an eligible country as defined in Section-IV titled as "Eligible Countries".

11.3. The documentary evidence of the bidder's qualification to perform the contract if its bid is accepted shall establish to the satisfaction of Procuring agency/Employer that:

11.3.1. The bidder has the financial and technical capability necessary to perform the Contract, meets the qualification criteria specified in Section-V, Evaluation and Qualification Criteria and **BDS**.

11.3.2. In the case of a bidder not doing business within Pakistan, the bidder is or will be (if awarded the contract) represented by a local bidder (Joint Venture) in accordance with the PEC works bylaws, and in case of award of works such foreign firm is required to participate in the execution of works to carry out its obligations as prescribed in the Conditions of Contract and /or Technical Specifications.

11.3.3. That the bidder meets the qualification criteria listed in Section-V, Evaluation and Qualification Criteria and **BDS**.

12. **Forms of Bid**

12.1. The Bidder shall fill the Form of Bids furnished in the bidding documents. The Bids Form must be completed without any alterations to its format and no substitute shall be accepted.

13. **Bid Prices**

13.1. The bid prices quoted by the bidder in the Standard bid Forms, Bill of Quantities and in the Price Schedules shall conform to the requirements specified below or exclusively mentioned hereafter in the bidding documents.

13.2. The bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. If a Price Schedule shows items listed but not priced, their prices shall be construed to be included in the prices of other items in the Bill of Quantities and will not be paid for separately by the Procuring agency/Employer.

13.3. Items not listed in the Price Schedule shall be assumed not to be included in the bid, and provided that the bid is still substantially responsive in their absence or due to their nominal nature, the corresponding average price of the respective item(s) of the remaining substantially responsive bidder(s) shall be construed to be the price of those missing item(s):
Provided that:

13.3.1. where there is only one (substantially) responsive bidder, or

13.3.2. where there is provision for alternate proposals and the respective items are not listed in the other bids,

The Procuring agency/Employer may fix the price of missing items in accordance with market survey, and the same shall be considered as final price.

13.4. The Bid price to be quoted in the Form of Bid in accordance with ITB 12 shall be the total price of the bid.

13.5. Unless otherwise specified in the **BDS** and the Contract, the rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract.

13.6. If so specified in ITB 1.1, bids may be invited for individual lots (contracts) or for any combination of lots (packages).

13.7. Prices quoted by the Bidder shall be fixed during the bidder's performance of the contract and not subject to variation on any account. A bid submitted with an adjustable price will be treated as non-responsive and shall be rejected, pursuant to **ITB 27**, unless otherwise price adjustment is permissible under Conditions of the Contract.

13.8. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date twenty-eight (28) days prior to the deadline for submission of bids, shall be included in the rates and prices and the total bid price submitted by the bidder.

14. **Currencies of Bid and Payment**

14.1. Prices shall be quoted in Pakistani Rupees unless otherwise specified in the **BDS**. Comparison of bids and tie of bid shall be treated in accordance with the PP rules 2004, rule no. 30.

15. **Documents Comprising the Technical Proposal**

15.1. The bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section VII – Standard Bid Forms, in sufficient detail to demonstrate the adequacy of the bidder's proposal to meet the work requirements and the completion time.

16. **Bid Validity Period**

16.1. Bids shall remain valid for the period specified in the BDS after the bid submission deadline prescribed by the Procuring agency/Employer. A bid valid for a shorter period shall be rejected by the Procuring agency/Employer as non-responsive. The period of bid validity will be determined from the complementary bid securing instrument i.e. the expiry period of bid security or bid securing declaration as the case may be.

16.2. Under exceptional circumstances, prior to the expiration of the initial Bids/Bid validity period, the Procuring Agency may request the Bidders' consent to an extension of the period of validity of their Bids/Bid. Such request for extension of the period of bid validity shall be carried out in accordance with the PP rules 2004, rule no. 26 i.e. Bid Validity.

17. **Bid Security or Bid Securing Declaration**

17.1. Pursuant to ITB 11.1 unless otherwise specified in the BDS, the bidder shall furnish as part of its bid, a Bid Security in accordance with the PP Rules 2004, rule no. 25 in the amount and currency specified in the BDS or Bid Securing Declaration as specified in the BDS in the format provided in Section VII (Standard Bidding Forms).
In case Procuring agency/Employer is inviting bids in lots / packages, the bidder shall be required to submit his bid security against the respective lot/ package for which he is submitting his bid.
Until the development of functionality of auto verification of financial instrument in **EPADS v2.0**, the scanned copy of bid security or bid securing declaration, as the case may be, shall be uploaded on **EPADS v2.0** whereas the original instrument to be submitted to the procuring agency before closing of bid submission deadline,

17.2. The Bid Security shall be denominated in the local currency or in another freely convertible currency, and it shall be in the form specified in the BDS which shall be in any of the following:

17.2.1. A bank guarantee, an irrevocable letter of credit issued by a Scheduled bank in the form provided in the Bidding Documents or another form acceptable to the Procuring agency/Employer and valid for twenty-

eight (28) days beyond the end of the validity of the Bid. This shall also apply if the period for Bid Validity is extended. In either case, the form must include the complete name of the bidder;

17.2.2. A cashier's or certified cheque; or

17.2.3. Another security as indicated in the **BDS**.

17.3. The Bid Security or Bid Securing Declaration shall be in accordance with the Form of the Bid Security or Bid Securing Declaration included in Section VII (Standard Bidding Forms) or another form approved by the Procuring agency/Employer prior to the bid submission.

17.4. The Bid Security shall be payable promptly upon written demand by the Procuring agency/Employer in case any of the conditions listed in **ITB 17.9** are invoked.

17.5. Any bid not accompanied by a Bid Security or Bid Securing Declaration in accordance with **ITB 17.1 or 17.3** shall be rejected by the Procuring agency/Employer and shall be declared as non-responsive bid, pursuant to **ITB 27**.

17.6. Unsuccessful bidders' Bid Security will be discharged or returned as promptly as possible, however in no case later than thirty (30) days after the expiration of the period of Bid Validity prescribed by the Procuring agency/Employer pursuant to **ITB 16**. The Procuring agency/Employer shall make no claim to the amount of the Bid Security, and shall promptly return the Bid Security document, after whichever of the following that occurs earliest:

17.6.1. The expiry of the Bid Security;

17.6.2. The entry into force of a procurement contract and the provision of a performance security (or guarantee), for the performance of the contract if such a security (or guarantee), is required by the Biding documents;

17.6.3. The rejection by the Procuring agency/Employer of all Bids;

17.6.4. The withdrawal of the bid prior to the deadline for the submission of bids, unless the biding documents stipulate that no such withdrawal is permitted.

17.7. The successful bidder's Bid Security will be discharged upon the bidder signing the contract pursuant to **ITB 40**, or furnishing the performance security (or guarantee), pursuant to **ITB 41**.

17.8. The Bid Security may be forfeited or the Bid Securing Declaration executed:
if a Bidder:

17.8.1. Withdraws its Bid during the period of Bid Validity as specified by the Procuring agency/Employer, and referred by the bidder on the Form of Bid except as provided for in ITB 16.2; or

17.8.2. In the case of a successful bidder, if the bidder fails:

17.8.2.1. to sign the contract in accordance with ITB 40; or

17.8.2.2. to furnish performance security (or guarantee) in accordance with ITB 41.

17.9. In case of Bid Security issued by the foreign bank is allowed by the Procuring agency/Employer, the same should be counter guaranteed by a corresponding bank in Pakistan. Furthermore, in case of joint venture, it should be in the name of Joint venture to ensure joint responsibility. In case the JV is not legally constituted at the time of bid submission, the bid security or bid securing declaration shall be in the names of all future members as named in the letter of bid.

18. **Withdrawal of Bids**

18.1. Before bid submission deadline, any bidder may withdraw, substitute, or modify its bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and the corresponding must accompany the respective written notice.

19. **Format and Signing of Bid**

19.1. The Bidder shall prepare and submit Bids through EPADS with due diligence after carefully reading all the terms and condition before bid submission deadline.

D. SUBMISSION OF BIDS

20. **Submission of Bids**

20.1. All bids shall be submitted through **EPADS v2.0**.

21. **Deadline for Submission of Bids**

21.1. All bids shall be received through **EPADS v2.0** not later than bid submission deadline as specified in the **BDS**.

21.2. The Procuring agency/Employer may, under exceptional circumstances and at its discretion, extend the deadline for the submission of bids, pursuant to PP Rules 2025, rule no.39 Extension of Time for submission of bid, by amending the Bidding Documents in accordance with ITB 7, in which case all rights and obligations of the Procuring agency/Employer and bidders previously subject to the deadline will thereafter be subject to the new deadline.

22. **Substitution and Modification of bids**

22.1. A bidder may substitute or modify his bid after it has been submitted, provided that written notice of the substitution or modification of the bid, is received by the Procuring agency/Employer prior to the deadline for submission of bids.

22.2. Revised bid may be submitted after the substitution or modification made in the original bid in accordance with the provisions referred in ITB 18.

E. OPENING AND EVALUATION OF BIDS

23. **Opening of Bids**

23.1. The Procuring Agency will open bids in accordance with the PP rules 2004, rule no 28 and as specified in the **BDS**.

24. **Confidentiality**

24.1. Information relating to the examination, clarification, evaluation and comparison of bids and recommendation of contract award shall not be disclosed to bidders or any other persons not officially concerned with such process until the time of the announcement of the respective evaluation report.

25. **Clarification of Bids**

25.1. Clarification of Bidding Documents shall be carried out in accordance with the PP Rules 2025, rule no 38 i.e. Clarifications.

25.2. The alteration or modification in the bid which in any case affect the following parameters will be considered as a change in the substance of a bid:

25.2.1. evaluation & qualification criteria;

25.2.2. required scope of work;

25.2.3. contract price;

25.2.4. all securities requirements;

25.2.5. tax requirements;

25.2.6. terms and conditions of bidding documents.

25.2.7. change in the ranking of the bidder

26. **Preliminary Examination of Bids**

26.1. Prior to the detailed evaluation of bids, the Procuring agency/Employer will determine whether each bid:

26.1.1. meets the eligibility criteria defined in ITB 3 and ITB 4;

26.1.2. has been prepared as per the format and contents defined by the Procuring agency/Employer in the bidding documents;

26.1.3. has been properly signed;

26.1.4. is accompanied by the required securities; and

26.1.5. is substantially responsive to the requirements of the bidding documents.

The Procuring agency/Employer's determination of a bid's substantial responsiveness will be based on the contents of the bid itself.

26.2. A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding Documents, without material deviation or reservation. A material deviation or reservation is one that: -

26.2.1. affects in any substantial way the scope, quality, or performance of the Works;

26.2.2. limits in any substantial way, inconsistent with the bidding documents, the Procuring agency/Employer's rights or the bidders' obligations under the Contract; or

26.2.3. if rectified, would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

26.3. The Procuring agency/Employer will confirm that the documents and information specified under ITB 9, 10 and 11 have been provided in the bid. If any of these documents or information is missing, or is not provided in accordance with the Instructions to Bidders, the bid shall be rejected.

26.4. The Procuring agency/Employer may waive-off any minor informality, nonconformity, or irregularity in a bid which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Bidder.

Explanation: A minor informality, non-conformity or irregularity is one that is merely a matter of form and not of substance. It also pertains to some

immaterial defect in a Bid or variation of a bid from the exact requirements of the invitation that can be corrected or waived without being prejudicial to other bidders. The defect or variation is immaterial when the effect on quantity, quality, or delivery is negligible when contrasted with the total cost or scope of the works. The Procuring agency/Employer either shall give the bidder an opportunity to cure any deficiency resulting from a minor informality or irregularity in a bid or waive the deficiency, whichever is advantageous to the Procuring agency/Employer. Examples of minor informalities or irregularities include failure of a bidder to –

26.4.1. Submit the number of copies of signed bids required by the invitation;

26.4.2. Furnish required information concerning the number of its employees;

26.4.3. the firm submitting a bid has formally adopted or authorized, before the date set for opening of bids, the execution of documents by typewritten, printed, or stamped signature and submits evidence of such authorization and the bid carries such a signature.

26.5. Provided that a Technical Bid is substantially responsive, the Procuring agency/Employer may request the bidder to submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any such aspect of the technical Proposal linked with the ranking of the bidders. Failure of the bidder to comply with the request may result in the rejection of its bid.

26.6. Provided that a Technical Bid is substantially responsive, the Procuring agency/Employer shall rectify quantifiable nonmaterial nonconformities or omissions related to the Financial Proposal. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of the missing or nonconforming item or component.

26.7. If a bid is not substantially responsive, it will be rejected by the Procuring agency/Employer and may not subsequently be evaluated for

complete technical responsiveness.

27. **Examination of Terms and Conditions; Technical Evaluation**

27.1. The Procuring agency/Employer shall examine the bid to confirm that all terms and conditions specified in the GCC and the PCC have been accepted by the bidder without any material deviation or reservation.
For this purpose:
"**Deviation**" means departure from the requirements specified in the Bidding Document.
"**Reservation**" means setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document.

27.2. The Procuring agency/Employer shall evaluate the technical aspects of the bid submitted in accordance with ITB 30, to confirm that all requirements specified in Section VI – Works Requirement, Technical Specifications of the Bidding Documents have been met without material deviation or reservation.

27.3. If after the examination of the terms and conditions and the technical evaluation, the Procuring agency/Employer determines that the bid is not substantially responsive in accordance with ITB 27, it shall reject the bid.

28. **Correction of Arithmetic Errors**

28.1. Bids determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows: -

28.1.1. if there is a discrepancy between unit prices and the sub-total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the sub-total price shall be corrected, unless in the opinion of the Procuring agency/Employer there is an obvious misplacement of the decimal point in the unit price, in which the total price as quoted shall govern and the unit price shall be corrected;

28.1.2. if there is an error in a total corresponding to the addition or subtraction of sub-totals, the sub-totals shall prevail, and the total shall be corrected; and

28.1.3. where there is a discrepancy between the amounts in figures and in words, the amount in words will govern.

28.1.4. Where there is discrepancy between grand total of price schedule and amount mentioned on the Form of Bid, the amount referred in Price Schedule shall be treated as correct subject to elimination of other errors.

28.2. The amount stated in the Bid will, be rectified by the Procuring agency/Employer in accordance with the above procedure for the correction of errors and, with, the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount, its bid shall be rejected after forfeiture of Bid Security or execution of the Bid Securing Declaration, as the case may be, in accordance with ITB 41.3.

29. **Conversion to Single Currency**

29.1. The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees. A bidder expecting to incur expenditures in other currencies for inputs to the Works from outside the Procuring agency/Employer's country (referred to as the "Foreign Currency Requirements") shall indicate the same in the letter of bid-financial proposal. The proportion of the Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements either (i) entirely in the currency of the Bidder's home country or, (ii) at the bidder's option, entirely in Pak rupees provided always that a bidder expecting to incur expenditures in a currency or currencies other than those stated in (i) and (ii) above for a portion of the foreign currency requirements, and wishing to be paid accordingly, shall indicate the respective portions in his bid. Comparison of bids quoted in different currencies and conversion of bids into a single currency shall be carried out in accordance with the PP Rule 2004, rule no. 30 (2).

30. **Evaluation of Bids**

30.1. The Procuring agency/Employer shall evaluate and compare only the bids determined to be substantially responsive, pursuant to ITB 27.

30.2. In evaluating the Technical Proposal of each Bid, the Procuring agency/Employer shall use the criteria and methodologies listed in the BDS and in terms of works requirement. No other evaluation criteria or methodologies shall be permitted.

30.3. The Procuring agency/Employer's evaluation of a bid will take into account:

30.3.1. the bid price, excluding provisional sums and the provision, if any, for contingencies in the summary bill of quantities, but including day work items, where priced competitively;

30.3.2. converting the amount resulting from applying above, if relevant, to a single currency in accordance with ITB 29;

30.4. The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.

30.5. If these bidding documents allow bidders to quote separate prices for different lots, and the award to a single bidder of multiple lots, the methodology of evaluation to determine the lowest evaluated lot combinations in the Form of Bid, is specified in the BDS.

30.6. If the bid, which results in the Evaluated Bid Price (Successful Bid), is seriously unbalanced or front loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

Explanation:

“Unbalanced” or “front-loaded” bids consist of deliberately submitting bids with artificially high prices or unit rates for the early stages of a construction project, offset by artificially low prices or unit rates for the later stages of the project, to improve the contractor’s cash flow.

31. **Domestic Preference**

31.1. If the BDS so specifies, the Procuring agency/Employer will grant a margin of preference to the domestic contractor in line with the rules, regulations, regulatory guides or instructions issued by the Authority from time to time.

32. **Determination of Successful Bid**

32.1. The Procuring agency/Employer shall compare the evaluated bids in accordance with the predefined bidding procedure, of all substantially responsive bids to determine the Successful bidder.

33. **Qualification of Bidder**

33.1. The Procuring agency/Employer shall determine to its satisfaction whether the bidder is substantially responsive and whose bid is declared as Successful bid either continues to meet (if prequalification applies) or meets (if post-qualification applies) the qualifying criteria specified in Evaluation and Qualification Criteria.
Note: In case of international bidding, the parameters for incorporation or licensing within Pakistan may be fulfilled as part of post qualification.

33.2. The determination shall be based upon an examination of the documentary evidence of the bidder’s qualifications submitted by the bidder, pursuant to ITB 11.

33.3. Prior to contract award, the Procuring agency/Employer will verify that the successful bidder (including each member of a JV) is not blacklisted/debarred. The Procuring agency/Employer will conduct the same verification for each sub-contractor proposed by the successful bidder.

34. **Sub-Contractors**

34.1. The bidder shall provide details regarding any specialized sub-contractor to the Procuring agency/Employer. In case change of sub-contractors, the bidder shall promptly notify the Procuring agency/Employer and obtain approval for replacement of sub-contractors.

34.2. Bidders may propose sub-contracting up to the percentage of total value of contracts or the volume of works as specified in the BDS.

35. **Abnormally Low Financial Bid**

35.1. A procuring Agency may reject abnormally low bids in accordance with the PP Rules 2025 rule no. 43. The decision of the Procuring agency/Employer to reject a bid and reasons for the decision shall be recorded in the procurement proceedings and promptly communicated to the bidder concerned. Moreover, the Procuring agency/Employer shall not incur any liability solely by rejecting abnormally bid

Guidance for Procuring agency/Employer:

An abnormally low bid means, in the light of the Procuring agency/Employer's estimate and of all the bids submitted, the bid appears to be abnormally low by not providing a margin for normal levels of profit. In order to identify the Abnormally Low Bid (ALB) following approaches can be considered to minimize the scope of subjectivity:

35.1.1. Comparing the bid price with the cost estimate;

35.1.2. Comparing the bid price with the bids offered by other bidders submitting substantially responsive bids; and

35.1.3. Comparing the bid price with prices paid in similar contracts in the recent past either government- or development partner-funded.

35.2. The Procuring agency/Employer will determine to its satisfaction whether the bidder that is selected as having submitted the successful bid is qualified to perform the contract satisfactorily, in accordance with the criteria listed in ITB 11

35.3. The determination will take into account the bidder's financial and technical capabilities. It will be based upon an examination of the

documentary evidence of the bidder's qualifications submitted by the bidder, pursuant to ITB 11, as well as such other information as the Procuring agency/Employer deems necessary and appropriate. Factors not included in these bidding documents shall not be used in the evaluation of the bidders' qualifications.

35.4. Procuring agency/Employer may seek "Certificate for Independent Price Determination" from the bidder and the results of reference checks may be used in determining award of contract.
Explanation: *The Certificate shall be furnished by the bidder. The bidder shall certify that the price is determined keeping in view of all the essential aspects such as raw material, its processing, value addition, optimization of resources due to economy of scale, transportation, insurance and margin of profit etc.*

35.5. An affirmative determination will be a prerequisite for award of the contract to the bidder. A negative determination will result in rejection of the bidder's bid, in which event the Procuring agency/Employer will proceed to the next ranked bidder to make a similar determination of that bidder's capabilities to perform satisfactorily.

F. AWARD OF CONTRACT

36. **Criteria of Award**

36.1. Subject to ITB 36 and 37, the Procuring agency/Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has been declared as Successful Bidder, provided that such bidder has been determined to be:

36.1.1. eligible in accordance with the provisions of ITB 3;

36.1.2. is determined to be qualified to perform the Contract satisfactorily; and

36.1.3. Successful negotiations have been concluded, if any.

37. **Negotiations**

37.1. The Committee of the Procuring agency/Employer may negotiate with the Most Advantageous Bidder relating to the following areas:

37.1.1. a minor alteration to the technical (drawings, design technical specifications) details of the statement of works;

37.1.2. Methodology, work plan, staffing in view to streamline the work;

37.1.3. a minor amendment to the Particular conditions of Contract;

37.1.4. finalizing payment arrangements;

37.1.5. clarifying details that were not apparent or could not be finalized at the time of Bidding;

37.2. Where negotiation fails to result into an agreement, the Procuring agency/Employer may invite the next ranked bidder for negotiations. Where negotiations are commenced with the next ranked bidder, the Procuring agency/Employer shall not reopen earlier negotiations.

38. **Procuring agency/Employer's Right to reject All Bids**

38.1. The procuring agency has the right to reject all bids in accordance with the PP Rules 2025 rule no. 45. However, the Authority (i.e. PPRA) may call from the Procuring agency/Employer the justification of those grounds.

39. **Notification of Award**

39.1. The procuring agency shall announce and publish the evaluation result in accordance with the PP Rules 2004, rule no. 40.

39.2. Where no complaints have been lodged, the bidder whose bid has been accepted will be notified of the award by the Procuring agency/Employer prior to expiration of the bid validity period through EPADS. However, the Procuring agency/Employer shall not award any procurement contract at least for five (05) days after the announcement of final evaluation report. The notification letter (herein after and in the condition of the contract and contract form called "Letter of Acceptance"

will specify the sum that the Procuring agency/Employer will pay the successful bidder in consideration for the execution and completion of the works as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price).

39.3. The notification of award will constitute the formation of the Contract, subject to the bidder furnishing the Performance Security (or guarantee) in accordance with ITB 41 and signing of the contract in accordance with ITB 40.

39.4. Upon the successful bidder’s furnishing of the performance security (or guarantee) pursuant to ITB 41, the Procuring agency/Employer will promptly notify each unsuccessful bidder, the name of the successful bidder and the Contract amount and will discharge the Bid Security or Bid Securing Declaration of the bidder(s) pursuant to ITB 17.

40. **Signing of Contract**

40.1. Promptly after notification of award, Procuring agency/Employer shall send the successful bidder the draft agreement, incorporating all terms and conditions as agreed by the parties to the contract.

40.2. Immediately after the Redressal of grievance by the GRC, and after fulfillment of all conditions precedent of the Contract Form, the successful bidder and the Procuring agency/Employer shall sign the contract.

40.3. Where no formal signing of a contract is required, work order issued to the bidder shall be construed to be the contract.

41. **Performance Security (or Guarantee)**

41.1. After the receipt of the Letter of Acceptance, the successful bidder, within the specified time, shall deliver to the Procuring agency/Employer a Performance Guarantee in the amount and in the form stipulated in the BDS and PCC, denominated in the type and proportions of currencies in the Letter of Acceptance and in accordance with the Conditions of Contract.

41.2. If the Performance Guarantee is provided by the successful bidder and it shall be in the form specified in the BDS which shall be in any of the

following:

41.2.1. certified cheque, cashier’s or manager’s cheque, or bank draft;

41.2.2. irrevocable letter of credit issued by a scheduled bank of Pakistan or in the case of an irrevocable letter of credit issued by a foreign bank, the letter shall be confirmed or authenticated by a scheduled bank of Pakistan;

41.2.3. bank guarantee confirmed by a reputable local bank or, in the case of a successful foreign bidder, bonded by a foreign bank; or

41.2.4. surety bond callable upon demand issued by any reputable surety or insurance company.
Any Performance Guarantee submitted shall be enforceable in Pakistan.

41.3. Failure of the Most Advantageous Bidder to comply with the requirement of ITB 40 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security or declare blacklisted (in case bid securing declaration is submitted) in which event the Procuring agency/Employer may make the award to the next most advantageous bidder or reinitiate the procurement process afresh (as a case may be).

42. **Advance Payment**

42.1. Advance payment will be provided to the bidder in percentage and in the manner as agreed by the both parties in terms of Conditions of the Contract.

42.2. The Procuring agency/Employer will provide an advance payment as stipulated in the Conditions of Contract, subject to a maximum amount, as stated and/or Conditions of the Contract. The advance payment request shall be accompanied by an advance payment security (guarantee) in the form provided in Section X. For the purpose of receiving the advance payment, the bidder shall make and estimate of, and include in its bid, the expenses that will relate to the purchase of equipment, machinery, materials, and on the engagement of labor during the first month beginning with the date of the Procuring agency/Employer’s “Notice to Commence” as specified in the PCC.

43. **General Performance of the Bidders**

43.1. The Procuring agency/Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts / works. The Procuring agency/Employer may seek information / report from the previous employer for consideration. However, the Procuring agency/Employer shall incorporate such parameters in the evaluation criteria and accordingly decide the fate of the bid submitted.

44. **Corrupt & Fraudulent Practices**

44.1. Procuring agencies (including beneficiaries of Government funded projects and procurement) as well as Bidders/Suppliers/Contractors under Government financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts, and will avoid to engage in any corrupt and fraudulent practices.

G. GRIEVANCE REDRESSAL & COMPLAINT REVIEW MECHANISM

45. Grievance Redressal

45.1. Grievance Redressal shall be carried out in accordance with the PP Rules 2025, rule no. 65 i.e. Redressal of grievances by the procuring agency and “Redressal of Grievances Regulations 2021”.

H. MECHANISM OF BLACKLISTING

46. Mechanism of Blacklisting

46.1. The Procuring agency/Employer shall proceed Blacklisting of Bidders/Contractors in accordance with PP Rules 2025, rule no.25 i.e. Blacklisting and “Blacklisting and Debarment of Bidders or Contractors Regulations 2024.

Bid Data Sheet

Bid Data Sheet (BDS)

The following specific data for the procurement of works shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITBs). Whenever there is a conflict, the provisions herein shall prevail over those in ITBs.

A. Introduction

ITB Number
Amendments of, and Supplements to, Clauses in the Instruction to Bidders

ITB Number1.1

Name of Procuring agency/Employer: **Securities & Exchange Commission of Pakistan (SECP)**

The subject of procurement is: **Construction of SECP Head Office Building Mauve Area G-11 Islamabad (Package -2A Architecture, Electrical & Plumbing Works)**

Period for completion of the works **660 Days**

Commencement date execution of the works: **14 Days**

Type of Procurement**:Local**

ITB Number2.1

Financial year for the operations of the Procuring agency/Employer: **2026-27**
Name of Project [insert: name and summary description of the Project if any]

Name of financing institution: [insert: name if any]

Name and identification number of the Contract: **P78769**

ITB Number3.1

JV/Consortium or Association Allowed: **No**

Maximum number of members in the joint venture shall be: **Nil**.

B. Bidding Documents

ITB Number6.4

The Bidders may seek clarifications through **EPADS v2.0**: **Last Clarification Date: Sunday, November 1, 2026**
Pre-Bid Meeting: Wednesday, October 14, 2026 10:30 AM
Meeting Link: https://us02web.zoom.us/j/83449014477?pwd=1lOu75k3rU2iczlOSuV2IkXrZtxnlB.1

C. Preparation of Bids

ITB Number8.1

The Language of all correspondences and documents related to the Bid is: **English**

ITB Number 5.1 & 9.1

The following documentsmust be includedto constitute the Bid

1. 1. Conditions of the Contract (CoC)
2. 2. Specifications (Architectural Works)
3. 3. Specifications (Electrical Works)
4. 4. Specifications (Plumbing Works)
5. 5. Approved Manufacturer List

ITB Number9.4 (b)

Other procurement specific documentation requirements are:

The Bidder shall download all theAnnexures, duly sign and stamp each page thereof, and upload the complete scanned copy forbid submission. Failure to comply with this requirement may declarethe bid non-responsive, in accordance with the applicable procurement Rules and the provisions of the SBD.

ITB Number12.4

The Bid price will be/will not be subject to the price adjustment **Yes**
Price Adjustment Annexure is attached in the Annexure Section with the name of Adjustment Data.

ITB Number12.6

The Bid price shall be adjusted in accordance with Schedule-A to Bid – “Schedule of Adjustment Data” if available.

ITB Number13.1

Bidders to quote entirely in**Pak rupees (PKR)**

Schedule of Adjustment Data for Local Currency (LC)

Index Code	Index Description	Source of Index	Weighting
1	Non-adjustable	---	0.76
2	Labour	FBS	0.20
3	High Speed Diesel (HSD)	PSO	0.04
	Total	PKR	1.00

ITB Number15.1

The Bid Validity period shall be **120 Days** days.

ITB Number16.1

The amount of Bid Security shall be (insert amount)

The currency of the Bid Security shall be: **PKR**.

ITB Number16.2

The Bid Security shall be in the form of:**Pay Order, Banker's Cheque, Call at Deposit, Bank Guarantee, Demand Draft**

D. Submission of Bids

ITB Number19.1

The deadline for Bid submission is:**Wednesday, November 4, 2026 11:00 AM**
Address for submission of Original Bid Security:**Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474**

ITB Number21.1
The Bid opening shall take place at:**EPADS v2.0**
Day : ***Wednesday***
Date: ***November 04, 2026***

Time : ***11:30 AM***

ITB Number27.1

The currency that shall be used for Bid evaluation and comparison purposes to convert all Bid prices expressed in various currencies is: **PKR Only**

The source of exchange rate shall be: **Nil**

The date of exchange rate shall be: **Nil**

ITB Number28.2 &28.5

Least Cost Based Selection (LCBS)

see Evaluation Criteria

ITB Number29.1

Domestic preference to apply.

Domestic preference:**Yes**

The Percentage of Domestic Preference is 100%

Preference to domestic or national suppliers or contractors shall be provided in accordance with policies of the Federal Government and/or in accordance with the regulations issued by the Authority.

If Yes, The percentage for the domestic preference alongwith calculation formula is provided in the evaluation and qualification criteria.

ITB Number32.2

Sub-contracting is allowed? : **Yes**

30% of the total value of the contract.

39.1 The Performance Security (or guarantee) shall be **10.00%**

39.2 The Performance Security (or guarantee) shall be in the form of:**Bank Guarantee**

Eligibility Criteria

Bidder's Type	Required Registration
Partnership Firm Company (Private Limited) Company (Public Limited) Company (Holding Company) Company (Limited by Guarantee) State Owned Enterprise (Private Limited) State Owned Enterprise (Public Limited)	FBR (NTN) PEC

Eligibility Criteria	Document
1. PEC Registration Certificate Valid license C-B or above Category with specialized code BC03	Yes
2. Audited Financial Statements Last 3 FYs i.e. 2024-25, 2023-24 & 2022-23	Yes
3. Tax Returns of Company Last 3 TYs i.e. 2024-25, 2023-24 & 2022-23	Yes
4. Affidavit on Blacklisting from any Agency on Notarized Rs.100 Stamp Paper	Yes
5. Declaration of Compliance for Ultimate Beneficial Ownership	Yes

Evaluation Criteria

Least Cost Based Selection (LCBS)

Weightage

Technical Evaluation %
100

Technical Marks	100
Passing Marks	70
Projects (at least 500 Million) of similar nature and complexity (Architectural/Finishing works, Electrical & ELV Works, Plumbing works) substantially completed (in min. 05 Floors building) over the last 10 years as main contractor. (20 Marks)	
Bidders shall fill Proforma attached as Annexure 3.1 (i) providing documentary evidences (contract agreement / letter of award / work order must for Public Projects, BOQ/scope of work, physical progress checks, and banking transactions for private projects) mentioned therein, failing which shall result in zero marks. The adjusted value shall be considered for qualification purposes on the basis of inflation indices or cost escalation factors notified by the PC or any other officially notified index. In addition, access for physical verification of the projects may be provided as & when required. Every high end finishing project of diff worth (adjusted) shall be evaluated as following: i - Above Rs. 1.5 Billion = 5 marks ii - Above 1.2 Billion & Upto Rs. 1.50 Billion = 4 Marks iii - Above 900 Million & Upto 1.2 Billion = 3 Marks iv - Above 700 Million & Upto 900 Million = 2 Marks v - Above 500 Million & 700 Million = 1 Mark Projects having financial value less than 500 Million shall not be considered for evaluation (Qualitative)(Doc Required)	20

Projects (at least 500 Million) of similar nature and complexity (Architectural/Finishing works, Electrical & ELV Works, Plumbing works) at least 15% completed (in min. 05 Floors building) over the last 5 years as main contractor. (20 Marks). Bidders shall fill Proforma for in Hand Projects attached as Annexure 3.1 (ii) providing documentary evidences (contract agreement / letter of award / work order must for Public Projects, BOQ/scope of work, physical progress checks, and banking transactions for private projects) mentioned therein, failing which shall result in zero marks. The adjusted value shall be considered for qualification purposes on the basis of inflation indices or cost escalation factors notified by the PC or any other officially notified index. In addition, access for physical verification of the projects may be provided as & when required. Every high end finishing project of diff worth (adjusted) shall be evaluated as following: i - Above Rs. 1.5 Billion = 5 marks ii - Above 1.2 Billion & Upto Rs. 1.50 Billion = 4 Marks iii - Above 900 Million & Upto 1.2 Billion = 3 Marks iv - Above 700 Million & Upto 900 Million = 2 Marks v - Above 500 Million & 700 Million = 1 Mark Projects having financial value less than 500 Million shall not be considered for evaluation (Qualitative)(Doc Required)	20
Local/Regional Experience i.e. Completed / In-Progress Project in Islamabad / Rawalpindi / Lahore Region. Relevant completed (during last 10 Years) or In-progress projects of Financial value Rs. 700 Million or above (awarded during last 3 Years) in Islamabad / Rawalpindi / Lahore region involving Architectural/ finishing, Electrical/ELV, Plumbing or similar Package-2a works. 1 project = 2 marks on the basis of project location as per agreement, work order or completion certificate (Maximum 3 Projects will be evaluated) (Qualitative)(Doc Required)	6
Local/Regional Presence i.e. Head Office/Regional in Islamabad / Rawalpindi / Lahore Region with Procurement, Project Management and Account team (09 Marks) The bidder shall provide document with office address with detail of deployed team. The employer may physically verify the office (s) and Project (s) Head Office in above mentioned location = 9 Marks Regional office in above mentioned location = 4 Marks (Qualitative)(Doc Required)	9
Financial Soundness (Max Marks = 30)	

Current Ratio (Current Assets ÷ Current Liabilities) (Below 1 will not be considered for evaluation) (Qualitative) (Doc Required) i. 1.5 or above **(3)** ii. Above 1 & Up to 1.5 **(2)**	3
Debt Equity (Total Liabilities ÷ Owner's Equity) (Qualitative)(Doc Required) Upto 1 **(4)** Above 1 and Up to 1.5 **(2)** Above 1.5 and Up to 2 **(1)**	4
Interest Cover Ratio (Profit before interest and tax ÷ Interest Expense) (Qualitative)(Doc Required) Above 1.5 **(4)** Up to 1.5 **(2)**	4
Working capital (Current Assets – Current Liabilities) (Qualitative)(Doc Required) Above 1.5 Billion **(4)** Up to 1.5. Billion **(2)**	4

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Annual Turnover (Audited Financials will be considered) (Qualitative)(Doc Required) Above Rs. 1.20 Billion **(5)** Above Rs. 900 Million and upto Rs. 1.20 Billion **(3)** Above Rs. 700 Million & upto 900 Million **(1)**	5
Overall Cash Flow (Bank balance plus credit facility – commitments towards banks/borrowings/clientele) (Bank confirmation will be obtained)) (Qualitative)(Doc Required) i. Above Rs. 3 Billion **(10)** ii. Above Rs. 2 and upto Rs. 3 Billion **(6)** iii. Above Rs. 1 & upto 2 billion **(3)**	10
Human Resource Capability & Competence (Max Marks = 08)	
Project Manager B.Sc. / B.E. (Civil Engineering) registered as Professional Engineer (PE) with PEC. ≥ 15 years overall experience with at least 5+ years managing high-rise building finishing, architectural, or MEP coordination works (1 PE = 1 marks) Between 8 to less than 15 years overall experience with at least 3+ years high-rise experience (1 PE = 0.50 marks) (Qualitative)(Doc Required)	2
Finishing / Architectural Engineer B.Sc. / B.E. (Civil / Architecture) registered (RE) with PEC. ≥ 8 years relevant experience in high-rise interior/exterior architectural finishes, dry lining, ceiling, flooring, marble/joinery, exterior development works (1 RE = 0.50 marks) Between 5 to less than 8 years relevant experience (1 RE = 0.25 marks) (Qualitative)(Doc Required)	1

MEP Coordinator / Engineer (Mechanical / Electrical) B.Sc. / B.E. (Mechanical / Electrical Engineering) Registered (RE) with PEC. ≥ 8 years relevant experience in high-rise building MEP services coordination, plumbing/fire-suppression, or electrical distribution (1.0 Mark) Between 5 to less than 8 years relevant experience (0.50 Mark) (Qualitative)(Doc Required)	1
Planning & Site Coordination Engineer B.Sc. / B.E. (Civil / Arch / Engg.) Registered (RE) with PEC. ≥ 8 years experience in project planning, scheduling (Primavera P6), site progress monitoring, and trade sequencing for multi-story buildings (1.0 Mark) Between 5 to less than 8 years relevant experience in project planning, scheduling (Primavera P6), site progress monitoring, and trade sequencing for multi-story buildings (0.50 Mark) (Qualitative) (Doc Required)	1
Associate Engineers / Supervisory Technical Staff (DAE) - 3 Nos. each trade 3-Year Diploma of Associate Engineer (DAE) in Finishes/Civil, Electrical, and/or Mechanical/Plumbing (01 Nos. each) (Qualitative)(Doc Required)	1
Quantity Surveyor - 1 No. (Qualitative)(Doc Required)	1
Specialist Finishing Supervisor DAE / Certified Technical Specialist in structural glazing, or high-end joinery/masonry, flooring/wall/ceiling finishes. ≥ 10 years relevant specialized field installation experience (1.0 Mark) Between 6 to less than 10 years relevant experience (0.50 Mark) (Qualitative)(Doc Required)	1
Equipment Sourcing Capabilities (07 Marks)	
Surveying Equipment including Total Station, Auto-Level / Multi-line 3D Green Laser Levels (Min 02 Sets) (Qualitative)(Doc Required)	1
Finishing Tools including Tile/ Marble / Stone Cutter, Grinder and Polisher, Alignment Tool with Vacuum Suction (Min 04 Sets) (Qualitative)(Doc Required)	1
Material Handling Equipment including Chain Block, Hoist / Material Lift/Tower Crane (Min 03 Sets) (Qualitative) (Doc Required)	1
Generator 100 KVA with Temporary DBs and Site Lighting (Min 02 Sets) (Qualitative)(Doc Required)	1

Electrical Testing Instruments including Insulation Tester and Earth Tester (Min 01 set) (Qualitative)(Doc Required)	1
Scaffolding / Mobile Platforms (Min 02 Sets) (Qualitative)(Doc Required)	1
Plumbing / Mechanical Testing Equipment including Pressure Gauges and Flow Meter (Min 01 Set) (Qualitative) (Doc Required)	1

Jobs/Lots

Jobs Without Lots :

Job	Delivery Schedule	Quantity	Bid Security
Package -2a Architecture, Electrical & Plumbing Works	**Address:** 63-NICL Building, Jinnah Avenue, Blue Area., Islamabad Capital Territory**Schedule:** 660 Days**Quantity:** 1/job	1/job	40000000 PKR

Items Without Lots :

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Related to Job/Lot
Construction of SECP Head Office Building Mauve Area, G-11 Islamabad. (Package-2a - Architecture, ID & External Works, Electrical & ELV and Plumbing Works)	Granite	**Address:** Project Management Unit 4th Floor, NICL Building, Jinnah Avenue051-9195437/051-9195474 **Schedule:** 660 Days **Quantity:** 1/job	1/job	PKR	Package -2a Architecture, Electrical & Plumbing Works (Job)

Work Specifications and Market Rates

Jobs Without Lots :

Job: Package -2a Architecture, Electrical & Plumbing Works

Specifications / Requirements:

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1	ARCHITECTURAL WORKS					
2	BLOCK MASONRY WORKS					
3	Providing and laying 1:3:6 cement concrete solid block masonry more than 6inches (152 mm) thick using graded screened bajri 3/4 inch (19 mm) and downgauge set in lime cement mortar 1:1:6 in foundation, basement and plinthincluding scaffolding, raking out Joints and curing etc. complete; foundationand basement masonry upto 5 feet (1.52 Ru.m.) depth and plinth upto 4 feet(1,2 Ru.m.) height from ground level .				Code # 110	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
4	Basement-4	per Cft		479.04	Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x9	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
5	Basement-3	per Cft		463.35	Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x7	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
6	Basement-2	per Cft		447.67	Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x5	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
7	Basement-1	per Cft		431.98	Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x3	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
8	Providing and laying 1:3:6 cement concrete solid block masonry more than 6inches (152 mm) thick using graded screened bajri 3/4 inch (19 mm) and down gauge set in lime cement mortar 1:1:6 including scaffolding, raking out joints and curing etc. complete in ground floor superstructure.				Code # 110	
9	Lower Ground Floor	per Cft	1450	428.74	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+	621673

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
10	Upper Ground Floor	per Cft	1950	428.74	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+	836043

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
11	Ist. Floor	per Cft	1850	452.89	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70	837846.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
12	2nd. Floor	per Cft	1700	476.98	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # 71	810866

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
13	3rd. Floor	per Cft	2350	501.08	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x2	1177538

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
14	4th. Floor	per Cft	2350	525.17	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x3	1234149.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
15	5th. Floor	per Cft	1100	549.27	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x4	604197

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
16	6th. Floor	per Cft	1100	573.36	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x5	630696

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
17	7th. Floor	per Cft	1050	597.46	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x6	627333

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
18	8th. Floor	per Cft	1050	621.55	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x7	652627.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
19	9th. Floor	per Cft	1050	645.65	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x8	677932.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
20	10th. Floor	per Cft	1050	669.74	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x9	703227

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
21	11th & 12th. Floor	per Cft	1300	693.84	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x10	901992

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
22	13th. Floor	per Cft	1050	717.94	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x11	753837

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
23	14th. Floor	per Cft	1050	742.03	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x12	779131.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
24	15th. Floor	per Cft	1050	766.13	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x13	804436.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
25	16th. Floor	per Cft	1050	790.22	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x14	829731

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
26	17th. Floor	per Cft	1050	814.32	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x15	855036

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
27	18th. Floor	per Cft	1050	838.41	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x16	880330.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
28	19th. Floor	per Cft	1200	862.51	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x17	1035012

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
29	20th. Floor	per Cft	1200	886.6	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x18	1063920

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
30	21st. Floor	per Cft	1200	910.7	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x19	1092840

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
31	22nd. Floor	per Cft	1650	934.8	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x20	1542420

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
32	Machine Room Level (23rd Floor)	per Cft	2350	958.89	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x21	2253391.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
33	Roof	per Cft	2100	982.99	Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x22	2064279

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
34	Providing and laying 1:3:6 cement concrete solid block masonry 4 inch to 6inch (102 mm to 152) thick using screened graded bajri 3/4 inch (19 mm) anddown gauge set in lime cement mortar 1:1:6 in foundation, basement and plinth including scaffolding, raking out joints and curing etc. complete;foundation and basement masonry upto 5 feet (1.52 Ru.m.) depth and plinthupto 4 feet (1.2 Ru.m.) height from ground level .				Code # 110	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
35	Basement-4	per Cft	3250	506.82	Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x9	1647165

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
36	Basement-3	per Cft	6050	491.13	Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x7	2971336.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
37	Basement-2	per Cft	3900	475.44	Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x5	1854216

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
38	Basement-1	per Cft	6050	459.76	Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x3	2781548

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
39	Providing and laying 1:3:6 cement concrete solid block masonry 4 inch to 6 inch (102 mm to 152) thick using crushed graded boulders 3/4 inch (19 mm) and down gauge instead of screened bajri, set in cement sand mortar 1:6 instead of lime cement mortar 1:1:6 in including scaffolding, raking out Joints and curing etc. complete in groud floor super structure				Code # 110	
40	Lower Ground Floor	per Cft	6700	454.64	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+	3046088

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
41	Upper Ground Floor	per Cft	3700	454.64	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+	1682168

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
42	Ist. Floor	per Cft	4050	478.78	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70	1939059

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
43	2nd. Floor	per Cft	4500	502.88	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # 71	2262960

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
44	3rd. Floor	per Cft	4250	526.97	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # 71 x 2	2239622.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
45	4th. Floor	per Cft	2150	551.07	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x3	1184800.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
46	5th. Floor	per Cft	2900	575.16	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x4	1667964

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
47	6th. Floor	per Cft	3450	599.26	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x5	2067447

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
48	7th. Floor	per Cft	2550	623.35	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x6	1589542.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
49	8th. Floor	per Cft	2750	647.45	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x7	1780487.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
50	9th. Floor	per Cft	2550	671.54	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x8	1712427

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
51	10th. Floor	per Cft	2770	695.64	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x9	1926922.8

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
52	11th & 12th. Floor	per Cft	1800	719.74	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x10	1295532

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
53	13th. Floor	per Cft	2750	743.83	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x11	2045532.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
54	14th. Floor	per Cft	2550	767.93	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x12	1958221.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
55	15th. Floor	per Cft	2750	792.02	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x13	2178055

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
56	16th. Floor	per Cft	2750	816.12	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x14	2244330

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
57	17th. Floor	per Cft	2700	840.21	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x15	2268567

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
58	18th. Floor	per Cft	2850	864.31	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x16	2463283.5

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
59	19th. Floor	per Cft	2950	888.4	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x17	2620780

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
60	20th. Floor	per Cft	2300	912.5	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x18	2098750

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
61	21st. Floor	per Cft	2250	936.59	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x19	2107327.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
62	22nd. Floor	per Cft	2650	960.69	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x 20	2545828.5

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
63	Machine Room Level (23rd Floor)	per Cft	750	984.79	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x 21	738592.5

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
64	Roof	per Cft	300	1008.88	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x 22	302664
65	INTERNAL FLOOR FINISHES					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
66	PCC Flooring					
67	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.				Code # 117	
68	Basement-4	per Sft	30730	155.19	Code #117 Item # 7+ Code #117 Item # (25)x4	4768988.7
69	Basement-3	per Sft	28930	147.47	Code #117 Item # 7+ Code #117 Item # (25)x3	4266307.1

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
70	Basement-2	per Sft	29090	139.75	Code #117 Item # 7+ Code #117 Item # (25)x2	4065327.5
71	Basement-1	per Sft	30920	132.03	Code #117 Item # 7+ Code #117 Item # (25)x1	4082367.6
72	Lower Ground Floor	per Sft	300	124.313	Code #117 Item # 7	37293.9
73	Upper Ground Floor	per Sft		124.313	Code #117 Item # 7	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
74	Ist. Floor	per Sft		133.88	Code #117 Item # 7+ Code #117 Item # 26	
75	2nd. Floor	per Sft		141.6	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # 27	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
76	3rd. Floor	per Sft		149.32	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x2	
77	4th. Floor	per Sft		157.04	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x3	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
78	5th. Floor	per Sft		164.76	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x4	
79	6th. Floor	per Sft	1090	172.48	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x5	188003.2

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
80	7th. Floor	per Sft		180.2	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x6	
81	8th. Floor	per Sft		187.92	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x7	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
82	9th. Floor	per Sft		195.63	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x8	
83	10th. Floor	per Sft		203.35	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x9	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
84	11th & 12th. Floor	per Sft	6800	211.07	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x10	1435276
85	13th. Floor	per Sft		218.79	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x11	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
86	14th. Floor	per Sft		226.51	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x12	
87	15th. Floor	per Sft		234.23	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x13	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
88	16th. Floor	per Sft		241.95	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x14	
89	17th. Floor	per Sft		249.67	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x15	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
90	18th. Floor	per Sft		257.38	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x16	
91	19th. Floor	per Sft		265.1	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x17	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
92	20th. Floor	per Sft		272.82	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x18	
93	21st. Floor	per Sft		280.54	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x19	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
94	22nd. Floor	per Sft		288.26	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x20	
95	Machine Room Level (23rd Floor)	per Sft	800	295.98	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x21	236784

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
96	Roof	per Sft	500	303.7	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x22	151850
97	Porcelain Tile Flooring					
98	FL-Type 08 Providing & laying light/colour unglazed Vitrified porcelain tiles (polished) not exceeding 3600 sq cm each on walls & floors foreign make (Italian or equivalent except China make) in any floor laid with dry bond (stile bond) over on 1" thick cement mortar (1:3) including jointing the tiles with joint filler of approved qualityas per direction of the Engineer incharge.	per Sft	2700	1285.24	Code #117 Item # 187	3470148

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
99	Providing and laying light colour, glazed/non skid vitrified porcelain tiles (Polished) exceeding 1600 sqcm and up to 3600 Sqcm each, (Pak made) on walls and floors, in any floor, laid with dry bond (stile bond) over a base of 1" thick cement mortar (1:3) including jointing to tiles with joint filler of approved quality as per direction of the Engineer incharge.				Code #117 Item # 180	
100	Porcelain Tile Flooring, FL-13	per Sft	16750	527.94		8842995
101	Porcelain Tile Flooring, FL-16	per Sft	10500	527.94		5543370
102	Porcelain Tile Flooring , FL-18	per Sft	6300	527.94		3326022
103	Porcelain Tile on wall, WL-09	per Sft	40380	527.94		21318217.2

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
104	Providing and laying in floor C.C. 1:2:4: tuff paver 2-1/2" thick of approved design and colour pattren laid on sand cushion filling of joint with sand and warring etc. complete as per direction of Engineer Incharge. (the cost of sand cushion is included)				Code #117 Item # 178	
105	a) Average strength 7000 psi	per Sft	15000	157.79		2366850
106	b) Average strength 5000 psi	per Sft	5500	130.98		720390
107	Providing & laying cement sand mortar 1:4 (1cement: 4sand) NOTE: To be used as levelling screed under tiles or where required at any floor any height complete in all respect and as per drawings, specifications and directions of the Engineer.	per Cft	10800	391.77	Code #101 Item # 24	4231116
108	INTERNAL WALL FINISHES					
109	Cement Plaster					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
110	1/2" (13 mm) thick cement plaster 1:6 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, comers, and curing etc., complete.				Code #122 Item # 6	
111	Basement-4	per Sft	26000	52.45	Code #122 Item # 6	1363700
112	Basement-3	per Sft	48000	52.45	Code #122 Item # 6	2517600
113	Basement-2	per Sft	27000	52.45	Code #122 Item # 6	1416150
114	Basement-1	per Sft	48000	52.45	Code #122 Item # 6	2517600
115	Lower Ground Floor	per Sft	35000	52.45	Code #122 Item # 6	1835750

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
116	Upper Ground Floor	per Sft	17000	52.45	Code #122 Item # 6	891650
117	Ist. Floor	per Sft	21500	56.45	Code #122 Item # 6+ Code #122 Item # 87	1213675
118	2nd. Floor	per Sft	25000	59.52	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # 90	1488000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
119	3rd. Floor	per Sft	24500	62.59	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*2	1533455
120	4th. Floor	per Sft	18000	65.67	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*3	1182060

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
121	5th. Floor	per Sft	17000	68.74	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*4	1168580
122	6th. Floor	per Sft	23000	71.81	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*5	1651630

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
123	7th. Floor	per Sft	15500	74.88	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*6	1160640
124	8th. Floor	per Sft	15500	77.95	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*7	1208225

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
125	9th. Floor	per Sft	14000	81.02	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*8	1134280
126	10th. Floor	per Sft	14000	84.09	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*9	1177260

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
127	11th & 12th. Floor	per Sft	16500	87.16	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*10	1438140
128	13th. Floor	per Sft	15500	90.24	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*11	1398720

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
129	14th. Floor	per Sft	15500	93.31	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*12	1446305
130	15th. Floor	per Sft	15500	96.38	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*13	1493890

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
131	16th. Floor	per Sft	16500	99.45	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*14	1640925
132	17th. Floor	per Sft	16500	102.52	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*15	1691580

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
133	18th. Floor	per Sft	17000	105.59	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*16	1795030
134	19th. Floor	per Sft	14500	108.66	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*17	1575570

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
135	20th. Floor	per Sft	12500	111.73	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*18	1396625
136	21st. Floor	per Sft	13000	114.81	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*19	1492530

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
137	22nd. Floor	per Sft	14000	117.88	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*20	1650320
138	Machine Room Level (23rd Floor)	per Sft	3000	120.95	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*21	362850

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
139	Roof	per Sft	1000	124.02	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*22	124020
140	Painting Works					
141	Painting with Robbialac supper gloss synthetic enamel paint of approved make and shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .	per Sft	560000	87.29	Code #122 Item # 161	48882400
142	INTERNAL CEILING FINISHES					
143	Cement Plaster					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
144	1/2" (13 mm) thick cement plaster 1:6 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, comers, and curing etc., complete.				Code #122 Item # 6	
145	Basement-4	per Sft	34300	52.45	Code #122 Item # 6	1799035
146	Basement-3	per Sft	30850	52.45	Code #122 Item # 6	1618082.5
147	Basement-2	per Sft	34300	52.45	Code #122 Item # 6	1799035
148	Basement-1	per Sft	30850	52.45	Code #122 Item # 6	1618082.5
149	Lower Ground Floor	per Sft	3500	52.45	Code #122 Item # 6	183575

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
150	Upper Ground Floor	per Sft	4000	52.45	Code #122 Item # 6	209800
151	Ist. Floor	per Sft	5500	56.45	Code #122 Item # 6+ Code #122 Item # 87	310475
152	2nd. Floor	per Sft	5000	59.52	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # 90	297600

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
153	3rd. Floor	per Sft	6000	62.59	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x2	375540
154	4th. Floor	per Sft	2000	65.67	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x3	131340

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
155	5th. Floor	per Sft	6500	68.74	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x4	446810
156	6th. Floor	per Sft	2500	71.81	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x5	179525

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
157	7th. Floor	per Sft	5500	74.88	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x6	411840
158	8th. Floor	per Sft	5500	77.95	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x7	428725

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
159	9th. Floor	per Sft	5500	81.02	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x8	445610
160	10th. Floor	per Sft	5500	84.09	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x9	462495

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
161	11th & 12th. Floor	per Sft	5500	87.16	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x10	479380
162	13th. Floor	per Sft	5500	90.24	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x11	496320

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
163	14th. Floor	per Sft	5500	93.31	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x12	513205
164	15th. Floor	per Sft	5000	96.38	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x13	481900

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
165	16th. Floor	per Sft	5000	99.45	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x14	497250
166	17th. Floor	per Sft	5000	102.52	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x15	512600

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
167	18th. Floor	per Sft	5500	105.59	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x16	580745
168	19th. Floor	per Sft	2000	108.66	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x17	217320

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
169	20th. Floor	per Sft	2000	111.73	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x18	223460
170	21st. Floor	per Sft	2000	114.81	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x19	229620

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
171	22nd. Floor	per Sft	2000	117.88	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x20	235760
172	Machine Room Level (23rd Floor)	per Sft	1500	120.95	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x21	181425

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
173	Roof	per Sft	500	124.02	Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x22	62010
174	Painting Works					
175	Painting with (IC Dulux plastic emulsion paint P of approved shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .	per Sft	234300	87.59	Code #122 Item # 162	20522337
176	Cement washing two coats at any height in any floor.....	per Sft	180000	3.96	Code #122 Item # 150	712800

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
177	ROOF FINISHES/TREATMENT					
178	PCC Flooring (Roof Screeding)					
179	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.				Code # 117	
180	5th. Floor	per Sft	5000	164.76	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x4	823800

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
181	19th. Floor	per Sft	3300	272.82	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x18	900306
182	Machine Room Level (23rd Floor)	per Sft	7650	303.69	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x22	2323228.5

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
183	Roof	per Sft	1400	311.42	Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x23	435988
184	EXTERNAL WALL FINISHES (BUILDING)					
185	3/4'' (19 mm) thick cement plaster 1:4 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, and curing etc., complete.					
186	Basement-4	per Sft		69.36	Code #122 Item # 8	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
187	Basement-3	per Sft		69.36	Code #122 Item # 8	
188	Basement-2	per Sft		69.36	Code #122 Item # 8	
189	Basement-1	per Sft		69.36	Code #122 Item # 8	
190	Lower Ground Floor	per Sft	7000	69.36	Code #122 Item # 8	485520
191	Upper Ground Floor	per Sft	4600	69.36	Code #122 Item # 8	319056

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
192	Ist. Floor	per Sft	5500	74.69	Code #122 Item # 8 Code #122 Item # 88	410795
193	2nd. Floor	per Sft	5500	78.78	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # 91	433290

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
194	3rd. Floor	per Sft	6500	82.88	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x2	538720
195	4th. Floor	per Sft	6500	86.97	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x3	565305

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
196	5th. Floor	per Sft	4500	91.07	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x4	409815
197	6th. Floor	per Sft	4500	95.16	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x5	428220

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
198	7th. Floor	per Sft	4500	99.26	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x6	446670
199	8th. Floor	per Sft	4500	103.35	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x7	465075

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
200	9th. Floor	per Sft	4500	107.45	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x8	483525
201	10th. Floor	per Sft	4500	111.54	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x9	501930

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
202	11th & 12th. Floor	per Sft	4800	115.64	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x10	555072
203	13th. Floor	per Sft	4500	119.73	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x11	538785

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
204	14th. Floor	per Sft	4500	123.83	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x12	557235
205	15th. Floor	per Sft	4500	127.92	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x13	575640

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
206	16th. Floor	per Sft	4500	132.02	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x14	594090
207	17th. Floor	per Sft	4500	136.11	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x15	612495

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
208	18th. Floor	per Sft	4500	140.21	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x16	630945
209	19th. Floor	per Sft	4000	144.3	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x17	577200

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
210	20th. Floor	per Sft	4000	148.4	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x18	593600
211	21st. Floor+	per Sft	4000	152.49	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x19	609960

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
212	22nd. Floor	per Sft	4500	156.59	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x20	704655
213	Machine Room Level (23rd Floor)	per Sft	8500	160.68	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x21	1365780

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
214	Roof	per Sft	4000	164.78	Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x22	659120
215	Extra if deep cut grooves of approved sizes and design are made on plastered surface of any description in any floor	per Sft	110900	29.74	Code #122 Item # 37	3298166
216	ROOF FINISHES/TREATMENT					
217	3/4'' (19 mm) thick cement plaster 1:4 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, and curing etc., complete.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
218	Providing & laying cement sand mortar 1:4 (1cement: 4sand) NOTE: To be used as levelling screed under tiles or where required at any floor/roof any height complete in all respect and as per drawings, specifications and directions of the Engineer.	per Cft	1650	391.77	Code #101 Item # 24	646420.5
219	B) Non Schedule Items					
220	MOISTURE PROTECTION					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
221	Providing and applying three coats of 2 component flexible polymer modified cementitious waterproof coating AQUAFIN-2C / SIKA /or approved equivalent over RCC slabs and walls of any wet area e.g. Toilets, Kitchens, Balcony's etc, at any height in any floor as per manufacturer's specifications & recommendations. The item shall also include flood testing for a minimum period of 24–72 hours (as per instruction of the site Engineer) after completion and curing of the waterproofing system, including making good any defects/leakages observed and retesting until satisfactory results are achieved, complete in all respect as per drawing, standards, specifications and direction of the Engineer.	Sft	19500	185	NSI	3607500
222	METAL WORKS					
223	Metal Doors					
224	Hollow Core Flush Type Metal Door					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
225	Providing, welding, fabricating and fixing in position approved colour powder-coated MS hollow flush door shutter including frame of 2" x 5" x16 gauge (1.6 mm) MS sections with single rebate 38 mm × 12 mm (1-1/2" × 1/2"), shutter 38 mm (1-1/2") thick faced both sides with 20 SWG (0.9 mm) GI sheet conforming to ASTM A653/A653M coating designation, reinforced with “C” channel bracing and cross bracing, filled with honeycomb kraft paper core, with or without vision panel and louvers, including 6 mm clear laminated safety glass fixed with EPDM gasket and metal trim, and all required hardware excluding ironmongery, at any floor and height, in accordance with drawings, specifications, and Engineer’s directions. Note: Cost of ironmongery such as hinges, locks, handles, closers, etc. shall be paid under separate items as per hardware schedule.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
226	Single Leaf Shutter					
227	Type-1 (Without Vision Panel and louvers)	Sft	40	11400		456000
228	Type-2 (Without Vision Panel and with louvers)	Sft	130	10100		1313000
229	Type-3 (With Vision Panel and without louvers)	Sft	260	10000		2600000
230	Type-4 (With Vision Panel and louvers)	Sft	170	9000		1530000
231	Double Leaf Shutter					
232	Type-5 (With Vision Panel and louvers)	Sft	245	9500		2327500
233	Type-6 (Without Vision Panel and louvers)	Sft	50	8000		400000
234	MS Louvered Door					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
235	Providing, welding, fabricating, and fixing in position MS louvered door including frame comprising of MS door frame 2" x 5" X 16Swg conforming to BSS. 1245 having a single rebate size 1-1/2" x 1/2", using MS tube 1-12" x 4" x 14 swg for top rail & stile and 1-12" x 9" x 14 swg for bottom rail and 2" x 2" x14 Swg mid/lock rail of shutter frames conforming to ASTM A500 Grade B/C (for hollow tubes) or equivalent BS EN 10219, fitted with 2.0 mm thick MS steel sheet louvers , spaced at 32 mm (1¼") centre-to-centre as per approved drawings and design. Door frame shall be fixed to wall with holdfasts 8" x 2" x 1/8" thick (4 Nos each side) hollow area to be filled with 1:2 cement sand morate, shutter hung on heavy-duty SS304 ball-bearing hinges, anchoring shall be detailed as per approved shop drawings. Surface finished with one coat of approved zinc-phosphate epoxy primer & three coats of approved industrial synthetic enamel paint. Installation shall include cutting holes for holdfast, grouting, alignment, and all accessories required for complete fixing,				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
236	Type-6 (With two shutter)	Sft	260	8000		2080000
237	Type-7 (With Four shutter)	Sft	260	14000		3640000
238	Fire Rated Door					
239	Provide factory-manufactured steel fire-rated door assembly having a 03 hours fire resistance rating, tested and certified in accordance with UL 10C/NFPA 252 (or EN 1634-1 where specified), UL 1784 and installed in accordance with NFPA 80". detail as under.				NSI	
240	DF01 & DF02	Sft	1880	10500		19740000
241	Testing/Cerifications ASTM, NFPA 252 (EN-1634-1), FAA, IMO / ISO/IEC 17020:2012 certified by PNAC SGS Building Standards Ltd.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
242	Material of frame & Leaf - ASTM A653/ A653M - Zinc coated Cold-rolled steel sheet/plate 2mm thick with180 micron DFT. - Door Jamb 200mm wide single rebated. - Door Leaf 44mm thick. - In fill material using mineral wool (Rockwaool) for insulation, minium density 180Kg/Cum.					
243	Anchors & Bolts - Jamb Anchors : 1No-In place concrete & Masonry anchor from jamb with minimum 9mm diameter concealed bolts in to expansion shiels or inseart 150mm from top & bottom. Floor Anchors - Clip type anchors with two holes to receive fasteners welded to bottom of jamb and mullions with the same thickness of frame material. Head Anchors - 02 head anchrs for frames more than 1066 mm wide and mounted in steel wall.					
244	Glass for vision penal - 5mm thick Fire rated Transparentceramic fire lite-NT Glass for fire rated door					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
245	Door Hardwares - Hinges: 150mm long, 38mm wide and 4.2mm thick, 2 Ball bearing, five knickle, butt hinges, single acting, fully mortise SS304 (4-Nos in each shutter),Tested by ANI/BHMAA156.1, UL listed, CE Certification, Pass BS EN1935 test, Pass EN 1634 test, 200, 000 life Cycle. - Panic Exit Device Escutcheon type heavy duty Liver trim sutiable for RIM type medium stile Exit device with provision for ANSI profile, UL listed, CE Cirtification, Pass BS EN1125 test, 200, 000 life Cycle. - Door Closer Overhead surface mounted Rack and Pinion type door closer, UL listed, CE Cirtification, Pass BS EN1154 test, 500, 000 life Cycle. - Liver Handle CE Cirtification, Pass BS EN1634 test, SS304. - Door Coordinator Non-Handed, SS304.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
246	Construction including In-fill Door with smooth, flush surface without visible joints or seams on exposed faces and stile adges. 1- Single acting swing doors, bevel both vertical adges 3mm in 50mm. 2- Galvanized steel vertical stiffeners extending full-door height, spaced not more than 150mm apart and not spot welded to face sheets a maximum of 150, fill space between stiffeners with rockwaool insulation of minium 180Kg/Cum density applied to inside surface of face sheet (Tested). 3- Closed bottom edge with metalic coated steel closing channel and top edge with filler channel of same material, so webs of chennals are flush with bottom & top door edge. 4- Polyestere Powder Coating (minimum 70-80 microns DFT) after finish.					
247	MS Rungs					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
248	Providing, making & fixing in position MS rungs comprising of 1" x 1" solid square bar U-shape 24" long & 8" wide rungs (usable size) including hold fast fixed on the wall as per drawing, applying three coat of anti rust paint as per approved by the Engineer, at any depth & any height in etc., complete in all respect and as per drawings, specifications and directions of the Engineer.	Each	40	5000	NSI	200000
249	Pre-Cast RCC Concrete Members					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
250	Providing, casting, supplying, and fixing RCC precast slabs/planks, including steel reinforcement bars and concrete of specified cylindrical compressive strength, with watertight, fair-faced formwork. The work shall include providing lifting hooks where required, and placing the units at the specified location, maintaining proper line, level, and alignment, at any height and floor etc., complete in all respects as per drawing, standard, specifications, and or as directed by the Engineer.				NSI	
251	Rcc Pre-Cast slab / Plank for MS Staircase-2 from Lower Ground to Upper Ground Floor (3000 Psi)	Cft	35	1500		52500
252	Rcc Pre-Cast slab / Plank for MEP Opening of Lower Ground Floor (3000 Psi)	Cft	435	1500		652500
253	Rcc Pre-Cast slab / Plank for MEP Shaft Opening over Ramp at Upper Ground Floor (3000 Psi)	Cft	400	1500		600000
254	MS Steel Structure Works					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
255	Providing, cutting, fabricating, erecting, placing, installing, inspecting, testing, and ensuring quality control for MS structural steel works, using members with minimum yield strength conforming to ASTM A36 Grade 36 / ASTM A572 Grade 50 / ASTM A992 / ASTM A500 Grade B or C. Structural steel members shall include drilling of holes, non-shrinkage grout, H-sections, I-sections, W-sections, angles, tubes, beams, channels, base plates, MS sheets, MS chequered plates, stiffener plates, MS pipes, MS square/round bars for railing, MS posts, anchors bolts, Rawl bolts, J-bolts, nuts, washers, and leveling grout, or as required, three coat of industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer. All jointing and welding shall comply with AWS D1.1 Structural Welding Code – Steel and BS EN ISO 3834 quality management system requirements. Works shall be executed at any floor or height, including the cost of scaffolding, platforms, and winches. The contractor shall submit coordinated and checked shop drawings for approval prior				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
256	MS Staircase-4 from Lower Ground to Upper Ground Floor	Kg	800	700		560000
257	MS Metal Staircase-3 from Upper Ground to 1st Floor	Kg	4000	700		2800000
258	MS Staircase-5 from Roof to MEP space Upper Roof	Kg	2100	700		1470000
259	MS Steel structure Framing for Glass Elevator	Kg	2000	700		1400000
260	MS Steel structure wall Framing for Reception	Kg	3600	700		2520000
261	MS Steel structure Framing for Ramp	Kg	23500	700		16450000
262	WOODEN WORKS					
263	Anti-Termite Treatment					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
264	Providing and applying anti-termite solution for the protection of all wooden surfaces against termites and other wood-destroying organisms, using 50ml of the approved termiticide per square foot of wood surface area, comprising of 200ml of Prevent 2.5EC by Ali Akbar Group or approved equivalent, mixed with 2000ml kerosine oil. This mixture must be applied to all wooden surfaces wether expose or not. Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	Sft	63000	85	NSI	5355000
265	Door Sub-frame					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
266	Providing, making, and fixing an approved quality seasoned rough wood sub-frame to support & backing all types of door frame, using approved rough wood 3" x 3/4" thick including 06 nos socket-type counter-sunken bolt with nuts in each backing frame as per the fixing details. Applying termite treatment as mentioned in the above item etc., complete in all respect as per engineering standards, specifications, drawings & entirely satisfaction of the Engineer.	Rft	8000	300	NSI	2400000
267	Wooden Door Frame					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
268	Providing, making, and fixing an approved quality seasoned Ash wood door frame 5" x 2" thick, including 06 nos socket-type counter-sunken bolt with nuts in each frame as per the fixing details. Applying PU foam to joined & fill all acvities of the frame and termite treatment as mentioned in the above item etc., complete in all respect as per engineering standards, specifications, drawings & entirely satisfaction of the Engineer.	Rft	6500	1800	NSI	11700000
269	Laminated Door Shutter					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
270	Providing, making & fixing in position 1-1/2" thick solid core Laminated board finish manufectured a factory-pressed flush door shutters comprising of 6.5mm thick approved color & shade laminated board with MDF/lasani back on both faces of the door, over all around seasoned rough wood 4-1/2" wide top rail and stile, 9" wide bottom rail and cross band frame (lock-rail) 6" wide lock rail, hollow area except framing to be filled with the seasoned rough wood, 1-1/2" x 1/2" thick Ash wood edge lipping all around, with or without Vision Panel and louvers including 6mm thick clear laminated glass with gasket, glazing bead and ash wood trim, solid ash wood louvered as per drawing & design, all ash wood to be covered with approved colour lacquer polish. The door shutter mechanically pressed by standard manufacturers under power driven hydraulic press as approved by the Engineer, including nails, glue or any required hardware's and applying termite treatment as mentioned in the above item etc, at any floor & any height in etc.,				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
271	Single Leaf Shutter					
272	Type-1 (Without Vision Panel and louvers)	Sft	770	1200		924000
273	Type-2 (Without Vision Panel and with louvers)	Sft	2700	1200		3240000
274	Type-3 (With Vision Panel and without louvers)	Sft	1900	1200		2280000
275	Type-4 (With Vision Panel and louvers)	Sft	2500	1200		3000000
276	Type-5 Frame less shutter (Without Vision Panel and louvers)	Sft	2200	1200		2640000
277	Double Leaf Shutter					
278	Type-6 (Without Vision Panel and louvers)	Sft	200	1200		240000
279	Type-7 (With Vision Panel and without louvers)	Sft	600	1200		720000
280	Floor and Wall Cabinets					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
281	Providing, constructing, and installing floor and wall mounted cabinets according to the given detail. This includes a 25mm thick both side approved colour laminated formaldehyde free moisture resistant MDF board density ≥700 kg/m³, E1 formaldehyde emission compliant, conforming to ANSI A208.2 / EN 622-5 for bottom, top, vertical /side supports, shelves & shutter etc., 6mm thick both side laminated MDF for back of cabinet's including approved Pvc edge banding all around expose surface, rough wood framing where required, glue, nail, soft-close SS304 concealed hinges, telescopic drawer slides, handles, adjustable shelf supports, locks (where required), and all fixing screws of approved quality. etc., all wood works treated with anti termite solution etc., complete in all respect as per drawing, specification and direction of the Engineer. NOTE: Only Front/Face area (Length X Height) will be measured for the payment.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
282	Floor mounted cabinets	Sft	3300	3500		11550000
283	Wall mounted cabinets	Sft	3300	3000		9900000
284	Providing, making & fixing in position 1-1/2" thick solid core Wood polymer composite (WPC) finish flush door shutters including frame & beading both sides, with or without vision panel 6mm clear glass, complete in all respect as per engineering standards, specifications, drawings and entirely satisfaction of the Engineer. (Note: Cost of Ironmongery such as Tower bolts, Locks, Handles, kick & push plate etc. paid in Separate item.)	Sft	240	3500	NSI	840000
285	Aluminum and Glass Door					
286	Frame Less Glass Door					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
287	Providing, fabricating and fixing in position frame less Glass door comprising of 12 mm thick clear fully tempered safety glass complying with ASTM C1048, EN 12150, or equivalent with polished edges and factory-fabricated holes/cut-outs complete in all respect as per drawing, standard, specifications and direction of the Engineer. Note: Cost of Ironmongery such as patch fittings, floor spring , Locks, long Handles etc. paid in Separate item as per hardware schedule.				NSI	
288	Type-1 (Single Leaf)	Sft	100	3500		350000
289	Type-2 (Double Leaf)	Sft	1500	4000		6000000
290	Aluminum Frame Door					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
291	Providing, fabricating, and fixing in position aluminium frame door comprising approved colour anodized premium quality aluminium sections 100 mm × 50 mm × 2 mm thick, conforming to Alloy 6063-T5 and complying with ASTM B221 or EN 755 standards, using Prime, Chawla, or approved equivalent sections; fitted with 8 mm thick clear tempered safety glass from Gunj Glass, Tariq Glass Industries, or approved equivalent cofirming to ASTM C1048 or EN 12150, fixed with EPDM/Neoprene gaskets, frame securely anchored to RCC/CC structure; all accessories and fixing screws in aluminium or SS304/SS316, including polished edges & all cut-outs completed before tempering, approved weatherproof silicone sealant to all external junctions between structure, wooden packing, and frame to ensure water- and wind-proof seal; complete at any floor or height, including all labour, materials, and as per drawings, specifications, and directions of the Engineer. NOTE: Contractor to submit the shop drawing without any additional				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
292	Type-3 (Double Leaf)	Sft	1600	2500		4000000
293	DOOR HARDWARE/IRON MONGERY					
294	Wooden Door					
295	H1 Mortise lock with lever (Two-way Key), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish detail as under.	Set	200	59550	NSI	11910000
296	Mortise lock; 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
297	Cylinder for Mortise lock; TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
298	Lever handle Lever handle solid 120mm or119 mm length, 64 mm height and 27mm or 19 mm ø. of approved shape or as approved by the Architect. fixing with brass insert. Fixing screws included. Stainless steel black finish. AISI304 stainless steel.					
299	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
300	Door stoper (floor type); 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
301	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
302	H2 Mortise lock with lever (One-way Key+ Thumb turn inside), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish detail as under..	Nos	99	59550		5895450
303	Mortise lock; 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
304	Cylinder for Mortise lock, Thumb turn euro profile; TD5 series patented half cylinder (single/Double), thumbturn euro profile 35x35 mm length. 5 spring loaded anti-pick pins . 15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated keys. Nickel plated finish. Masterkeyed.					
305	Lever handle Lever handle solid 120mm or119 mm length, 64 mm height and 27mm or 19 mm ø. of approved shape or as approved by the Architect. fixing with brass insert. Fixing screws included. Stainless steel black finish. AISI304 stainless steel.					
306	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
307	Door stoper (floor type); 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
308	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
309	H2A Push Plate (outside), Pull handle (inside), latch (inside), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish detail as under.	Nos	12	18312.5		219750
310	Push Plate (outside); SS 304 black finish with maching screw, 4" x 12" x 1.5mm thick					
311	Pull handle (inside); SS 304 black finish with maching screw, 4" x 12" x 1.5mm thick, 2" projected, 1" dia and 6" long					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
312	Latch; SS 304 black finish with matching screw 150mm long, 15 to 20mm hook bolt, tested with 100,000 cycle as per ANSI/BHMA A156.14 or equivalent standards					
313	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
314	H3 48" Long pull / push handle, dead lock (two-way key), floor mounted door closer (hold open). All items in SS black finish detail as under	Nos	33	59987.5		1979588
315	48" Long pull / push handle; SS 3041-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
316	Dead lock (two-way key); 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
317	Cylinder for Dead lock; double cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
318	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
319	H4 48" Long pull / push handle, dead lock (one-way key+ thumb turn inside), floor mounted door closer (hold open). All items in SS black finish.	Nos	54	59987.5		3239325
320	48" Long pull / push handle; SS 3041-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C,					
321	Dead lock (two-way key); 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
322	Cylinder for Dead lock; double cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
323	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
324	H5 Inside Lock with push button, outside magnetic lock with access system, door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish.	Nos	26	47112.5		1224925
325	Electro agnetic lock; UL 294 (U.S.) – Access control and security signaling equipmen, UL 1034 / 1076 (varies by device type) – Sometimes relevant depending on the lock/strike and whether it’s classified under different categories by the listing, NFPA 101 (Life Safety Code) – Fire/life safety requirements for doors and egress					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
326	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
327	Door stoper (floor type); 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
328	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
329	H6 Mortise lock with lever(Two-way Key), Double acting (two way) spring hinges (heavy duty), door stoper (floor type) and concealed bolt. All items in SS black finish.	Nos	1	32262.5		32263

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
330	Mortise lock; 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
331	Cylinder for Mortise lock; TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
332	Double acting (two way) spring hinges (heavy duty); Spring hinges, SS304 black colour finish, size 100 × 75 mm, adjustable spring tension complete with all fixing accessories.Tested in accordance with ANSI/BHMA A156.17 minimum 500,000 operating cycles					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
333	Door stoper (floor type); 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
334	Concealed Bolt; SS 304, 8" long with 100dia bolt, lever-action, mortised concealed type, omplete with dust-proof strike plate and fixing screws.					
335	Glass Door					
336	H7 48" long SS Door handles (inside & outside), floor mounted door closer (hold open), patch fitting & locks at bottom (Two-way Key).All items in SS black finish.	Nos	17	150062.5		2551063
337	48" Long pull / push handle; SS 3041-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C, complete set					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
338	patch fitting (Top & Bottom) Top patch fitting; Top centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish Bottom patch fitting; Bottom centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish					
339	Floor Hinges, Certified according to EN-1154 and suitable for heavy duty doors according to EN-1634, tested to 1.00.000 cycles under UL standards, Grade 1, as per Warrington Certifire Certificate of Approval No. CF5530. Stainless Steel finish					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
340	Lock for glass door; for floor or ceiling. For euro profile cylinders. Strike included. AISI304 stainless steel black finish.					
341	H8 48" long SS Door handles (inside & outside), floor mounted door closer (hold open), patch fitting & Inside Lock with push button, outside magnetic lock with access system All items in SS black finish.	Nos	18	150062.5		2701125
342	48" Long pull / push handle; SS 3041-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C, complete set					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
343	patch fitting (Top & Bottom) Top patch fitting; Top centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish Bottom patch fitting; Bottom centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish					
344	Floor Hinges, Certified according to EN-1154 and suitable for heavy duty doors according to EN-1634, tested to 1.00.000 cycles under UL standards, Grade 1, as per Warrington Certifire Certificate of Approval No. CF5530. Stainless Steel finish					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
345	Lock for glass door; for floor or ceiling. For euro profile cylinders. Strike included. AISI304 stainless steel black finish.					
346	H9 48" long SS Door handles (inside & outside),, floor mounted door closer (hold open) and Lock (Two-way Key) All items in SS black finish.	Nos	32	136812.5		4378000
347	48" Long pull / push handle; SS 3041-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C, complete set					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
348	Door closer ;overhead door closer body, suitable for doors up to 120 kg weight and 140 cm width. Reversible. Continuous size adjustment EN2-6. Closing speed, latching speed and backcheck adjustable valves. Double internal safety valve. To be combined with link arm or rail guide. Certified according to EN-1154 and suitable for heavy duty fire rated doors according to EN-1634, tested to 2.000.000 cycles under UL standards, Grade 1. Fire rated 120 min for Timber Door and 240 min for Steel Door as per Warrington Certifire Certificate of Approval No. CF5530. Stainless Steel finish.					
349	Deadlock for glass door; for floor or ceiling. For euro profile cylinders. Strike included. AISI304 stainless steel black finish.					
350	MS Steel Door					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
351	H11 Mortise lock with lever (Two-way Key), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish.	Nos	26	59550		1548300
352	Mortise lock; 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
353	Cylinder for Mortise lock; TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
354	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
355	Door stoper (floor type); 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
356	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
357	H12 Mortise lock with lever, (One-way Key+ Thumb turn inside), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish.	Nos	2	59550		119100

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
358	Mortise lock; 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
359	Cylinder for Mortise lock, Thumb turn euro profile; TD5 series patented half cylinder (single/Double), thumbturn euro profile 35x35 mm length. 5 spring loaded anti-pick pins . 15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated keys. Nickel plated finish. Masterkeyed.					
360	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
361	Door stoper (floor type); 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
362	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
363	H13 Mortise lock with lever, (Two-way Key), sliding bolt, heavy duty door closer, door stoper (floor type) and heavy duty ball bearing hinges.	Nos	4	59550		238200
364	Mortise lock; 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
365	Cylinder for Mortise lock; TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
366	Door closer (hold open); Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
367	Door stoper (floor type); 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
368	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
369	H14 Mortise lock with lever, (Two-way Key), sliding bolts, bifold and heavy duty ball bearing hinges.	Nos	2	59550		119100
370	Mortise lock; 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
371	Cylinder for Mortise lock; TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
372	Sliding Bolts; 12" long sliding bolts as per drawings					
373	Hinges Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
374	INTERNAL FLOOR FINISHES					
375	Marble Flooring					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
376	Providing and laying approved premium "A grade pre-polished approved imported & local marble slab and tiles flooring. The tiles free from cracks, open veins, repairs, excessive colour variation, imported from instructed origin and to be procured from an approved supplier. The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar 1:2 ratio using grey cement and screened sand,1/4" thick neat white slurry of polymer-modified stone adhesive (class C2TES or approved equivalent), ensuring jointing, washing and grouting with approved epoxy based grouting material, applying approved sealer as per instruction, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer. NOTE: 1- Approved mock-up and sample panels before procurement with out any additional cost.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
377	i) Imported Marble Slab 48" x 72" x 3/4" thick	Sft	5750	3800		21850000
378	ii) Imported Marble slab 36" x 72" x 3/4" thick	Sft	20750	3800		78850000
379	i) Local Marble Slab 48" x 72" x 3/4" thick	Sft	5750	2850		16387500
380	ii) Local Marble slab 36" x 72" x 3/4" thick	Sft	20750	2850		59137500
381	Raised Access Flooring					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
382	Providing, laying, and fixing complete Calcium Sulphate raised access floor system comprising 600 mm × 600 mm × 32 mm thick panels with ESD PVC tile top cover, aluminum sheet bottom cover, ABS edge band, and minimum panel weight not less than 8.5 kg/panel, of approved make and colour. Panels shall conform to EN 12825 performance requirements, tested for Concentrated Load, Uniformly Distributed Load (UDL), Rolling Load, Ultimate Load, and Safety Factor in accordance with CISCA, PSA MOB PF2, or EN 12825. Flooring system shall be fire-rated in accordance with EN 13501-1 (Class A2-s1,d0 or equivalent) and ASTM E84. Installation shall be carried out on height-adjustable galvanized steel pedestals with die-cast/aluminium heads, steel stringers (where required), base plates, and approved pedestal adhesive or mechanical fixing, conforming to ASTM A653/A123 galvanization standards. Panels shall be installed over 38 mm (avg.) thick 1:4 leveled screed bedding mortar (paid separately under NSI Flooring Subhead). at	Sft	500	7000	NSI	3500000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
383	Porcelain Tile Flooring					
384	Providing and laying glazed (polished) porcelain tile (A-grade quality tile), measuring as mentioned below, laid in pattern using spacer up to 2mm thick. The tiles to be procured from an approved make and colour. The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar 1:2 ratio & 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
385	Glazed Porcelain tiles 30" x 60" x 1/2" thick (FLOOR TYPE - FL 04)	Sft	16500	1000		16500000
386	Glazed Porcelain tiles 24" x 48" x 1/2" thick (FLOOR TYPE - FL 15)	Sft	10500	700		7350000
387	Epoxy Flooring (FLOOR TYPE - FL 19)					
388	Providing and applying epoxy flooring comprising of 3mm thick (DFT) self levelling approved colour epoxy flooring over PCC flooring, from approved manufacturer's or approved equivalent including & over one coat of primer, mechanical surface Preparation by usung grinding, shot blasting, repair of cracks/voids and applying approved seal top coating etc., at any floor & any height, complete in all respect as per engineering standards, specifications and entirely satisfaction of the Engineer.	Sft	1090	450	NSI	490500
389	Solvent-free, heavy-duty epoxy flooring (FLOOR TYPE - FL 20)					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
390	Provide and apply a solvent-free, heavy-duty epoxy flooring 2.5mm thick system of approved manufecturer over PCC flooring, comprising of three-component, solvent-free epoxy flooring comprising epoxy resin, compatible graded aggregates including two-component, low-viscosity, solvent-free epoxy primer as per ASTAM D1475, comprehansive strength as per ASTM D695 including surface prepration etc, at any floor & any height, complete in all respect as per engineering standards, specifications and entirely satisfaction of the Engineer.	Sft	16300	350	NSI	5705000
391	EPDM Rubber Flooring (FL-03)					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
392	Providing and laying EPDM rubber interlocking flooring system 20mm thick of approved make, size and color for tensile strength, impact resistance, and shock absorption. Flooring shall be installed with approved bonding agent/adhesive, complete with all required underlay, edge trims, and accessories. Work shall be executed in full compliance with approved drawings, standards, and specifications, and/or as directed by the Engineer, complete in all respects.	Sft	800	550	NSI	440000
393	Power float with & without fishbone grooves.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
394	Applying power floating including making fishboan grooves over PCC concrete flooring (Item # 7.1 of PWD) on ramp, driveway, parking and or where required (at any floor & any height), laid in approved size panels as per drawing, including compacting, leveling, finishing and curing etc., complete in all respects as per drawing, standard, specifications and directed by the Engineer.				NSI	
395	i) Power float with fishbone grooves. (FLOOR TYPE - FL 20A)	Sft	14500	175		2537500
396	ii) Power float without fishbone grooves. (FLOOR TYPE - FL 20B)	Sft	100000	150		15000000
397	Flame Torch Finished Granite Flooring					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
398	Providing and laying local approved Flame granite tiles flooring. The tiles to be procured from an approved supplier. The installation process includes laying the tiles with 2mm to 3mm wide approved spacer, over 1-1/2" thick cement-sand mortar 1:2 ratio using grey cement and screened sand, 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	
399	a) Local approved Flame granite 24" x 48" x 3/4" thick pre-polished (FLOOR TYPE - FL 10)	Sft	7250	2700		19575000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
400	b) Local approved Flame granite 24" x 24" x 3/4" thick pre-polished (FLOOR TYPE - FL 11)	Sft	5650	2250		12712500
401	PCC Edge Kerb Cast in SITU					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
402	Providing, casting, finishing and curing cast in-situ plain cement concrete edge kerb, 6" wide & 7" high (or as shown on drawings), using 21Mpa or 3000 Psi cylendrical strength concrete, with fair-face smooth finish achieved by using approved steel shuttering/formwork, true to line, level, profile and curvature, including supply, erection and removal of shuttering on exposed faces, proper compaction by mechanical vibration, finishing arrises neatly, curing for minimum 7 days, complete in all respects as per drawings, specifications and Engineer’s approval. Rate to include all materials, labour, plant, placing, finishing, formwork, joints where required, and incidentals. Measured per linear running ft (Rft).	Rft	9500	850	NSI	8075000
403	VERTICAL CIRCULATION /STAIRCASE FINISHES					
404	Flame Torch Finished Granite Steps					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
405	Providing and laying local approved Flame granite slab/tiles steps including three non slip groove on each tread, fill the grooves with carborundum powder and epoxy mixed, round edge etc. The tiles to be procured from an approved supplier. The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar 1:2 ratio using grey cement and screened sand, 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	
406	i) Staircase # 01and 02					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
407	a) Flame Torch Finished Stair Treads/Steps Up to 4'-6" x 1'-0" x 3/4" thick with with grove and bullnozing. (FLOOR TYPE - FL 09)	Sft	15130	2200		33286000
408	b) Stair Riser Pre-polished Up to 4'-0" x 0'-7" x 1/2" thick	Sft	7565	1500		11347500
409	c) Stair Landing Flame Torch Finished 1'-0" x 2'-0" x 3/4" thick	Sft	8400	2200		18480000
410	d) Skirting Pre-polished 1'-0" x 0'-6" x 1/2" thick as per profile	Sft	5600	1200		6720000
411	ii) Staircase # 03 and 04					
412	a) Flame Torch Finished Stair Treads/Steps 6'-0" x 1'-0" x 3/4" thick with with grove and bullnozing.	Sft	250	2500		625000
413	b) Flame Torch Finished Stair Treads/Steps 7'-0" x 1'-0" x 3/4" thick with with grove and bullnozing.	Sft	70	2500		175000
414	c) Stair Landing Flame Torch Finished 1'-0" x 2'-0" x 3/4" thick	Sft	100	2200		220000
415	Staircase Railing					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
416	Floor Mounted SS Railing					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
417	Providing, welding (using TIG – Gas Tungsten Arc Welding), fabricating, and fixing in position floor-mounted stainless steel railing of SS 304 grade, comprising 2" dia (50 mm) × 16 SWG wall thickness top handrail, 1-1/2" dia (38 mm) × 16 SWG wall thickness balustrade on every alternate step welded to handrail, and three (3 Nos.) 1/2" dia × 16 SWG horizontal bracing members at intermediate height, as shown in drawings. Railing shall include SS base plates, anchor bolts, covering caps, and all required hardware as approved, drilling and grouting with non-shrink grout material of approved make, all accessories and fixing screws in SS 304, TIG welding to ensure clean, precise, and corrosion-resistant joints; silicone sealant applied where required. Work shall be executed at any floor or height, complete in all respects, in accordance with drawings, specifications, and directions of the Engineer.	Rft	1500	5000	NSI	7500000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
418	Wall Mounted SS Railing					
419	Providing, TIG welding (Gas Tungsten Arc Welding), fabricating, and fixing in position wall-mounted stainless steel railing of SS 304 grade, comprising 2" dia (50 mm) × 16 SWG wall thickness handrail, with 1/2" dia × 16 SWG wall thickness support below handrail fixed with SS plate 4" dia × 3 mm thick, including SS base plates, anchor bolts, covering caps, and all required hardware as approved, drilling and grouting with non-shrink grout material of approved make, all accessories and fixing screws in SS 304, TIG welding to ensure clean, precise, and corrosion-resistant joints, silicone sealant applied where required. Work shall be executed at any floor or height, complete in all respects, in accordance with drawings, specifications, and directions of the Engineer.	Rft	2000	3000	NSI	6000000
420	INTERNAL WALL FINISHES					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
421	Aluminum Shadow Gap Skirting					
422	Providing, cutting and fixing Aluminum Shadow Gap Skirting 4"(100mm) high of approved make & color on wall. The installation process includes fixing the approved shadow gap strip with approved screwed, ensuring jointing as per standard etc, Additional tasks such as cutting, cleaning and any other required steps are part of the comprehensive installation process at any floor & any height etc., complete in all respect and as per drawings, specifications and directions of the Engineer. (SK-04)	Rft	800	3000	NSI	2400000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
423	Aluminum Skirting Providing and fixing approved colour aluminum skirting 4"(100mm) high of approved profile, size, and colour with smooth surface finish. Installation shall be carried out using galvanized steel or approved fixing accessories, including anchors, screws, clips, and where specified. Joints shall be aligned, mitred, and finished neatly to ensure uniformity. Work shall include all required hardware and accessories, cutting, edge finishing, cleaning, and protection of installed surfaces. Execution shall be at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Rft	800	650	NSI	520000
424	PVC Vinyl Tiles Skirting					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
425	Providing, cutting and fixing homogeneous PVC vinyl sheet Skirting 3" high skirting of approved make & color on wall. The installation process includes fixing solution & all necessary required hardware's. Additional tasks such as cutting, cleaning and any other required steps are part of the comprehensive installation process at any floor & any height etc., complete in all respect and as per drawings, specifications and directions of the Engineer. (SK-02)	Rft	3000	1400	NSI	4200000
426	INTERNAL CELING FINISHES					
427	Gypsum Board Suspended Ceiling					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
428	Providing, fabricating and installing gypsum board suspended ceiling system, comprising 4'-0" × 8'-0" × 12.5 mm (½") thick gypsum boards conforming to ASTM C1396 and ASTM C1264, with fire performance tested to ASTM E119/EN 1364-2, of approved manufacturer. Ceiling shall include borders, bulkheads, cove lights, pelmets, and other architectural features as shown in drawings. Installation shall be carried out on a galvanized steel suspension system comprising runners, cross “T” sections, perimeter angles, threaded hanger rods with 6mm dia (M6), clips, and accessories, conforming to ASTM C645 / ASTM C754 or EN 14195, with minimum steel thickness and galvanization as specified. All joints shall be treated with approved jointing tape and compound to achieve seamless finish, including screw head filling, sanding, and crack prevention. Ceiling shall incorporate cut-outs for light fixtures and design features, and be finished with one coat of primer and three coats of approved acrylic emulsion paint, with surface preparation including putty	Sft	145000	500	NSI	72500000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
429	Laminated Mineral Fiber tiles Suspended Ceiling					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
430	Providing, fabricating, and installing mineral fiber lay-in tile Suspended ceiling system, comprising 600 mm × 600 mm × 12.5 mm thick mineral fiber tiles conforming to ASTM E1264 and ASTM E1477, with anti-bacterial coating tested to Class 100 US FED STD 209 or equivalent cleanroom standard. Tiles shall be moisture-resistant and fire-rated to EN 13501-1 (Class A2-s1,d0 or equivalent). Installation shall be carried out on a galvanized steel suspension system comprising main runners, cross “T” sections, perimeter angles, threaded hanger rods, clips, and accessories, conforming to ASTM C635 (metal suspension systems) and ASTM C636 (installation methods). All joints shall be aligned to achieve seamless grid finish; cut-outs shall be provided for light fixtures, diffusers, and other design features. Work shall include all required hardware, fixing arrangements, drilling, and grouting with approved non-shrink grout material. Execution shall be complete at any floor or height, in accordance with approved	Sft	1500	400	NSI	600000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
431	Moisture Resistant Gypsum Board Suspended Ceiling					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
432	Providing, fabricating, and installing moisture-resistant gypsum board suspended ceiling and border, comprising gypsum boards of cut edge Type H conforming to TS EN 520 +A1 (4'-0" × 8'-0" × 12.5 mm thick), of approved manufacturer list. Boards shall be moisture-resistant and fire-rated, tested to ASTM E119 / EN 1364-2 for fire performance. Ceiling shall include borders, bulkheads, cove lights, pelmets, and other architectural features as shown in drawings. Installation shall be carried out on a galvanized steel suspension system comprising runners, cross “T” sections, perimeter angles, threaded hanger rods, clips, and accessories, conforming to ASTM C645 / ASTM C754 or EN 14195, with minimum steel thickness and galvanization as specified. All joints shall be treated with approved jointing tape and compound to achieve seamless finish, including screw head filling, sanding, and crack prevention. Ceiling shall incorporate cut-outs for light fixtures and design features, and be finished with one coat of primer and three	Sft	6500	700	NSI	4550000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
433	Mineral Fiber tiles Suspended Ceiling					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
434	Providing, fabricating, and installing mineral fiber lay-in tile Suspended ceiling system, comprising 600 mm × 600 mm × 12 mm thick mineral fiber tiles conforming to ASTM E1264 and ASTM E1477, with moisture resistance and fire performance tested to EN 13501-1 (Class A2-s1,d0 or equivalent). Tiles shall be factory-finished with anti-bacterial coating where specified. Installation shall be carried out on a galvanized steel suspension system comprising main runners, cross “T” sections, perimeter angles, threaded hanger rods, clips, and accessories, conforming to ASTM C635 and ASTM C636, with minimum steel thickness and galvanization as specified. All joints shall be aligned to achieve seamless grid finish; cut-outs shall be provided for light fixtures, diffusers, and other design features. Work shall include all required hardware, fixing arrangements, drilling, and grouting with approved non-shrink grout material. Execution shall be complete at any floor or height, in accordance with approved drawings, relevant standards,	Sft	24000	400	NSI	9600000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
435	ROOF FINISHES/TREATMEANT					
436	Providing and laying roof finishes/ treatment (Moisture & Thermal control) consisting of followings as per drawing & detail, standards, specifications, manufacturer's recommendations and directed by the Engineer at any height & any floor complete in all respect.				NSI	
437	Accessible Roof finishes					
438	Water proofing					
439	Provide and apply cementitious membrane AQUAFIN 2K/M water proofing over concrete slabs of roof including returning 300mm high all around the area/parapet wall complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.				NSI	
440	(Level +89'-0", +261'-0"and 312'-9")	Sft	16500	185		3052500
441	Water Proof membrane					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
442	Provide and apply waterproofing membrane horizontal surface on roof Plastomat PA 4000, 4mm thick of HY-GRIP or approved equivalent including primer coating overlapping levelling screed etc. complete as per instruction / recommendation of manufacturer's, specifications and entire satisfaction of the Engineer.				NSI	
443	(Level +89'-0", +261'-0"and 312'-9")	Sft	16500	185		3052500
444	Roof Insulation					
445	Providing & laying in position 2"(50mm) thick Diamond jumbolon-Board from Diamond Foam or approved equivalent having density 35kg/cum, over above levelling screed with rebated edge as per manufacturer's specifications, instruction & as shown in the drawing etc., complete in all respects as per drawings, specification and as directed by the Engineer.				NSI	
446	(Level +89'-0", +261'-0"and 312'-9")	Sft	16500	350		5775000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
447	Inaccessible Roof finishes					
448	Water proofing					
449	Provide and apply cementitious membrane AQUAFIN 2K/M water proofing over concrete slabs of roof including returning 300mm high all around the area/parapet wall complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.				NSI	
450	(Level +334'-6" and +329'-6")	Sft	4000	185		740000
451	Roof Insulation					
452	Providing & laying in position 2"(50mm) thick Diamond jumbolon-Board from Diamond Foam or approved equivalent having density 35kg/cum, over above levelling screed with rebated edge as per manufacturer's specifications, instruction & as shown in the drawing etc., complete in all respects as per drawings, specification and as directed by the Engineer.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
453	(Level +334'-6" and +329'-6")	Sft	4000	350		1400000
454	Water Proof membrane					
455	Provide and apply waterproofing membrane horizontal surface on roof Plastomat PG 4000, 4mm thick of HY-GRIP or approved equivalent including primer coating overlapping over reinforced screed. complete as per instruction / recommendation of manufacturer's, specifications and entire satisfaction of the Engineer.				NSI	
456	(Level +334'-6" and +329'-6")	Sft	4000	185		740000
457	Reinforcement Bars for Screeding					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
458	Providing and laying deformed steel reinforcement bars with and including the cost of straightening, removing twists, cutting, bending, binding, welding wastage, overlaps as are not shown in drawings and placing the steel in position, typing with binding wire complete including cost of binding wire and cement concrete 1:2:4 spacers etc, complete in all respects as per drawings, specification and as directed by the Engineer.	Kg	3000	350		1050000
459	EXTERNAL WALL FINISHES (BUILDING)					
460	Cementitious Water proofing Coating					
461	Provide and apply cementitious membrane AQUAFIN 2K/M / BASF / SIKA or equivalent approved water proofing over RCC concrete slabs and walls of any wet area e.g. Baths, terrace at any height in any floor etc. complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.	Sft	120000	200	NSI	24000000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
462	Decorative Plaster					
463	Providing and applying decorative Plaster 6mm to 8mm thick as per ASTM C926-22 of approved brand as per approved manufecturer list over rough cast plaster, comprising of cementitious binder, fine aggregate & special additives with approved colour shade as per instruction of manufacturer including scaffolding etc.,. All decorative Plaster finish to smooth flat in true level, line in plumb, maintain v-groove edges, dimension as mentioned & curing at any floor & any height in etc., complete in all respects and as per drawings, specifications and directions of the Engineer.	Sft	51000	350	NSI	17850000
464	Breathable Water repellent					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
465	Providing & applying breathable water repellent over external decorative plaster not less than 2 coats comprising of silane and siloxane based mixture as per BS 3003 serve as high quality general-purpose water repellents impregnation agents permanently protect decorative Plaster/concrete against moisture and microorganisms etc as per approved manufecturer list including scaffolding etc., at any floor & any height as per instruction of manufacturer, etc., complete in all respect, as per drawings, specifications and or as directed by the Engineer/ consultant.	Sft	51000	150	NSI	7650000
466	PARKING AREA ACCESSORIES					
467	Column Guard					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
468	Providing, fabrication & installation of MS Column Guards 2'-4" high, comprising of 2" dia x 3.2mm thick thick vertical pipe 2 nos filled with concrete, 2" dia x 3.2mmthick horizontal pipe welded with vertical pipe on two level @ 6" interval, to protection of columns corner, 8" x 8"x 5mm thick base plate with 4-holes in each plate welded with vertical pipe and fixed on basement slab by drilling & grouting, using shear bolts & approved epoxy for grouting, applying three coat of yellow colour glossy enamel paint including & over a coat of red oxide paint etc., complete in all respect specification and to the entire satisfaction of the Engineer. NOTE: Only top horizontal pipe will be measured for the payment.				NSI	
469	Same as above using 2" dia pipe 3-nos vertical pipe instead of 2 nos vertical pipe	Rft	100	6000		600000
470	Same as above using 2" dia pipe 4-nos vertical pipe instead of 2 nos vertical pipe	Rft	100	7500		750000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
471	Same as above using 2" dia pipe 6-nos vertical pipe instead of 2 nos vertical pipe	Rft	200	9000		1800000
472	Wheel Stopper					
473	Providing & fixing reflective tape molded wheel stopper comprising of rubber wheel stopper 24"x 5" x 4" high as approved from POLYCRAFT (Pvt) Limited or approved equivalent including fixing accessories in basement or where required complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.	Each	310	4000	NSI	1240000
474	Rubber Speed Hump/Breaker					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
475	Providing and fixing reflective rubber speed hump/road breaker, including end caps, manufactured from high-strength recycled or virgin rubber, resistant to UV radiation, oil, grease, water, abrasion, and vehicular impact, with thermal resistance from +120 °C to –12 °C. Modules shall be anti-skid, interlocking, middle section size 20" × 15" × 2" high and end cap size 7" × 15" × 2" high, fitted with integrated yellow reflective inserts/cat-eye reflectors or high-intensity reflective tape suitable for indoor and outdoor use. Installation shall include galvanized or stainless steel anchor bolts of minimum diameter and embedment depth, fixed into RCC/CC pavement using galvanized or stainless steel anchor bolts as per approved fixing system with non-shrink grout. Work shall be complete in all respects, including alignment, drilling, fixing hardware/accessories, and as per approved manufacturer’s specifications and directions of the Engineer.	Rft	200	4500	NSI	900000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
476	Convex Mirror					
477	Providing erection & installation 32" dia Convex Mirror consisting of Convex Mirror with stainless steel covering plate, pipes and other required accessories fixed on turning point and suitable locations for traffic drive way, fixing arrangement as per standard etc. complete in all respect, as per drawings, specifications and instructions of the Engineer.	Each	8	150000	NSI	1200000
478	Pavement Marking with Thermoplastic Paint					
479	Providing and applying Pavement Marking Reflective thermoplastic paint of approved make as specified locations etc. complete in all respect, as per drawings, specifications and instructions of the Engineer.(at any height in any floor)				NSI	
480	Yellow paint 5" Wide	Rft	7500	150		1125000
481	White paint 5" Wide	Rft	7500	150		1125000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
482	For Special persons	Each	8	2500		20000
483	Straight Arrow 10'-0" x 1'-0"	Each	60	2500		150000
484	One Side Turning Arrow 10'-0" x 1'-0"	Each	16	2500		40000
485	Mid Line Markings	Rft	600	100		60000
486	Charging Station Marks	Each	20	2500		50000
487	INTERIOR WORKS					
488	A) Schedule Items					
489	INTETRIOR CEILING FINISHES					
490	Providing, fabricating, fixing as per finishing schedule and attached drawing complete in all respect and as entire satisfaction The Architect/consultant.					
491	PlasticEmulsion Paint					
492	Painting with (ICI) Dulux plastic emulsion paint VIP of approved shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .	Sft	238300	87.581	Code #122 Item # 162	20870552.3

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
493	B) Non Schedule Items					
494	INTERNAL FLOOR FINISHES					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
495	FL-05 (LAMINATED WOOD 48" x 8") Providing and laying 8 mm thick laminated wood flooring panels of size 1220 × 200 mm (48" × 8"), manufactured from high-density fibreboard (HDF) core with decorative wood veneer surface, conforming to EN 13329 / ASTM standards. Panels shall be factory-finished with approved polish finish (matt/satin/gloss) and UV-resistant protective coating. Flooring shall be installed over approved underlay (foam or acoustic layer) to absorb impact and reduce sound transmission. Installation shall be carried out using click-lock or tongue-and-groove system, with spacers to maintain expansion joints as per manufacturer’s recommendations. Work shall include cutting, edge finishing, cleaning, and provision of all required accessories such as trims, transition profiles, end caps, and adhesives where specified. Execution shall be at any floor level, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	11440	600	NSI	6864000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
496	FL-06 (CARPET TILE 2'X2') Providing and laying of modular carpet tiles 50cm x 50cm / 25cm x 100cm. made with 100% Nylon, Multi-level loop, commercial - Heavy duty, ASTM E 648 Class I Flammability, Smoke density ASTM E 662 Less than 450 & static propensity passed at AATCC-134 ≤3.5kV, high density, wear resistant, stain resistant, color fade resistant, Mix-Bac® backing system, 15 years warranty, limited to health product declared, environmental quality declared EPD Approved, leed and sustainability certified manufacturer, Green Label and Green Label Plus certification, installation adhesive restricted to imported tackifier products, VOC-free, non-harmful for health, durable with approved color and pattern, provide facility to quick ship import as per project deadlines, i/c cost of tools, wastage, labor etc. complete according to drawings, specifications and instructions of architect / engineer in charge.	Sft	46950	1200	NSI	56340000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
497	FL-07 (EPDM Rubberized Floor 8MM thick) Providing and laying EPDM rubber floor in roll form 8mm thick of approved make, size and color for tensile strength, impact resistance, and shock absorption. Flooring shall be installed with approved bonding agent/adhesive, complete with all required underlay (not less than 6mm), edge trims, and accessories. Work shall be executed in full compliance with approved drawings, standards, and specifications, and/or as directed by the Engineer, complete in all respects.	Sft	1850	1400	NSI	2590000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
498	FL-12 (CARPET ROLL 4' WIDE) PRAYER AREA CARPET Providing and laying carpet roll, 4' wide, of approved make, colour, and texture, suitable for prayer area application, manufactured from high-quality synthetic or blended fibre with anti-static, fire-retardant, and stain-resistant properties, conforming to ASTM/EN standards, fixed on prepared floor surface using approved adhesive or underlay system, including cutting, edge finishing, fitting around columns, ducts, and outlets, surface preparation, cleaning, and protection of finished flooring, executed to true line, level, and plumb, complete in all respects as per approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Sft	4440	2100	NSI	9324000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
499	COUNTER TOP Providing, laying, and fixing pre-polished bull-nosed (half-round / “D”) granite of 20 mm thickness, with a minimum slab length of 1500 mm in a single piece, for use as a countertop in pantry areas or other designated locations. The work includes provision of a 40 mm thick RCC slab beneath the granite top, cutting and chiseling of RCC/CC members as required, and fixing with polymer-modified stone adhesive. Installation shall incorporate stainless steel dowels/brackets where necessary, using the approved bedding method, and executed strictly in accordance with the stone manufacturer’s recommendations. The work shall be completed at any height or floor level, in all respects, as per drawings, standards, specifications, and/or as directed by the Engineer.	Sft	715	2700	NSI	1930500
500	INTETRIOR WALL FINISHES					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
501	WL-01 PLY WOOD PASTED ON 1/2" THK. CEMENT BOARD POLISH FINISH Providing and fixing commercial-grade plywood of BWP/BWR type, conforming to BS 1088 / IS 710 (or equivalent), laminated over 12 mm (½") thick fibre cement board conforming to ASTM C1186 or EN 12467. The assembly shall be polish-finished and installed on hot-dip galvanized GI framing of approved section and thickness, with galvanization coating, anchorage, bracing, and installation carried out strictly in accordance with approved shop drawings. The finish shall include application of approved wood stain followed by clear polyurethane (PU) or melamine protective coating, with sealer and minimum required number of coats, in specified sheen (matt / satin / gloss). Work shall be executed at any height or floor level, complete in all respects as per drawings, standards, specifications, and/or as directed by the Engineer.	Sft	4790	1175	NSI	5628250

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
502	LAMINATED SHEET AND TACTILE SHEET Providing and fixing approved-grade & shade laminated sheet and tactile 16mm thick with GI frame over cement board partition including approved Pvc lipping, installation carried out strictly in accordance with approved shop drawings. Work shall be executed at any height or floor level, complete in all respects as per drawings, standards, specifications, and directed by the Engineer.				NSI	
503	a) WL- 02 (Glossed Laminated sheet approved shade)	Sft	1340	700		938000
504	b) WL-06 (High Glossed Laminated approved Marble pattern finish)	Sft	2640	850		2244000
505	c) WL-24 (Matt tactile approved Marble pattern finish)	Sft	4750	600		2850000
506	d) WL-28 (Laminated sheet green marble patterm)	Sft	2200	3500		7700000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
507	e) WL-34 (12mm thick Laminated sheet marble patterm)	Sft	50	750		37500
508	WPC FLUTED PANEL Providing and fixing high-density WPC panels in matt finish, conforming to the manufacturer’s specifications, Panels shall be installed on GI frame /masonry wall and pasted over cement board partition wall etc, approved section with specified fixing anchor, Work shall be executed at any height or floor level, complete in all respects as per drawings, standards, specifications, and/or as directed by the Engineer.	Sft	200	3350	NSI	670000
509	a) WL-03 (Up to122mm x 21mm thick in approved Dark finish & profile)	Sft	200	3350		670000
510	b) WL-04 (Up to122mm x 21mm thick in approved White finish & profile)	Sft	200	3350		670000
511	c) WL-05 (Up to122mm x 12mm thick in approved finish & profile)	Sft	360	3488		1255680

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
512	d) WL-20 (Up to122mm x 12mm thick in approved finish & profile)	Sft	100	5000		500000
513	WL-08 WOODEN RAFTERS POLISH FINISH Providing and fixing wooden rafters fabricated from Grade-A seasoned Ash wood 1-1/2" x 3" free from decay. Rafters shall be installed using MS brackets of powder colour coated, anchor bolts and screws etc, as per connection details, surface finishing shall include approved wood stain (Polish), sealer. Work shall be completed at any height or floor level, in all respects as per drawings, standards, specifications, and/or as directed by the Engineer.	Rft	1120	350	NSI	392000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
514	WL-10 PORCELAIN TILE 8'x4' MATT FINISH BATHROOMS Providing, fabricating, and installing matt finish porcelain tiles 2400 × 1200 mm/(8'-0" × 4'-0"), A-grade quality, in approved colour/shade and pattern, conforming to EN/ISO standards, fixed on wall surfaces includes laying the tiles over 3/4" thick cement-sand mortar 1:2 ratio & 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.	Sft	3990	3000	NSI	11970000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
515	WALL PAPER Providing and fixing/pasting approved wallpaper, applied over cement board partition and msonry wall Grasscloth wallpaper shall be of approved roll width, colour, texture etc. Additional works shall include surface prepration with filling putti, at any floor & anyr height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	18690	500	NSI	9345000
516	a) WL-11 Grass cloth wall Paper over proposed 12mm thick cement board partition Top & Bottom Lit with approved GI framing	Sft	18690	500		9345000
517	b) WL-18 Dark shade Grass cloth wall Paper over msonry wall	Sft	280	500		140000
518	c) WL-19 Approved shade Grass cloth wall Paper over msonry wall	Sft	1160	500		580000
519	d) WL-26 Approved shade texture shade wall Paper over msonry wall	Sft	2090	200		418000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
520	e) WL-29 Approved shade texture shade wall Paper over msonry wall	Sft	620	700		434000
521	f) WL-33 Approved shade wall Paper over msonry wall	Sft	430	700		301000
522	WL-12 (ACRYLIC SIGNAGE) Providing, fabricating and installing acrylic signage of approved colour 6mm thick sheet, design & size as per drawing using high-quality acrylic sheets conforming to relevant ASTM/BS/EN standards, including laser cutting, edge finishing, complete with stainless steel approved colour studs, and anchors etc, bonded with approved adhesive, surface preparation, alignment in true line, level at any floor level or height, complete in all respects as per approved drawings, manufacturer’s specifications, standards, and/or as directed by the Engineer.	Sft	540	1200	NSI	648000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
523	WL-13 DECORATIVE TEXTURE PAINT Providing and applying decorative texture paint of approved shade on plastered wall over and includung one coat of primer. Surface preparation shall include filling depressions with putty, rubbing, sanding and cleaning etc. Application shall be carried out at any floor & anyr height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	7250	200	NSI	1450000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
524	WL-14 CEMENT BOARD WALL. PAINT FINISH Providing and fixing 12 mm/ (½") thick fibre cement board conforming to ASTM C1186 or EN 12467, installed on GI framing comprising C-studs and U-tracks of approved section size, minimum steel thickness 0.55–0.75 mm (or as approved), Fixing shall be carried out with approved anchors, screws, and accessories, maintaining specified spacing and installation details. Joints shall be treated with approved joint tape and compound, including screw head filling. Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	7200	1150	NSI	8280000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
525	BOOK MATCH MARBLE PATTERN PORCELAIN TILE (8'-0" x 4'-0") WITH CEMENT BOARD BACKING Providing and fixing approved marble pattern porcelain tile cladding using 2400 × 1200 mm/(8'-0" × 4'-0"), tile shall be backed with 12 mm (½") moisture-resistant grade fibre cement board with GI framing, with & without back lit. The installation process includes laying the tiles over 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material and edge covered with approved metal trim Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
526	a) WL-15 (Book match marble patter tile)	Sft	750	2300		1725000
527	b) WL-17 (Book match marble patter tile with backlit)	Sft	160	2000		320000
528	CARBON FIBER VENEER PASTED ON WALLS & CEILING. Providing and fixing carbon fiber veneer sheets, comprising of 5mm thick approved colour carbon fiber veneer sheets bonded with silicone adhesive over plastered surface and accessories, installation shall be executed at any floor & any height, complete in all respects as per drawings, standards, specifications, and directed by the Engineer.	Sft	840	7000	NSI	5880000
529	a) WL-16 (Only on Wall & Cloumn)	Sft	840	7000		5880000
530	b) WL-27 (Only on Wall & ceiling)	Sft	120	8500		1020000

PUBLIC PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
531	WL-21 1"/25mm THICK MDF SHEET LASER CUT WITH PAINT FINISH. Providing and fixing 1"/25 mm thick MDF formaldehyde sheet having density 700 kg/m³ including laser cut of approved latter/design with approved colour acrylic paint over & including one coat of primer, Installation shall be carried out on with approved anchors, screws, spacing as per fixing details All required hardware and accessories shall be incuded. Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications and as directed by the Engineer.	Sft	60	1000	NSI	60000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
532	WL-22 MIRROR PASTED OVER APPROVED FRAMING SYSTEM Providing and fixing 6 mm thick copper-free silver mirror with safety backing film, distortion-free quality, Mirrors shall be installed over 12mm thick cement board cladding fixed with G.I framing system, mirror to be fixed with approved silicon, surrounding cover stain finished black colour SS304 frame 1-1/2" x 2" . Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications and directed by the Engineer.	Sft	260	2150	NSI	559000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
533	WL-23 MS MESH WALL WITH LATTERING & BACK LIT Providing and making MS Mesh wall comprising of approved colour powder coating MS mesh panels welded over 1" x 1" x 1/8" thick Ms tube framing system, MS Sheet lattering as per drawing, Installation shall be carried out on wall with 4" x4" 1/4" thick MS sheet base plate anchor with approved anchoring system and accessories, ensuring proper joint detailing, spacing, and alignment. Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications, and directed by the Engineer.	Sft	50	1400	NSI	70000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
534	WL-25 MARBLE RUNNER ON TOP EDGES. Providing and fixing marble runner comprising of 24"/600mm x48"/1200 mm x 3/4" thick, fixed in approved pattern using spacers up to 2 mm to maintain uniform joints. Marble tile shall be procured from approved manufacturer in specified colour/shade. Installation shall be carried out on wall surfaces using C2 polymer-modified tile adhesive (or equivalent) suitable for porcelain and marble cladding, with joints filled using compatible grout as recommended by the adhesive manufacturer. Work shall include all associated tasks such as cutting, edge finishing, cleaning, curing, and protection of finished surfaces. Execution shall be at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	600	600	NSI	360000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
535	WL-30 DRY CLADDING (TRAVERTINE STONE) Providing, fabricating, and installing dry-clad travertine stone panels of approved shade, upto 10Sft, 3/4"/20mm thickness, and shade, conforming to ASTM/EN standards, fixed on wall surfaces using mechanical cladding system comprising stainless steel anchors, kerfs, dowels, brackets and supported hardware, ensuring proper load transfer and thermal movement allowance, including cutting, edge finishing, joint treatment, expansion joints, and sealing where required, executed with scaffolding, alignment, and installation to true line, level, and plumb, complete with all accessories and fixing arrangements, at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Sft	14950	2500	NSI	37375000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
536	WL-31 8MM TEMPERED BLACK TINTED GLASS CLADDING ON WALLS Providing and fixing 8 mm thick tempered black tinted glass cladding on wall, column or where required, conforming to ASTM C1048, EN 12150, or equivalent. Glass panels shall be distortion-free, with polished edges and safety performance. Installation shall be executed using stainless steel stand-off fittings in SS304 grade, Fixing shall include stud diameter, spacing, anchor bolts, and layout details in accordance with approved shop drawings. All required hardware and accessories. Work shall be completed at any floor level or height, in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	12450	2000	NSI	24900000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
537	WL-32 POWDER COATED CNC CUT M.S SCREEN Providing and fixing approved powder coating CNC-cut metal panels with MS framing system 2" x"x1/8" thick with approved anchoring. Installation shall be carried out on wall surfaces framing, anchors, screws, and accessories, ensuring proper joint detailing, spacing, and alignment. All required hardware and accessories shall be provided. Work shall be executed at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	470	1850	NSI	869500

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
538	WL-36 DECORATIVE PLASTER Providing and applying 6 mm thick decorative plaster, pigmented and of approved make (e.g., Ressi Plastored 110 from RESSICHEM or equivalent), with or without comb finish, applied over rough-cast plaster. The work shall include formation of grooves, drip courses, jambs, bends, corners, and recesses, as well as hacking of uneven concrete surfaces to ensure proper bonding. Execution shall involve scaffolding, curing, and finishing to true line, level, and plumb, carried out at any floor level or height. The work shall be completed in all respects as per approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Sft	610	350	NSI	213500

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
539	PVC Molding Providing and fixing PVC molding of approved profile, size, and colour, manufactured from rigid polyvinyl chloride (PVC) compound conforming to relevant ASTM/EN standards. Installation shall be carried out using approved adhasive. Joints shall be aligned, mitred, and finished uniformity. Execution shall be at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Rft	6720	350	NSI	2352000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
540	MT-01 (T PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER) Providing, fabricating, and installing T-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Rft	2590	850	NSI	2201500

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
541	MT-02 (FLAT PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER) Providing, fabricating, and installing Flat-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Rft	140	850	NSI	119000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
542	MT-03 (L PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER) Providing, fabricating, and installing L-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as edge trim, corner protection, or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Rft	100	850	NSI	85000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
543	MT-04 (U GROVE PROFILE - 1/4" WIDE ALUMINUM - CHROME BLACK) Providing, fabricating, and installing U-groove profile sections of aluminum, 1/4" wide, finished in chrome black anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as decorative groove, divider, or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Rft	1470	1250	NSI	1837500

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
544	MT-05 (FLAT PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER) Providing, fabricating, and installing Flat-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Rft	550	850	NSI	467500

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
545	MT-06 (FLAT PROFILE 1" WIDE ALUMINUM - CHROME BLACK) Providing, fabricating, and installing Flat-profile sections of aluminum, 1" wide, finished in chrome black anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Rft	2950	1250	NSI	3687500

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
546	MT-07 (FLAT PROFILE 3" WIDE ALUMINUM - CHROME SILVER) Providing, fabricating, and installing Flat-profile sections of aluminum, 3" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Rft	40	1700	NSI	68000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
547	CEMENT BOARD WALL (4" THICK) Providing and constructing 100 mm (4") thick cement board partition wall including insulation comprising double-layer fibre cement boards of approved make conforming to ASTM C1186 / EN 12467, fixed on a complete framing system of GI C-studs and U-tracks, minimum steel thickness 0.55–0.75 mm, hot-dip galvanized to G90/Z275 coating, installed with approved anchors, screws, and accessories, including joint treatment with tape and compound, screw head filling, sanding, and finishing, surface preparation with primer and putty where required, and final finishing with emulsion paint or other specified coating, executed to true line, level, and plumb at any floor level or height, complete in all respects as per approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Sft	30500	1700	NSI	51850000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
548	INTETRIOR CEILING FINISHES					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
549	CL-06 (CARBON FIBER VENEER) Providing, fabricating, and installing 5 mm thick carbon fibre veneer sheets, bonded with silicone adhesive to 12.5 mm thick gypsum board conforming to ASTM C1396 / BS EN 520, including specification of board type, manufacturer, and performance requirements. Installation shall be carried out using a GI ceiling suspension system comprising main channels, furring channels, and perimeter angles, with minimum steel thickness as specified, proper suspension spacing, hanger details, and galvanization, all in compliance with ASTM C645 / ASTM C754 or equivalent standards. The work shall include all required hardware and fixing arrangements, cutting and forming openings for light fixtures and other design features, and finishing with three coats of matte enamel paint of approved make and colour shade, applied over one coat of primer, with surface preparation including putty filling as required. Execution shall be completed at any floor level or height, in full conformity with approved drawings,	Sft	2300	7000	NSI	16100000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
550	CL-07 (BAYRISOL FABRIC CEILING) Providing, fabricating, and installing Bayrisol PVC/Polyester stretch fabric ceiling system comprising non-flammable vinyl membrane of approved thickness and finish, conforming to EN ISO 9001, EN ISO 14001, EN ISO 50001, EN ISO 45001, EN ISO 11654, EN 14716, and EN 13501-1 fire classification standards, fixed with proprietary perimeter rails in aluminum/PVC profiles, tensioned and installed by heating and stretching method with minimum plenum depth as specified, including accessories such as acoustic backing, luminous integration, light fixtures, diffusers, suspension hardware, stainless steel fasteners, hangers, and fixing arrangements, complete with cutting and forming openings for light fixtures, ducts, sprinklers, and other design features, finished to true line, level, and plumb, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer, complete in all respects.	Sft	1700	9000	NSI	15300000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
551	CL-08 (MDF ROUND CEILING 24", 18" , 12" DIA) Providing, fabricating, and installing modular MDF ceiling panels of approved make and finish, fixed on MS pipe support framework comprising main runners, cross tees, perimeter angles, hangers, and suspension system of specified minimum steel thickness, duly galvanized and conforming to relevant ASTM/BS/EN standards, including all required hardware, fixing arrangements, cutting and forming openings for light fixtures, ducts, sprinklers, and other design features, surface preparation with putty, primer, and finishing coats of approved paint and colour shade, executed to true line, level, and plumb at any floor level or height, complete in all respects as per approved drawings, manufacturer’s specifications, standards, and/or as directed by the Engineer.	Sft	4000	1000	NSI	4000000
552	WALL PARTITIONS & FIXED GLAZING					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
553	FIXED GLAZING Providing and installing fixed glazing system comprising clear/coloured/tinted toughened or laminated glass panels of approved make and thickness (minimum 10–12 mm or as specified), conforming to ASTM C1048 / EN 12150 standards for safety glazing, fixed in aluminum framing system with powder-coated/anodized finish, using EPDM gaskets, silicone sealant, spacers, and stainless steel fasteners, including cutting, edge finishing, joint sealing, cleaning, and protection of installed glazing, executed to true line, level, and plumb at any floor level or height, complete in all respects as per approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Sft	12520	1600	NSI	20032000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
554	GLASS PARTITION WALL LOW HEIGHT Providing and installing low-height glass partition wall comprising toughened/laminated glass panels of approved make and thickness (minimum 8 mm or as specified), conforming to ASTM C1048 / EN 12150 standards for safety glazing, fixed in powder-coated/anodized aluminum framing system with EPDM gaskets, silicone sealant, spacers, and stainless steel fasteners, including cutting, edge finishing, joint sealing, cleaning, and protection of installed partition, executed to true line, level, and plumb at any floor level, complete in all respects as per approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.	Sft	3440	1600	NSI	5504000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
555	PHENOLIC CUBICAL PARTITION WALL SYSTEM Providing, fabricating, fixing & Installation Phenolic Partitions wall system in wash room and where required, high-pressure phenolic resin compact laminate conforming to ASTM E84 / EN 438 / EN 13501-1 standards for fire resistance, moisture resistance, and impact durability of approved manufacturer or equivalent including edge trims, all required accessories for framing such as legs, bracket, hinges etc are paid as seaperate item as mentioned below Partitions and doors, of approved colour as per manufacturer's specification up to required height, complete in all respect as per drawing, specifications and entire satisfaction of the Engineer.				NSI	
556	i) Phenolic core Sheet 12mm thick (complete Cubical Partitions wall & Doors) without accessories	Sft	3200	3200		10240000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
557	ii) SS 304 Cubical Partitions hollow leg 200mm high (SS Stain Finished) with fixing accessories.	Each	264	2500		660000
558	iii) SS 304 Wall Bracket (L type) 3mm thick (SS satin finished)	Each	360	500		180000
559	iv) SS 304 Wall Bracket (double " L & T" type) 3mm thick (SS satin finished)	Each	170	1600		272000
560	iv) SS304 Hinges with cover & screw (SS satin finished)	Each	198	4000		792000
561	v) SS304 Indicator Turn Lock (SS satin finished)	Each	66	3200		211200
562	vi) SS304 Head Rail (Required length in one piece with out any joint)	Rft	220	350		77000
563	vii) SS304 Coat Hook (SS satin finished)	Each	66	1200		79200
564	EXTERNAL DEVELOPMENT WORKS					
565	Damp Proof Course (DPC)					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
566	Providing and laying 2 inches (51 mm) thick damp proof course with cement concrete 1:2:4 cast in situ using graded screened bajri of 3/4 inch (19 mm) and down gauge mixed with any approved water proofing agent including compacting, curing form work and its removal etc. complete, but excluding the cost of water proofing agent .				Code #108 Item # 03	
567	i) Boundary Wall	Sft	400	72.215		28886
568	ii) Guard Room & Guard Rest Room	Sft	200	72.215		14443
569	Pudlo					
570	Extra for using water proofing agent pudlo in item Nos. 1,2 and 3 (quantity to be used as per manufacturer's specification).	Kg	45	233.012	Code #108 Item # 05	10485.54
571	Solid Block Masonry Walls.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
572	Providing and laying 1:3:6 cement concrete machine made solid block masonry 4 to 6 inches (102 mm to 152 mm) thick using crushed graded boulders 3/4 inch (19 mm) and down gauge instead of screened bajri, set in cement sand mortar 1:6 instead of lime cement mortar 1:1:6 including scaffolding, raking out Joints and curing etc. complete in ground floor superstructure.			454.64	Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+	
573	i) Boundary Wall	per Cft	2345	454.64		1066130.8
574	ii) Guard & Guard Rest Room	per Cft	1675	454.64		761522
575	Rough Cast Cement Plaster					

PUBLIC PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
576	Providing and applying 3/4" (19 mm) thick rough cast cement rendering consisting of 3/8" or 8.6 mm topping of 1:2 (one cement and two mixed graded bajri 3/8" or 8.5 mm and down gauge) and base of 3/8" or 8.5 mm thick rough plaster 1:4 (one cement four sand) in plinth and ground floor including finishing etc. complete .				Code #122 Item # 22	
577	i) Boundary Wall	Sft	12500	87.23		1090375
578	Finishing works of Guard Room & Guard Rest Room					
579	Cement Plaster					
580	1/2" (13 mm) thick cement plaster 1:6 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, comers, and curing etc., complete.				Code #122 Item # 06	
581	i) Ceiling	Sft	1000	52.455		52455
582	ii) Wall	Sft	3000	52.455		157365
583	Distemper					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
584	Distempering with vinyle distemper (ICI) Dulux Paintex of approved make and shade in two coats over and including the cost of wall putti, sand papering, dusting, and filling the holes, cracks and inequalities, if any, at any height in any floor.				Code #122 Item # 151	
585	i) Ceiling	Sft	1000	44.213		44213
586	Plastic Emulsion Paint					
587	Painting with (ICI) Dulux plastic emulsion paint VIP of approved shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .				Code #122 Item # 162	
588	i) Wall	Sft	3000	87.581		262743
589	Flooring, Skirting & Dado					
590	Porcelain Tile Flooring including Skirting & Dado					

PUBLIC PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
591	Providing and laying light colour, glazed/non skid vitrified Porcelain tiles (Polished) not exceeding 1600 Sqcm each, (Pak made) on walls and floors, in any floor, laid with dry bond (stile bond) over a base of 1" thick cement mortar (1:3) including jointing to tiles with joint filler of approved quality as per direction of the Engineer incharge.				Code #117 Item # 179	
592	Glazed Full Body Porcelain Tiles 24" x 24" x 1/2" thick	Sft	1000	468.221		468221
593	Roof Finishes/Treatment					
594	PCC Roof Screeding (Flooring)					
595	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using crushed graded boulders 3/4 inch (19 mm) and down gauge instead of screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.				Code #117 Item # 7+	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
596	i) Guard Room Roof (2-Nos)	Sft	162	124.31		20138.22
597	EXTERNAL WALL FINISHES					
598	Cement Plaster					
599	3/4'' (19 mm) thick cement plaster 1:4 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, and curing etc., complete.	Sft	800	69.36	Code #122 Item # 08	55488
600	Weather Resistance Paint					
601	Painting three coats with weather shield paint deluxe (ICI) make of approved shade on plaster surface (External) and including the cost of cleaning the surface, sand papering etc. complete at any height in any floor.	Sft	800	57.317	Code #122 Item # 172	45853.6
602	CONCRETE TILES PAVERS AND FLOORING					
603	Concrete Pavers					

PUBLIC PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
604	Providing and laying in floor C.C. 1:2:4: tuff paver 2-1/2" thick of approved design and colour pattren laid on sand cushion filling of joint with sand and warring etc. complete as per direction of Engineer Incharge. (the cost of sand cushion is included)				Code #117 Item # 178	
605	a) Average strength 7000 psi	per Sft	15000	157.794		2366910
606	b) Average strength 5000 psi	per Sft	5500	130.975		720362.5
607	Extra for using water proofing agent pudlo in item Nos. 1,2 and 3 (quantity to be used as per manufacturer's specification).	per Kg	125	233.01	Code #108 Item # 5	29126.25
608	PCC Flooring					
609	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.	per Sft	3000	124.319	Code #117 Item # 7	372957

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
610	Kerb Stone					
611	Providing and laying kerb stone 18" x 12" x 6" (457 mm x 305 mm x 152 mm) obtained from approved quarry, chisel dressed on top and sides, laid in cement mortar 1:4 ruled cement pointing in cement mortar 1:3 including cost of excavation and back filling of excavated stuff and its disposal within one chain lead as desired.	Rft	1800	273.98	Code #127 Item # 113	493164
612	B) Non Schedule Items					
613	Decorative Plaster					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
614	Providing and applying decorative plaster system, 6 mm to 8mm thick, comprising cementitious binder, fine aggregate, and special additives with approved colour & shade as per brand listed in the manufacturer list. The decorative plaster system shall comply relevant ASTM C926-22/BS EN 998-1and BS EN 13914-1 and BS EN 13914-2 standards for cementitious decorative coatings. Substrate shall be sound, fully cured, clean, dry, and roughened where required, prepared strictly in accordance. Alkali-resistant fiberglass mesh shall be provided at construction joints, corners, and crack-prone locations where required, works including number of coats, approved texture/finish, curing, protection, scaffolding, alignment, maintaining v-groove edges and dimensions as shown, and be executed at any floor or height, complete in all respects, in accordance with approved drawings, specifications, and directions of the Engineer.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
615	i) Boundary Wall	Sft	12500	350		4375000
616	Breathable Water repellent					
617	Providing & applying breathable water repellent over external decorative plaster not less than 2 coats comprising of silane and siloxane based mixture as per BS EN 1504-2 or equivalent standard, serve as high quality general-purpose water repellents impregnation agents permanently protect decorative Plaster/concrete against moisture and microorganisms etc as per approved manufecturer list including scaffolding etc., at any floor & any height as per instruction of manufacturer, etc., complete in all respect, as per drawings, specifications and or as directed by the Engineer/ consultant.				NSI	
618	i) Boundary Wall	Sft	12498.5	150		1874775
619	Coping & Cladding On Boundary Wall					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
620	Providing and fixing approved pre-polished/honed Sill Batta stone coping & cladding using different sizes & thickness as per drawing for wall & column and where required, fixed with approved design pattern including & over 3/4" thick cement-sand mortar 1:2 ratio using grey cement and screened sand, 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.	Sft	3000	850	NSI	2550000
621	Coping with 1-1/2" thick pre-polished Sill Batta stone Half D-Shape gola and drip course	Sft	3000	850		2550000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
622	Cladding On Boundary Wall with 24" x12" x3/4" thick pre-polished Sill Batta stone	Sft	3000	850		2550000
623	Metal Fence					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
624	Providing, fabricating, welding, erecting, and fixing in position MS fence 6' high, using structural steel conforming to ASTM A36 for solid sections and ASTM A500 Grade B/C for hollow sections (or equivalent BS EN 10025 / EN 10219 standards), Fence posts shall be 25 × 25 mm (1" × 1") solid square bar conforming to ASTM A36, with horizontal members of 50 × 50 × 3.2 mm (2" × 2" × 1/8") hollow tubes conforming to ASTM A500 Grade B/C, provided at top, bottom, and vertical sides. Base plates shall be minimum 200 × 200 × 10 mm thick, fabricated from ASTM A36 steel, fixed with anchor bolts of ASTM F1554 Grade 36/55, minimum M16 size, embedded 200 mm in reinforced concrete foundation. Surface preparation & apply 2 coats of approved industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer. Fabrication and welding shall comply with AWS D1.1 or BS EN ISO 3834 / EN 1090, including grinding, weld finishing, and dimensional tolerances. Works shall include excavation, backfilling, reinforced concrete	Rft	400	18500	NSI	7400000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
625	MS Gate					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
626	Providing, fabricating, welding, erecting, and fixing in position MS gate comprising outer frame of 50 × 50 × 3.2 mm (2" × 2" × 1/8") outer frame of square hollow section conforming to ASTM A500 Grade B/C (or BS EN 10219), with infill members of 25 × 25 mm (1" × 1") solid square bar conforming to ASTM A36 (or BS EN 10025), spaced at 175 mm (7") c/c horizontally. Gate shall include two vertical posts of 150 × 150 × 5 mm (6" × 6" × 5.16 mm) hollow section conforming to ASTM A500 Grade C (or EN 10219), complete with hinges, L-drops (2 nos), drop bolts/floor bolts (2 nos), heavy-duty bearing wheels, wheel track fabricated from 75 × 75 × 6 mm (3" × 3" × 1/4") MS angle, and hold-fasts at 600 mm (24") c/c. Surface preparation & apply 2 coats of approved industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer. Fabrication and welding shall comply with AWS D1.1 – Steel (or BS EN ISO 3834 / EN 1090), including grinding, weld finishing, and dimensional tolerances. Complete in all respects as per drawings, standard,				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
627	Main Gate with wheel & wheel track (17'-0" x 7'-0")	Sft	500	3500		1750000
628	Gate without wheel & wheel track (6'-0" x 7'-0")	Sft	150	3500		525000
629	Metal Louvered					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
630	Providing, welding, fabricating and fixing in position MS louvered fixed panels comprising of MS tube 2"x 2"x 12 Swg (50mmx50mmx2.77mm) main frame horizontal & vertical, 14 Swg (2mm) thick MS sheet for louvers @ 1-1/4" center to center as per drawing & design, main frame fixed on wall with hold fast using 9" long hold fast 4 Nos in each sides, shutter fixed with hinges 4 Nos in each sides on the frame, Surface finished with one coat of approved zinc-phosphate epoxy primer & three coats of approved industrial synthetic enamel paint. Installation shall include cutting holes for holdfast, grouting, alignment, and all accessories required for complete fixing, complete in all respects, at any floor and height, in accordance with approved drawings, specifications, and directions of the Engineer.	Sft	1200	2100	NSI	2520000
631	Steel Structure Shade with Polyacrbonite sheet Roofing					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
632	Design, drawing, providing, fabricating, welding, erecting, and installing Steel Structure Shade comprising MS steel columns, beams, and bracing, including anchoring, surface preparation, and protective coating. Structural steel shall conform to ASTM A36 for solid members and ASTM A500 Grade B/C for hollow sections (or equivalent BS EN 10025 / EN 10219 standards), with minimum yield strength ≥ 250 MPa (A36) and ≥ 290–345 MPa (A500). All fabrication and welding shall comply with AWS D1.1 – Steel (or BS EN ISO 3834 / EN 1090), including grinding, weld finishing, and dimensional tolerances. Surface preparation & apply 2 coats of approved industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer as required, Roofing shall be covered with polycarbonate sheet panels over ramp of thickness as approved, UV-resistant, fire-retardant, conforming to EN 16153 (or ASTM D3935 for polycarbonate resins, fixed with self-drilling screws and aluminum flashing profiles. Designed and constructed	Sft	4100	3500	NSI	14350000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
633	STAIRCASE GLASS RAILING					
634	Providing, fabricating, welding & fixing in position Stainless Steel Glass Railing floor moundted 900mm high from FFL with SS grade 304 (IIL or approved), comprising 2" dia SS pipe as hand rail, 10mm thick S.S balustrade welded to handrail, including fixing 10mm thick tempered glass with S.S clamp, 1/4" thick base plate bolted to wall, height and detail as shown in drawing, including all fixing arrangement with SS hardware etc., complete in all respect as per drawing, standard, specifications and direction of the Engineer.	Rft	100	4500	NSI	450000
635	Finishing works of Guard Room & Guard Rest Room					
636	Flooring, Skirting & Dado					
637	Levelling Screed					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
638	Providing & laying 1:4 cement sand mortar levelling screed under tiles or where required at any Floor any height complete in all respect and as per drawings, specifications and directions of the Engineer.	Cft	100	750	NSI	75000
639	Ceramic Tile Flooring including & Dado					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
640	Providing and fixing glazed ceramic tiles measuring 600 × 300 × 10 mm (24" × 12" × 3/8") on floor & wall surfaces, in accordance with the finishing schedule. Tiles shall be fixed using polymer-modified cementitious tile adhesive conforming to EN 12004 (Class C2TE) or ASTM C482/C627, applied over properly prepared substrate. Joints shall be filled with approved polymer-modified grout conforming to EN 13888 (CG2) or ASTM C118. Installation shall include proper jointing, alignment, washing, and grouting with manufacturer - recommended material. Additional tasks such as cutting, edge finishing, cleaning, curing, and protection of finished surfaces are part of the comprehensive installation process. Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	Sft	350	575	NSI	201250
641	Door Frame, Shutter and Windows					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
642	Hollow Core Flush Type Metal Door					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
643	Providing, welding, fabricating and fixing in position approved colour powder-coated MS hollow flush door shutter including frame of 2" x 5" x16 gauge (1.6 mm) MS sections with single rebate 38 mm × 12 mm (1-1/2" × 1/2"), shutter 38 mm (1-1/2") thick faced both sides with 20 SWG (0.9 mm) GI sheet conforming to ASTM A653/A653M coating designation, reinforced with “C” channel bracing and cross bracing, filled with honeycomb kraft paper core, with or without vision panel and louvers, including 6 mm clear laminated safety glass fixed with EPDM gasket and metal trim, and all required hardware excluding ironmongery, at any floor and height, in accordance with drawings, specifications, and Engineer’s directions. Note: Cost of ironmongery such as hinges, locks, handles, closers, etc. shall be paid under separate items as per hardware schedule.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
644	a) Type-1 (Without Vision Panel and louvers)	Sft	40	11400		456000
645	b) Type-2 (Without Vision Panel and with louvers)	Sft	48	10100		484800
646	c) Type-3 (With Vision Panel and without louvers)	Sft	24	10000		240000
647	d) Type-4 (With Vision Panel and louvers)	Sft	40	9000		360000
648	Aluminum Fixed Glazing with Openable Windows					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
649	Providing, fabricating, and fixing in position double-glazed sliding aluminum windows, comprising one fixed panel and one openable shutter, manufactured from approved colour anodized premium quality aluminum sections of 100 mm width × 2 mm thickness, conforming to Alloy 6063-T5 and complying with ASTM B221 or EN 755 extrusion standards, using Prime, Chawla, or equivalent approved sections, securely fixed to RCC/CC structure. Glazing shall consist 6 mm clear laminated safety glass, conforming to ASTM C1172 / EN 14448. Glass shall be sourced from approved local manufacturers (Ghani Glass, Tariq Float, or equivalent) and fitted with EPDM/Neoprene gaskets. All hardware and accessories including hinges, handles, stays, locks, and screws shall be of aluminium or SS304, installed in accordance with manufacturer’s recommendations. Silicone sealant conforming to ASTM C920 / EN ISO 11600 shall be applied to all external junctions between structure, wooden packing, and window frame to ensure water- and wind-proof sealing. Surface treatment shall	Sft	72	3500	NSI	252000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
650	Roof Finishes/Treatment					
651	Rain Water Spouts					
652	Providing, Making and Fixing in position R.C.C Precast Rain Water spouts (size as shown in drawing)/ 24" x 16" x 2.5", complete in all respect as per drawing, specification and directed by the engineer.	Each	2	7000	NSI	14000
653	Water proofing					
654	Provide and apply cementitious membrane AQUAFIN 2K/M water proofing over concrete slabs of roof including returning 300mm high all around the area/parapet wall complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.				NSI	
655	Guard Room Roof (2-Nos)	Sft	150	185	i)	27750
656	Under Concrete Tile & Pavers	Sft	27750	185	ii)	5133750
657	CONCRETE TILES PAVERS AND FLOORING					
658	Concrete Tiles					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
659	Providing, laying and fixing Pre-cast concrete tiles 12" x 12" and 18" x 18", 1-1/2" thick complying with ASTMC936/C936M / BS EN 1339, strength of tiles not less than 3000 psi or approved equivalent, The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar mix 1:2 ratio & 1/4" thick neat cement slurry, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. The entire work is to be completed precisely as outlined in the provided drawings, specifications, and as directed by the Engineer.	Sft	7000	950	NSI	6650000
660	Power float with & without fishbone grooves.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
661	Applying power floating including making fishboan grooves over PCC concrete flooring (Item # 13 of CSR) on ramp, driveway, parking and or where required, laid in approved size panels as per drawing, including compacting, leveling, finishing and curing etc., complete in all respects as per drawing, standard, specifications and directed by the Engineer.					
662	i) Power float with fishbone grooves. (FLOOR TYPE - FL 20A)	Sft	1500	175		262500
663	ii) Power float without fishbone grooves. (FLOOR TYPE - FL 20B)	Sft	1500	150		225000
664	Foam Concrete					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
665	Providing & laying Foam concrete over RCC slab or where required, the density of Foam concrete shall not be greater than be 12kn/m3 and should have minimum compressive strength of 7 Mpa at 28 days including cement, pre-formed foam, admixtures, water, batching, pumping, placing, finishing, testing, curing at any height & any floor as per drawing standard specification etc., complete in all respect as per drawings and as directed by the Engineer.	Cft	10000	1000	NSI	10000000
666	Neoprene Rubber Board					
667	Providing & pasting/fixing10mm thick Neoprene Rubber Board for separating the foam concrete or where required, at any height & any floor as per drawing standard specification etc., complete in all respect as per drawings and as directed by the Engineer.	Rft	150	600	NSI	90000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
668	Pavement Marking with Thermoplastic Paint					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
669	Providing and applying pavement marking with hot-applied thermoplastic paint, conforming to BS EN 1871 & BS EN 1436, with glass beads for retro-reflectivity as per ASTM D6359/EN 1423. Material shall be high-strength thermoplastic, resistant to UV radiation, oil, grease, water, abrasion, and vehicular impact, with skid-resistant and anti-fade properties. Surface preparation shall include cleaning, drying, and removal of dust, grease, and laitance, substrate shall be sound. Application shall be carried out using approved thermoplastic applicator machine at a temperature of 180–200 °C, with uniform thickness of 2.5–3 mm, applied in two coats (primer + thermoplastic), ensuring proper bonding with pavement. Markings shall be executed as per approved colour shade, executed at any floor level or height, in full compliance with approved drawings, manufacturer’s specifications, relevant standards, and/or as directed by the Engineer.				NSI	

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
670	Yellow paint 5" Wide	Rft	7500	150		1125000
671	White paint 5" Wide	Rft	7500	150		1125000
672	For Special persons	Each	8	2500		20000
673	Straight Arrow 10'-0" x 1'-0"	Each	60	2500		150000
674	One Side Turning Arrow 10'-0" x 1'-0"	Each	16	2500		40000
675	Two Sides Turning Arrow 10'-0" x 1'-0"	Each	10	3000		30000
676	Mid Line Markings	Rft	100	100		10000
677	Rubber Speed Hump/Breaker					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
678	Providing and fixing reflective rubber speed hump/road breaker, including end caps, manufactured from high-strength recycled or virgin rubber, resistant to UV radiation, oil, grease, water, abrasion, and vehicular impact, with thermal resistance from +120 °C to –12 °C. Modules shall be anti-skid, interlocking, middle section size 20" × 15" × 2" high and end cap size 7" × 15" × 2" high, fitted with integrated yellow reflective inserts/cat-eye reflectors or high-intensity reflective tape suitable for indoor and outdoor use. Installation shall include galvanized or stainless steel anchor bolts of minimum diameter and embedment depth, fixed into RCC/CC pavement using galvanized or stainless steel anchor bolts as per approved fixing system with non-shrink grout. Work shall be complete in all respects, including alignment, drilling, fixing hardware/accessories, and as per approved manufacturer’s specifications and directions of the Engineer.	Rft	50	4500	NSI	225000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
679	Staniless Steel Lettering With Backlight					
680	Providing, making & fixing Staniless steel Lettering with backlight arrangements on entrance wall of Elevation #1 comprising of SS 304, 1.626mm (16 Swg) thick sheet, size of each letter 250mm x 300mm high. The lettering "SECURITIES & EXCHANGE COMMISSION OF PAKISTAN." in capital letters as per drawing including all required fixing accessories & required hardwares, drilling & epoxy grouting, backlight scaffolding & pranches etc., true line & level, plumb. complete in all respect as per drawing, specifications and direction by the Engineer.	Each letter	39	7000	NSI	273000
681	Wall Mounted sign, Logo with Lettering					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
682	Providing, making, and fixing wall-mounted stainless steel signage/logo with lettering, overall size 6'-0" × 7'-0" (1800 mm × 2100 mm), fabricated from SS304 conforming to ASTM A240, minimum 1.6 mm thick, Satin finish as shown on drawings. Signage letters in upper case “SECP” and Urdu lettering with approved colour engraving and symbols, approved SS threaded studs at 300 mm c/c. Signage shall incorporate IP65/IP67 LED backlighting with approved colour temperature (3000K - 6500K), concealed wiring, installation in accordance with IEC standards and manufacturer’s recommendations. Mounting shall be with SS304 anchor bolts / chemical anchors, epoxy fixing. Specify concealed conduits, waterproof cable joints and weatherproofing suitable for exterior exposure. Submission of shop drawings, font layout, mock-up, illumination test and manufacturer’s warranty shall be required prior to fabrication and installation. Complete in all respects including all required hardware, drilling, grouting, scaffolding, alignment, line, level, and	Job	1	300000	NSI	300000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
683	ELECTRICAL WORKS					
684	DRY TYPE POWER TRANSFORMERS					
685	All items under this head to be carried out as per technical specifications and approval, Drawings, relevant BSI /ASTM Standards, IEC regulation, complete in all respect and to the entire satisfaction of the Employer, and as mentioned in General Notes or noted otherwise, Including providing of shop and as built drawings. complete in all respects.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
686	Supply, installation, testing and commissioning of following 11 / 0.4kV, 50 Hz, Dyn11, 3 phase, 4 wire, Dry type Transformer (Alu/Alu) for Indoor use with IP-31 enclosure, including connection with MV cables and Busbars, foundation pad as per manufacturer recommendation, Connection of neutral and body earthing to the provided earthing system and necessary installation accessories etc. as per drawing, specifications, data sheets, complete in all respects including testing at factory Permisses expenditure as mentioned in Clause 8 of specific provision (specification)..					
687	2000 kVA Dry Type Transformer	No.	3	19426110		58278330
688	MEDIUM VOLTAGE SWITCHGEARS					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
689	All items under this head to be carried out as per technical specifications and approval, Drawings, relevant BSI /ASTM Standards, IEC regulation, complete in all respect and to the entire satisfaction of the Employer, and as mentioned in General Notes or noted otherwise, Including providing of shop and as built drawings. complete in all respects.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
690	Supply, installation, testing and commissioning of following 11kV Medium Voltage Switchgears, indoor floor standing totally enclosed, dust protected, vermin proof, sheet metal clad cubical type, 3-phase 3-wire 50Hz in free standing design including all accessories with a set of 3-phase insulated 630 Amp copper bus bars, control wiring with cleats and ferrules, earthing bar connecting studs, manual charging handle, cable sockets, designation labels, holding bolts, incoming and outgoing VCBs, disconnect / earth switches and other components as per drawings, specifications and approvals, complete in all respect.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
691	Consumer MV Switchgear 11kV MV Switchgears Panel with 1 No. Incoming 630A VCB and 3 Nos. Outgoing 630A VCBs including Surge Arrestor, earthing switch etc., complete in all respects as per the relevant authority approval and instructions / guidance of the Engineer-in-Charge.	Job.	1	16815400		16815400
692	Supply and installation / laying of following Accessories / Signs as per drawings and specifications, including all mounting accessories, complete in all respects.					
693	Supply and laying of 600mm wide, 6mm thick Rubber mat piece to be installed all along MV & LV Switchgears in substation rooms as per requirements, drawings and specifications, including all accessories, complete in all respects.	Rm.	25	57415		1435375
694	Supply and installation of Danger Boards, Emergency Signs etc.	No.	3	15070		45210

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
695	L.V SWITCH BOARDS, PFI & DISTRIBUTION BOARDS					
696	LV, PFI & ATS PANELS					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
697	Supply, installation, testing and commissioning of following Free Standing Floor Mounted, totally Enclosed, Cubical type, LV Panels, Power Factor Improvement Panels, Bus Coupler and ATS Panels, (Form-2), complete with incoming and outgoing Circuit Breakers ,incoming protective devices as specified on the drawings and single-line diagram, complete with all internal components and accessories as specified and shown on the drawings. complete with termination of incoming and outgoing cables/busbars at the panel, made with 14 SWG sheet metal housing powder coated with approved colour, (As per Form-2 and specifications). Complete in all respects. Note: Necessary inter-connected cable / busbar arrangements between ATS Panels to LV Panel included in the scope with all installation accessories.					
698	MDB with 3 No. 400 kVAR PFI PANELS & 2 No. BUS COUPLER PANELS	No.	1	41387850		41387850

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
699	ATS PANEL-1	No.	1	11560720		11560720
700	ATS PANEL-2	No.	1	11560720		11560720
701	ATS PANEL-3	No.	1	11560720		11560720
702	SUB MAIN DISTRIBUTION BOARDS (SMDB)					
703	Supply, installation, testing and commissioning of following floor mounted Sub Main Distribution Boards (SMDB) (Form-3), with incoming and outgoing circuit breakers and complete with all internal components and accessories as indicated on the SLD and specified. with cable terminations, made with 14 SWG sheet steel metal housing powder coated with approved color (as per specifications), dust protected, vermin proof housing having all the necessary switching & protections, metering/instrumentation as indicated on the Single Line Diagram (SLD) etc. including Pull Boxes and all mounting accessories etc., as per specifications and drawings, complete in all respect.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
704	SMDB-B3	No.	1	425230		425230
705	SMDB-B1	No.	1	852570		852570
706	SMDB-LGF	No.	1	533915		533915
707	SMDB-UGF	No.	1	399100		399100
708	SMDB-1F	No.	1	399100		399100
709	SMDB-2F	No.	1	930200		930200
710	SMDB-3F	No.	1	399100		399100
711	SMDB-4F	No.	1	375815		375815
712	SMDB-5F	No.	1	344760		344760
713	SMDB-6F	No.	1	368050		368050
714	SMDB-7F	No.	1	425230		425230
715	SMDB-8F	No.	1	425230		425230
716	SMDB-9F	No.	1	425230		425230
717	SMDB-10F	No.	1	425230		425230
718	SMDB-11F	No.	1	375815		375815
719	SMDB-13F	No.	1	425230		425230

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
720	SMDB-14F	No.	1	425230		425230
721	SMDB-15F	No.	1	425230		425230
722	SMDB-16F	No.	1	425230		425230
723	SMDB-17F	No.	1	425230		425230
724	SMDB-18F	No.	1	425230		425230
725	SMDB-19F	No.	1	368050		368050
726	SMDB-20F	No.	1	425230		425230
727	SMDB-21F	No.	1	425230		425230
728	SMDB-22F	No.	1	471810		471810
729	DISTRIBUTION BOARDS (DB)					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
730	Supply, installation, testing and commissioning of following Wall/Flush/floor mounted Distribution Boards (DB), with incoming and outgoing circuit breakers and other components as per SLD with cable terminations, made with 14 SWG sheet steel metal housing powder coated with approved color (as per specifications), dust protected, vermin proof housing having all the necessary switching & protections, energy analyzer etc. including Pull Boxes and all mounting accessories etc., as per specifications and drawings, complete in all respect.					
731	DB-B1-LP	No.	1	261285		261285
732	DB-B2-LP	No.	1	245300		245300
733	DB-B3-LP	No.	1	261285		261285
734	DB-B4-LP	No.	1	237310		237310
735	DB-LGF-L	No.	1	139475		139475
736	DB-UGF-L	No.	1	165385		165385

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
737	DB-1F-L	No.	1	197350		197350
738	DB-2F-L	No.	1	189360		189360
739	DB-3F-L	No.	1	189360		189360
740	DB-4F-L	No.	1	165385		165385
741	DB-5F-LP	No.	1	165385		165385
742	DB-6F-L	No.	1	149400		149400
743	DB-7F-L	No.	1	165385		165385
744	DB-8F-L	No.	1	189360		189360
745	DB-9F-L	No.	1	189360		189360
746	DB-10F-L	No.	1	189360		189360
747	DB-11F-L	No.	1	131485		131485
748	DB-13F-L	No.	1	197350		197350
749	DB-14F-L	No.	1	189360		189360
750	DB-15F-L	No.	1	189360		189360
751	DB-16F-L	No.	1	189360		189360
752	DB-17F-L	No.	1	189360		189360

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
753	DB-18F-L	No.	1	189360		189360
754	DB-19F-L	No.	1	157395		157395
755	DB-20F-L	No.	1	189360		189360
756	DB-21F-L	No.	1	165385		165385
757	DB-22F-L	No.	1	157390		157390
758	UDB-B1	No.	1	115500		115500
759	UDB-B2	No.	1	123490		123490
760	UDB-B3	No.	1	123490		123490
761	UDB-B4	No.	1	123490		123490
762	UDB-LGF	No.	1	205340		205340
763	UDB-UGF	No.	1	197350		197350
764	UDB-1F	No.	1	189360		189360
765	UDB-2F	No.	1	213335		213335
766	UDB-3F	No.	1	165385		165385
767	UDB-6F	No.	1	131485		131485
768	UDB-7F	No.	1	189360		189360

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
769	UDB-8F	No.	1	197350		197350
770	UDB-9F	No.	1	213335		213335
771	UDB-10F	No.	1	197350		197350
772	UDB-11F	No.	1	131485		131485
773	UDB-13F	No.	1	205340		205340
774	UDB-14F	No.	1	213335		213335
775	UDB-15F	No.	1	197350		197350
776	UDB-16F	No.	1	213335		213335
777	UDB-17F	No.	1	197350		197350
778	UDB-18F	No.	1	213335		213335
779	UDB-19F	No.	1	139475		139475
780	UDB-20F	No.	1	157390		157390
781	UDB-21F	No.	1	139475		139475
782	UDB-22F	No.	1	149400		149400
783	DB-LGF-P	No.	1	123490		123490
784	DB-EXT-LGF	No.	1	181370		181370

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
785	DB-DC	No.	1	189360		189360
786	DB-FCR	No.	1	139475		139475
787	DB-AD	No.	1	205340		205340
788	DB-LGF-MECH	No.	1	197350		197350
789	DB-UGF-P	No.	1	165385		165385
790	DB-EXT-UGF	No.	1	189360		189360
791	DB-UGF-MECH	No.	1	173375		173375
792	DB-1F-P	No.	1	189360		189360
793	DB-1F-MECH	No.	1	197350		197350
794	DB-2F-P	No.	1	189360		189360
795	DB-2F-MECH	No.	1	197350		197350
796	DB-3F-P	No.	1	165385		165385
797	DB-3F-MECH	No.	1	197350		197350
798	DB-MPS	No.	1	149400		149400
799	DB-4F-P	No.	1	131485		131485
800	DB-4F-MECH	No.	1	306400		306400

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
801	DB-5F-KT	No.	1	165385		165385
802	DB-5F-MECH	No.	1	189360		189360
803	DB-6F-P	No.	1	149400		149400
804	DB-6F-GYM	No.	1	157395		157395
805	DB-6F-MECH	No.	1	221325		221325
806	DB-7F-P	No.	1	189360		189360
807	DB-7F-MECH	No.	1	165385		165385
808	DB-8F-P	No.	1	189360		189360
809	DB-8F-MECH	No.	1	165385		165385
810	DB-9F-P	No.	1	189360		189360
811	DB-9F-MECH	No.	1	165385		165385
812	DB-10F-P	No.	1	189360		189360
813	DB-10F-MECH	No.	1	131485		131485
814	DB-11F-P	No.	1	189360		189360
815	DB-11F-MECH	No.	1	173375		173375
816	DB-13F-P	No.	1	189360		189360

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
817	DB-13F-MECH	No.	1	173375		173375
818	DB-14F-P	No.	1	189360		189360
819	DB-14F-MECH	No.	1	173375		173375
820	DB-15F-P	No.	1	189360		189360
821	DB-15F-MECH	No.	1	173375		173375
822	DB-16F-P	No.	1	197350		197350
823	DB-16F-MECH	No.	1	173375		173375
824	DB-17F-P	No.	1	189360		189360
825	DB-17F-MECH	No.	1	173375		173375
826	DB-18F-P	No.	1	197350		197350
827	DB-18F-MECH	No.	1	173375		173375
828	DB-19F-P	No.	1	157390		157390
829	DB-19F-MECH	No.	1	173375		173375
830	DB-20F-P	No.	1	149400		149400
831	DB-20F-MECH	No.	1	173375		173375
832	DB-21F-P	No.	1	139475		139475

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
833	DB-21F-MECH	No.	1	173375		173375
834	DB-22F-P	No.	1	165385		165385
835	DB-22F-MECH	No.	1	173375		173375
836	Supply, installation, testing and commissioning of following Isolator / Load Break Switch in 16 SWG sheet steel enclosure with neutral and earth terminal strips, including all mounting accessories, back box etc. as per specifications and drawings, complete in all respect.					
837	1000A, TPN Weatherproof type Load Break Switch	No.	3	791615		2374845
838	400A, TPN Weatherproof type Load Break Switch	No.	1	252280		252280
839	300A, TPN Weatherproof type Load Break Switch	No.	2	250025		500050
840	200A, TPN Weatherproof type Isolator	No.	1	282235		282235
841	160A, TPN Weatherproof type Isolator	No.	3	222700		668100
842	125A, TPN Weatherproof type Isolator	No.	1	108765		108765

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
843	100A, TPN Weatherproof type Isolator	No.	6	107100		642600
844	63A, TPN Weatherproof type Isolator	No.	2	29360		58720
845	40A, TPN Weatherproof type Isolator	No.	13	25920		336960
846	32A, TPN Weatherproof type Isolator (for EV Charging)	No.	12	16845		202140
847	20A, TPN Weatherproof type Isolator	No.	17	13530		230010
848	20A, SPN Weatherproof type Isolator	No.	125	10010		1251250
849	16A, SPN Weatherproof type Isolator	No.	1	10010		10010
850	MEDIUM VOLTAGE CABLES					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
851	Supply, laying, termination, tagging, testing and commissioning of following size 15KV voltage grade Aluminum conductor, multi core M.V Cable including all required accessories in already laid raceway / cable trench, including all accessories lugs, cable gland, cable ID marker etc. Complete in all respects, as per drawing and specifications and to the entire satisfaction of the engineer and employer. Note: Contractor is advised to confirm the actual lengths as per site conditions before commencement of work / ordering of cables.					
852	3C, 300 Sq.mm AL/XLPE/SWA/PVC, 15kV Cable (from IESCO MV Panel to Client MV Panel and to Transformers)	Rm.	100	22840		2284000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
853	Supply, installation, testing and commissioning of following size MV Indoor Termination Kits, including all installation and termination accessories, HT tape, Bi-Metallic Cable Lugs etc. Complete in all respects, as per drawings and specifications.					
854	MV Indoor Termination kit for 15kV 3 Core, 300 Sq.mm AL/XLPE/SWA/PVC cable	No.	10	68470		684700
855	BUSWAYS					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
856	Supply, installation, testing and commissioning of following sizes Compact Cast Resin Aluminium Busways TPN+E (4 Bar) including all components and fixing accessories such as couplers, Plug-in units, Tap Off Boxes with interlocking mechanism & breakers, Flanged end, Flexible conductors, Elbows (Vertical and Horizontal), copper link pads (termination to Transformer), ends enclosure, end feed unit, center feed units, spring hangers, terminations, clamps etc. required for completion of work as per description, drawings and standards. Complete in all respects including testing at factory Permisses expenditure as mentioned in Clause 8 of specific provision (specification). Any mechanical arrangements as per site conditions is also included in this scope. (for Substation)					
857	2500 Amp TPN+E BTD					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
858	2500 Amp TPN+E Aluminum Busways, IP-54	Rm.	42	193235		8115870
859	2500 Amp TPN+E Terminal Element, IP-55 (for Panel Connection)	No.	6	168650		1011900
860	2500 Amp TPN+E ATR Element, IP-55 (for Trafo Connection)	No.	3	168650		505950
861	2500 Amp TPN+E Breaded Tin Copper Flexible Busbar Connection (Length =600mm)	Set	9	766045		6894405
862	2500 Amp TPN+E Flatwise Elbow, IP-55	No.	15	189300		2839500
863	Fixing Brackets Accessories	No.	14	43960		615440

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
864	Supply, installation, testing and commissioning of following sizes Compact Cast Resin Aluminium Busways TPN+E (4 Bar) including all components and fixing accessories such as couplers, Plug-in units, Tap Off Boxes with interlocking mechanism & breakers, Flanged end, Flexible conductors, Elbows (Vertical and Horizontal), copper link pads, ends enclosure, end feed unit, center feed units, spring hangers, terminations, clamps etc. required for completion of work as per description, drawings and standards. Complete in all respects including testing at factory Permisses expenditure as mentioned in Clause 8 of specific provision (specification). Any mechanical arrangements as per site conditions is also included in this scope. (for Riser)					
865	2500 Amp TPN+E BTD					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
866	2500 Amp TPN+E Aluminum Busways, IP-54	Rm.	369	193235		71303715
867	2500 Amp TPN+E Terminal Element, IP-55 (for Panel Connection)	No.	3	168650		505950
868	2500 Amp TPN+E Breaded Tin Copper Flexible Busbar Connection (Length =600mm)	Set	3	766045		2298135
869	2500 Amp TPN+E Flatwise Elbow, IP-55	No.	15	189300		2839500
870	Fixing Brackets Accessories	No.	123	43960		5407080
871	Supply, installation, testing and commissioning of following sizes Tap Off Units as per SLD, drawings and specifications, including circuit breakers (MCB / MCCB), all mounting and installation accessories as per description, drawings, standards and specifications. Complete in all respects.					
872	Tap Off units, 800A TP MCCB (65kA), 3P+N+E, IP55	No.	1	1327550		1327550

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
873	Tap Off units, 630A TP MCCB (65kA), 3P+N+E, IP55	No.	1	918960		918960
874	Tap Off units, 200A TP MCCB (50kA), 3P+N+E, IP55	No.	1	348115		348115
875	Tap Off units, 160A TP MCCB (35kA), 3P+N+E, IP55	No.	12	222240		2666880
876	Tap Off units, 125A TP MCCB (35kA), 3P+N+E, IP55	No.	3	217815		653445
877	Tap Off units, 100A TP MCCB (35kA), 3P+N+E, IP55	No.	4	212900		851600
878	Tap Off units, 80A TP MCCB (35kA), 3P+N+E, IP55	No.	1	212900		212900
879	Tap Off units, 63A TP MCCB (35kA), 3P+N+E, IP55	No.	3	212900		638700

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
880	Note: 1) Contractor is advised to confirm the running lengths, quantities and termination as per site conditions before commencement of work. 2) Cables for connection between Panel & CFU and Busway & CFU is also included in the Contractor's scope of work. 3) Busway Length will not be measured end to end. Elbow, Flange, Tee, Cable Feed Units are to be subtracted from straight length. 4) The Bidder shall provide the complete Technical Literature for the system offered.					
881	LOW VOLTAGE CABLES & WIRES					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
882	Supply, laying, termination, tagging, testing and commissioning of following size copper conductor multi core / single core, Cu/PVC, Cu/XLPE/PVC, unarmoured, 600/1000V, 450/750V or 300/500V voltage grade copper cable in already laid PVC conduit / cable tray / trench including all accessories lugs, cable gland etc. as per drawings and specification, complete in all respect. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.					
883	4 Core, Cu/XLPE/PVC Cable (600/1000V)				1	
884	4 Core, 400 Sq.mm Cu/XLPE/PVC	Rm.	5	152085	1	760425
885	4 Core, 240 Sq.mm Cu/XLPE/PVC	Rm.	85	80715	2	6860775
886	4 Core, 185 Sq.mm Cu/XLPE/PVC	Rm.	60	61515	3	3690900
887	4 Core, 150 Sq.mm Cu/XLPE/PVC	Rm.	10	57710	4	577100
888	4 Core, 120 Sq.mm Cu/XLPE/PVC	Rm.	55	39920	5	2195600
889	4 Core, 95 Sq.mm Cu/XLPE/PVC	Rm.	85	31655	6	2690675

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
890	4 Core, 50 Sq.mm Cu/XLPE/PVC	Rm.	10	18700	7	187000
891	4 Core, 35 Sq.mm Cu/XLPE/PVC	Rm.	65	11780	8	765700
892	4 Core, 25 Sq.mm Cu/XLPE/PVC	Rm.	15	10080	9	151200
893	4 Core, 16 Sq.mm Cu/XLPE/PVC	Rm.	555	4905	10	2722275
894	4 Core, 10 Sq.mm Cu/XLPE/PVC	Rm.	745	3060	11	2279700
895	4 Core, 6 Sq.mm Cu/XLPE/PVC	Rm.	680	2535	12	1723800
896	4 Core, 4 Sq.mm Cu/XLPE/PVC	Rm.	360	1305	13	469800
897	1 Core, Cu/PVC Cable (600/1000V)					
898	1 Core, 6 Sq.mm Cu/PVC	Rm.	300	495	14	148500
899	1 Core, 4 Sq.mm Cu/PVC	Rm.	450	325	15	146250
900	1 Core, Cu/PVC Cable as ECC (600/1000V)					
901	1 Core, 185 Sq.mm Cu/PVC as ECC	Rm.	35	15610	16	546350
902	1 Core, 120 Sq.mm Cu/PVC as ECC	Rm.	75	10130	17	759750
903	1 Core, 70 Sq.mm Cu/PVC as ECC	Rm.	65	5795	18	376675
904	1 Core, 50 Sq.mm Cu/PVC as ECC	Rm.	85	3800	19	323000
905	1 Core, 25 Sq.mm Cu/PVC as ECC	Rm.	30	2390	20	71700

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
906	1 Core, 16 Sq.mm Cu/PVC as ECC	Rm.	615	1270	21	781050
907	1 Core, 10 Sq.mm Cu/PVC as ECC	Rm.	745	825	22	614625
908	1 Core, 6 Sq.mm Cu/PVC as ECC	Rm.	680	495	23	336600
909	1 Core, 4 Sq.mm Cu/PVC as ECC	Rm.	360	325	24	117000
910	CONDUITS & PIPES					
911	Supply and laying of following size inner dia PVC / uPVC Class-D pipe / Flexible PVC Conduit including all accessories, as per drawings and specification etc., complete in all respect.					
912	25 mm dia PVC Conduit	Rm.	10	190		1900
913	38 mm dia PVC Conduit	Rm.	10	430		4300
914	50 mm dia PVC Conduit	Rm.	10	655		6550
915	75 mm dia PVC Conduit	Rm.	10	870		8700
916	100 mm dia PVC Conduit	Rm.	10	1155		11550
917	38 mm dia uPVC Conduit (Class-D)	Rm.	10	705		7050
918	50 mm dia uPVC Conduit (Class-D)	Rm.	10	1080		10800

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
919	25 mm dia Flexible PVC Conduit	Rm.	10	185		1850
920	Supply and laying of following size inner dia UPVC Pipe Class-D for Power Cable, buried in ground / under roads / under floor as per specification, including excavation for laying of pipe, bricks, warning tape and backfilling with new and fresh sand (6" under and 6" above pipe) etc. (whereever required), as shown on the specifications and drawings, complete in all respect.					
921	100mm dia uPVC Pipe (Class-D)	Rm.	10	4435		44350
922	Supply and laying of following size inner dia G.I Pipe as race ways with all accessories surface / recessed on wall / column / under floor, as per drawings and specification etc., complete in all respect.					
923	25 mm dia G.I. Pipe	Rm.	30	1385		41550
924	32 mm dia G.I. Pipe	Rm.	20	1795		35900
925	50 mm dia G.I. Pipe	Rm.	10	2880		28800

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
926	Supply and installation of following Pull Boxes with all installation accessories, as per specifications, drawings and approved brands, complete in all respect.					
927	300 mm x 300 mm	No.	5	15510		77550
928	150 mm x 150 mm	No.	5	7700		38500
929	Providing and Construction of Manhole Size 3'-0" x 3'-0" x 3'-0" deep, 6"thick, concrete 1:2:4 ratio with round heavy duty cast iron cover, 100% water proof, as per drawings and specification etc., complete in all respect. (For Electrical cables)	No.	1	90000		90000
930	WIRING ACCESSORIES					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
931	Supply, installation, testing and commissioning of following 10/13/15/20A, gang type switches, Dimmer Switches, Sockets including 16 SWG Sheet Steel powder coated back boxes with earth terminal, recessed in wall, with all accessories as per specification, complete in all respects.					
932	One Gang Switch 10A	No.	191	1360		259760
933	One Gang 2-Way Switch 10A	No.	5	1770		8850
934	Two Gang Switch 10A	No.	139	1875		260625
935	Two Gang 2-Way Switch 10A	No.	58	2475		143550
936	Three Gang Switch 10A	No.	144	2750		396000
937	Four Gang Switch 10A	No.	219	3835		839865
938	Five Gang Switch 10A	No.	3	4370		13110
939	13A, International Switch Socket Outlet	No.	767	2800		2147600
940	13A, International Switch Socket Outlet (Weatherproof)	No.	61	5385		328485

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
941	13A, 3-Pin Flat Simplex Switch Socket Outlet	No.	943	2320		2187760
942	13A, 3-Pin Flat Duplex Switch Socket Outlet	No.	929	3550		3297950
943	13A, Spur Socket Outlet	No.	331	9875		3268625
944	15A, 3-Pin Switch Socket Outlet	No.	54	2910		157140
945	20A, Flux Outlet	No.	55	9875		543125
946	20A, Double Pole Switch with Neon	No.	55	3785		208175
947	16A, 3-Pin Industrial socket with Plug top and Angle Iron	No.	11	4840		53240
948	16A, 5-Pin Industrial socket with Plug top and Angle Iron	No.	27	5745		155115
949	32A, 5-Pin Industrial socket with Plug top and Angle Iron	No.	14	7765		108710

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
950	Supply, installation, testing and commissioning of Floor Box (imported), 14 SWG Sheet Steel with all accessories, as per drawings, specifications and site requirements, complete in all respect. Note: Excluded of all Sockets and Face plates.	No.	723	31500		22774500
951	LIGHT FIXTURES					
952	Supply, installation, testing and commissioning of following Light Fixtures complete with starters, Electronic ballast (mention otherwise), lamps, drivers,mounting accessories etc., complete in all respects. Lighting fixtures Sample must be submitted to consultant for approval, (For complete detail references of Light Fixtures, please refer to Light Fixture Schedules).					
953	Ceiling Recessed 1x11 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	296	4545	1	1345320

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
954	Ceiling Recessed 1x45 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	42	6845		287490
955	Ceiling Recessed 1x12 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	846	4860		4111560
956	Ceiling Recessed 1x20 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	413	5020		2073260
957	Ceiling Surface 1x22 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	485	5180		2512300
958	Ceiling Surface 1x20 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	75	5660		424500
959	Ceiling Suspended 1x22 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	18	5855		105390

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
960	Ceiling Recessed 1x17 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	181	5085		920385
961	Wall/Surface Mounted 1x12 W LED Mirror Light Fixture, (IP-44), Pf>0.9,4000k	No.	18	4545		81810
962	Ceiling Suspended 2x12 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	728	15765		11476920
963	Ceiling Recessed 1x12 W LED Track Light Fixture, (IP-20)	No.	400	13430		5372000
964	Ceiling Recessed 1x18 W LED Track Light Fixture, (IP-20)	No.	708	14230		10074840
965	Ceiling Surface 1x40 W LED 4'x1' Batten Light Fixture, HRS @25°C CRI≥, UGR≤24 (IP-65), Pf>0.9,4000k	No.	386	22160		8553760
966	Ceiling Recessed 1x40 W LED Batten Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	516	19760		10196160

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
967	Ceiling Surface 1x40 W LED Batten Light Fixture, Polycarbonate Painted Steel Housing, (IP-20)	No.	4	19760		79040
968	Ceiling Surface 1x24 W LED 1200mm Continuous Batten Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9, 4000k	No.	166	16400		2722400
969	Ceiling Suspended 1x18 W LED Keen Track Light Fixture, (IP-20)	No.	390	16630		6485700
970	Ceiling Coved 18 W/m LED Strip Light, (IP-65)	Rm.	5627	4815		27094005
971	Ramp Recessed 1x4 W LED Ramp Light Fixture, (IP-67)	No.	119	39905		4748695
972	Wall/Surface Mounted 1x20 W LED Wall Light Fixture Polycarbonate Housing, (IP-20), Pf>0.9,3000k	No.	168	10140		1703520
973	Wall/Surface Mounted 1x6 W LED Wall Light Fixture Decorative Type, (IP-64)	No.	29	11100		321900
974	Floor Mounted 1x7 W LED Spike Planter Light Fixture Polycarbonate Housing, (IP-65), Pf>0.9,3000k	No.	16	11930		190880

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
975	Ceiling Suspended 1x96 W LED Ring Pendent Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	31	64685		2005235
976	Wall/Surface Mounted 1x200 W LED Flood Light Fixture Type, (IP-66)	No.	9	109710		987390
977	Floor Mounted 1x12 W LED Floor Light Fixture @25°C CRI≥, UGR≤24 (P.F 0.9)	No.	53	59255		3140515
978	1x9 W LED Bollard Light Fixture, (IP-65)	No.	22	63400		1394800
979	Façade Lighting					
980	Philips BGC401, 3000K, 1150 lm, 14W, IP66, 1010 T, ON-OFF Control Type	Rm.	1100	25900		28490000
981	Philips BVP353, 72 LED, RGBWW, 220V, L57 10, DMX Control Type	No.	10	354125		3541250
982	Philips BBP343, G2, 3000K, 24V, 18W, 10 DEGREE, ON-OFF Control Type	No.	4	98070		392280
983	Philips BVP355, 216 LED, RGBWW, 220V, L57 10, DMX Control Type	No.	7	528665		3700655
984	Philips BVP353, 24 LED, RGBWW, 220V, L24 15, DMX Control Type	No.	1	312200		312200

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
985	Philips BGP150, G2, 470 lm, 6W, 36 DEGREE, ON-OFF Control Type	No.	40	113600		4544000
986	WIRING FOR LIGHTS, FANS & SOCKETS					
987	Supply, laying, tagging, testing and commissioning of Circuit wiring from DB to Switchboard including wiring between switch on the same circuit with 2x2.5 sq.mm. + 1x2.5 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc., as per drawing and specification, complete in all respect.	No.	335	10605		3552675

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
988	Supply, laying, tagging, testing and commissioning of Point wiring for light/fan point from Switch Board to Light/fan Point with 3x1.5 sq.mm. single core copper conductor PVC insulated wires in already installed 20mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc. as per drawing and specification, complete in all respect.	No.	1908	2175		4149900
989	Supply, laying, tagging, testing and commissioning of Point wiring from Light/fan point to Light/fan point with 3x1.5 sq.mm. single core copper conductor PVC insulated wires in already installed 20mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc. as per drawing and specification, complete in all respect.	No.	2040	1305		2662200

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
990	Supply, laying, tagging, testing and commissioning of Circuit wiring from DB to Ist. light point with 2x2.5 sq.mm. + 1x2.5 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc., as per drawing and specification, complete in all respect.	No.	199	14140		2813860
991	Supply, laying, tagging, testing and commissioning of wiring from Light point to Light Point with 2x2.5 sq.mm. + 1x2.5 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc., as per drawing and specification, complete in all respect.	No.	1972	3535		6971020

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
992	Supply, laying, tagging, testing and commissioning of wiring for 13/15A Socket / Spur outlet with 2x4 sq.mm + 1x4 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling, under floor etc, including with all conduit accessories, back boxes etc. as per drawing and specification, complete in all respect.					
993	DB to Socket outlet	No.	1175	14585		17137375
994	Socket outlet to Socket outlet	No.	2020	2915		5888300

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
995	Supply, laying, tagging, termination, testing and commissioning of wiring for 16A Industrial Socket with 2x4 sq.mm + 1x4 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling, under floor etc., including with all conduit accessories, as per drawing and specification, complete in all respect.	No.	11	14585		160435
996	Supply, laying, tagging, termination, testing and commissioning of wiring for 20A SPN Isolator with 2x4 sq.mm + 1x4 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling, under floor etc., including with all conduit accessories, as per drawing and specification, complete in all respect.	No.	125	21395		2674375
997	CABLE TRAYS					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
998	Supply, fabricating, erecting, fixing and installing of following size of base perforated Cable Tray Complete with covers where indicated on the drawings/specifications. Tray thickness as per the specification based on tray width. Including Manufacturer's standard supports and fixing accessories. complete with factory-made fittings and support system. and necessary required hardware etc. Complete in all respect as shown in drawings and specification or as directed by the Engineer.					
999	900 mm x 100 mm for Power Cables	Rm.	20	21055		421100
1000	600 mm x 100 mm for Power Cables	Rm.	230	14962.5		3441375
1001	450 mm x 100 mm for Power Cables	Rm.	910	11395		10369450
1002	300 mm x 100 mm for Power Cables	Rm.	1340	8357.5		11199050
1003	250 mm x 100 mm for Power Cables	Rm.	170	6962.5		1183625
1004	150 mm x 100 mm for Power Cables	Rm.	1440	5327.5		7671600
1005	100 mm x 50 mm for Power Cables	Rm.	1390	3840		5337600

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1006	LIGHTNING PROTECTION SYSTEM					
1007	Supply, installation, testing and commissioning of 25mm x 3mm Tinned Copper Tape to be run on roof surface, as required and shown on drawings including all fixing accessories etc., as per specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	40	15135		605400
1008	Supply, installation, testing and commissioning of Early Streamer Emission (ESE) Air Terminal mounted on 5.5 meter elevation mast, as per drawing, complete in all respect and having following specifications: * Efficiency: 60 micro seconds * Lightning current withstanding test (10/350µs):100 kA * ESE Central Rod: Nickel Plated Copper * Metal Housing: Stainless Steel 316L * Protection Radius: 58 meter at 5.5 meter height	No.	1	556000		556000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1009	Supply and installation of 5.5 meter high elevation mast consist of mounting bracket for installation and fixing of ESE Air Terminal, as per drawing, specification and site requirements, complete in all respect.	No.	1	240535		240535
1010	Supply and installation of pyramid holdfasts / studs filled with cement for holding and supporting the flat tape conductor, as per drawing, specification and site requirements, complete in all respect.	No.	12	7225		86700
1011	Supply and installation of Lightning Flash Counter including control cables from ESE Air Terminal to Flash Counter, as per drawing, specification and site requirement necessary for the system, complete in all respect.	No.	1	172600		172600
1012	Supply and installation of Test Clamp and Guard Tube 2m in length, as per drawing, specification, and site requirement necessary for the functioning of the system, complete in all respect.	Job.	2	60200		120400

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1013	Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm PVC insulated Cu. Conductor cable in 38 mm dia uPVC conduit run with elevation of the building from Roof Copper Tape network to Test Link at Basement-4 floor in 38mm dia UPVC conduit embelded in columns including clad welding, all accessories lugs, cable glands, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	240	6430		1543200
1014	Testing and commissioning of the complete Lightning Protection System, including verification of earth resistance in accordance with the specifications, complete in all respects.	Job.	1	150000		150000
1015	EARTHING SYSTEM					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1016	Supply, installation, testing and commissioning of following items for complete Earthing system, complete with all materials necessary to achieve the specified earth resistance, other all required materials and connecting accessories, boring, labor, tools, transportation etc., as per drawings and specifications, complete in all respects with detailed test reports.					
1017	Earth pit with Rod type earth electrode, 3/4" dia and 9 Ft. long copper bonded rod to achieve the earthing resistivity as mentioned in drawings.	No.	4	94435		377740
1018	Supply, installation, testing and commissioning of Copper Earth Bar 475 mm x 90 mm x 96 mm with single disconnecting link for earthing system as per drawings and instruction of consultant, including all mounting accessories etc., complete in all respect.	No.	7	76240		533680

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1019	Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm Bare Copper Conductor from Earth pit to Earth pit as earth continuity conductor (ECC) installed under floor including exothermic (Cadweld) welding or approved jointing method, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	325	5085		1652625

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1020	Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm PVC insulated Cu. Conductor cable in already installed cable tray / already installed 38 mm dia uPVC conduit, from Earth pit to Earth Bar / Earth pit and to equipments as earth continuity conductor (ECC) including exothermic (Cadweld) welding or approved jointing method, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm PVC insulated Cu. Conductor cable in already installed cable tray / already installed 38 mm dia uPVC conduit, from Earth pit to Earth Bar / Earth pit and to equipments as earth continuity conductor (ECC) including exothermic (Cadweld) welding or approved jointing method, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	730	5795		4230350

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1021	ELV WORKS					
1022	VOICE & DATA COMMUNICATION SYSTEMS (Passive Equipment Only)					
1023	Supply, installation, testing and commissioning of following Data / Voice items on LSOH solution, as per the single line diagram and specification, complete in all respect.					
1024	Supply, installation, testing and commissioning of following Wall / Floor mounted, Data / Voice Cabinets for patch panel, Fiber panels, adapter, PDU's, Fans and space for active switches as it may require to complete the entire passive and active network as per the single line diagram, drawings and specifications, complete in all respect.					
1025	42U Data Rack with PDU's	No.	16	211600		3385600
1026	27U Data Rack with PDU's	No.	10	141075		1410750
1027	9U Data Rack with PDU's	No.	3	82360		247080

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1028	Supply, installation, testing and commissioning of Dual RJ-45, Cat-6 outlet for Voice & Data with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	783	4050		3171150
1029	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for TV with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	36	2920		105120
1030	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Projector with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	2	2920		5840

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1031	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Wifi with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	165	2920		481800
1032	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Data with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	166	2920		484720
1033	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for CCTV system with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	255	2920		744600

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1034	Supply, laying, termination, testing and commissioning of Cat-6, 4 pair cable on LSOH solution for Single RJ-45 outlet (for Data, Voice, TV, Projector & Wifi systems) in already installed 25mm dia PVC conduit concealed / surface from each outlet to IDF rack, including tagging and piping with all necessary accessories, complete in all respect.	Rm.	57480	390		22417200
1035	Supply, installing, testing and commissioning of 24 port Fiber Patch Panel fully loaded with pigtails, rear cable manager etc., as per drawing and specification, complete in all respect.	No.	30	82000		2460000
1036	Supply, testing and commissioning of 24 port shutter type Cat 6, RJ 45 UTP Patch Panel fully loaded with tool less jacks and rear cable manager, as per drawing and specification, complete in all respect.	No.	95	56100		5329500

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1037	Supply, installing, testing and commissioning of 19" front/rear (as required) cable organizer between patch panels and active equipment to provide patch cable management including with all necessary accessories, as per drawing & specification, complete in all respect.	No.	122	7980		973560
1038	Supply, installation, testing and commissioning of Cat-6 UTP (RJ-45 to RJ-45 on LSOH solution) for the above Patch Panels including with all necessary accessories, as per drawing and specification, complete in all respect. (As per required quantity)					
1039	CAT-6 (1m) Long Patch Cord	No.	1660	1600		2656000
1040	CAT-6 (3m) Long Patch Cord	No.	1660	2050		3403000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1041	Supply, installation, testing and commissioning of following Fiber Optic Patch Cords on LSOH solution (certified) of specified color at both ends for communication with SC/LC/APC connector. (As per requirement depends on active part)					
1042	3m Long Patch Cord	No.	15	6160		92400
1043	Supply, installation, testing and commissioning of following 19" Tag blocks on LSOH solution in Data rack, as per drawings and specifications, complete in all respect.					
1044	1x50 Pair IDC Block 19" type	No.	14	19750		276500
1045	1x25 Pair IDC Block 19" type	No.	16	9870		157920

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1046	Supply, laying, termination, testing and commissioning of 8C, Multi Mode Fiber Optic Cable from Server Rack to each floor racks in already installed cable tray / conduit, as shown in drawings including termination and tagging at both ends, as per standard specifications with all termination accessories up to entire satisfaction of IT Engineer. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.	Rm.	2250	1700		3825000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1047	Supply, laying, termination, testing and commissioning of 48C, Single Mode Tight Buffered Fiber Optic Cable to Server Rack in already installed cable tray / conduit, as shown in drawings including termination and tagging at both ends, as per standard specifications with all termination accessories up to entire satisfaction of IT Engineer. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.	Rm.	50	2160		108000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1048	Supply, laying, termination, testing and commissioning of 25 Pair Cat-5E Copper Jelly filled Cable from Server Rack to IDF racks in already installed cable tray / conduit, as shown in drawings including termination & tagging at both ends, as per standard specifications with all termination accessories up to entire satisfaction of IT Engineer. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.	Rm.	3900	2950		11505000
1049	Installation, testing and commissioning by Manufacturer Authorized Agent / Dealer and handing over complete Voice & Data System to Owner with Providing Training voice data fuke & OTDR Testing,as build drawing,Rack layouts and certification's Principal, complete equipment's Manual and Warranty Documents to Owners representative.	Job.	1	1000000		1000000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1050	ADDRESSABLE FIRE ALARM SYSTEM					
1051	Supply, installation, testing & commissioning of following items for Addressable Fire Alarm System including all communication, power and controlling accessories, housings, mounting brackets, suspension rods etc. required for completion of the system, as per drawing and specification. Complete in all respect.					
1052	Supply, laying, tagging, termination, testing and commissioning of wiring for complete Fire Alarm System with 2C-1.5 Sq.mm shielded, twisted pair Fire Resistant Cable (2 hrs. rated) (FP-200 gold Equivalent) in already installed 25mm dia PVC conduit concealed, (M.S conduit for surface) etc., including any wiring between fire alarm control panel and other's systems control panel's etc. Complete in all respect.	Rm.	24600	567.5		13960500

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1053	Supply, installation, testing and commissioning of Addressable Photoelectric Smoke Detector with base and back box, as per drawing and specification, complete in all respect.	No.	1198	17595		21078810
1054	Supply, installation, testing and commissioning of Addressable Photoelectric Heat Detector with base and back box, as per drawing and specification, complete in all respect.	No.	238	17595		4187610
1055	Supply, Installation, Testing and Commissioning of Addressable Dual Action Manual Pull Station / Call Point with base and back box, as per drawing and specification, complete in all respect.	No.	224	21995		4926880
1056	Supply, Installation, Testing and Commissioning of Addressable Dual Action Manual Pull Station / Call Point (Weatherproof type) with base and back box, as per drawing and specification, complete in all respect.	No.	74	39590		2929660

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1057	Supply, Installation, Testing and Commissioning of Addressable Sounder with flasher / Strobe with base and back box, as per drawing and specification, complete in all respect.	No.	100	24195		2419500
1058	Supply, Installation, Testing and Commissioning of Addressable Sounder with flasher / Strobe (Weatherproof type) with base and back box, as per drawing and specification, complete in all respect.	No.	122	57187.5		6976875
1059	Supply, Installation, Testing and Commissioning of Beam Detector (Transmitter & Receiver complete set) with base and back box, complete in all respect.	No.	2	351925		703850
1060	Supply, Installation, Testing and Commissioning of Input / Output Module (Zone Control Module), including with all required equipments and cabling, complete in all respect.	No.	372	76980		28636560

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1061	Supply, Installation, Testing and Commissioning of 10 Loop Analogue Intelligent Addressable Main Fire Alarm Control Panel (MFACP) including all necessary accessories,including Backnet Card for Interfacing of Panels to BMS with soft Programming and integration with EVAC System, required FR cable from panel to GCC, identification, tagging etc. and 3Hrs battery back up as per drawing and specification, complete in all respect.	No.	2	1868390		3736780
1062	Supply, Installation, Testing and Commissioning of 4 Loop Analogue Intelligent Addressable Fire Alarm Control Panel (FACP) including all necessary accessories, including Backnet Card for Interfacing of Panels to BMS with soft programming and integration, identification tagging etc. and 3Hrs battery back up, as per drawing and specification, complete in all respect.	No.	2	830395		1660790

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1063	Supply, Installation, Testing and Commissioning of Addressable Fire Alarm Repeater Panel including all necessary accessories, including Backnet Card for Interfacing of Panels to BMS with soft programming and integration, identification tagging etc. and 3Hrs battery back up, as per drawing and specification, complete in all respect.	No.	2	332155		664310
1064	Supply, laying, tagging, termination, testing and commissioning of wiring from Main FACP to FACP and FARP with 2x1.5 sq.mm FP200 Class A cable with 3 hours Fire rating Cable in already installed 25mm dia UPVC conduit buried / surface as per drawings with all conduit accessories, junction boxes, pull boxes etc. complete in all respects as per drawings and specifications.	Rm.	400	500		200000

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1065	Supply, Installation, Testing and Commissioning of Backnet Card For Interfacing of Panels to BMS with soft programming and integrationm as per drawing and specification, complete in all respect.	Job	1	721980		721980
1066	Supply, Installation, Testing and Commissioning of Graphic Command Center as per drawing and specification, complete in all respect.	Job	1	3128580		3128580
1067	Supply, installation, testing and commissioning of Monitor Module FM 200, as per drawing and specification, complete in all respect.	No.	3	70380		211140
1068	Supply, Installation, Testing and Commissioning of Distributed Panel, Dual Channel, 100W, complete in all respect.	No.	1	885000		885000
1069	Supply, Installation, Testing and Commissioning of Fire Phone cabinet including Handset, complete in all respect.	No.	1	714140		714140

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1070	Supply, Installation, Testing and Commissioning of Fire Phone jacks with plates, complete in all respect as per specification and drawings.	No.	120	42756		5130720
1071	Supply, Installation, Testing and Commissioning of Fire Phone cabling with 2C-1.5 Sqmm FP200 2H Fire Resistant cable in already installed 25mm dia PVC conduit concealed, complete in all respects as per drawings and specifications.	Rm.	480	1135		544800
1072	Installation, Testing & Commissioning, Software, Programming by Manufacturer Authorized Agent / Dealer, License Fee and handing over complete Fire Alarm system & Fire Telephone system to owner with providing training, SOP, cause and effect sheet complete equipment's manual and warranty documents to Owner's Representative.	Job	1	700000		700000
1073	PUBLIC ADDRESS SYSTEM					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1074	Supply, installation, testing and commissioning of following items for Public Address System, described below including all accessories, mounting brackets, installation accessories, wiring etc. as per drawings and specifications, complete in all respect.					
1075	Supply, laying, tagging, termination, testing and commissioning of wiring for complete Public Address System with 2C-1.5 Sq.mm Fire Resistant Cable (2 hrs. rated)(FP-200 gold Equivalent) in already installed 25mm dia PVC conduit, concealed (M.S conduit for surface.) etc. as per drawings and specifications, complete in all respect.	Rm.	4815	851.25		4098768.75
1076	Providing, Wiring and Testing of PA Microphone points with Microphone cable in already installed 25mm dia PVC conduit, recessed / surface in wall and ceiling, complete in all respects.	Rm.	300	15127.5		4538250

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1077	Supply, installation, testing and commissioning of Public Address System complete with all connecting accessories comprising of the following equipment with complete connecting accessories, as per drawing and specification, complete in all respect.					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1078	IP Based System Manager Zone Modular type with voice Alarm controller , EN54 compliant, 20 monitored speaker outputs, 4x500W Class-D Amplifier module, 4 Audio Input Line/Mic, 10 contact inputs, Stand by Amplifier Slot, Matrix EN54 approved, 4 general balanced audio inputs (microphone/line level) and 2 inputs for upto 8 remote microphones including upto two emergency microphones, Frequency range: 40 – 16.000 Hz, Signal-to-noise ratio: > 60 dB (A-rated), THD: 1% at, Operating voltage: 31 VDC, Voltage range: 20 VDC to 34 VDC, allows a simultaneous broadcast of two different audio signals per frame to achieve an interruption-free BGM operation during a paging, built-in Network Adapter, complete with battery backup, as per drawing and specification, complete in all respects.	No.	1	3979706.25		3979706.25

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1079	IP Based System Manager Zone Modular type with voice Alarm controller , EN54 compliant, 20 monitored speaker outputs, 2x500W Class-D Amplifier module, 4 Audio Input Line/Mic, 10 contact inputs, Stand by Amplifier Slot, Matrix EN54 approved, 4 general balanced audio inputs (microphone/line level) and 2 inputs for upto 8 remote microphones including upto two emergency microphones, Frequency range: 40 – 16.000 Hz, Signal-to-noise ratio: > 60 dB (A-rated), THD: 1% at, Operating voltage: 31 VDC, Voltage range: 20 VDC to 34 VDC, allows a simultaneous broadcast of two different audio signals per frame to achieve an interruption-free BGM operation during a paging, built-in Network Adapter, complete with battery backup, as per drawing and specification, complete in all respects.	No.	1	3296475		3296475

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1080	Power supply manager with Battery Backup, RJ45 female connector for connecting the system and cascade connection with shielded twisted pair straight cable and with indications battery check, charging circuit failure, battery failure (EN54 compliant), as per drawing and specification, complete in all respects.	No.	2	823338.75		1646677.5
1081	Zone Selection Remote Microphone with 16 programable Keys and fault monitoring, EN54 compliant, as per drawings and specifications, complete in all respect.	No.	2	915176.25		1830352.5
1082	Providing & Connecting of Inter Connects cables etc.	No.	2	259623		519246
1083	27U Rack Cabinet with Perforated Door to accommodate above equipments, located at Security room, as per drawing and specification, complete in all respects.	No.	2	152130		304260

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1084	12U Rack Cabinet with Perforated Door to accommodate above equipments, located at Security room, as per drawing and specification, complete in all respects.	No.	3	59575		178725
1085	Supply, installation, testing and commissioning of following type Speakers of Architect Approved color with all mounting and installation accessories, steel wire and holding arrangements, as per drawing and specification, complete in all respects.					
1086	6W Ceiling / Surface mounted Speakers with fire dome and Tapping Transformers (1,1.5,3,4.5,6W), EN54 Compliant.	No.	304	17721		5387184
1087	30W Horn Type Speaker IP-65 H, Circular 20", En 54 -24 Compliant, IP65.	No.	9	101776.5		915988.5
1088	30W Wall mounted Premium Sound Cabinet loudspeaker with Tapping, ABS Enclosure IP65.	No.	24	60544		1453056

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1089	30W Hanging Type Pendent Speaker IP65 (EN 54-24) Ral Base ReflexType Black Color.	No.	11	64840		713240
1090	Supply, installing, testing and commissioning of 150W room Mixer Amplifier for Prayer Area, as per drawing and specifications, complete in all respect.	No.	1	454340		454340
1091	Supply, installing, testing and commissioning of 150W room Mixer Amplifier for Board Room, as per drawing and specifications, complete in all respect.	No.	1	454340		454340
1092	Supply, installing, testing and commissioning of 240W room Mixer Amplifier for Multipurpose, as per drawing and specifications, complete in all respect.	No.	1	688035		688035
1093	Supply, installation, testing and commissioning of Push To Talk Microphone, as per drawing and specification, complete in all respects.	No.	2	168755		337510

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1094	Supply, installation, testing and commissioning of Color Microphone for Imam, as per drawing and specification, complete in all respects.	No.	1	194715		194715
1095	Supply, installation, testing and commissioning of Microphone with boom for Azan, as per drawing and specification, complete in all respects.	No.	1	129810		129810
1096	Installation, testing and commissioning, Programming by Manufacturer Authorized Agent / Dealer and handing over complete Public Address / Voice Alarm System to Owner with providing training, SOP, complete equipment's manual and warranty documents to Owners representative.	Job	1	750000		750000
1097	CENTRAL BATTERY SYSTEM					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1098	Supply, installation, testing and commissioning of following items for Central Battery System including all communication, power and controlling accessories, housings, mounting brackets, suspension rods etc. required for completion of the system, as per drawing and specification. Complete in all respect.					
1099	Central Battery System (CBS) including Battery bank with min 90 min battery backup of full load and submit calculations for justification of providing load, built-in charger, battery cabinet with Sealed Lead acid batteries, Interface between CBS to BMS / Fire Alarm over BACNET Protocol, interface card, identification tagging etc. as per drawings and specification, complete in all respect.	Job	3	3786359		11359077

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1100	Central Monitoring System with Software including latest PC, all necessary accessories, programming and integration with building management system over BACNET Protocol, identification tagging etc. as per drawing and specification, complete in all respect.	Job	3	1895935.625		5687806.875
1101	Supply, installation, testing and commissioning of following Standalone central battery system based Emergency / Exit lights with all drivers and accessories, as per drawing and specification, complete in all respect.					
1102	7W Emergency LED light (Non-maintained type), Ceiling / Surface mounted, IP-20 rated, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	626	35545		22251170

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1103	7W Emergency LED light (Non-maintained type), Wall mounted, IP-20 rated, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	85	35545		3021325
1104	7W Emergency LED light (Non-maintained type), Ceiling / Recessed mounted, IP-65 rated, EN Listed, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	12	35545		426540
1105	7W Emergency LED light (Non-maintained type), Wall mounted, IP-65 rated, EN Listed, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	38	35545		1350710
1106	8W, Exit light (maintained type), Standalone CBS based, 24m viewing, Directional Pandent, IP-65 rated, UL 924 Listed, as per specification and drawing, complete in all respect.	No.	249	57632		14350368

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1107	Supply, installation, testing and commissioning of Circuit Wiring from CBS to EM/EXIT Lights and interface each panel with 2C, 1.5 Sq.mm 2 Hours rated Fire rated cable in already installed 25mm dia PVC conduit with all accessories as per drawing & specification, complete in all respect. Actual length at site shall be paid. Note: Contractor is advised to confirm the actual cable running lengths as per site conditions before commencement of work/ordering of cables.	Rm.	9112	1021.5		9307908
1108	Supply, installation, testing and commissioning of Core i7 Work Station, 6/7th Generation, complete with Dual VGA Card & Licensed windows 10, as per drawing and specifications, complete in all respect.	No.	3	995235		2985705

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1109	Testing, Commissioning, Software, Programming by Manufacturer Authorized Agent / Dealer and handing over complete Central Battery System to owner with providing training, SOP, cause and effect sheet complete equipment's manual and warranty documents to Owner's Representative.	Job.	1	3708750		3708750
1110	CONDUITS & PIPES					
1111	Supply and laying of following size inner dia PVC / uPVC Class-D pipe / Flexible PVC Conduit including all accessories, as per drawings and specification etc., complete in all respect.					
1112	25 mm dia PVC Conduit	Rm.	10	190		1900
1113	38 mm dia PVC Conduit	Rm.	10	430		4300
1114	50 mm dia PVC Conduit	Rm.	15	655		9825
1115	75 mm dia PVC Conduit	Rm.	10	870		8700
1116	100 mm dia PVC Conduit	Rm.	10	1155		11550

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1117	38 mm dia uPVC Conduit (Class-D)	Rm.	10	705		7050
1118	50 mm dia uPVC Conduit (Class-D)	Rm.	10	1080		10800
1119	25 mm dia Flexible PVC Conduit	Rm.	10	185		1850
1120	Supply and laying of following size inner dia UPVC Pipe Class-D for Telecommunication Cables (copper / optic fiber), buried in ground / under roads / under floor as per specification, including excavation for laying of pipe, bricks, warning tape and backfilling with new and fresh sand (6" under and 6" above pipe) etc., (whereever required), as shown on the specifications and drawings, complete in all respect.					
1121	50mm dia uPVC Pipe (Class-D)	Rm.	10	1600		16000
1122	Supply and laying of following size inner dia G.I Pipe as race ways with all accessories surface / recessed on wall / column / under floor, as per drawings and specification etc., complete in all respect.					
1123	25 mm dia G.I. Pipe	Rm.	30	1385		41550

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1124	32 mm dia G.I. Pipe	Rm.	20	1795		35900
1125	Supply and installation of following Pull Boxes with all installation accessories, as per specifications, drawings and approved brands, complete in all respect.					
1126	300 mm x 150 mm	No.	5	15510		77550
1127	150 mm x 150 mm	No.	5	7700		38500
1128	Providing and Construction of Manhole Size 3'-0" x 3'-0" x 3'-0" deep, 6"thick, concrete 1:2:4 ratio with round heavy duty cast iron cover, 100% water proof, as per drawings and specification etc., complete in all respect. (For Electrical cables)	No.	1	90000		90000
1129	CABLE TRAYS					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1130	Supply, fabricating, erecting, fixing and installing of following size of base perforated Cable Tray Complete with covers where indicated on the drawings/specifications. Tray thickness as per the specification based on tray width. Including Manufacturer's standard supports and fixing accessories. complete with factory-made fittings and support system. and necessary required hardware etc. Complete in all respect as shown in drawings and specification or as directed by the Engineer.					
1131	450 mm x 100 mm for ELV Cables	Rm.	470	11395		5355650
1132	300 mm x 100 mm for ELV Cables	Rm.	2600	8357.5		21729500
1133	100 mm x 100 mm for ELV Cables	Rm.	30	4245		127350
1134	PLUMBING WORKS					
1135	WATER SUPPLY:					
1136	PACKAGED PUMP SETS:					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1137	Supply, Installation, testing & commissioning of below mentioned Packaged pump sets including pump foundation, Pressure vessel, control panel, wiring from panel to pumps, valves, piping, accessories, etc. from Suction header to Discharge header, as indicated on the drawing, as per specifications and Engineers approval.					
1138	Cold Water Booster Pump Set - 01 (Duplex with VFD) Set: 1 Duty + 1 Support (35 GPM @ 80FT Head) each	Nos.	1	3978982.17		3978982.17
1139	Irrigation Booster Pump Set - 01 (Duplex) Set: 1 Duty + 1 standby (60 GPM @ 100FT Head)	Nos.	1	3659000		3659000
1140	COOLING TOWER MAKEUP WATER PUMP:					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1141	Supply, Installation, testing & commissioning of below mentioned Packaged pump sets including pump foundation, Pressure vessel, control panel, wiring from panel to pumps, valves, piping, accessories, etc. from Suction header to Discharge header, as indicated on the drawing, as per specifications and Engineers approval.					
1142	Constant Speed Cooling tower Makeup Pump Set (1 Duty + 1 Standby) Set: 1 Duty + 1 standby (40 GPM @ 50FT Head)	Nos.	1	4201350.66		4201350.66
1143	TREATED WASTE WATER PUMP:					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1144	Supply, Installation, testing & commissioning of below mentioned Packaged pump sets including pump foundation, Pressure vessel, control panel, wiring from panel to pumps, valves, piping, accessories, etc. from Suction header to Discharge header, as indicated on the drawing, as per specifications and Engineers approval.					
1145	Constant Speed Treated water transfer Pump Set (1 Duty + 1 Standby) Flow = 200 GPM @ 430FT head	Nos.	1	5891318.46		5891318.46
1146	ELECTRIC WATER HEATER:					
1147	Providing and fixing of Ceiling hung electric Water heater of below mentioned capacity with all accessories, Thermostat, Drain Tank, inlet and outlet valves, Air Vent, Pressure relief valve, Air relief valves as indicated in the drawings, as per specifications and engineers approval					
1148	EWH -(Capacity 50 Litres)	Nos.	6	66520		399120

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1149	EWH -(Capacity 80 Litres)	Nos.	4	86740		346960
1150	EWH -(Capacity 100 Litres)	Nos.	58	93200		5405600
1151	EWH -(Capacity 150 Litres)	Nos.	4	150000		600000
1152	COLD & HOT WATER PIPING:					
1153	Supply, installation, testing and Commissioning of PPR PN - 20 Cold/Hot water pipes as per DIN 8077-8078 with molded fittings PN - 25 as per DIN 16962 of below mentioned Outer Diamaters, including pipe Hangers and supports, Anchors cutting, filling, testing/commissioning and all accessories like SS Unions, flanges, gaskets, nuts and bolts as indicated on the drawing, as per specifications and Engineers approval.					
1154	15mm dia	RFT.	70	280		19600
1155	20mm dia	RFT.	8360	370		3093200
1156	25mm dia	RFT.	1210	520		629200
1157	32mm dia	RFT.	1000	900		900000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1158	40mm dia	RFT.	400	1970		788000
1159	50mm dia	RFT.	680	3200		2176000
1160	65mm dia	RFT.	240	5120		1228800
1161	75mm dia	RFT.	990	5560		5504400
1162	90mm dia	RFT.	50	12930		646500
1163	110mm dia	RFT.	1090	13570		14791300
1164	125mm dia	RFT.	40	23270		930800
1165	160mm dia	RFT.	30	35360		1060800
1166	ISOLATION VALVES:					
1167	Providing and fixing of Gate valves of bronze material for diameter 50mm and smaller and Cast Iron material for Diameter greater than 50mm as per specifications and Engineers approval.					
1168	20mm dia	Nos.	30	4100		123000
1169	25mm dia	Nos.	55	5890		323950
1170	32mm dia	Nos.	62	6280		389360

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1171	40mm dia	Nos.	25	10800		270000
1172	50mm dia	Nos.	8	14770		118160
1173	65mm dia	Nos.	50	103700		5185000
1174	75mm dia	Nos.	12	124140		1489680
1175	100mm dia	Nos.	18	152910		2752380
1176	NON RETURN VALVES:					
1177	Providing and fixing of non return Valve of Bronze Material for diameter 50mm and smaller and Cast Iron material for Diameter greater than 50mm as per type indicated in specifications and as per Engineers approval.					
1178	32mm dia	Nos.	4	23450		93800
1179	50mm dia	Nos.	2	31480		62960
1180	65mm dia	Nos.	2	41870		83740
1181	75mm dia	Nos.	10	55090		550900
1182	100mm dia	Nos.	16	80280		1284480
1183	125mm dia	Nos.		102470		

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1184	150mm dia	Nos.	2	140880		281760
1185	200mm dia	Nos.	2	235330		470660
1186	PRESSURE REGULATING VALVE:					
1187	Providing and fixing of pilot controlled, hydraulically operated, diaphragm type Pressure Reducing Valve Assembly with a low by-pass capability of below mentioned diameter as per drawings, specifications and Engineers approval.					
1188	50mm dia	Nos.	2	142140		284280
1189	65mm dia	Nos.	2	587150		1174300
1190	75mm dia	Nos.	2	635160		1270320
1191	100mm dia	Nos.	6	1095590		6573540
1192	MIXING VALVES:					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1193	Supply and installation Thermostatic Type Missing Valve of Lead free Cast Copper Silicon alloy construction capable of withstanding 150 PSi pressure and 90C Temperature as indicated on the drawing, as per Specifications and Engineers approval.					
1194	20mm dia	Nos.	2	73990		147980
1195	25mm dia	Nos.	2	86580		173160
1196	32mm dia	Nos.	4	118060		472240
1197	PLUMBING SPECIALITIES:					
1198	Supply and installation of the following including all fittings, fixings, accessories, etc., as indicated on the drawing, as per Specifications and Engineers approval.					
1199	1/2" dia. Bib Tap	Nos.	85	12620		1072700
1200	1" dia Air Relief Valve	Nos.	50	11210		560500
1201	4" dia foot valve	Nos.	1	162210		162210
1202	3" dia foot valve	Nos.	1	154200		154200

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1203	4" Y-type Strainer	Nos.	2	105840		211680
1204	3" Y-type Strainer	Nos.	2	80750		161500
1205	WATER TANK CONNECTIONS:					
1206	4" dia Connection to existing Tubewell in Basement-4 including water meter, Gate valves, Level Indicate and Modulating Valve for Auto Shit off l etc. complete all in accordance with the drawing and specifications.	Job	1	547230		547230
1207	3" dia Connection to existing City Network including water meter, Gate valves, Level Indicate and Modulating Valve for Auto Shit off l etc. complete all in accordance with the drawing and specifications.	Job	1	450200		450200
1208	4" Goose neck for underground Water Tank & Grey Water tanks with Stainless steel Insect Mesh for insect as per drawing and specifications.	Nos.	4	70220		280880
1209	Connection to overhead water tanks using Float switch or Pressure Switch	Nos.	2	12500		25000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1210	Medium Duty PVC Cover For RCC water tanks	Nos.	6	22500		135000
1211	Heavy Duty Covers For Sump pits	Nos.	3	718600		2155800
1212	Heavy Duty Covers For Sump pits	Nos.	3	987000		2961000
1213	IRRIGATION PIPING & ISOLATION VALVES:					
1214	Supply, installation, testing and commissioning of PVC class E pipe as per BS 4660, or conforming to ASTM D2241 with solvent joints including the cost of excavation, backfill and other fittings, all connections to be sealed properly with water proof material. Warning tape to be laid over the buried pipes, as per drawings, specifications and Engineer's approval.					
1215	1" dia	RFT.	550	420		231000
1216	1 1/4" dia	RFT.	385	550		211750
1217	1 1/2" dia	RFT.	410	720		295200
1218	2"" dia	RFT.	720	1250		900000
1219	ISOLATION VALVES					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1220	Supply, installation, testing and commissioning of PN-16 Ball Valves of PVC / cPVC material for diameter 50mm and smaller and Cast iron for Diameter above 50mm of Same brand as of piping, as per drawings, specifications and Engineer's approval.					
1221	1" dia	Nos.	26	2270		59020
1222	1 1/4" dia	Nos.	3	3820		11460
1223	1 1/2" dia	Nos.	3	4600		13800
1224	2"" dia	Nos.	6	5590		33540
1225	SUBMERSIBLE PUMPS:					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1226	Supply, Installation of below mentioned Stainless Steel Submersible pumps sets including, Guide Rails with Chain, Automatic control panel, Level indicator and High level warning indicator, connection with BMS System, wiring, Gate valves, Non Return Valves piping, accessories, etc., as indicated on the drawing, as per specifications and Engineers approval.					
1227	S.Steel Submersible Pump 01 & 02 (1 Duty + 1 Support/Standby) (70 GPM @ 100FT Head)	Set	1	1417600		1417600
1228	S.Steel Submersible Pump 03 & 04 (1 Duty + 1 Support/Standby) (60 GPM @ 100FT Head)	Set	1	1417600		1417600
1229	S.Steel Submersible Pump 05 & 06 (1 Duty + 1 Support/Standby) (60 GPM @ 100FT Head)	Set	1	1417600		1417600
1230	SOIL, WASTE & VENT PIPING:					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1231	Providing and fixing, Sound Proof PP Pipes and fittings as per DIN 4109 and 4102 and Flame Retardant as per BS 4102 for above ground installations for Soil, Waste, Vent pipes including cleanout plug, clamps, hangers collars, supports, specials (bend, tees, Y-tee etc.) as indicated on the drawing, as per specifications and Engineers approval.					
1232	1 1/2" dia	RFT.	50	1560		78000
1233	2" dia	RFT.	1780	1730		3079400
1234	3" dia	RFT.	6490	1650		10708500
1235	4" dia	RFT.	3120	2630		8205600
1236	6" dia	RFT.	2390	4690		11209100
1237	8" dia	RFT.	20	26610		532200

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1238	Providing and fixing, uPVC pipes and fittings as per BS EN 1401 (BS 4660) for below ground installations for Soil pipes including excavation, backfill, fittings (bend, tees, Y-tee etc.) as indicated on the drawing, as per specifications and Engineers approval.					
1239	3" dia	RFT.	700	1030		721000
1240	4" dia	RFT.	280	1600		448000
1241	PRESSURE PIPES:					
1242	Providing and fixing, uPVC pipes (Class D) and fittings as per BS 3505 and fittings to BS 4346 for Sump pit Drainage pipes and below ground installations for Soil pipes including fittings (bend, tees, Y-tee etc.) All connections to be sealed properly with water proof material. Warning tape to be laid over the buried pipes as indicated on the drawing, as per specifications and Engineers approval.					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1243	2" dia	RFT.	450	700		315000
1244	3" dia	RFT.	50	1510		75500
1245	DRAINAGE SPECIALITIES:					
1246	Providing and fixing of Sound Proof PP Multi floor trap with multiple dia inlet and Single outlet and cleanout plug of the approved self cleaning design with S.Steel grating as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	280	15470		4331600
1247	Providing and fixing of PVC Roof Drains with Over Drain of Dome Type with PVC/Stainless Steel Dome with 150mm Outlet, as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	12	21330		255960

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1248	Providing and fixing of PVC Balcony Drains Skupper type with PVC Grating with 50mm side of bottom Outlet (as approved), as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	38	5500		209000
1249	Providing and fixing of catch basin of 304 s.steel body of 2mm thickness with ductile iron grating of 25mm thickness and s.steel bucket 1.25mm thickness with perforated holes (detail as shown in b-3 as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and engineers approval.	Nos.	12	35980		431760

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1250	Providing and fixing of Duco coated Ductile iron body Area drain 200mm diameter circular type with flashing flange, S.Steel strainer and heavy duty Stainless Steel grating with 110mm bottom outlet to BS EN 1329 push-fit piping COMPLETE SET WITH CONNECTORS as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	48	22500		1080000
1251	Providing and fixing of floor drain channel with 8" wide and 6" deep ductile Iron grating for Waste and Storm Water collection as indicated on the drawing, as per specifications and Engineers approval.	RFT.	260	6320		1643200
1252	Providing and fixing UPVC cowl for vent pipe of the following dia including all accessories complete in all respects.					
1253	50 mm dia	Nos.	60	550		33000
1254	100 mm dia	Nos.	140	610		85400
1255	150 mm dia	Nos.	140	1010		141400

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1256	OIL & SAND INTERCEPTORS:					
1257	Supply and installation of Stainless Steel Centralized Oil & Sand interceptor (50 gpm) with Automatic Oil & Sand Recovery System, Stainless Steel Strainer, removable baffle assembly to be installed with Vent piping specified and shown on the drawing, as per specifications and Engineers approval.	Nos.	1	212740		212740
1258	MANHOLES & GULLYTRAPS:					
1259	Construction of 32" x 32" Sanitary sewage manhole with 24" x 24" Heavy duty HDPE/ Polypropylene Man Hole Access covers with frame Medium Duty with 1000KG minimum bearing capacity As per BS-497:1976 (BS EN124:1994) cover as specified and shown on the drawing, as per specifications and Engineers approval.	Nos.	2	128060		256120

PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1260	Construction of 32" x 32" Storm Water manhole with 24" x 24" Heavy duty HDPE/ Polypropylene Man Hole Access covers with frame Medium Duty with 1000KG minimum bearing capacity As per BS-497:1976 (BS EN124:1994) cover as specified and shown on the drawing, as per specifications and Engineers approval.	Nos.	2	128060		256120
1261	EXTERNAL CONNECTION:					
1262	Connection to external Sewage network, after obtaining approval from CDA / local authorities including the cost of excavation, Piping as specified and shown on the drawing, as per specifications and Engineers approval.	Job	1	250000		250000
1263	PLUMBING FIXTURES:					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1264	Providing and fixing of Floor mounted European type water closet, with dual flush Tank having 6.0 liters main flush tank and 4.0 liters secondary flush tank, build in S-Trap , Stop cock, flexible pipe as specified by the architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	130	64180		8343400
1265	Fixing Asia type water closet with dual flush Tank of 6.0 liters main flush and 3 liters secondary flush, build in S/P-Trap , Stop cock with flexible pipe as specified by architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	35	38350		1342250
1266	Providing & Fixing semi pedestal type wash basin with mixer having flow of 6.0 lpm or less with two (2) nos. Stop cocks, Flexible Connection , flexible drain pipe to floor drain as specified by architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	135	55530		7496550

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1267	Providing & Fixing of Shower head with shower mixer having maximum flow of 8.5 lpm, as specified by architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	6	43780		262680
1268	Providing & Fixing Single Compartment 304 stainless Steel kitchen Sink with mixer having maximum flow of 6.0 lpm, waste trap, Stop cocks with flexible pipes, Flexible drain pipe as specified by architect and kitchen Consultant in Fixture schedule, as per drawings, specifications and Engineers Approval.	Nos.	28	79740		2232720
1269	ACCESSORIES:					
1270	Supply, Installation and fixing bath toilet accessories as under:					
1271	Toilet Paper Holder	Nos.	130	4040		525200
1272	Hand Spray / Muslim shower	Nos.	165	4840		798600
1273	Liquid Soap Dispenser/ Soap dish	Nos.	145	4040		585800
1274	WC Cleaning Brush	Nos.	130	800		104000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1275	Robe Hooks	Nos.	209	2900		606100
1276	Towel Railing	Nos.	60	6300		378000
1277	Hand Dryer	Nos.	48	31490		1511520
1278	GENERAL MECHANICAL SYSTEM:					
1279	Specification Section 15440, 15519:					
1280	Painting and Finishes					
1281	Providing Painting and Finishing including stenciling and identification tags as specified in technical specifications and as directed by the Engineer In charge, complete in all respect.	Job	1	950000		950000
1282	Shop Drawing & As-Built Drawings					
1283	Providing Shop Drawings and As Built Drawings in A1 size with Electronic Copies, as specified in specifications, complete in all respect and as directed by the Engineer in charge.	Job	1	250000		250000
1284	Test Run					

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1285	Providing two months Test Run in summer / winter, as specified in specifications, as advised by the Consultant/Client and as directed by the Engineer in charge. After satisfactory completion of test run, a certificate will be issued to the Contractor.	Job	1	500000		500000
1286	Providing and installation of 10 inch dia test bore complete in all respect (if sub soil water is not achieved)	Job	1	1800000		1800000
1287	TUBE WELL					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1288	Drilling, construction, development and testing of one perfectly vertical 16-inch dia tube well to a minimum depth of 600 ft, complete with 12-inch dia PVC Class-E plain and slotted screen casing, couplers and accessories, approved graded gravel filter pack, cement/bentonite grouting and sanitary sealing, borehole development, flushing and disinfection, water-level measurements, step-drawdown, constant-rate pumping and recovery tests, water sampling and laboratory testing, and all necessary materials, labour, equipment, transportation, mobilization and demobilization, including coordination and acquiring NOC from CDA before start of work and all incidental works necessary to complete and commission a fully operational tube well capable of demonstrating a minimum sustainable yield of 60,000 gallons/day, complete in accordance with the specifications and to the satisfaction of the Engineer.	Job	1	6000000		6000000

Sr. No	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1289	Supply, install, test and commission one stainless steel submersible borehole pump complete with submersible motor, control panel, power cable, riser pipe, non-return valve, isolation valve, wellhead assembly, piping, fittings, supports, accessories, electrical connections, testing and commissioning, having a duty of 100 GPM at 600 ft total dynamic head with a 30 HP motor, complete in accordance with the drawings, specifications, and Engineer's approval	Job	1	3502318.5		3502318.5
1290	Providing and installation of 16 inch dia test bore(minimum 600ft depth) complete in all respect (if sub soil water is not achieved)	Job	1	2000000		2000000
1291	Submission of water quality report as per WHO standards and as mentioned in specification.	Job	1	200000		200000
					GRAND TOTAL:	Rs2,538,599,183.88

Scope of Work

As per BOQ, drawings and other bidding documents

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Price Schedule

For Individual Jobs

#	Job Title	Quantity	Unit Price (PKR)	Total Price (PKR)	Delivery Location	Delivery Period / Year	Country of Origin
1							
2							

For Lots

#	Lot Title	Total Lot Price (PKR)	Country of Origin
1	[Lot 1 Title]		

PUBLIC PROCUREMENT REGULATORY AUTHORITY
(PPRA)
EPADS

General Conditions of Contract

Red Book:
© FIDIC 2017. All rights reserved.

The Conditions of Contract are the “General Conditions” which form part of the “Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer (“Red book”) Second edition 2017” published by the Federation Internationale Des Ingenieurs – Conseils (FIDIC) and the following “Particular Conditions” which shall complement the General Conditions of the Contract.

The successful Bidder, upon contract award, shall be required to furnish two (02) copies of aforementioned “General Conditions” for incorporation in the Works Contract.

International Federation of Consulting Engineers (FIDIC) FIDIC
Bookshop – Box- 311 – CH – 1215 Geneva 15, Switzerland
Fax: +41 22 799 49 054
Telephone: **+41 22 568 0500**
E-mail: **fidic@fidic.org**
Website: www.fidic.org
FIDIC code: ISBN13: 978-2-88432-084-9

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Special Conditions of Contract

PARTICULAR CONDITIONS OF CONTRACT (PCC)

Particular Conditions
(Mandatory Provisions not to be amended/substituted)

The Particular Conditions (PCC) complement the General Conditions (GCC) to specify dates, contractual requirements, and special circumstances related to the Works. The PCC consists of two parts, Part A - Contract Data and Part B - Special Provisions. The provisions to be found in the Special Provisions (Particular Conditions - Part B) take precedence over the equivalent provisions found under the same Sub-Clause number(s) in the General Conditions, and the provisions of the Contract Data (Particular Conditions - Part A) take precedence over the Special Provisions (Particular Conditions - Part B).

PART A - Contract Data

Sub-Clause 1.1.27
Defects Notification Period (DNP): **365** Days

Sub-Clause 1.1.31
Employer's name & address: **Securities & Exchange Commission of Pakistan (SECP), Engr. Anwar Ghani - Project Director Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474**

Sub-Clause 1.1.35
Engineer's name & address: EA Consulting

Plot#25, Mauve Area, G11/1 Islamabad

Sub-Clause 1.1.84
Time for Completion: **660** days for whole of the works

Sub-Clause 1.3 (a)(ii)
Agreed method of electronic transmission: Agreed
The Electronic Transmission Methods are EPADS V 2.0

Sub-Clause 1.3 (d)
Address of Empoyer for Communications: **Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474**
Address of Engineer for Communications:

Plot#25, Mauve Area, G11/1 Islamabad

Address of Contractor for Communications: ----------

Sub-Clause 1.4
Contract shall be governed by the law of: **Islamic Republic of Pakistan**
Ruling language: **English**
Language for communications: **English**

Sub-Clause 2.1
After receiving the Letter of Acceptance, the Contractor shall be given right of access to all or part of the Site within: **30** days after Commencement Date

Sub-Clause 2.4
Employer's financial arrangements:

Own Funds

Sub-Clause 3.2 (e)(ii)
Engineer's Duties and Authority: **Variation resulting in an increase of the Accepted Contract Amount in excess ofone percent (1%)subject to accumulative Variations not exceeding five percent (5%)of the Accepted Contract Amount**

Sub-Clause 4.2
Performance Security (as percentage of the Accepted Contract Amount in Currencies): 10.00%
Form of Performance Guarantee: **Bank Guarantee**

Sub-Clause 4.2.1
List of Insurance Companies:

NA

Sub-Clause 4.7.2
period for notification of errors in the items of reference: **Twenty Eight (28) days**

Sub-Clause 4.19
Period of payment for temporary utilities: **Each Month**

Sub-Clause 5.1 (a)
Maximum allowable accumulated value of work subcontracted (as a percentage of the Accepted Contract Amount): **30** %

Sub-Clause 5.1 (b)
Parts of the Works for which subcontracting is not permitted: 70

Civil Works should not be sub-contracted while specialized jobs i.e. Electrical and Plumbing Works may be permitted

Sub-Clause 6.5
Normal working hours on the Site: **8**

Sub-Clause 8.3
Number of additional paper copies of programmes: **3**

Sub-Clause 8.8 & 14.15(b)
Delay Damages payable for each day of delay **0.01**% of the Accepted Contract Amountfor delay in completion of whole of the Works

Sub-Clause 8.8
Maximum amount of Delay Damages **10.00 %** of the Accepted Contract Amount

Sub-Clause 8.14
Applicability of Incentives for Early Completion **No**

Sub-Clause 12.3
Percentage profit (Not more than 10%): **Nil**

Sub-Clause 13.4.(b)(ii)
Percentage rate to be applied to Provisional Sums for overhead charges and profit: **Twenty Five percent (25%)**

Sub-Clause 14.2
Total Advance Payment: **Fifteen percent (15%) of the Accepted Contract Amount excluding Provisional Sums payable in the currencies and proportions in which the Accepted Contract Amount is payable**

Sub-Clause 14.2.1
Advance Payment Insurance **Not Allowed**

Sub-Clause 14.2.3
Percentage deductions for the repayment of the Advance Payment: Deduction shall be made at the amortization rate of 17.5 % of the value of the Works executed of each IPC as provided in paragraph (i) of Sub-Clause GCC 14.3, starting from 2nd IPC provided that the advance payment shall be completely repaid prior to the time when 90% of the Accepted Contract Amount less Provisional Sums has been certified for payment. It may be more than 17.5% in the last instalment to ensure full repayment.

Sub-Clause 14.3
Period of payment **One Month**

Sub-Clause 14.3(b)
Number of additional paper copies of Statements: **2**

Sub-Clause 14.3 (iii)
Percentage of retention: **Seven percent (7%)**

Sub-Clause 14.3 (iii)
Limit of Retention Money (as a percentage of the Accepted Contract Amount): **Five percent (5%)**

Sub-Clause 14.5(b)(i)
Plant and Materials for payment when shipped: **Plant and Materials under Bill of "Imported Plant and Materials"**

Sub-Clause 14.5(c)(i)
Plant and Materials for payment when delivered to the Site: Plant and Non Perishable Materials

Sub-Clause 14.6.2
Minimum amount of Interim Payment Certificate (IPC): **Yes**
The Minimum Amount IPC is 35M consisting of 50% Adhoc (10 working days) and 50% remaining payment (01 month). Deductions for Mobilization Advance, retention money, applicable taxes shall be made at the remaining payment stage.
[Employer to give value not exceeding one fifth of the average expected value of Interim Payment Certificate]

Sub-Clause 14.7(a)
Period of payment of Advance Payment to the Contractor**: 14 days**

Sub-Clause 14.7b(i)
Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.6: **30** days

Sub-Clause 14.7b(ii)
Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.13 (Final Payment)**: 56** days

Sub-Clause 14.7(c)
Period for the Employer to make final payment to the Contractor**: 56** days

Sub-Clause 14.8
Financing charges for delayed payment Local Currency (PKR):
6-Month KIBOR (Offer) +3% per annum.
Foreign Currency:
USD
6-Month SOFR (Secured Overnight Financing Rate for USD) +1% per annum.

EURO
6-Month EURIBOR (EURO Interbank Offered Rate for EURO) +1% per annum.

Others
Appropriate rates +1% (for other foreign currencies, Ref. Schedule-A, A-4 to Bid).

Sub-Clause 14.11.1(b)
Number of additional paper copies of draft Final Statements**: 2**
[insert number of copies say six (06)]

Sub-Clause 14.15
Currencies of payment of Contract Price: **as stated in the Table Schedule of Adjustment Data of Schedule A (if Given)**

Sub-Clause 14.15(a)(i)
Proportions or amounts of Local and Foreign currencies: **as stated in the Table Schedule of Adjustment Data of Schedule A (if Given)**

Sub-Clause 14.15(c)
Currencies and proportions for payment of Delay Damages: **as stated in the Table Schedule of Adjustment Data of Schedule A (if Given)**

Sub-Clause 14.15(f)
rates of exchange: **as stated in the Table IV of Schedule A (If Given)**

Sub-Clause 17.2(d)
Forces of nature, the risks of which are allocated to the Contractor: **Nil**

Sub-Clause 19.1
Permitted deductible limits:
i) insurance required for the Works: **Ten percent (10%) of loss amount on each & every loss**
ii) insurance required for Goods: **Nil**
iii) insurance required for liability for breach of professional duty: **Nil**
iv) insurance required against liability for fitness for purpose (if any is required): **Nil**
v) insurance required for injury to persons and damage to property: **Nil**
vi) insurance required for injury to employees: **Nil**
vii) other insurances required by Laws and by local practice : **Nil**

Periods for submission of insurance:
a) evidence of insurance: Not later than the Commencement Date
b) relevant policies: Within twenty eight (28) day from the Commencement Date

Sub-Clause 19.2.1(b)
Additional amount to be insured (as a percentage of the replacement value): 15% of the replacement value

(Accepted Contract Amount)

Sub-Clause 19.2.2

Extent of insurance required for Goods: From Ex-Works (i.e., works, factory, warehouse, etc) to delivery at the Site

Amount of insurance required for Goods: Full replacement value

Sub-Clause 19.2.3(a)

Amount of insurance required for liability for breach of professional duty: Full replacement value of the Works to be designed by the Contractor

Sub-Clause 19.2.3(b)

Insurance required against liability for fitness for purpose: **Yes**

Sub-Clause 19.2.3

Period of insurance required for liability for breach of professional duty: Until the date of issuance of Performance Certificate

Sub-Clause 19.2.4

Amount of insurance required for injury to persons and damage to property: Injury to person and Fatal case: in accordance with Workmen Compensation Act

Damage to Property: The Amount of Insurance Required for Person Injury is in accordance with Workmen Compensation Act

The Amount of Insurance Required for Damage to Property is 30M as per his assessment of the adjoining property(ies) other than the Works]

without limit to the number of incidents

Sub-Clause 19.2.6

Other insurances required by Laws and by local practice: All insurances as applicable, to the extent of execution of the project, under Federal and Provincial laws of Islamic Republic of Pakistan

Sub-Clause 21.1

Time for appointment of the DAAB: Within 28 days from the Commencement Date.

In case the Accepted Contract Amount is lesser than PKR one (01) billion, appointment of the DAAB shall be made when Dispute arises between the Parties.

Sub-Clause 21.1

The DAAB shall comprise 3

[insert either “a sole Member” or “Three Members”]

[For a Contract estimated to cost above PKR 2.5billion, the DAAB shall comprise of three members. For a Contract estimated to cost between PKR1billion and PKR2.5billion, the DAAB may comprise of three members or a sole member. For a Contract estimated to cost less than PKR1billion, a sole member is recommended.]

Sub-Clause 21.1

List of proposed members of DAAB

- proposed by Employer

TBD

TBD

TBD

- proposed by Contractor
[to be inserted at the time of signing of the Contract]
1._____
2._____
3._____

Sub-Clause 21.2
Appointing entity (official) for DAAB members Managing Director Public Procurement Regulatory Authority (PPRA) or Chairman Pakistan Engineering Council (PEC) from the list of PEC approved arbitrators published at its website

Sub-Clause 21.6
Rules of Arbitration: PEC Rules of Conciliation and Arbitration or Pakistan Arbitration Act of 1940, if the former is inactive.
The place of Arbitration shall be in the Employer's country: **ISLAMABAD PAK**
[Insert name of city]

Particular Conditions

PartB - Special Provisions

1.1 Definitions

1.1.76 "Specification"
Following is added at the end:
"and consists of two parts i.e.,
i) "Part A - Specific Provisions"; and
ii) "Part B - Technical Provisions"."

1.2 Interpretation

"and" is deleted from the end of sub-paragraph (i) and added at the end of sub-paragraph (j).
Sub-paragraph (k) is added:
"(k) The word "tender" is synonymous with "bid" the word tenderer with "bidder", the words "tender documents" with "bidding documents" and "Schedule of Prices" with "Bill of Quantities", as applicable."
1.5 Priority of Documents The documents listed at (a) through (k) of this Sub-Clause are deleted and substituted with the following:
(a) the Contract Agreement;
(b) the Letter of Acceptance;
(c) the Letter of Bid;
(d) the Particular Conditions Part A - Contract Data;
(e) the Particular Conditions Part B - SpecialProvisions;
(f) the General Conditions;
(g) the Specification Part A - SpecificProvisions;
(h) the Specification Part B- Technical Provisions;
(i) the Drawings;
(j) the completed Schedules to Bid includingBillof Quantities;
(k) the JV Undertaking (if the Contractor is a JV); and
(l) any other documents forming part of the Contract.
The addenda/corrigenda, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

1.6 Contract Agreement

In the last line of the 1st paragraph the text “shall be borne by the Employer” is substituted by “shall be reimbursed by the Employer to the Contractor”.

3.1 The Engineer

In sub-paragraph (a) the text “as defined in the Pakistan Engineering Council Act, 1975 (Act No.V of 1976)” are added after the words “professional engineer”.

3.2 Engineer’s Duties and Authority

The Engineer shall obtain the consent in writing of the Employer before taking action under the following Sub-Clauses of these Conditions:
(a) Consenting to the subcontracting of any part of the Works under Sub-Clause 5.1 [Subcontractors]
(b) Any action under Sub-Clauses 8.9 [Employer’s Suspension] and 8.12 [Prolonged Suspension]
(c) Issuance of “Taking Over Certificate” under Sub-Clause 10.1 [Taking Over the Works and Sections].
(d) Issuing the “Performance Certificate” under Sub-Clause 11.9 [Performance Certificate].
(e) Sub-Clause 13.1 [Right to Vary]: instructing a Variation, except;
(i) in an emergency situation as determined by the Engineer, or
(ii) if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the Contract Data.
(f) Sub-Clause 13.3 [Variation Procedure]: approving a proposal for Variation submitted by the Contractor in accordance with Sub-Clause 13.3.2 [Variation by Request for Proposal] or 13.2 [Value Engineering].
(g) Certifying release of second half of the Retention Money under Sub-Clause 14.9 [Release of Retention Money].
(h) Issuing Final Payment Certificate under Sub-Clause 14.13 [Issue of FPC].
(i)

Issue of FPC Sub Clauses

As per Clause 3.2 after sub-clause h add the following

(i)The Engineer shall obtain the Employer's prior written consent before approving, accepting, or testing any material, equipment, mock-up, or sample submitted by the Contractor.

(j) If any item(s) missing in the Approved Manufacturers List is required for inclusion into permanent works, prior written consent regarding identifying, sampling, testing, approval of material/manufacturer must be obtained from the Employer. Notwithstanding the above, the materials/items in the Approved Manufacturers list shall be used.

*[insert Sub-Clause number (not Sub-Clause 3.7 [Agreement or Determination]
Any such requirement shall not be applied to any action by the Engineer under Sub-Clause 3.7 [Agreement or Determination], as stated in Sub-Clause 3.2 [Engineer’s Duties and Authority] of the General Conditions. Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Employer.
Following is added after the words “the Employer’s consent is required” in 4th paragraph:

“stating that the Employer’s consent has been obtained for that specified authority”

4.2 Performance Security

4.2.1 Contractor’s Obligations

The entity issuing the Performance Security and its form shall be as under:

The Performance Security shall be, at the option of the Contractor,issuedin the prescribed form included in the Bidding Documents,by(a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan or (c)an Insurance Companylisted in the Contract Data and rated by PACRA/VIS ofratingas provided in Table below:

Accepted Contract Amount (In Eq. PKR million) Minimum Rating of Insurance Companies

Up to 1000 A (+)

1001 to no limit AA

In case of Joint Venture, the Performance Security shall be in the name of the Joint Venture or in the name of Lead/either firm of the JV or in ratio of shares of the individual JV partners.

Following paragraph is added at the end of this Sub-Clause:

“The amount of Performance Security shall be reducedto 50%following issue of the Taking-Over Certificate for the whole of the Works under Clause 10 of Conditions of Contract.”

4.3 Contractor’s Representative

In second paragraphthe text “professional engineer as defined in the Pakistan Engineering Council Act, 1975 (Act No. V of 1976) (having temporary licence in case of foreign engineer under Section 12 of the Pakistan Engineering Council Act, 1975 (Act No. V of 1976)” are added after the words “qualified, experienced”.

In the 3rd paragraph the words “28 days” are substituted by “14 days”. In 2nd line of 4thparagraph the text “or appoint a replacement” is substituted by “except appointment of a suitable temporary replacement is deployed at the Site”

4.4 Contractor’s Documents

4.4.2 As-Built Records

First paragraph is deleted and the text in the last paragraph is substituted with the following:

“The Contractor shall furnish to the Engineer 6 copies, one reproducible and one electronic copy(provided the Engineer has made available to the Contractor editable form of the Drawings)of all Drawings amended to conform to the Works as built.In case the Engineer does not make available to the Contractor editable form of the Drawings, the Contractor shall furnish to the Engineer as-built data for incorporation in the Drawings. Upon receipt of PDF versions of the as-built drawings prepared by the Engineer, the Contractor shall furnish to the Engineer 6copies and one reproducible of these Drawings.

The price of such Drawings shall be deemed to be included in the Contract Price.”

Following Sub-Clause is added:

4.4.4 ShopDrawings

The Contractor shall submit to the Engineer for review 3 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.

Review and approval by the Engineer shall not exceed 21 days and be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory and the Engineer’s review or approval shall not relieve the Contractor of any of his responsibilities under the Contract.

4.8 Health and Safety Obligations

The following text is added at the end ofthis Sub-Clause:

In the event of work being carried out outside the normal working hours and in the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night work is being carried out shall be sufficiently lighted. All arrangement adopted for

such lighting shall be to the satisfaction of the Engineer.

4.20 Progress Reports

At the end of sub-paragraph (g) the word “and” is deleted and at the end of sub-paragraph (h) the full stop (.) is replaced with “;”, and the following new sub-paragraphs are added as:
(i) planned programme for the execution of the Works for next 56 days to enable the Engineer to determine its programme of inspection and testing;
(j) monthly summery of daily job record indicating weather conditions, deployment of Contractor’s Equipment, labour employment, local material procurement and material import, if any; and
(k) salient contractual and project information.

5.1 Subcontractors

Add the following text at the end of paragraph (ii):
“underSchedule to Bid”
The following is added at the end of the last paragraph of Sub-Clause 5.1:
“All subcontracts relating to the Works shall include provisions which entitle the Employer to require the subcontract to be assigned to the Employer under sub-paragraph (a) of Sub-Clause 15.2.3 [After Termination].
The Contractor shall give reasonable opportunity to contractors from Islamic Republic of Pakistan for subcontracts for the Works, and endeavour to employ such contractors as Subcontractors.”

5.2 Nominated Subcontractors

5.2.2 Objection to Nomination
In sub-paragraph (c), “and” is deleted from the end of (i);
“.” at the end of (ii) is replaced with: “, and”.
The following is then added as (iii):
“(iii) be paid only if and when the Contractor has received from the Employer payments for sums due under the Subcontract referred to under Sub-Clause 5.2.3 [Payment to nominated Subcontractors].”

6.1 Engagement of Staff and Labour

The following paragraph is added at the end of the Sub-Clause:
“The Contractor shall, to the extent practicable and reasonable, employ staff (not less than 50%) and labour (not less than 85%) with appropriate qualifications and experience from sources within the Islamic Republic of Pakistan.”

6.7 Health and Safety of Personnel

The existing text is substituted with the following:
“In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose. The Contractor shall also provide all other medical services and appoint a health and safety officer at Site if stated in the Specifications. In case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means.”

6.8 Contractor’s Superintendence

Insert at the end of sub-paragraph (a) of this Sub-Clause:
"or, if not, the Contractor shall make competent interpreters available during all working hours, in a number sufficient for those persons to properly perform their superintendence duties"
The following text is added at the end of this Sub-Clause:
“The Contractor’s authorized representative and his other engineers working at site shall possess valid registration with the Pakistan Engineering Council.
The Contractor’s authorized representative at Site shall be authorized to exercise adequate administrative and financial powers on behalf of the Contractor so as to achieve completion of the Works as per the Contract.”

6.12 Key Personnel

The following is inserted at the end of the last paragraph:
“If any of the Key Personnel are not fluent in this language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.”
The following Sub-Clauses 6.13 to 6.26 are added at the end of Sub-Clause 6.12:

6.13 Foreign Personnel

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use all reasonable endeavours in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor’s personnel.
The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

6.14 Supply of Foodstuffs

The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor’s Personnel for the purposes of or in connection with the Contract.

6.15 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor’s Personnel.

6.16 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor’s Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

6.17 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereto by Contractor’s Personnel.

6.18 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

6.19 Festivals and Religious Customs

The Contractor shall respect the Country's recognized festivals, days of rest and religious or other customs.

6.20 Funeral Arrangements

The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of its local employees who may die while engaged upon the Works.

6.21 Forced Labour

The Contractor, including its Subcontractors, shall not employ or engage forced labour which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.

6.22 Child Labour

The Contractor, including its Subcontractors, shall not employ or engage child labour in accordance with relevant law(s) in force in Islamic Republic of Pakistan.

6.23 Employment Records of Workers

The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Contractor's Records].

6.24 Workers' Organizations

The Contractor shall comply with the relevant labour laws of Pakistan which recognize workers' rights to form and to join workers' organizations/Trade Union of their choosing and to bargain collectively without interference.

6.25 Non-Discrimination and Equal Opportunity

The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment of Contractor's Personnel on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices.
Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide protection and assistance as necessary to ensure nondiscrimination and equal opportunity, including for specific groups such as women, persons with disabilities, migrant workers and children (of working age in accordance with Sub-Clause 6.22).

6.26 Epidemics

In the event of any out-break of illness of epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government or the local medical or

sanitary authorities for the purpose of overcoming the same.

7.7 Ownership of Plant and Materials

The following is added before the first paragraph:
“Except as otherwise provided in the Contract,”
The following is added at the end of the Sub-Clause:
"No Plant and/or Materials that is the property of the Employer shallbe removed from the Site. If it becomes necessary to:
(i) remove any item of such Plant from the Site for the purposesof repair, the Contractor shall give a Notice, with reasons, tothe Engineer requesting consent to remove the defective ordamaged item off the Site. This Notice shall clearly identifythe item of defective or damaged Plant, and shall give detailsof: the defect or damage to be repaired; the place to whichdefective or damaged item of Plant is to be taken for repair;the transportation to be used (and insurance cover for suchtransportation); the proposed inspections and testing off theSite; and the planned duration required before the repaireditem of Plant shall be returned to the Site. The Contractorshall also provide any further details that the Employer mayreasonably require; or
(ii) replace any item(s) of such Plant and/or Materials, theContractor shall give a Notice, with reasons, to the Engineerclearly identifying the item(s) of Plant and/or Materials to bereplaced, and giving details of the due date of delivery tothe Site of the replacement item(s).
Where any item of Plant and/or Materials has become the propertyof the Employer under this Sub-Clause before it has been deliveredto the Site, the Contractor shall ensure that such an item is notmoved except for its delivery to the Site.
The Contractor shall indemnify and hold the Employer harmlessagainst and from the consequences of any defect in title orencumbrance or charge (except any reasonable restrictionarising from the intellectual property rights of the manufacturer orproducer) on any item of Plant and/or Materials that has becomethe property of the Employer under this Sub-Clause."
The following Sub-Clause7.9 is added after Sub Clause 7.8:

7.9 Use of Pakistani Materials and Services

The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.

8.1 Commencement of Works

The following is added before the first paragraph:
“After signing of the Contract Agreement by both Parties,” and thereafter the word “The” is replaced with the word “the”.

8.5 Extension of Time for Completion

The following is added after paragraph (c):
“for last five years”.
The following Sub-Clause 8.14 is added after Sub-Clause 8.13:

8.14 Incentives For Early Completion

If Contract Data does not state applicability of incentives for early completion, this Sub-Clause shall not apply.
The Contractor shall be entitled subject to Sub-Clause 20.2 [Claims for Payment and/or EOT] to bonus payment if the Works and/or each Section is completed earlier than the Time for Completion for the Works or Section (as the case may be). The amount of bonus for early completion of the Works and/or each Section shall be upto a limit and at a rate to 50% of the relevant limit and rate of delay damages prescribed in

Contract Data and shall be paid for every day which shall elapse between the relevant Date of Completion of the Works or Section and the relevant Time for Completion.
For the purposes of calculating any bonus payment, the applicableTime for Completion stated in the Contract Data is fixed and noadjustments of this time by reason of granting an EOT will beallowed.
The following Sub-Clause 11.12 is added after Sub-Clause 11.11:

11.12 Supervisory Assistance During DNP

If provided under the Schedule of Prices, the Contractor shall provide supervisory assistance to the Employer during the DNP for the Works. Such supervisory assistance shall be as described in the Specification for the purpose of supporting the Employer's operation and maintenance of the Plant for the period specified in the Schedule of Prices after the Date of Completion.

12.2 Method of Measurement

The following paragraph is added at the end of the Sub-Clause:
“Summary of measured quantity for payment shall be delineated item-wise under four headsnamely; “Schedule of Prices Quantity”, “Quantity Executed To-date”, “Quantity Certified Previously” and “Net Quantity Executed under this Certificate”.

12.3 Valuation of the Works

The following text is added at the end of fifth paragraph of the Sub-Clause:
“Sum of overhead charges and profit for sub-paragraph (a) shall be Twenty Five percent (25%)”.

13.4 Provisional Sums

The following paragraph is inserted as the penultimate paragraph:
“The Provisional Sum shall be used to cover the Employer’s share of the DAAB members’ fees and expenses, in accordance with Clause 21. No prior instruction of the Engineer shall be required with respect to the work of the DAAB. The Contractor shall submit the DAAB members’ invoices and the satisfactory evidence of having paid 100% of such invoices as part of the substantiation of those Statements submitted under Sub-Clause 14.3.

13.6 Adjustments for Changes in Laws

The following paragraphsare added at the end of the Sub-Clause:
“Notwithstanding the foregoing, the Contractor shall not be entitled to an extension of time if the relevant delay has already been taken into account in the determination of a previous extension of time and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the Table of Adjustment Data in accordance with the provisions of Sub-Clause 13.7 [Adjustments for Changes in Cost].”

14.1 The Contract Price

The following is added at the end of the Sub-Clause:
“Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the port of entry an approved re-export bond or bank guarantee, valid until the Time for Completion plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment and spare parts, and callable in the event the Contractor's Equipment is not re-exported from the Country on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the

Employer upon the importation of individual items of Contractor's Equipment and spare parts. Upon re-export of individual items of Contractor's Equipment or spare parts, or upon the completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment and spare part to be re-exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable Laws. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to re-exported; and (b) on the initial imported value of the Contractor's Equipment and spare parts remaining in the Country after completion of the Contract. Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining."
[The Employer may change or delete this Sub-Clause as per Project requirements]

14.2 Advance Payment

14.2.1 Advance Payment Guarantee
The entity issuing the Advance PaymentGuaranteeand its form shall be as under:
The Advance PaymentGuarantee shall be in the form of Guarantee issued by (a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistanor (c)an Insurance Companylisted in the Contract Data and rated by PACRA/VIS ofrating as provided in Table below:
Accepted Contract Amount (In Eq. million PKR) Minimum Rating of Insurance Companies
Up to 1000 A (+)
1001 to no limit AA
In case of Joint Venture, the Advance PaymentGuarantee(s)shall be in the name of the Joint Venture or in the name of Lead/either firm of the JV or in ratio of shares of the individual JV partners.

14.6 Issue of IPC

14.6.1 The IPC
In the first line of the 1st paragraph the words "28 days" are substituted by "14 days".

14.7 Payment

The words "or through crossed cheque in favour of the Contractor or JV partners. The Payment to JV partners shall be made at the request of the Joint Ventures in the ratio of their shares specified by them" are added at the end of the Sub-Clause.

14.8 Delayed Payment

In the first paragraph, third line, the words "compounded monthly" are deleted.
The text of 2nd paragraph is deleted and substituted with the following:
"The Employer shall pay to the Contractor compensation at the rate stated in the Contract Data."

14.9 Release of Retention Money

The following is added at the end of Sub-Clause 14.9:
"Unless otherwise stated in the Contract, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment by the Engineer, the Contractor shall be entitled to substitute a guarantee, in the form annexed to the Particular Conditions or in another form approved by the Employer and issued by a schedule bank selected by the Contractor, for the second half of the Retention Money. The Contractor shall ensure that the guarantee is in the amounts and currencies of the second half of the Retention Money and is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security. On receipt by the Employer of the required guarantee, the Engineer shall certify, and the Employer shall pay the second half of

the Retention Money. The release of the second half of the Retention Money against a guarantee shall then be in lieu of the release after the latest of the expiry dates of the Defects Notification Periods. The Employer shall return the guarantee to the Contractor within 21 days after receiving a copy of the Performance Certificate.

If the Performance Security required under Sub-Clause 4.2 is in the form of a demand guarantee, and the amount guaranteed under them when the Taking-Over Certificate is issued is more than half of the Retention Money, then the Retention Money guarantee will not be required. If the amount guaranteed under the Performance Security when the Taking-Over Certificate is issued is less than half of the Retention Money, the Retention Money guarantee will only be required for the difference between half of the Retention Money and the amount guaranteed under the Performance Security.

15.2 Termination for Contractor's Default

15.2.1 Notice
Following text is added at the end of sub-paragraph (h) of this Sub-Clause:
"For the purposes of this Contract, corrupt and fraudulent practices have been defined in Public Procurement Rules 2004."
15.2.3 After Termination
The word "and" at the end of sub-paragraph (ii) of paragraph (b) is deleted the following paragraph is added after sub-paragraph (iii):
"(iv) all Employer-Supplied Materials and/or Employer's Equipment madeavailable to the Contractor in accordance with Sub-Clause 2.6 [Employer-Supplied Materials and Employer's Equipment], and"

15.4 Payment after Termination

The following text is added at the end of this Sub-Clause:
"The Employer shall be entitled to sell any of the Contractor's Equipment, Temporary Works and unused materials and apply the proceeds of sale towards payment of any debt due from the Contractor to the Employer under this Clause including any outstanding payments to the Subcontractors.

16.2 Termination by Contractor

16.2.1 Notice
The sub-paragraph (j) is deleted in its entirety.
At the end of sub-paragraph (i) "; or" is replaced with "." and at the end of sub-paragraph (h) ";" is replaced with "; or".
In sub-paragraph (f) "84 days" are replaced with "180 days" and text "for reasons not attributable to the Contractor" is added at the end.

16.3 Contractor's Obligations After Termination

Sub-paragraph (c) is deleted and replaced with:
"(c) deliver to the Engineer all Employer-Supplied Materials and/orEmployer's Equipment made available to the Contractor in accordance with Sub-Clause 2.6 [Employer-Supplied Materials and Employer's Equipment]; and
(d) remove all other Goods from the Site, except as necessary for safety,and leave the Site."

17.1 Responsibility for Care of the Works

After the two instances of "Goods" in the last paragraph, the words "Employer-Supplied Materials and/orEmployer's Equipment" are added.
The following Sub-Clause 17.7 is added after Sub-Clause 17.6:

17.7 Use of Employer's Accommodation/Facilities

The Contractor shall take full responsibility for the care of the items of the Employer's facilities and/or accommodation, if any, as detailed in the Specification, from the date of use and/or occupation by the Contractor until the date on which such use and/or occupation is re-vested in the Employer.
If any loss or damage happens to any of the above items during a time while the Contractor is responsible for its care, arising from any cause other than a cause for which the Employer is responsible or liable, the Contractor shall promptly rectify the loss or damage at the Contractor's risk and cost.

18.1 Exceptional Events

The words "or disorder" are replaced with "disorder or sabotage" in sub-paragraph (c) of the Clause.

18.4 Consequences of an Exceptional Event

The following is added at the end of sub-paragraph (b) after deleting the ".":
", including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Exceptional Events, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 19.2 [Insurance to be provided by the Contractor]."

18.5 Optional Termination

In sub-paragraph (c), the words "and necessarily" areadded after the words "was reasonably".

19.1 General Requirements

Following text is added at the end of first paragraph:
"The Contractor shall immediately after the date of the Letter of Acceptance submit the draft of insurance policies for the Employer's consent."
Following text is added at the end of third paragraph:
"The Contractor shall, within the respective periods stated in the Contract Data submit to the Engineer and the Employer a) evidence that the insurances described in this Clause have been effected, and b) copies of policies of the insurances described in Sub-Clauses 19.2.1, 19.2.4 and 19.2.5."

19.2 Insurance to be provided by the Contractor

19.2.5 Injury to employees
The words "sickness, disease" are deleted in the third line of first paragraph.

The following Sub-Clause is added after Sub-Clause 19.2.6:
19.2.7 Insurance Company
"The Contractor shall be obliged to place all insurances described in this Clause with insurers listed in the Contract Data and rated byPACRA/VISofrating as provided in Table below:

Accepted Contract Amount (In Eq. million PKR)	Minimum Rating of Insurance Companies
Up to 1000	A (+)
1001 to no limit	AA

21.6 Arbitration

The word "international" is deleted in the sixth line of first paragraph. The text of sub-paragraph (a) is substituted with the following:
"the Dispute shall be finally settled under the Rules of Arbitration, specified in the Contract Data;"
The following Clauses are added after Clause 21

22 Custom Duty

[Employer may incorporate provisions where applicable. However, in order to make the bid more balanced, the payment of Customs Duties should be the responsibility of the Employer.]

23 Taxes

The Contractor, Subcontractors and their employees shall be liable to pay income tax, withholding tax, super tax and other taxes on income arising out of the Contract. The rates and prices as stated in the contract shall be deemed to cover all such taxes.

24 Integrity Part

If it is found and established at any stage that the Contractor or any of his Subcontractors, agents or servants have violated or involved in violation of the Integrity Pact signed by the Contractor then the Employer shall be entitled to :

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agent or servants;

(b) terminate the Contract; and

(c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agent or servants.

The termination under sub-paragraph(b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clause 15.1 to 15.4 and the payment under Sub-Clause 15.4 shall be made after having deducted the amounts due to the Employer under sub-paragraph(a) and (c) of this Sub-Clause.

Appendix General Conditions of Dispute Avoidance/Adjudication Agreement

12 Disputes Under DAAB Agreement

In the first paragraph, third, fourth and fifth line, the text "under the Rules of Arbitration of the International Chamber of Commerce 2017……shall apply" is substituted with "under the Arbitration Act 1940 by sole arbitrator appointed by the Managing Director Public Procurement Regulatory Authority or Chairman Pakistan Engineering Council."

Bid Securing Declaration

FORM OF BID SECURING DECLARATION

Date:
No.:
Alternative No.: ***P78769***

To: **Securities & Exchange Commission of Pakistan (SECP), Engr. Anwar Ghani - Project Director Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474**

We, the undersigned, declare that:

We understand that, according to your conditions, Bids must be supported by a Bid-Securing Declaration.

We accept that we will be blacklisted and henceforth cross debarred for participating in respective category of public procurement proceedings for a period of (not more than) six months, if fail to abide with a bid securing declaration, however without indulging in corrupt and fraudulent practices, if we are in breach of our obligation(s) under the Bid conditions, because we:

(a) have withdrawn our Bid during the period of Bid validity specified in the Letter of Bid; or
(b) having been notified of the acceptance of our Bid by the Procuring agency/Employer during the period of Bid validity, (i) fail or refuse to sign the Contract; or (ii) fail or refuse to furnish the Performance Security (or guarantee), if required, in accordance with the ITB.

We understand this Bid Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of our Bid.

Name of the Bidder*
Name of the person duly authorized to sign the Bid on behalf of the Bidder** _____
Title of the person signing the Bid _____
Signature of the person named above _____
Date signed _____ day of _____, _____
*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder
**: Person signing the Bid shall have the power of attorney given by the Bidder attached to the Bid

[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the Bid.]

Contract Form

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____ (month) 20_____ between **Securities & Exchange Commission of Pakistan (SECP), Engr. Anwar Ghani - Project Director Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474** (hereinafter called the "Employer") of the one part and _____ (hereinafter called the "Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works, viz., **Construction of SECP Head Office Building Mauve Area G-11 Islamabad (Package -2A Architecture, Electrical & Plumbing Works) (*P78769*)** should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnessed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents, in the order of priority, after incorporating addenda, if any, except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement:

a) This Contract Agreement;
b) The Letter of Acceptance;
c) The Letter of Bid;
d) The Particular Conditions Part A - Contract Data;
e) The Particular Conditions Part B - SpecialProvisions;
f) The General Conditions;
g) The Specifications Part A - SpecificProvisions;
h) The Specifications Part B- Technical Provisions;
i) The Drawings;
j) The Completed Schedules to Bid including Schedule of Prices;
k) the JV Undertaking (if the Contractor is a JV); and
l) [Employer to insert any other documents forming part of the Contract]

The addenda/corrigenda,if any, (Excluding part relating to Instructions to Bidders alongwith Bidding Data) shall be deemed to have been incorporated at the appropriate places in the "Documents forming the Contract".

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed on the day, month and year first before written in accordance with their respective laws.

Signature of the Contactor Signature of Employer

(Seal) (Seal)

Signed, Sealed and Delivered in the presence of:

Witness Witness

(Name, Title and Address) (Name, Title and Address)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

DAAB Agreement

[All italicised text and any text within square brackets (except sub-clause headings) in this form of agreement is for use in preparing the form and should be deleted from the final product].

Name and details of the Contract Construction of SECP Head Office Building Mauve Area G-11 Islamabad (Package -2A Architecture, Electrical & Plumbing Works)

_____

This Agreement made the _____day of _____ [month], _____ [year], between

Name and contact details of the Employer **Securities & Exchange Commission of Pakistan (SECP), Engr. Anwar Ghani - Project Director**
Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474
+92-519-195551
procurement.info@secp.gov.pk

Name and contact details of the Contractor _____ (name)
_____ (address)
_____ (telephone)
_____(email / other contact details);

Name and contact details of the DAAB Member _____ (name)
_____ (address)
_____ (telephone)
_____(email / other contact details);

("DAAB Agreement")

Whereas:
A. the Employer and the Contractor have entered (or intend to enter) into the Contract;
B. under the Contract, the "DAAB" or "Dispute Avoidance/Adjudication Board" means the sole member or three members (as stated in the Contract Data of the Contract) so named in the Contract, or appointed under Sub-Clause 21.1 [Constitution of the DAAB] or Sub-Clause 21.2 [Failure to Appoint DAAB Members] of the Conditions of Contract;
C. the Employer and the Contractor desire jointly to appoint the above-named DAAB Member to act on the DAAB as:
a. the sole member of the DAAB, and where this is the case, all references to the "Other Members" do not apply; or
b. one of three members / chairman [delete the one which is not applicable] of the DAAB and, where this is the case, the other two persons are:

_____ (name) _____ (name)
_____ (address) _____ (address)
_____(telephone) _____(telephone)
_____(email/ other contact details) _____ (email/other contact details)

the "**Other Members**"; and
D. the DAAB Member accepts this appointment.

The Employer, Contractor and DAAB Member jointly agree as follows:

1. The conditions of this DAAB Agreement comprise:
(a) Clause 21 [Disputes and Arbitration] of the Conditions of Contract, and any other provisions of the Contract that are applicable to the DAAB's Activities; and
(b) the "General Conditions of Dispute Avoidance/Adjudication Agreement", which is appended to the General Conditions of the "Conditions of Contract for Construction" Second Edition 2017 published by FIDIC ("GCs"), as amended and/or added to by the following provisions.
2. [Details of amendments to the GCs, if any. For example:
In the procedural rules annexed to the GCs, Rule _ is deleted and replaced by: " … "]
3. The DAAB Member shall be paid in accordance with Clause 9 of the GCs. The currency of payment shall be _____.
In respect of Sub-Clauses 9.1 and 9.2 of the GCs, the amounts of the DAAB Member's monthly fee and daily fee shall be:
monthly fee_____ per month, and
daily fee of_____ per day
(or as otherwise set under Sub-Clause 9.3 of the GCs).
4. In consideration of the above fees, and other payments to be made to the DAAB Member in accordance with the GCs, the DAAB Member undertakes to act as DAAB Member in accordance with the terms of this DAAB Agreement.
5. The Employer and the Contractor shall be jointly and severally liable for the DAAB Member's fees and other payments to be made to the DAAB Member in accordance with the GCs.
6. This DAAB Agreement shall be governed by the law of _____ (if not stated, the law that governs the Contract under Sub-Clause 1.4 of the Conditions of Contract).

SIGNED by:_____	SIGNED by:_____	SIGNED by:_____
Print name:_____	Print name:_____	DAAB Member
Title: _____	Title:_____	Title:_____
for and on behalf of the Employer	for and on behalf of the Contractor	
in the presence of	in the presence of	in the presence of
Witness:_____	Witness:_____	Witness:_____
Name:_____	Name:_____	Name:_____
Address:_____	Address:_____	Address:_____
_____	_____	_____
Date:_____	Date:_____	Date:_____

FORM OF MOBILIZATION ADVANCE GUARANTEE/ BOND

Guarantee No._____ Date _____

WHEREAS _____ (hereinafter called the 'Employer')
has entered into a Contract for _____
(Particulars of Contract)
with _____ (hereinafter called the "Contractor').
AND WHEREAS, the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Pak Rupees _____ (PKR _____) which amount shall be advanced to the Contractor as per provisions of the Contract.
AND WHEREAS, the Employer has asked the Contractor to furnish Guarantee to secure the mobilization advance for the performance of his obligations under the said Contract.
AND WHEREAS, _____

(hereinafter called the "Guarantor") at the request of the Contractor and in consideration of theEmployer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.
NOW, THEREFORE, the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails and commits default in fulfilment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.
Notice in writing of any default,on the part of the Contractor, of which the Employer at his discretion of making decision, shall be given by the Employer to the Guarantor, and on such first written demand, payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.
This Guarantee shall remain in force until the advance is fully adjusted against payments from the Interim Payment Certificates of the Contractor or until _____whichever is earlier.
(Date)
The Guarantor's liability under this Guarantee shall not in any case exceed the sum of
PKR _____ (PakRupees _____).
This Guarantee shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against paymentsfrom Interim Payment Certificates of the Contractor provided that the Guarantor

agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted.

Guarantor
(Scheduled Bank/ Insurance Company)

Signature _____
Name _____
Title _____

WITNESS:

1. _____

_____

Corporate Secretary (Seal) Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Retention Money Security
Demand Guarantee

_____ [Guarantor letterhead or SWIFT identifier code]
Beneficiary: _____ [Insert name and Address of Employer]
Date: _____[Insert date of issue]
RETENTION MONEY GUARANTEE No.: [Insert guarantee reference number]
Guarantor: [Insert name and address of place of issue, unless indicated in the letterhead]

We have been informed that _____ [insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture] (hereinafter called "the Contractor") has entered into Contract No. _____ [insert reference number of the contract] dated _____ with the Employer, for the execution of _____ [insert name of contract and brief description of Works] (hereinafter called "the Contract").
Furthermore, we understand that, according to the conditions of the Contract, the Employer retains moneys up to the limit set forth in the Contract ("the Retention Money"), and that when the Taking-Over Certificate has been issued under the Contract and the first half of the Retention Money has been certified for payment, payment of [insert the second half of the Retention Money orifthe amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money, the difference between half of the Retention Money and the amount guaranteed under the Performance Security and, if required, the ES Performance Security] is to be made against a Retention Money guarantee.
At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ [insert amount in figures] () [amount in words] upon receipt by us of the Employer's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without your needing to prove or show grounds for your demand or the sum specified therein.
A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Employer's bank stating that the second half of the Retention Money as referred to above has been credited to the contractor on its account number _____ at _____ [insert name and address of Contractor's bank].
This guarantee shall expire no later than the …. day of ……, 2…, and any demand for payment under it must be received by us at the office indicated above on or before that date.

_____
[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

Integrity Pact

Integrity Pact

DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC. PAYABLE BYTHE SUPPLIERS OF GOODS, SERVICES & WORKS IN CONTRACTS WORTH RS.10.00 MILLION OR MORE

Contract Number: Contract Value: Contract Title:

Dated:

[Name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan or any administrative subdivision or agency thereof or any other entity owned or controlled by it (GoP) through any corrupt business practice.

Without limiting the generality of the foregoing [Name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fee etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultations fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.

[Name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representative or warranty.

[Name of Supplier] accepts full responsibility and strict liability for making and false declaration, not making full disclosure, misrepresenting fact or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, [Name of Supplier] agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [Name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

Name of Employer: …… Name of Bidder/Contractor: ……
Signature: …… Signature: …….
[Seal] [Seal]

Performance Guarantee Form

FORM OF PERFORMANCE SECURITY

Guarantee No._____
Executed on _____
Expiry date _____

Name of Guarantor with address:
_____

Name of Principal (Contractor) with address:_____

Penal Sum of Security (express in words and figures)
_____

Letter of Acceptance No. _____Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the **Securities & Exchange Commission of Pakistan (SECP), Engr. Anwar Ghani - Project Director Project Management Unit 4th Floor, NICL Building, Jinnah Avenue 051-9195437/051-9195474** (hereinafter called the Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____
_____

(Name of Contract) for the **Construction of SECP Head Office Building Mauve Area G-11 Islamabad (Package -2A Architecture, Electrical & Plumbing Works)** (**P78769**)
_____ (Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause11, Defects After Taking Over, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, _____ (the Guarantor), waiving all objections and defense under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the

Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer’s designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall decide, whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above-bounden Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Guarantor
(Schedule Bank/ Insurance Company)
Signature: _____
Name: _____
Title: _____

Corporate Guarantor (Seal)

WITNESS:

1.
_____
_____

2.

_____
_____
Name, Title & Address

Annexure

Adjustment Data

Price Adjustment Indices

SBD Document (Read-Only)

See Form Under Additional Forms and Documents: **Adjustment Data** (page number: 476)

Tender Drawings

The drawings are available at the attached QR Code which arerequired to be downloded through scanning of the same. Further, a declarationaffirming theunderstanding of the layout shall be submitted along with the bid.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Tender Drawings** (page number: 478)

Financial Submission Form for BoQ

The Annexure shall constitute an integral, essential, and binding part of the Bidding Documents. The Bidder shall download the aforesaid Annexures, duly sign and stamp each page thereof, and upload the complete scanned copy as an integral part of its bid submission. Failure to comply with this requirement may render the bid non-responsive, in accordance with the applicable procurement rules and the provisions of the Bidding Documents.

Financial Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Financial Submission Form for BoQ** (page number: 479)

Annexure

The Annexure shall constitute an integral, essential, and binding part of the Bidding Documents. The Bidder shall download the aforesaid Annexures, duly sign and stamp each page thereof, and upload the complete scanned copy as an integral part of its bid submission. Failure to comply with this requirement may render the bid non-responsive, in accordance with the applicable procurement rules and the provisions of the Bidding Documents.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Annexure** (page number: 579)

Technical Specification (Electrical)

The Annexure shall constitute an integral, essential, and binding part of the Bidding Documents. The Bidder shall download the aforesaid Annexures, duly sign and stamp each page thereof, and upload the complete scanned copy as an integral part of its bid submission. Failure to comply with this requirement may render the bid non-responsive, in accordance with the applicable procurement rules and the provisions of the Bidding Documents.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specification (Electrical)** (page number: 709)

Technical Specifcation (Plumbing)

The Annexure shall constitute an integral, essential, and binding part of the Bidding Documents. The Bidder shall download the aforesaid Annexures, duly sign and stamp each page thereof, and upload the complete scanned copy as an integral part of its bid submission. Failure to comply with this requirement may render the bid non-responsive, in accordance with the applicable procurement rules and the provisions of the Bidding Documents.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specifcation (Plumbing)** (page number: 904)

Technical Specification (Arch & Interior)

The Annexure shall constitute an integral, essential, and binding part of the Bidding Documents. The Bidder shall download the aforesaid Annexures, duly sign and stamp each page thereof, and upload the complete scanned copy as an integral part of its bid submission. Failure to comply with this requirement may render the bid non-responsive, in accordance with the applicable procurement rules and the provisions of the Bidding Documents.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specification (Arch & Interior)** (page number: 1037)

Approved Manufacturer List (Architecture)

The Annexure shall constitute an integral, essential, and binding part of the Bidding Documents. The Bidder shall download the aforesaid Annexures, duly sign and stamp each page thereof, and upload the complete scanned copy as an integral part of its bid submission. Failure to comply with this requirement may render the bid non-responsive, in accordance with the applicable procurement rules and the provisions of the Bidding Documents.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Approved Manufacturer List (Architecture)** (page number: 1474)

Annexure 3.1 (i)

Bidders shall provide information as per the Proforma attached as Annexure 3.1 (i) along with documentary evidences mentioned therein, failing which shall result in zero marks.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Annexure 3.1 (i)** (page number: 1476)

Annexure 3.1 (ii)

Bidders shall provide information as per the Proforma attached as Annexure 3.1 (ii) along with documentary evidences mentioned therein, failing which shall result in zero marks.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Annexure 3.1 (ii)** (page number: 1477)

Procurement Forms

Past Construction Experiences

See Form Under Additional Forms and Documents: **Past Construction Experiences** (page number: 1478)

Contractor's Key Personnel Representative and Their Schedules

See Form Under Additional Forms and Documents: **Contractor's Key Personnel Representative and Their Schedules** (page number: 1484)

Financial Resources

See Form Under Additional Forms and Documents: **Financial Resources** (page number: 1488)

Past Experience and Completed Contracts

See Form Under Additional Forms and Documents: **Past Experience and Completed Contracts** (page number: 1489)

Historical Contract Non-Performance, and Pending Litigation and Litigation History

See Form Under Additional Forms and Documents: **Historical Contract Non-Performance, and Pending Litigation and Litigation History** (page number: 1490)

Current Contracts and Their Progress

See Form Under Additional Forms and Documents: **Current Contracts and Their Progress** (page number: 1492)

Financial Capacity and Net Worth Evaluation Form

See Form Under Additional Forms and Documents: **Financial Capacity and Net Worth Evaluation Form** (page number: 1493)

Average Annual Turnover

See Form Under Additional Forms and Documents: **Average Annual Turnover** (page number: 1495)

PUBLIC PROCUREMENT REGULATORY AUTHORITY
(PPRA)
EPADS

Additional Forms and Documents

A-1
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Schedule of Cost Indexation

[The Employer is to engage a professional with experience in construction costs and the inflationary effect on construction costs when preparing the contents of the Schedule of Cost Indexation. In the case of very large and/or complex works contracts, it may be necessary to specify several families of price adjustment formulae corresponding to the different works involved.]

[The formulae for price adjustment shall be of the following general type:]

Pn= a + b Ln / Lo + c En/ Eo + d Mn/Mo + ...

where:

"Pn" is the adjustment multiplier to be applied to the estimated Contract value in the relevant currency of the work carried out in period "n", this period being a month;

"a" is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

"b", "c", "d", ... are coefficients representing the estimated proportion of each cost element related to the execution of the Works as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

"Ln", "En", "Mn", are the current cost indices or reference prices for period "n", expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particular Payment Certificate relates); and

"Lo", "Eo", "Mo", are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

The weightings (coefficients) for each of the factors of cost stated in the following table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalancedor inapplicable, as a result of Variation(s).

If the currency in which the Contract price is expressed is different from the currency of the country of origin of the indices, a correction factor will be applied to avoid incorrect adjustments of the Contract price. The correction factor shall be: Z_0 / Z_1, where,

Z_0 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price on the Base date, and

Z_1 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price on the Date of Adjustment.

A-2
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Table I. Local Currency (LC) For Bill Nos._____

[In the Table below, the Bidder shall (a) indicate amount of local currency payment, and the Employer shall (b) enter the Index description and source of indices for the different elements of cost, and (c) derive weightings for local currency payment including nonadjustable fixed portion. PEC Standard Procedure and Formula for Price Adjustment (Second Edition), May, 2022 as amended time to time shall be applied for preparation of the following Table.]

Index code	Index description	Source of index	Bidder's related currency amount	Weightages
(i)	**Non-adjustable / Fixed Portion**	Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin	—	0.76
(iii)	**Labour**			0.20
(v)	**High Speed Diesel (HSD)**			0.04
	TOTAL =			**1.00**



	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
	ARCHITECTURAL WORKS					
1	**BLOCK MASONRY WORKS**					
2	Providing and laying 1:3:6 cement concrete solid block masonry more than 6inches (152 mm) thick using graded screened bajri 3/4 inch (19 mm) and downgauge set in lime cement mortar 1:1:6 in foundation, basement and plinthincluding scaffolding, raking out Joints and curing etc. complete; foundationand basement masonry upto 5 feet (1.52 Ru.m.) depth and plinth upto 4 feet(1,2 Ru.m.) height from ground level .				Code # 110	
3	Basement-4	per Cft	-		Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x9	
4	Basement-3	per Cft	-		Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x7	
5	Basement-2	per Cft	-		Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x5	
6	Basement-1	per Cft	-		Code #110 Item # 2 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #(31)x3	
7	Providing and laying 1:3:6 cement concrete solid block masonry more than 6inches (152 mm) thick using graded screened bajri 3/4 inch (19 mm) and down gauge set in lime cement mortar 1:1:6 including scaffolding, raking out joints and curing etc. complete in ground floor superstructure.				Code # 110	

PUBLIC PROCUREMENT REGULATORY AUTHORITY EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
8	Lower Ground Floor	per Cft	1,450		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+	
9	Upper Ground Floor	per Cft	1,950		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+	
10	Ist. Floor	per Cft	1,850		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70	
11	2nd. Floor	per Cft	1,700		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # 71	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
12	3rd. Floor	per Cft	2,350		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x2	
13	4th. Floor	per Cft	2,350		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x3	
14	5th. Floor	per Cft	1,100		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x4	
15	6th. Floor	per Cft	1,100		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x5	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
16	7th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x6	
17	8th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x7	
18	9th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x8	
19	10th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x9	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
20	11th & 12th. Floor	per Cft	1,300		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x10	
21	13th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x11	
22	14th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x12	
23	15th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x13	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
24	16th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x14	
25	17th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x15	
26	18th. Floor	per Cft	1,050		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x16	
27	19th. Floor	per Cft	1,200		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x17	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
28	20th. Floor	per Cft	1,200		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x18	
29	21st. Floor	per Cft	1,200		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x19	
30	22nd. Floor	per Cft	1,650		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x20	
31	Machine Room Level (23rd Floor)	per Cft	2,350		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x21	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
32	Roof	per Cft	2,100		Code #110 Item # 34 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # 70+ Code #110 Item # (71)x22	
33	Providing and laying 1:3:6 cement concrete solid block masonry 4 inch to 6inch (102 mm to 152) thick using screened graded bajri 3/4 inch (19 mm) anddown gauge set in lime cement mortar 1:1:6 in foundation, basement and plinth including scaffolding, raking out joints and curing etc. complete;foundation and basement masonry **upto 5 feet (1.52 Ru.m.) depth and plinthupto 4 feet (1.2 Ru.m.) height from ground level .**				Code # 110	
34	Basement-4	per Cft	3,250		Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x9	
35	Basement-3	per Cft	6,050		Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x7	
36	Basement-2	per Cft	3,900		Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x5	
37	Basement-1	per Cft	6,050		Code #110 Item # 12 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item # (31)x3	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
38	Providing and laying 1:3:6 cement concrete solid block masonry 4 inch to 6 inch (102 mm to 152) thick using crushed graded boulders 3/4 inch (19 mm) and down gauge instead of screened bajri, set in cement sand mortar 1:6 instead of lime cement mortar 1:1:6 in including scaffolding, raking out Joints and curing etc. **complete in groud floor super structure**				Code # 110	
39	Lower Ground Floor	per Cft	6,700		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+	
40	Upper Ground Floor	per Cft	3,700		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+	
41	Ist. Floor	per Cft	4,050		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70	
42	2nd. Floor	per Cft	4,500		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # 71	
43	3rd. Floor	per Cft	4,250		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # 71 x 2	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
44	4th. Floor	per Cft	2,150		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x3	
45	5th. Floor	per Cft	2,900		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x4	
46	6th. Floor	per Cft	3,450		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x5	
47	7th. Floor	per Cft	2,550		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x6	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
48	8th. Floor	per Cft	2,750		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x7	
49	9th. Floor	per Cft	2,550		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x8	
50	10th. Floor	per Cft	2,770		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x9	
51	11th & 12th. Floor	per Cft	1,800		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x10	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
52	13th. Floor	per Cft	2,750		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x11	
53	14th. Floor	per Cft	2,550		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x12	
54	15th. Floor	per Cft	2,750		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x13	
55	16th. Floor	per Cft	2,750		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x14	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
56	17th. Floor	per Cft	2,700		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x15	
57	18th. Floor	per Cft	2,850		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x16	
58	19th. Floor	per Cft	2,950		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x17	
59	20th. Floor	per Cft	2,300		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x18	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
60	21st. Floor	per Cft	2,250		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x19	
61	22nd. Floor	per Cft	2,650		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x 20	
62	Machine Room Level (23rd Floor)	per Cft	750		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x 21	
63	Roof	per Cft	300		Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+ Code #110 Item #70+ Code # 110 Item # (71)x 22	
64	**INTERNAL FLOOR FINISHES**					
65	**PCC Flooring**					
66	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.				Code # 117	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
67	Basement-4	per Sft	30,730		Code #117 Item # 7+ Code #117 Item # (25)x4	
68	Basement-3	per Sft	28,930		Code #117 Item # 7+ Code #117 Item # (25)x3	
69	Basement-2	per Sft	29,090		Code #117 Item # 7+ Code #117 Item # (25)x2	
70	Basement-1	per Sft	30,920		Code #117 Item # 7+ Code #117 Item # (25)x1	
71	Lower Ground Floor	per Sft	300		Code #117 Item # 7	
72	Upper Ground Floor	per Sft	-		Code #117 Item # 7	
73	Ist. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26	
74	2nd. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # 27	
75	3rd. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x2	
76	4th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x3	
77	5th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x4	
78	6th. Floor	per Sft	1,090		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x5	
79	7th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x6	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
80	8th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x7	
81	9th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x8	
82	10th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x9	
83	11th & 12th. Floor	per Sft	6,800		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x10	
84	13th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x11	
85	14th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x12	
86	15th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x13	
87	16th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x14	
88	17th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x15	
89	18th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x16	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
90	19th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x17	
91	20th. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x18	
92	21st. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x19	
93	22nd. Floor	per Sft	-		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x20	
94	Machine Room Level (23rd Floor)	per Sft	800		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x21	
95	Roof	per Sft	500		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x22	
96	**Porcelain Tile Flooring**					
97	**FL-Type 08** Providing & laying light/colour unglazed Vitrified porcelain tiles (polished) not exceeding 3600 sq cm each on walls & floors foreign make **(Italian or equivalent except China make)** in any floor laid with dry bond (stile bond) over on 1" thick cement mortar (1:3) including jointing the tiles with joint filler of approved qualityas per direction of the Engineer incharge.	per Sft	2,700		Code #117 Item # 187	
98	Providing and laying light colour, glazed/non skid vitrified porcelain tiles (Polished) exceeding 1600 sqcm and up to 3600 Sqcm each, (Pak made) on walls and floors, in any floor, laid with dry bond (stile bond) over a base of 1" thick cement mortar (1:3) including jointing to tiles with joint filler of approved quality as per direction of the Engineer incharge.				Code #117 Item # 180	
99	Porcelain Tile Flooring, FL-13	per Sft	16,750			
100	Porcelain Tile Flooring, FL-16	per Sft	10,500			
101	Porcelain Tile Flooring , FL-18	per Sft	6,300			
102	Porcelain Tile on wall, WL-09	per Sft	40,380			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
103	Providing and laying in floor C.C. 1:2:4: tuff paver 2-1/2" thick of approved design and colour pattren laid on sand cushion filling of joint with sand and warring etc. complete as per direction of Engineer Incharge. (the cost of sand cushion is included)				Code #117 Item # 178	
104	a) Average strength 7000 psi	per Sft	15,000			
105	b) Average strength 5000 psi	per Sft	5,500			
106	Providing & laying cement sand mortar 1:4 (1cement: 4sand) ***NOTE*** : To be used as levelling screed under tiles or where required at any floor any height complete in all respect and as per drawings, specifications and directions of the Engineer.	per Cft	10,800		Code #101 Item # 24	
107	**INTERNAL WALL FINISHES**					
108	**Cement Plaster**					
109	1/2" (13 mm) thick cement plaster 1:6 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, comers, and curing etc., complete.				Code #122 Item # 6	
110	Basement-4	per Sft	26,000		Code #122 Item # 6	
111	Basement-3	per Sft	48,000		Code #122 Item # 6	
112	Basement-2	per Sft	27,000		Code #122 Item # 6	
113	Basement-1	per Sft	48,000		Code #122 Item # 6	
114	Lower Ground Floor	per Sft	35,000		Code #122 Item # 6	
115	Upper Ground Floor	per Sft	17,000		Code #122 Item # 6	
116	Ist. Floor	per Sft	21,500		Code #122 Item # 6+ Code #122 Item # 87	
117	2nd. Floor	per Sft	25,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # 90	
118	3rd. Floor	per Sft	24,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*2	
119	4th. Floor	per Sft	18,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*3	
120	5th. Floor	per Sft	17,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*4	
121	6th. Floor	per Sft	23,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*5	

PUBLIC PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
122	7th. Floor	per Sft	15,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*6	
123	8th. Floor	per Sft	15,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*7	
124	9th. Floor	per Sft	14,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*8	
125	10th. Floor	per Sft	14,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*9	
126	11th & 12th. Floor	per Sft	16,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*10	
127	13th. Floor	per Sft	15,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*11	
128	14th. Floor	per Sft	15,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*12	
129	15th. Floor	per Sft	15,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*13	
130	16th. Floor	per Sft	16,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*14	
131	17th. Floor	per Sft	16,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*15	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
132	18th. Floor	per Sft	17,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*16	
133	19th. Floor	per Sft	14,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*17	
134	20th. Floor	per Sft	12,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*18	
135	21st. Floor	per Sft	13,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*19	
136	22nd. Floor	per Sft	14,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*20	
137	Machine Room Level (23rd Floor)	per Sft	3,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*21	
138	Roof	per Sft	1,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)*22	
139	**Painting Works**					
140	Painting with Robbialac supper gloss synthetic enamel paint of approved make and shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .	per Sft	560,000		Code #122 Item # 161	
141	**INTERNAL CEILING FINISHES**					
142	**Cement Plaster**					
143	1/2" (13 mm) thick cement plaster 1:6 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, comers, and curing etc., complete.				Code #122 Item # 6	
144	Basement-4	per Sft	34,300		Code #122 Item # 6	
145	Basement-3	per Sft	30,850		Code #122 Item # 6	
146	Basement-2	per Sft	34,300		Code #122 Item # 6	
147	Basement-1	per Sft	30,850		Code #122 Item # 6	
148	Lower Ground Floor	per Sft	3,500		Code #122 Item # 6	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
149	Upper Ground Floor	per Sft	4,000		Code #122 Item # 6	
150	Ist. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87	
151	2nd. Floor	per Sft	5,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # 90	
152	3rd. Floor	per Sft	6,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x2	
153	4th. Floor	per Sft	2,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x3	
154	5th. Floor	per Sft	6,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x4	
155	6th. Floor	per Sft	2,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x5	
156	7th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x6	
157	8th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x7	
158	9th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x8	
159	10th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x9	
160	11th & 12th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x10	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
161	13th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x11	
162	14th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x12	
163	15th. Floor	per Sft	5,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x13	
164	16th. Floor	per Sft	5,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x14	
165	17th. Floor	per Sft	5,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x15	
166	18th. Floor	per Sft	5,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x16	
167	19th. Floor	per Sft	2,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x17	
168	20th. Floor	per Sft	2,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x18	
169	21st. Floor	per Sft	2,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x19	
170	22nd. Floor	per Sft	2,000		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x20	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
171	Machine Room Level (23rd Floor)	per Sft	1,500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x21	
172	Roof	per Sft	500		Code #122 Item # 6+ Code #122 Item # 87+ Code #122 Item # (90)x22	
173	**Painting Works**					
174	Painting with (IC Dulux plastic emulsion paint P of approved shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .	per Sft	234,300		Code #122 Item # 162	
175	Cement washing two coats at any height in any floor.....	per Sft	180,000		Code #122 Item # 150	
176	**ROOF FINISHES/TREATMENT**					
177	**PCC Flooring (Roof Screeding)**					
178	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.				Code # 117	
179	5th. Floor	per Sft	5,000		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x4	
180	19th. Floor	per Sft	3,300		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x18	
181	Machine Room Level (23rd Floor)	per Sft	7,650		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x22	
182	Roof	per Sft	1,400		Code #117 Item # 7+ Code #117 Item # 26+ Code #117 Item # (27)x23	
183	**EXTERNAL WALL FINISHES (BUILDING)**					
184	3/4" (19 mm) thick cement plaster 1:4 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, and curing etc., complete.					
185	Basement-4	per Sft	-		Code #122 Item # 8	
186	Basement-3	per Sft	-		Code #122 Item # 8	
187	Basement-2	per Sft	-		Code #122 Item # 8	
188	Basement-1	per Sft	-		Code #122 Item # 8	
189	Lower Ground Floor	per Sft	7,000		Code #122 Item # 8	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
190	Upper Ground Floor	per Sft	4,600		Code #122 Item # 8	
191	Ist. Floor	per Sft	5,500		Code #122 Item # 8 Code #122 Item # 88	
192	2nd. Floor	per Sft	5,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # 91	
193	3rd. Floor	per Sft	6,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x2	
194	4th. Floor	per Sft	6,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x3	
195	5th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x4	
196	6th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x5	
197	7th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x6	
198	8th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x7	
199	9th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x8	
200	10th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x9	
201	11th & 12th. Floor	per Sft	4,800		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x10	

PUBLIC PROCUREMENT REGULATORY AUTHORITY PPRA EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
202	13th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x11	
203	14th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x12	
204	15th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x13	
205	16th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x14	
206	17th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x15	
207	18th. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x16	
208	19th. Floor	per Sft	4,000		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x17	
209	20th. Floor	per Sft	4,000		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x18	
210	21st. Floor+	per Sft	4,000		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x19	
211	22nd. Floor	per Sft	4,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x20	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
212	Machine Room Level (23rd Floor)	per Sft	8,500		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x21	
213	Roof	per Sft	4,000		Code #122 Item # 8 Code #122 Item # 88+ Code #122 Item # (91)x22	
214	Extra if deep cut grooves of approved sizes and design are made on plastered surface of any description in any floor	per Sft	110,900		Code #122 Item # 37	
215	**ROOF FINISHES/TREATMENT**					
216	3/4" (19 mm) thick cement plaster 1:4 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, and curing etc., complete.					
217	Providing & laying cement sand mortar 1:4 (1cement: 4sand) ***NOTE*** : To be used as levelling screed under tiles or where required at any floor/roof any height complete in all respect and as per drawings, specifications and directions of the Engineer.	per Cft	1,650		Code #101 Item # 24	
218	**B) Non Schedule Items**					
219	**MOISTURE PROTECTION**					
220	Providing and applying three coats of 2 component flexible polymer modified cementitious waterproof coating AQUAFIN-2C / SIKA /or approved equivalent over RCC slabs and walls of any wet area e.g. Toilets, Kitchens, Balcony's etc, at any height in any floor as per manufacturer's specifications & recommendations. **The item shall also include flood testing for a minimum period of 24–72 hours (as per instruction of the site Engineer) after completion and curing of the waterproofing system, including making good any defects/leakages observed and retesting until satisfactory results are achieved**, complete in all respect as per drawing, standards, specifications and direction of the Engineer.	Sft	19,500		NSI	
221	**METAL WORKS**					
222	**Metal Doors**					
223	**Hollow Core Flush Type Metal Door**					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
224	Providing, welding, fabricating and fixing in position approved colour powder-coated MS hollow flush door shutter including frame of 2" x 5" x16 gauge (1.6 mm) MS sections with single rebate 38 mm × 12 mm (1-1/2" × 1/2"), shutter 38 mm (1-1/2") thick faced both sides with 20 SWG (0.9 mm) GI sheet conforming to ASTM A653/A653M coating designation, reinforced with "C" channel bracing and cross bracing, filled with honeycomb kraft paper core, with or without vision panel and louvers, including 6 mm clear laminated safety glass fixed with EPDM gasket and metal trim, and all required hardware excluding ironmongery, at any floor and height, in accordance with drawings, specifications, and Engineer's directions. **Note: Cost of ironmongery such as hinges, locks, handles, closers, etc. shall be paid under separate items as per hardware schedule.**				NSI	
225	**Single Leaf Shutter**					
226	Type-1 (Without Vision Panel and louvers)	Sft	40			
227	Type-2 (Without Vision Panel and with louvers)	Sft	130			
228	Type-3 (With Vision Panel and without louvers)	Sft	260			
229	Type-4 (With Vision Panel and louvers)	Sft	170			
230	**Double Leaf Shutter**					
231	Type-5 (With Vision Panel and louvers)	Sft	245			
232	Type-6 (Without Vision Panel and louvers)	Sft	50			
233	**MS Louvered Door**					
234	Providing, welding, fabricating, and fixing in position MS louvered door including frame comprising of MS door frame 2" x 5" X 16Swg conforming to BSS. 1245 having a single rebate size 1-1/2" x 1/2", using MS tube 1-12" x 4" x 14 swg for top rail & stile and 1-12" x 9" x 14 swg for bottom rail and 2" x 2" x14 Swg mid/lock rail of shutter frames conforming to ASTM A500 Grade B/C (for hollow tubes) or equivalent BS EN 10219, fitted with 2.0 mm thick MS steel sheet louvers , spaced at 32 mm (1¼") centre-to-centre as per approved drawings and design. Door frame shall be fixed to wall with holdfasts 8" x 2" x 1/8" thick (4 Nos each side) hollow area to be filled with 1:2 cement sand morate, shutter hung on heavy-duty SS304 ball-bearing hinges, anchoring shall be detailed as per approved shop drawings. Surface finished with one coat of approved zinc-phosphate epoxy primer & three coats of approved industrial synthetic enamel paint. Installation shall include cutting holes for holdfast, grouting, alignment, and all accessories required for complete fixing, complete in all respects, at any floor and height, in accordance with approved drawings, specifications, and directions of the Engineer. Note: Cost of Ironmongery such as hinges, Locks, Handles etc. paid in Separate item as per hardware schedule.				NSI	
235	Type-6 (With two shutter)	Sft	260			
236	Type-7 (With Four shutter)	Sft	260			
237	**Fire Rated Door**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
238	Provide factory-manufactured steel fire-rated door assembly having a 03 hours fire resistance rating, tested and certified in accordance with UL 10C/NFPA 252 (or EN 1634-1 where specified), UL 1784 and installed in accordance with NFPA 80". detail as under.				NSI	
239	DF01 & DF02	Sft	1,880			
240	**Testing/Cerifications** ASTM, NFPA 252 (EN-1634-1), FAA, IMO / ISO/IEC 17020:2012 certified by PNAC SGS Building Standards Ltd.					
241	**Material of frame & Leaf** - ASTM A653/ A653M - Zinc coated Cold-rolled steel sheet/plate 2mm thick with180 micron DFT. - Door Jamb 200mm wide single rebated. - Door Leaf 44mm thick. - In fill material using mineral wool (Rockwaool) for insulation, minium density 180Kg/Cum.					
242	**Anchors & Bolts** - Jamb Anchors : 1No-In place concrete & Masonry anchor from jamb with minimum 9mm diameter concealed bolts in to expansion shiels or inseart 150mm from top & bottom. **Floor Anchors** - Clip type anchors with two holes to receive fasteners welded to bottom of jamb and mullions with the same thickness of frame material. **Head Anchors** - 02 head anchrs for frames more than 1066 mm wide and mounted in steel wall.					
243	**Glass for vision penal** - 5mm thick Fire rated Transparentceramic fire lite-NT Glass for fire rated door					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
244	**Door Hardwares** **- Hinges:** 150mm long, 38mm wide and 4.2mm thick, 2 Ball bearing, five knickle, butt hinges, single acting, fully mortise SS304 (4-Nos in each shutter),Tested by ANI/BHMAA156.1, UL listed, CE Certification, Pass BS EN1935 test, Pass EN 1634 test, 200, 000 life Cycle. **- Panic Exit Device** Escutcheon type heavy duty Liver trim sutiable for RIM type medium stile Exit device with provision for ANSI profile, UL listed, CE Cirtification, Pass BS EN1125 test, 200, 000 life Cycle. **- Door Closer** Overhead surface mounted Rack and Pinion type door closer, UL listed, CE Cirtification, Pass BS EN1154 test, 500, 000 life Cycle. **- Liver Handle** CE Cirtification, Pass BS EN1634 test, SS304. **- Door Coordinator** Non-Handed, SS304.					
245	**Construction including In-fill** Door with smooth, flush surface without visible joints or seams on exposed faces and stile adges. 1- Single acting swing doors, bevel both vertical adges 3mm in 50mm. 2- Galvanized steel vertical stiffeners extending full-door height, spaced not more than 150mm apart and not spot welded to face sheets a maximum of 150, fill space between stiffeners with rockwaool insulation of minium 180Kg/Cum density applied to inside surface of face sheet (Tested). 3- Closed bottom edge with metalic coated steel closing channel and top edge with filler channel of same material, so webs of chennals are flush with bottom & top door edge. 4- Polyestere Powder Coating (minimum 70-80 microns DFT) after finish					
246	**MS Rungs**					
247	Providing, making & fixing in position MS rungs comprising of 1" x 1" solid square bar U-shape 24" long & 8" wide rungs (usable size) including hold fast fixed on the wall as per drawing, applying three coat of anti rust paint as per approved by the Engineer, at any depth & any height in etc., complete in all respect and as per drawings, specifications and directions of the Engineer.	Each	40		NSI	
248	**Pre-Cast RCC Concrete Members**					
249	Providing, casting, supplying, and fixing RCC precast slabs/planks, including steel reinforcement bars and concrete of specified cylindrical compressive strength, with watertight, fair-faced formwork. The work shall include providing lifting hooks where required, and placing the units at the specified location, maintaining proper line, level, and alignment, at any height and floor etc., complete in all respects as per drawing, standard, specifications, and or as directed by the Engineer.				NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
250	Rcc Pre-Cast slab / Plank for MS Staircase-2 from Lower Ground to Upper Ground Floor (3000 Psi)	Cft	35			
251	Rcc Pre-Cast slab / Plank for MEP Opening of Lower Ground Floor (3000 Psi)	Cft	435			
252	Rcc Pre-Cast slab / Plank for MEP Shaft Opening over Ramp at Upper Ground Floor (3000 Psi)	Cft	400			
253	**MS Steel Structure Works**					
254	Providing, cutting, fabricating, erecting, placing, installing, inspecting, testing, and ensuring quality control for MS structural steel works, using members with minimum yield strength conforming to ASTM A36 Grade 36 / ASTM A572 Grade 50 / ASTM A992 / ASTM A500 Grade B or C. Structural steel members shall include drilling of holes, non-shrinkage grout, H-sections, I-sections, W-sections, angles, tubes, beams, channels, base plates, MS sheets, MS chequered plates, stiffener plates, MS pipes, MS square/round bars for railing, MS posts, anchors bolts, Rawl bolts, J-bolts, nuts, washers, and leveling grout, or as required, three coat of industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer. All jointing and welding shall comply with AWS D1.1 Structural Welding Code – Steel and BS EN ISO 3834 quality management system requirements. Works shall be executed at any floor or height, including the cost of scaffolding, platforms, and winches. The contractor shall submit coordinated and checked shop drawings for approval prior to commencement, without additional cost, and complete all works in accordance with drawings, standards, specifications, and directions of the Engineer.				NSI	
255	MS Staircase-4 from Lower Ground to Upper Ground Floor	Kg	800			
256	MS Metal Staircase-3 from Upper Ground to 1st Floor	Kg	4,000			
257	MS Staircase-5 from Roof to MEP space Upper Roof	Kg	2,100			
258	MS Steel structure Framing for Glass Elevator	Kg	2,000			
259	MS Steel structure wall Framing for Reception	Kg	3,600			
260	MS Steel structure Framing for Ramp	Kg	23,500			
261	**WOODEN WORKS**					
262	**Anti-Termite Treatment**					
263	Providing and applying anti-termite solution for the protection of all wooden surfaces against termites and other wood-destroying organisms, using 50ml of the approved termiticide per square foot of wood surface area, comprising of 200ml of **Prevent 2.5EC by Ali Akbar Group** or approved equivalent, mixed with 2000ml kerosine oil. This mixture must be applied to all wooden surfaces wether expose or not. Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	Sft	63,000		NSI	
264	**Door Sub-frame**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
265	Providing, making, and fixing an approved quality seasoned rough wood sub-frame to support & backing all types of door frame, using approved rough wood 3" x 3/4" thick including 06 nos socket-type counter-sunken bolt with nuts in each backing frame as per the fixing details. Applying termite treatment as mentioned in the above item etc., complete in all respect as per engineering standards, specifications, drawings & entirely satisfaction of the Engineer.	Rft	8,000		NSI	
266	**Wooden Door Frame**					
267	Providing, making, and fixing an approved quality seasoned Ash wood door frame 5" x 2" thick, including 06 nos socket-type counter-sunken bolt with nuts in each frame as per the fixing details. Applying PU foam to joined & fill all acvities of the frame and termite treatment as mentioned in the above item etc., complete in all respect as per engineering standards, specifications, drawings & entirely satisfaction of the Engineer.	Rft	6,500		NSI	
268	**Laminated Door Shutter**					
269	Providing, making & fixing in position 1-1/2" thick solid core Laminated board finish manufectured a factory-pressed flush door shutters comprising of 6.5mm thick approved color & shade laminated board with MDF/lasani back on both faces of the door, over all around seasoned rough wood 4-1/2" wide top rail and stile, 9" wide bottom rail and cross band frame (lock-rail) 6" wide lock rail, hollow area except framing to be filled with the seasoned rough wood, 1-1/2" x 1/2" thick Ash wood edge lipping all around, with or without Vision Panel and louvers including 6mm thick clear laminated glass with gasket, glazing bead and ash wood trim, solid ash wood louvered as per drawing & design, all ash wood to be covered with approved colour lacquer polish. The door shutter mechanically pressed by standard manufacturers under power driven hydraulic press as approved by the Engineer, including nails, glue or any required hardware's and applying termite treatment as mentioned in the above item etc, at any floor & any height in etc., complete in all respect as per engineering standards, specifications, drawings and entirely satisfaction of the Engineer. ***Note: Cost of Ironmongery such as hinges, Locks, Handles etc. paid in Separate item as per hardware schedule.***				NSI	
270	**Single Leaf Shutter**					
271	Type-1 (Without Vision Panel and louvers)	Sft	770			
272	Type-2 (Without Vision Panel and with louvers)	Sft	2,700			
273	Type-3 (With Vision Panel and without louvers)	Sft	1,900			
274	Type-4 (With Vision Panel and louvers)	Sft	2,500			
275	Type-5 Frame less shutter (Without Vision Panel and louvers)	Sft	2,200			
276	**Double Leaf Shutter**					
277	Type-6 (Without Vision Panel and louvers)	Sft	200			
278	Type-7 (With Vision Panel and without louvers)	Sft	600			
279	**Floor and Wall Cabinets**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
280	Providing, constructing, and installing floor and wall mounted cabinets according to the given detail. This includes a 25mm thick both side approved colour laminated formaldehyde free moisture resistant MDF board density ≥700 kg/m³, E1 formaldehyde emission compliant, conforming to ANSI A208.2 / EN 622-5 for bottom, top, vertical /side supports, shelves & shutter etc., 6mm thick both side laminated MDF for back of cabinet's including approved Pvc edge banding all around expose surface, rough wood framing where required, glue, nail, soft-close SS304 concealed hinges, telescopic drawer slides, handles, adjustable shelf supports, locks (where required), and all fixing screws of approved quality. etc., all wood works treated with anti termite solution etc., complete in all respect as per drawing, specification and direction of the Engineer. ***NOTE: Only Front/Face area (Length X Height) will be measured for the payment.***				NSI	
281	Floor mounted cabinets	Sft	3,300			
282	Wall mounted cabinets	Sft	3,300			
283	Providing, making & fixing in position 1-1/2" thick solid core Wood polymer composite (WPC) finish flush door shutters including frame & beading both sides, with or without vision panel 6mm clear glass, complete in all respect as per engineering standards, specifications, drawings and entirely satisfaction of the Engineer. (Note: Cost of Ironmongery such as Tower bolts, Locks, Handles, kick & push plate etc. paid in Separate item.)	Sft	240		NSI	
284	**Aluminum and Glass Door**					
285	**Frame Less Glass Door**					
286	Providing, fabricating and fixing in position frame less Glass door comprising of 12 mm thick clear fully tempered safety glass complying with ASTM C1048, EN 12150, or equivalent with polished edges and factory-fabricated holes/cut-outs complete in all respect as per drawing, standard, specifications and direction of the Engineer. ***Note: Cost of Ironmongery such as patch fittings, floor spring , Locks, long Handles etc. paid in Separate item as per hardware schedule.***				NSI	
287	Type-1 (Single Leaf)	Sft	100			
288	Type-2 (Double Leaf)	Sft	1,500			
289	**Aluminum Frame Door**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
290	Providing, fabricating, and fixing in position aluminium frame door comprising approved colour anodized premium quality aluminium sections 100 mm × 50 mm × 2 mm thick, conforming to Alloy 6063-T5 and complying with ASTM B221 or EN 755 standards, using Prime, Chawla, or approved equivalent sections; fitted with 8 mm thick clear tempered safety glass from Gunj Glass, Tariq Glass Industries, or approved equivalent cofirming to ASTM C1048 or EN 12150, fixed with EPDM/Neoprene gaskets, frame securely anchored to RCC/CC structure; all accessories and fixing screws in aluminium or SS304/SS316, including polished edges & all cut-outs completed before tempering, approved weatherproof silicone sealant to all external junctions between structure, wooden packing, and frame to ensure water- and wind-proof seal; complete at any floor or height, including all labour, materials, and as per drawings, specifications, and directions of the Engineer. ***NOTE: Contractor to submit the shop drawing without any additional charges for approval prior initiate the work.* Cost of Ironmongery such as hinges, Locks, long Handles, door closer etc. paid in Separate item as per hardware schedule.**				NSI	
291	Type-3 (Double Leaf)	Sft	1,600			
292	**DOOR HARDWARE/IRON MONGERY**					
293	**Wooden Door**					
294	**H1** **Mortise lock with lever (Two-way Key), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish detail as under.**	Set	200		NSI	
295	**Mortise lock;** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
296	**Cylinder for Mortise lock;** TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
297	**Lever handle** Lever handle solid 120mm or119 mm length, 64 mm height and 27mm or 19 mm ø. of approved shape **or as approved by the Architect.** fixing with brass insert. Fixing screws included. Stainless steel black finish. AISI304 stainless steel.					
298	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
299	**Door stoper (floor type);** 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
300	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
301	**H2** **Mortise lock with lever (One-way Key+ Thumb turn inside), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish detail as under..**	Nos	99			
302	**Mortise lock;** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
303	**Cylinder for Mortise lock, Thumb turn euro profile;** TD5 series patented half cylinder (single/Double), thumbturn euro profile 35x35 mm length. 5 spring loaded anti-pick pins . 15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated keys. Nickel plated finish. Masterkeyed.					
304	**Lever handle** Lever handle solid 120mm or119 mm length, 64 mm height and 27mm or 19 mm ø. of approved shape **or as approved by the Architect.** fixing with brass insert. Fixing screws included. Stainless steel black finish. AISI304 stainless steel.					
305	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
306	**Door stoper (floor type);** 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
307	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
308	**H2A** **Push Plate (outside), Pull handle (inside), latch (inside), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish detail as under.**	Nos	12			
309	**Push Plate (outside);** SS 304 black finish with maching screw, 4" x 12" x 1.5mm thick					
310	**Pull handle (inside);** SS 304 black finish with maching screw, 4" x 12" x 1.5mm thick, 2" projected, 1" dia and 6" long					
311	**Latch;** SS 304 black finish with matching screw 150mm long, 15 to 20mm hook bolt, tested with 100,000 cycle as per ANSI/BHMA A156.14 or equivalent standards					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
312	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
313	**H3** **48" Long pull / push handle, dead lock (two-way key), floor mounted door closer (hold open). All items in SS black finish detail as under**	Nos	33			
314	**48" Long pull / push handle; SS 304**1-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C.					
315	**Dead lock (two-way key);** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
316	**Cylinder for Dead lock;** double cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
317	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
318	**H4** **48" Long pull / push handle, dead lock (one-way key+ thumb turn inside), floor mounted door closer (hold open). All items in SS black finish.**	Nos	54			
319	**48" Long pull / push handle; SS 304**1-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C,					
320	**Dead lock (two-way key);** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
321	**Cylinder for Dead lock;** double cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
322	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
323	**H5** **Inside Lock with push button, outside magnetic lock with access system, door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish.**	Nos	26			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
324	**Electro agnetic lock;** UL 294 (U.S.) – Access control and security signaling equipmen, UL 1034 / 1076 (varies by device type) – Sometimes relevant depending on the lock/strike and whether it's classified under different categories by the listing, NFPA 101 (Life Safety Code) – Fire/life safety requirements for doors and egress					
325	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
326	**Door stoper (floor type);** 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
327	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
328	**H6** **Mortise lock with lever(Two-way Key), Double acting (two way) spring hinges (heavy duty), door stoper (floor type) and concealed bolt. All items in SS black finish.**	Nos	1			
329	**Mortise lock;** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
330	**Cylinder for Mortise lock;** TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
331	**Double acting (two way) spring hinges (heavy duty); S**pring hinges, SS304 black colour finish, size 100 × 75 mm, adjustable spring tension complete with all fixing accessories.Tested in accordance with ANSI/BHMA A156.17 minimum 500,000 operating cycles					
332	**Door stoper (floor type);** 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
333	**Concealed Bolt;** SS 304, 8" long with 100dia bolt, lever-action, mortised concealed type, omplete with dust-proof strike plate and fixing screws.					
334	**Glass Door**					
335	**H7** 48" long SS Door handles (inside & outside), floor mounted door closer (hold open), patch fitting & locks at bottom (Two-way Key).All items in SS black finish.	Nos	17			
336	**48" Long pull / push handle; SS 304**1-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C, complete set					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
337	**patch fitting (Top & Bottom)** **Top patch fitting;** Top centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish **Bottom patch fitting;** Bottom centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish					
338	**Floor Hinges,** Certified according to EN-1154 and suitable for heavy duty doors according to EN-1634, tested to 1.00.000 cycles under UL standards, Grade 1, as per Warrington Certifire Certificate of Approval No. CF5530. Stainless Steel finish					
339	**Lock for glass door;** for floor or ceiling. For euro profile cylinders. Strike included. AISI304 stainless steel black finish.					
340	**H8** 48" long SS Door handles (inside & outside), floor mounted door closer (hold open), patch fitting & Inside Lock with push button, outside magnetic lock with access system All items in SS black finish.	Nos	18			
341	**48" Long pull / push handle; SS 304**1-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C, complete set					
342	**patch fitting (Top & Bottom)** **Top patch fitting;** Top centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish **Bottom patch fitting;** Bottom centred arm for floor spring for double action doors. Spindle centreline at 55-65 mm, with +/- 3 mm adjustment. Designed to fit with 7645 Floor Spring. Valid for 8-12 mm glass thickness. Matte Stainless Steel black finish					
343	**Floor Hinges,** Certified according to EN-1154 and suitable for heavy duty doors according to EN-1634, tested to 1.00.000 cycles under UL standards, Grade 1, as per Warrington Certifire Certificate of Approval No. CF5530. Stainless Steel finish					
344	**Lock for glass door;** for floor or ceiling. For euro profile cylinders. Strike included. AISI304 stainless steel black finish.					
345	**H9** 48" long SS Door handles (inside & outside),, floor mounted door closer (hold open) and Lock (Two-way Key) All items in SS black finish.	Nos	32			
346	**48" Long pull / push handle; SS 304**1-1/4" (32mm) dia or rectangle tubular bar with 1.5mm thick wall thickness, mounting holes 36" (914mm) C/C, complete set					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
347	**Door closer ;**overhead door closer body, suitable for doors up to 120 kg weight and 140 cm width. Reversible. Continuous size adjustment EN2-6. Closing speed, latching speed and backcheck adjustable valves. Double internal safety valve. To be combined with link arm or rail guide. Certified according to EN-1154 and suitable for heavy duty fire rated doors according to EN-1634, tested to 2.000.000 cycles under UL standards, Grade 1. Fire rated 120 min for Timber Door and 240 min for Steel Door as per Warrington Certifire Certificate of Approval No. CF5530. Stainless Steel finish.					
348	**Deadlock for glass door;** for floor or ceiling. For euro profile cylinders. Strike included. AISI304 stainless steel black finish.					
349	**MS Steel Door**					
350	**H11** Mortise lock with lever (Two-way Key), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish.	Nos	26			
351	**Mortise lock;** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
352	**Cylinder for Mortise lock;** TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
353	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
354	**Door stoper (floor type);** 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
355	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
356	**H12** Mortise lock with lever, (One-way Key+ Thumb turn inside), door closer (hold open), door stoper (floor type) and heavy duty ball bearing hinges. All items in SS black finish.	Nos	2			
357	**Mortise lock;** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
358	**Cylinder for Mortise lock, Thumb turn euro profile;** TD5 series patented half cylinder (single/Double), thumbturn euro profile 35x35 mm length. 5 spring loaded anti-pick pins . 15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated keys. Nickel plated finish. Masterkeyed.					
359	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
360	**Door stoper (floor type);** 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
361	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
362	**H13** Mortise lock with lever, (Two-way Key), sliding bolt, heavy duty door closer, door stoper (floor type) and heavy duty ball bearing hinges.	Nos	4			
363	**Mortise lock;** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					
364	**Cylinder for Mortise lock;** TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
365	**Door closer (hold open);** Overhead Door Closer with V arm, Valve with Adjustable Sweep Speed, Reversible, Second Valve for latch Speed Adjustment, Back Check Valve, Suitable for Door Weights Upto 80kg and up to 1,10m width. Certified to EN 1154.					
366	**Door stoper (floor type);** 45 mm diameter half-dome floor stop. Lateral rubber protection. Fixing screws and rubber plugs included. Black Stainless steel finish.					
367	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
368	**H14** Mortise lock with lever, (Two-way Key), sliding bolts, bifold and heavy duty ball bearing hinges.	Nos	2			
369	**Mortise lock;** 50 mm backset and 85 mm between axes. 8 mm follower. Reversible latch bolt. Operated by an euro profile 15 mm cam cylinder. CE certified according to EN-12209 and NCH345, tested to 300.000 opening and closing cycles. Rectangular.					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
370	**Cylinder for Mortise lock;** TD5 series patented half cylinder, euro profile 45 mm length. 5 spring loaded anti-pick pins.15 mm cam. Certified according to EN-1303. Supplied with 3 patented sawn brass nickel plated (keys. Nickel plated finish. Master keyed)					
371	**Sliding Bolts;** 12" long sliding bolts as per drawings					
372	**Hinges** Double ball bearing butt hinge,102x76x3 mm (4"x3") black Stainless steel AISI304. Suitable for fire rated doors. CE certified according to EN-1935, tested to 200,000 cycles.					
373	**INTERNAL FLOOR FINISHES**					
374	**Marble Flooring**					
375	Providing and laying approved premium "A grade pre-polished approved **imported & local** marble slab and tiles flooring. The tiles free from cracks, open veins, repairs, excessive colour variation, imported from instructed origin and to be procured from an approved supplier. The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar 1:2 ratio using grey cement and screened sand,1/4" thick neat white slurry of polymer-modified stone adhesive (class C2TES or approved equivalent), ensuring jointing, washing and grouting with approved epoxy based grouting material, applying approved sealer as per instruction, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer. ***NOTE:*** ***1- Approved mock-up and sample panels before procurement with out any additional cost.***				NSI	
376	i) Imported Marble Slab 48" x 72" x 3/4" thick	Sft	5,750			
377	ii) Imported Marble slab 36" x 72" x 3/4" thick	Sft	20,750			
378	i) Local Marble Slab 48" x 72" x 3/4" thick	Sft	5,750			
379	ii) Local Marble slab 36" x 72" x 3/4" thick	Sft	20,750			
380	**Raised Access Flooring**					

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
381	Providing, laying, and fixing complete Calcium Sulphate raised access floor system comprising 600 mm × 600 mm × 32 mm thick panels with ESD PVC tile top cover, aluminum sheet bottom cover, ABS edge band, and minimum panel weight not less than 8.5 kg/panel, of approved make and colour. Panels shall conform to EN 12825 performance requirements, tested for Concentrated Load, Uniformly Distributed Load (UDL), Rolling Load, Ultimate Load, and Safety Factor in accordance with CISCA, PSA MOB PF2, or EN 12825. Flooring system shall be fire-rated in accordance with EN 13501-1 (Class A2-s1,d0 or equivalent) and ASTM E84. Installation shall be carried out on height-adjustable galvanized steel pedestals with die-cast/aluminium heads, steel stringers (where required), base plates, and approved pedestal adhesive or mechanical fixing, conforming to ASTM A653/A123 galvanization standards. Panels shall be installed over 38 mm (avg.) thick 1:4 leveled screed bedding mortar (paid separately under NSI Flooring Subhead). at any floor or height, complete in all respect as per drawings, specifications, and directions of the Engineer. **Contractor shall submit the Shop drawing (without any cost) before start of work .**	Sft	500		NSI	
382	**Porcelain Tile Flooring**					
383	Providing and laying glazed (polished) porcelain tile (A-grade quality tile), measuring as mentioned below, laid in pattern using spacer up to 2mm thick. The tiles to be procured from an approved make and colour. The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar 1:2 ratio & 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	
384	Glazed Porcelain tiles 30" x 60" x 1/2" thick **(FLOOR TYPE - FL 04)**	Sft	16,500			
385	Glazed Porcelain tiles 24" x 48" x 1/2" thick **(FLOOR TYPE - FL 15)**	Sft	10,500			
386	**Epoxy Flooring (FLOOR TYPE - FL 19)**					
387	Providing and applying epoxy flooring comprising of 3mm thick (DFT) self levelling approved colour epoxy flooring over PCC flooring, from approved manufacturer's or approved equivalent including & over one coat of primer, mechanical surface Preparation by usung grinding, shot blasting, repair of cracks/voids and applying approved seal top coating etc., at any floor & any height, complete in all respect as per engineering standards, specifications and entirely satisfaction of the Engineer.	Sft	1,090		NSI	
388	**Solvent-free, heavy-duty epoxy flooring (FLOOR TYPE - FL 20)**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
389	Provide and apply a solvent-free, heavy-duty epoxy flooring 2.5mm thick system of approved manufecturer over PCC flooring, comprising of three-component, solvent-free epoxy flooring comprising epoxy resin, compatible graded aggregates including two-component, low-viscosity, solvent-free epoxy primer as per ASTAM D1475, comprehansive strength as per ASTM D695 including surface prepration etc, at any floor & any height, complete in all respect as per engineering standards, specifications and entirely satisfaction of the Engineer.	Sft	16,300		NSI	
390	**EPDM Rubber Flooring (FL-03)**					
391	Providing and laying EPDM rubber interlocking flooring system 20mm thick of approved make, size and color for tensile strength, impact resistance, and shock absorption. Flooring shall be installed with approved bonding agent/adhesive, complete with all required underlay, edge trims, and accessories. Work shall be executed in full compliance with approved drawings, standards, and specifications, and/or as directed by the Engineer, complete in all respects.	Sft	800		NSI	
392	**Power float with & without fishbone grooves.**					
393	Applying power floating including making fishboan grooves over PCC concrete flooring (Item # 7.1 of PWD) on ramp, driveway, parking and or where required (at any floor & any height), laid in approved size panels as per drawing, including compacting, leveling, finishing and curing etc., complete in all respects as per drawing, standard, specifications and directed by the Engineer.				NSI	
394	i) Power float with fishbone grooves. **(FLOOR TYPE - FL 20A)**	Sft	14,500			
395	ii) Power float without fishbone grooves. **(FLOOR TYPE - FL 20B)**	Sft	100,000			
396	**Flame Torch Finished Granite Flooring**					
397	Providing and laying local approved Flame granite tiles flooring. The tiles to be procured from an approved supplier. The installation process includes laying the tiles with 2mm to 3mm wide approved spacer, over 1-1/2" thick cement-sand mortar 1:2 ratio using grey cement and screened sand, 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	
398	a) Local approved Flame granite 24" x 48" x 3/4" thick pre-polished **(FLOOR TYPE - FL 10)**	Sft	7,250			
399	b) Local approved Flame granite 24" x 24" x 3/4" thick pre-polished **(FLOOR TYPE - FL 11)**	Sft	5,650			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
400	**PCC Edge Kerb Cast in SITU**					
401	Providing, casting, finishing and curing cast in-situ plain cement concrete edge kerb, 6" wide & 7" high (or as shown on drawings), using 21Mpa or 3000 Psi cylendrical strength concrete, with fair-face smooth finish achieved by using approved steel shuttering/formwork, true to line, level, profile and curvature, including supply, erection and removal of shuttering on exposed faces, proper compaction by mechanical vibration, finishing arrises neatly, curing for minimum 7 days, complete in all respects as per drawings, specifications and Engineer's approval. Rate to include all materials, labour, plant, placing, finishing, formwork, joints where required, and incidentals. Measured per linear running ft (Rft).	Rft	9,500		NSI	
402	**VERTICAL CIRCULATION /STAIRCASE FINISHES**					
403	**Flame Torch Finished Granite Steps**					
404	Providing and laying local approved Flame granite slab/tiles steps including three non slip groove on each tread, fill the grooves with carborundum powder and epoxy mixed, round edge etc. The tiles to be procured from an approved supplier. The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar 1:2 ratio using grey cement and screened sand, 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	
405	**i) Staircase # 01and 02**					
406	**a) Flame Torch Finished Stair Treads/Steps** Up to 4'-6" x 1'-0" x 3/4" thick with with grove and bullnozing. **(FLOOR TYPE - FL 09)**	Sft	15,130			
407	**b) Stair Riser** Pre-polished Up to 4'-0" x 0'-7" x 1/2" thick	Sft	7,565			
408	**c) Stair Landing** Flame Torch Finished 1'-0" x 2'-0" x 3/4" thick	Sft	8,400			
409	**d) Skirting** Pre-polished 1'-0" x 0'-6" x 1/2" thick as per profile	Sft	5,600			
410	**ii) Staircase # 03 and 04**					
411	**a) Flame Torch Finished Stair Treads/Steps** 6'-0" x 1'-0" x 3/4" thick with with grove and bullnozing.	Sft	250			
412	**b) Flame Torch Finished Stair Treads/Steps** 7'-0" x 1'-0" x 3/4" thick with with grove and bullnozing.	Sft	70			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
413	**c) Stair Landing** Flame Torch Finished 1'-0" x 2'-0" x 3/4" thick	Sft	100			
414	**Staircase Railing**					
415	**Floor Mounted SS Railing**					
416	Providing, welding (using TIG – Gas Tungsten Arc Welding), fabricating, and fixing in position floor-mounted stainless steel railing of SS 304 grade, comprising 2" dia (50 mm) × 16 SWG wall thickness top handrail, 1-1/2" dia (38 mm) × 16 SWG wall thickness balustrade on every alternate step welded to handrail, and three (3 Nos.) 1/2" dia × 16 SWG horizontal bracing members at intermediate height, as shown in drawings. Railing shall include SS base plates, anchor bolts, covering caps, and all required hardware as approved, drilling and grouting with non-shrink grout material of approved make, all accessories and fixing screws in SS 304, TIG welding to ensure clean, precise, and corrosion-resistant joints; silicone sealant applied where required. Work shall be executed at any floor or height, complete in all respects, in accordance with drawings, specifications, and directions of the Engineer.	Rft	1,500		NSI	
417	**Wall Mounted SS Railing**					
418	Providing, TIG welding (Gas Tungsten Arc Welding), fabricating, and fixing in position wall-mounted stainless steel railing of SS 304 grade, comprising 2" dia (50 mm) × 16 SWG wall thickness handrail, with 1/2" dia × 16 SWG wall thickness support below handrail fixed with SS plate 4" dia × 3 mm thick, including SS base plates, anchor bolts, covering caps, and all required hardware as approved, drilling and grouting with non-shrink grout material of approved make, all accessories and fixing screws in SS 304, TIG welding to ensure clean, precise, and corrosion-resistant joints, silicone sealant applied where required. Work shall be executed at any floor or height, complete in all respects, in accordance with drawings, specifications, and directions of the Engineer.	Rft	2,000		NSI	
419	**INTERNAL WALL FINISHES**					
420	**Aluminum Shadow Gap Skirting**					
421	Providing, cutting and fixing Aluminum Shadow Gap Skirting 4"(100mm) high of approved make & color on wall. The installation process includes fixing the approved shadow gap strip with approved screwed, ensuring jointing as per standard etc, Additional tasks such as cutting, cleaning and any other required steps are part of the comprehensive installation process at any floor & any height etc., complete in all respect and as per drawings, specifications and directions of the Engineer. **(SK-04)**	Rft	800		NSI	

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
422	**Aluminum Skirting** Providing and fixing approved colour aluminum skirting 4"(100mm) high of approved profile, size, and colour with smooth surface finish. Installation shall be carried out using galvanized steel or approved fixing accessories, including anchors, screws, clips, and where specified. Joints shall be aligned, mitred, and finished neatly to ensure uniformity. Work shall include all required hardware and accessories, cutting, edge finishing, cleaning, and protection of installed surfaces. Execution shall be at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Rft	800		NSI	
423	**PVC Vinyl Tiles Skirting**					
424	Providing, cutting and fixing homogeneous PVC vinyl sheet Skirting 3" high skirting of approved make & color on wall. The installation process includes fixing solution & all necessary required hardware's. Additional tasks such as cutting, cleaning and any other required steps are part of the comprehensive installation process at any floor & any height etc., complete in all respect and as per drawings, specifications and directions of the Engineer. **(SK-02)**	Rft	3,000		NSI	
425	**INTERNAL CELING FINISHES**					
426	**Gypsum Board Suspended Ceiling**					
427	Providing, fabricating and installing gypsum board suspended ceiling system, comprising 4'-0" × 8'-0" × 12.5 mm (½") thick gypsum boards conforming to ASTM C1396 and ASTM C1264, with fire performance tested to ASTM E119/EN 1364-2, of approved manufacturer. Ceiling shall include borders, bulkheads, cove lights, pelmets, and other architectural features as shown in drawings. Installation shall be carried out on a galvanized steel suspension system comprising runners, cross "T" sections, perimeter angles, threaded hanger rods with 6mm dia (M6), clips, and accessories, conforming to ASTM C645 / ASTM C754 or EN 14195, with minimum steel thickness and galvanization as specified. All joints shall be treated with approved jointing tape and compound to achieve seamless finish, including screw head filling, sanding, and crack prevention. Ceiling shall incorporate cut-outs for light fixtures and design features, and be finished with one coat of primer and three coats of approved acrylic emulsion paint, with surface preparation including putty filling. Work shall be executed at any floor level or height, complete in all respects, in accordance with approved drawings, relevant standards, specifications, and directions of the Engineer. **(CEILING TYPE - CL 01)**	Sft	145,000		NSI	
428	**Laminated Mineral Fiber tiles Suspended Ceiling**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
429	Providing, fabricating, and installing mineral fiber lay-in tile Suspended ceiling system, comprising 600 mm × 600 mm × 12.5 mm thick mineral fiber tiles conforming to ASTM E1264 and ASTM E1477, with anti-bacterial coating tested to Class 100 US FED STD 209 or equivalent cleanroom standard. Tiles shall be moisture-resistant and fire-rated to EN 13501-1 (Class A2-s1,d0 or equivalent). Installation shall be carried out on a galvanized steel suspension system comprising main runners, cross "T" sections, perimeter angles, threaded hanger rods, clips, and accessories, conforming to ASTM C635 (metal suspension systems) and ASTM C636 (installation methods). All joints shall be aligned to achieve seamless grid finish; cut-outs shall be provided for light fixtures, diffusers, and other design features. Work shall include all required hardware, fixing arrangements, drilling, and grouting with approved non-shrink grout material. Execution shall be complete at any floor or height, in accordance with approved drawings, relevant standards, specifications, and directions of the Engineer. (CEILING TYPE - CL 02)	Sft	1,500		NSI	
430	**Moisture Resistant Gypsum Board Suspended Ceiling**					
431	Providing, fabricating, and installing moisture-resistant gypsum board suspended ceiling and border, comprising gypsum boards of cut edge Type H conforming to TS EN 520 +A1 (4'-0" × 8'-0" × 12.5 mm thick), of approved manufacturer list. Boards shall be moisture-resistant and fire-rated, tested to ASTM E119 / EN 1364-2 for fire performance. Ceiling shall include borders, bulkheads, cove lights, pelmets, and other architectural features as shown in drawings. Installation shall be carried out on a galvanized steel suspension system comprising runners, cross "T" sections, perimeter angles, threaded hanger rods, clips, and accessories, conforming to ASTM C645 / ASTM C754 or EN 14195, with minimum steel thickness and galvanization as specified. All joints shall be treated with approved jointing tape and compound to achieve seamless finish, including screw head filling, sanding, and crack prevention. Ceiling shall incorporate cut-outs for light fixtures and design features, and be finished with one coat of primer and three coats of approved acrylic emulsion paint, with surface preparation including putty filling. Work shall be executed at any floor level or height, complete in all respects, in accordance with approved drawings, relevant standards, specifications, and directions of the Engineer. **(CEILING TYPE - CL 03)**	Sft	6,500		NSI	
432	**Mineral Fiber tiles Suspended Ceiling**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
433	Providing, fabricating, and installing mineral fiber lay-in tile Suspended ceiling system, comprising 600 mm × 600 mm × 12 mm thick mineral fiber tiles conforming to ASTM E1264 and ASTM E1477, with moisture resistance and fire performance tested to EN 13501-1 (Class A2-s1,d0 or equivalent). Tiles shall be factory-finished with anti-bacterial coating where specified. Installation shall be carried out on a galvanized steel suspension system comprising main runners, cross "T" sections, perimeter angles, threaded hanger rods, clips, and accessories, conforming to ASTM C635 and ASTM C636, with minimum steel thickness and galvanization as specified. All joints shall be aligned to achieve seamless grid finish; cut-outs shall be provided for light fixtures, diffusers, and other design features. Work shall include all required hardware, fixing arrangements, drilling, and grouting with approved non-shrink grout material. Execution shall be complete at any floor or height, in accordance with approved drawings, relevant standards, specifications, and directions of the Engineer. (CEILING TYPE - CL 04)	Sft	24,000		NSI	
434	**ROOF FINISHES/TREATMEANT**					
435	Providing and laying roof finishes/ treatment (Moisture & Thermal control) consisting of followings as per drawing & detail, standards, specifications, manufacturer's recommendations and directed by the Engineer at any height & any floor complete in all respect.				NSI	
436	**Accessible Roof finishes**					
437	Water proofing					
438	Provide and apply cementitious membrane AQUAFIN 2K/M water proofing over concrete slabs of roof including returning 300mm high all around the area/parapet wall complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.				NSI	
439	(Level +89'-0", +261'-0"and 312'-9")	Sft	16,500			
440	Water Proof membrane					
441	Provide and apply waterproofing membrane horizontal surface on roof Plastomat PA 4000, 4mm thick of HY-GRIP or approved equivalent including primer coating overlapping levelling screed etc. complete as per instruction / recommendation of manufacturer's, specifications and entire satisfaction of the Engineer.				NSI	
442	(Level +89'-0", +261'-0"and 312'-9")	Sft	16,500			
443	**Roof Insulation**					
444	Providing & laying in position 2"(50mm) thick Diamond jumbolon-Board from Diamond Foam or approved equivalent having density 35kg/cum, over above levelling screed with rebated edge as per manufacturer's specifications, instruction & as shown in the drawing etc., complete in all respects as per drawings, specification and as directed by the Engineer.				NSI	
445	**(Level +89'-0", +261'-0"and 312'-9")**	Sft	16,500			
446	**Inaccessible Roof finishes**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
447	Water proofing					
448	Provide and apply cementitious membrane AQUAFIN 2K/M water proofing over concrete slabs of roof including returning 300mm high all around the area/parapet wall complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.				NSI	
449	(Level +334'-6" and +329'-6")	Sft	4,000			
450	**Roof Insulation**					
451	Providing & laying in position 2"(50mm) thick Diamond jumbolon-Board from Diamond Foam or approved equivalent having density 35kg/cum, over above levelling screed with rebated edge as per manufacturer's specifications, instruction & as shown in the drawing etc., complete in all respects as per drawings, specification and as directed by the Engineer.				NSI	
452	(Level +334'-6" and +329'-6")	Sft	4,000			
453	**Water Proof membrane**					
454	Provide and apply waterproofing membrane horizontal surface on roof Plastomat PG 4000, 4mm thick of HY-GRIP or approved equivalent including primer coating overlapping over reinforced screed. complete as per instruction / recommendation of manufacturer's, specifications and entire satisfaction of the Engineer.				NSI	
455	(Level +334'-6" and +329'-6")	Sft	4,000			
456	**Reinforcement Bars for Screeding**					
457	Providing and laying deformed steel reinforcement bars with and including the cost of straightening, removing twists, cutting, bending, binding, welding wastage, overlaps as are not shown in drawings and placing the steel in position, typing with binding wire complete including cost of binding wire and cement concrete 1:2:4 spacers etc, complete in all respects as per drawings, specification and as directed by the Engineer.	Kg	3,000			
458	**EXTERNAL WALL FINISHES (BUILDING)**					
459	**Cementitious Water proofing Coating**					
460	Provide and apply cementitious membrane AQUAFIN 2K/M / BASF / SIKA or equivalent approved water proofing over RCC concrete slabs and walls of any wet area e.g. Baths, terrace at any height in any floor etc. complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.	Sft	120,000		NSI	
461	**Decorative Plaster**					
462	Providing and applying **decorative Plaster** 6mm to 8mm thick as per **ASTM C926-22** of approved brand as per approved manufecturer list over rough cast plaster, comprising of cementitious binder, fine aggregate & special additives with approved colour shade as per instruction of manufacturer including scaffolding etc.,. All decorative Plaster finish to smooth flat in true level, line in plumb, maintain v-groove edges, dimension as mentioned & curing at any floor & any height in etc., complete in all respects and as per drawings, specifications and directions of the Engineer.	Sft	51,000		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
463	**Breathable Water repellent**					
464	Providing & applying breathable water repellent over external decorative plaster not less than 2 coats comprising of silane and siloxane based mixture as per BS 3003 serve as high quality general-purpose water repellents impregnation agents permanently protect decorative Plaster/concrete against moisture and microorganisms etc as per approved manufecturer list including scaffolding etc., **at any floor & any height** as per instruction of manufacturer, etc., complete in all respect, as per drawings, specifications and or as directed by the Engineer/ consultant.	Sft	51,000		NSI	
465	**PARKING AREA ACCESSORIES**					
466	**Column Guard**					
467	Providing, fabrication & installation of MS Column Guards 2'-4" high, comprising of 2" dia x 3.2mm thick thick vertical pipe 2 nos filled with concrete, 2" dia x 3.2mmthick horizontal pipe welded with vertical pipe on two level @ 6" interval, to protection of columns corner, 8" x 8"x 5mm thick base plate with 4-holes in each plate welded with vertical pipe and fixed on basement slab by drilling & grouting, using shear bolts & approved epoxy for grouting, applying three coat of yellow colour glossy enamel paint including & over a coat of red oxide paint etc., complete in all respect specification and to the entire satisfaction of the Engineer. ***NOTE: Only top horizontal pipe will be measured for the payment.***				NSI	
468	Same as above using 2" dia pipe 3-nos vertical pipe instead of 2 nos vertical pipe	Rft	100			
469	Same as above using 2" dia pipe 4-nos vertical pipe instead of 2 nos vertical pipe	Rft	100			
470	Same as above using 2" dia pipe 6-nos vertical pipe instead of 2 nos vertical pipe	Rft	200			
471	**Wheel Stopper**					
472	Providing & fixing reflective tape molded wheel stopper comprising of rubber wheel stopper 24"x 5" x 4" high as approved from ***POLYCRAFT (Pvt) Limited*** or approved equivalent including fixing accessories in basement or where required complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.	Each	310		NSI	
473	**Rubber Speed Hump/Breaker**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
474	Providing and fixing reflective rubber speed hump/road breaker, including end caps, manufactured from high-strength recycled or virgin rubber, resistant to UV radiation, oil, grease, water, abrasion, and vehicular impact, with thermal resistance from +120 °C to –12 °C. Modules shall be anti-skid, interlocking, middle section size 20" × 15" × 2" high and end cap size 7" × 15" × 2" high, fitted with integrated yellow reflective inserts/cat-eye reflectors or high-intensity reflective tape suitable for indoor and outdoor use. Installation shall include galvanized or stainless steel anchor bolts of minimum diameter and embedment depth, fixed into RCC/CC pavement using galvanized or stainless steel anchor bolts as per approved fixing system with non-shrink grout. Work shall be complete in all respects, including alignment, drilling, fixing hardware/accessories, and as per approved manufacturer's specifications and directions of the Engineer.	Rft	200		NSI	
475	**Convex Mirror**					
476	Providing erection & installation 32" dia Convex Mirror consisting of Convex Mirror with stainless steel covering plate, pipes and other required accessories fixed on turning point and suitable locations for traffic drive way, fixing arrangement as per standard etc. complete in all respect, as per drawings, specifications and instructions of the Engineer.	Each	8		NSI	
477	**Pavement Marking with Thermoplastic Paint**					
478	Providing and applying Pavement Marking Reflective thermoplastic paint of approved make as specified locations etc. complete in all respect, as per drawings, specifications and instructions of the Engineer.(at any height in any floor)				NSI	
479	Yellow paint 5" Wide	Rft	7,500			
480	White paint 5" Wide	Rft	7,500			
481	For Special persons	Each	8			
482	Straight Arrow 10'-0" x 1'-0"	Each	60			
483	One Side Turning Arrow 10'-0" x 1'-0"	Each	16			
484	Mid Line Markings	Rft	600			
485	Charging Station Marks	Each	20			
486	**INTERIOR WORKS**					
487	**A) Schedule Items**					
488	**INTETRIOR CEILING FINISHES**					
489	Providing, fabricating, fixing as per finishing schedule and attached drawing complete in all respect and as entire satisfaction The Architect/consultant.					
490	**PlasticEmulsion Paint**					
491	Painting with (ICI) Dulux plastic emulsion paint VIP of approved shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .	Sft	238,300		Code #122 Item # 162	
492	**B) Non Schedule Items**					
493	**INTERNAL FLOOR FINISHES**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
494	**FL-05 (LAMINATED WOOD 48" x 8")** Providing and laying 8 mm thick laminated wood flooring panels of size 1220 × 200 mm (48" × 8"), manufactured from high-density fibreboard (HDF) core with decorative wood veneer surface, conforming to EN 13329 / ASTM standards. Panels shall be factory-finished with approved polish finish (matt/satin/gloss) and UV-resistant protective coating. Flooring shall be installed over approved underlay (foam or acoustic layer) to absorb impact and reduce sound transmission. Installation shall be carried out using click-lock or tongue-and-groove system, with spacers to maintain expansion joints as per manufacturer's recommendations. Work shall include cutting, edge finishing, cleaning, and provision of all required accessories such as trims, transition profiles, end caps, and adhesives where specified. Execution shall be at any floor level, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	11,440		NSI	
495	**FL-06 (CARPET TILE 2'X2')** Providing and laying of modular carpet tiles 50cm x 50cm / 25cm x 100cm. made with 100% Nylon, Multi-level loop, commercial - Heavy duty, ASTM E 648 Class I Flammability, Smoke density ASTM E 662 Less than 450 & static propensity passed at AATCC-134 ≤3.5kV, high density, wear resistant, stain resistant, color fade resistant, Mix-Bac® backing system, 15 years warranty, limited to health product declared, environmental quality declared EPD Approved, leed and sustainability certified manufacturer, Green Label and Green Label Plus certification, installation adhesive restricted to imported tackifier products, VOC-free, non-harmful for health, durable with approved color and pattern, provide facility to quick ship import as per project deadlines, i/c cost of tools, wastage, labor etc. complete according to drawings, specifications and instructions of architect / engineer in charge.	Sft	46,950		NSI	
496	**FL-07 (EPDM Rubberized Floor 8MM thick)** Providing and laying EPDM rubber floor in roll form 8mm thick of approved make, size and color for tensile strength, impact resistance, and shock absorption. Flooring shall be installed with approved bonding agent/adhesive, complete with all required underlay (not less than 6mm), edge trims, and accessories. Work shall be executed in full compliance with approved drawings, standards, and specifications, and/or as directed by the Engineer, complete in all respects.	Sft	1,850		NSI	

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
497	**FL-12 (CARPET ROLL 4' WIDE)** **PRAYER AREA CARPET** Providing and laying carpet roll, 4' wide, of approved make, colour, and texture, suitable for prayer area application, manufactured from high-quality synthetic or blended fibre with anti-static, fire-retardant, and stain-resistant properties, conforming to ASTM/EN standards, fixed on prepared floor surface using approved adhesive or underlay system, including cutting, edge finishing, fitting around columns, ducts, and outlets, surface preparation, cleaning, and protection of finished flooring, executed to true line, level, and plumb, complete in all respects as per approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Sft	4,440		NSI	
498	**COUNTER TOP** Providing, laying, and fixing pre-polished bull-nosed (half-round / "D") granite of 20 mm thickness, with a minimum slab length of 1500 mm in a single piece, for use as a countertop in pantry areas or other designated locations. The work includes provision of a 40 mm thick RCC slab beneath the granite top, cutting and chiseling of RCC/CC members as required, and fixing with polymer-modified stone adhesive. Installation shall incorporate stainless steel dowels/brackets where necessary, using the approved bedding method, and executed strictly in accordance with the stone manufacturer's recommendations. The work shall be completed at any height or floor level, in all respects, as per drawings, standards, specifications, and/or as directed by the Engineer.	Sft	715		NSI	
499	**INTETRIOR WALL FINISHES**					
500	**WL-01** **PLY WOOD PASTED ON 1/2" THK. CEMENT BOARD POLISH FINISH** Providing and fixing commercial-grade plywood of BWP/BWR type, conforming to BS 1088 / IS 710 (or equivalent), laminated over 12 mm (½") thick fibre cement board conforming to ASTM C1186 or EN 12467. The assembly shall be polish-finished and installed on hot-dip galvanized GI framing of approved section and thickness, with galvanization coating, anchorage, bracing, and installation carried out strictly in accordance with approved shop drawings. The finish shall include application of approved wood stain followed by clear polyurethane (PU) or melamine protective coating, with sealer and minimum required number of coats, in specified sheen (matt / satin / gloss). Work shall be executed at any height or floor level, complete in all respects as per drawings, standards, specifications, and/or as directed by the Engineer.	Sft	4,790		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
501	**LAMINATED SHEET AND TACTILE SHEET** Providing and fixing approved-grade & shade laminated sheet and tactile 16mm thick with GI frame over cement board partition including approved Pvc lipping, installation carried out strictly in accordance with approved shop drawings. Work shall be executed at any height or floor level, complete in all respects as per drawings, standards, specifications, and directed by the Engineer.				NSI	
502	a) WL- 02 (Glossed Laminated sheet approved shade)	Sft	1,340			
503	b) WL-06 (High Glossed Laminated approved Marble pattern finish)	Sft	2,640			
504	c) WL-24 (Matt tactile approved Marble pattern finish)	Sft	4,750			
505	d) WL-28 (Laminated sheet green marble patterm)	Sft	2,200			
506	e) WL-34 (12mm thick Laminated sheet marble patterm)	Sft	50			
507	**WPC FLUTED PANEL** Providing and fixing high-density WPC panels in matt finish, conforming to the manufacturer's specifications, Panels shall be installed on GI frame /masonry wall and pasted over cement board partition wall etc, approved section with specified fixing anchor, Work shall be executed at any height or floor level, complete in all respects as per drawings, standards, specifications, and/or as directed by the Engineer.	Sft	200		NSI	
508	a) WL-03 (Up to122mm x 21mm thick in approved Dark finish & profile)	Sft	200			
509	b) WL-04 (Up to122mm x 21mm thick in approved White finish & profile)	Sft	200			
510	c) WL-05 (Up to122mm x 12mm thick in approved finish & profile)	Sft	360			
511	d) WL-20 (Up to122mm x 12mm thick in approved finish & profile)	Sft	100			
512	**WL-08** **WOODEN RAFTERS POLISH FINISH** Providing and fixing wooden rafters fabricated from Grade-A seasoned Ash wood 1-1/2" x 3" free from decay. Rafters shall be installed using MS brackets of powder colour coated, anchor bolts and screws etc, as per connection details, surface finishing shall include approved wood stain (Polish), sealer. Work shall be completed at any height or floor level, in all respects as per drawings, standards, specifications, and/or as directed by the Engineer.	Rft	1,120		NSI	
513	**WL-10** **PORCELAIN TILE 8'x4' MATT FINISH BATHROOMS** Providing, fabricating, and installing matt finish porcelain tiles 2400 × 1200 mm/(8'-0" × 4'-0"), A-grade quality, in approved colour/shade and pattern, conforming to EN/ISO standards, fixed on wall surfaces includes laying the tiles over 3/4" thick cement-sand mortar 1:2 ratio & 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.	Sft	3,990		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
514	**WALL PAPER** Providing and fixing/pasting approved wallpaper, applied over cement board partition and msonry wall Grasscloth wallpaper shall be of approved roll width, colour, texture etc. Additional works shall include surface prepration with filling putti, at any floor & anyr height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	18,690		NSI	
515	a) WL-11 Grass cloth wall Paper over proposed 12mm thick cement board partition Top & Bottom Lit with approved GI framing	Sft	18,690			
516	b) WL-18 Dark shade Grass cloth wall Paper over msonry wall	Sft	280			
517	c) WL-19 Approved shade Grass cloth wall Paper over msonry wall	Sft	1,160			
518	d) WL-26 Approved shade texture shade wall Paper over msonry wall	Sft	2,090			
519	e) WL-29 Approved shade texture shade wall Paper over msonry wall	Sft	620			
520	f) WL-33 Approved shade wall Paper over msonry wall	Sft	430			
521						
522	**WL-12** **(ACRYLIC SIGNAGE)** Providing, fabricating and installing acrylic signage of approved colour 6mm thick sheet, design & size as per drawing using high-quality acrylic sheets conforming to relevant ASTM/BS/EN standards, including laser cutting, edge finishing, complete with stainless steel approved colour studs, and anchors etc, bonded with approved adhesive, surface preparation, alignment in true line, level at any floor level or height, complete in all respects as per approved drawings, manufacturer's specifications, standards, and/or as directed by the Engineer.	Sft	540		NSI	
523	**WL-13** **DECORATIVE TEXTURE PAINT** Providing and applying decorative texture paint of approved shade on plastered wall over and includung one coat of primer. Surface preparation shall include filling depressions with putty, rubbing, sanding and cleaning etc. Application shall be carried out at any floor & anyr height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	7,250		NSI	
524	**WL-14** **CEMENT BOARD WALL. PAINT FINISH** Providing and fixing 12 mm/ (½") thick fibre cement board conforming to ASTM C1186 or EN 12467, installed on GI framing comprising C-studs and U-tracks of approved section size, minimum steel thickness 0.55–0.75 mm (or as approved), Fixing shall be carried out with approved anchors, screws, and accessories, maintaining specified spacing and installation details. Joints shall be treated with approved joint tape and compound, including screw head filling. Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	7,200		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
525	**BOOK MATCH MARBLE PATTERN PORCELAIN TILE (8'-0" x 4'-0") WITH CEMENT BOARD BACKING** Providing and fixing approved marble pattern porcelain tile cladding using 2400 × 1200 mm/(8'-0" × 4'-0"), tile shall be backed with 12 mm (½") moisture-resistant grade fibre cement board with GI framing, with & without back lit. The installation process includes laying the tiles over 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material and edge covered with approved metal trim Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.				NSI	
526	a) WL-15 (Book match marble patter tile)	Sft	750			
527	b) WL-17 (Book match marble patter tile with backlit)	Sft	160			
528	**CARBON FIBER VENEER PASTED ON WALLS & CEILING.** Providing and fixing carbon fiber veneer sheets, comprising of 5mm thick approved colour carbon fiber veneer sheets bonded with silicone adhesive over plastered surface and accessories, installation shall be executed at any floor & any height, complete in all respects as per drawings, standards, specifications, and directed by the Engineer.	Sft	840		NSI	
529	a) WL-16 (Only on Wall & Cloumn)	Sft	840			
530	b) WL-27 (Only on Wall & ceiling)	Sft	120			
531	**WL-21** **1"/25mm THICK MDF SHEET LASER CUT WITH PAINT FINISH.** Providing and fixing 1"/25 mm thick MDF formaldehyde sheet having density 700 kg/m³ including laser cut of approved latter/design with approved colour acrylic paint over & including one coat of primer, Installation shall be carried out on with approved anchors, screws, spacing as per fixing details All required hardware and accessories shall be incuded. Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications and as directed by the Engineer.	Sft	60		NSI	
532	**WL-22** **MIRROR PASTED OVER APPROVED FRAMING SYSTEM** Providing and fixing 6 mm thick copper-free silver mirror with safety backing film, distortion-free quality, Mirrors shall be installed over 12mm thick cement board cladding fixed with G.I framing system, mirror to be fixed with approved silicon, surrounding cover stain finished black colour SS304 frame 1-1/2" x 2" . Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications and directed by the Engineer.	Sft	260		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
533	**WL-23** **MS MESH WALL WITH LATTERING & BACK LIT** Providing and making MS Mesh wall comprising of approved colour powder coating MS mesh panels welded over 1" x 1" x 1/8" thick Ms tube framing system, MS Sheet lattering as per drawing, Installation shall be carried out on wall with 4" x4" 1/4" thick MS sheet base plate anchor with approved anchoring system and accessories, ensuring proper joint detailing, spacing, and alignment. Work shall be executed at any floor & any height, complete in all respects as per approved drawings, standards, specifications, and directed by the Engineer.	Sft	50		NSI	
534	**WL-25** **MARBLE RUNNER ON TOP EDGES.** Providing and fixing marble runner comprising of 24"/600mm x48"/1200 mm x 3/4" thick, fixed in approved pattern using spacers up to 2 mm to maintain uniform joints. Marble tile shall be procured from approved manufacturer in specified colour/shade. Installation shall be carried out on wall surfaces using C2 polymer-modified tile adhesive (or equivalent) suitable for porcelain and marble cladding, with joints filled using compatible grout as recommended by the adhesive manufacturer. Work shall include all associated tasks such as cutting, edge finishing, cleaning, curing, and protection of finished surfaces. Execution shall be at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	600		NSI	
535	**WL-30** **DRY CLADDING (TRAVERTINE STONE)** Providing, fabricating, and installing dry-clad travertine stone panels of approved shade, upto 10Sft, 3/4"/20mm thickness, and shade, conforming to ASTM/EN standards, fixed on wall surfaces using mechanical cladding system comprising stainless steel anchors, kerfs, dowels, brackets and supported hardware, ensuring proper load transfer and thermal movement allowance, including cutting, edge finishing, joint treatment, expansion joints, and sealing where required, executed with scaffolding, alignment, and installation to true line, level, and plumb, complete with all accessories and fixing arrangements, at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Sft	14,950		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
536	**WL-31** **8MM TEMPERED BLACK TINTED GLASS CLADDING ON WALLS** Providing and fixing 8 mm thick tempered black tinted glass cladding on wall, column or where required, conforming to ASTM C1048, EN 12150, or equivalent. Glass panels shall be distortion-free, with polished edges and safety performance. Installation shall be executed using stainless steel stand-off fittings in SS304 grade, Fixing shall include stud diameter, spacing, anchor bolts, and layout details in accordance with approved shop drawings. All required hardware and accessories. Work shall be completed at any floor level or height, in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	12,450		NSI	
537	**WL-32** **POWDER COATED CNC CUT M.S SCREEN** Providing and fixing approved powder coating CNC-cut metal panels with MS framing system 2" x"x1/8" thick with approved anchoring. Installation shall be carried out on wall surfaces framing, anchors, screws, and accessories, ensuring proper joint detailing, spacing, and alignment. All required hardware and accessories shall be provided. Work shall be executed at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Sft	470		NSI	
538	**WL-36** **DECORATIVE PLASTER** Providing and applying 6 mm thick decorative plaster, pigmented and of approved make (e.g., Ressi Plastored 110 from RESSICHEM or equivalent), with or without comb finish, applied over rough-cast plaster. The work shall include formation of grooves, drip courses, jambs, bends, corners, and recesses, as well as hacking of uneven concrete surfaces to ensure proper bonding. Execution shall involve scaffolding, curing, and finishing to true line, level, and plumb, carried out at any floor level or height. The work shall be completed in all respects as per approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Sft	610		NSI	
539	**PVC Molding** Providing and fixing PVC molding of approved profile, size, and colour, manufactured from rigid polyvinyl chloride (PVC) compound conforming to relevant ASTM/EN standards. Installation shall be carried out using approved adhasive. Joints shall be aligned, mitred, and finished uniformity. Execution shall be at any floor level or height, complete in all respects as per approved drawings, standards, specifications, and/or as directed by the Engineer.	Rft	6,720		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
540	**MT-01** **(T PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER)** Providing, fabricating, and installing T-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Rft	2,590		NSI	
541	**MT-02** **(FLAT PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER)** Providing, fabricating, and installing Flat-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Rft	140		NSI	
542	**MT-03** **(L PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER)** Providing, fabricating, and installing L-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as edge trim, corner protection, or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Rft	100		NSI	

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
543	**MT-04** **(U GROVE PROFILE - 1/4" WIDE ALUMINUM - CHROME BLACK)** Providing, fabricating, and installing U-groove profile sections of aluminum, 1/4" wide, finished in chrome black anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as decorative groove, divider, or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Rft	1,470		NSI	
544	**MT-05** **(FLAT PROFILE - 1/2" WIDE ALUMINUM - CHROME SILVER)** Providing, fabricating, and installing Flat-profile sections of aluminum, 1/2" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Rft	550		NSI	
545	**MT-06** **(FLAT PROFILE 1" WIDE ALUMINUM - CHROME BLACK)** Providing, fabricating, and installing Flat-profile sections of aluminum, 1" wide, finished in chrome black anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Rft	2,950		NSI	

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
546	**MT-07** **(FLAT PROFILE 3" WIDE ALUMINUM - CHROME SILVER)** Providing, fabricating, and installing Flat-profile sections of aluminum, 3" wide, finished in chrome silver anodized/polished coating, conforming to ASTM/BS/EN standards for aluminum extrusions, fixed as divider or transition profiles in ceilings, wall panels, or flooring systems as specified, including cutting, edge finishing, stainless steel screws, anchors, adhesive bonding where required, alignment to true line, level, and plumb, complete with all accessories and fixing arrangements, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Rft	40		NSI	
547	**CEMENT BOARD WALL (4" THICK)** Providing and constructing 100 mm (4") thick cement board partition wall including insulation comprising double-layer fibre cement boards of approved make conforming to ASTM C1186 / EN 12467, fixed on a complete framing system of GI C-studs and U-tracks, minimum steel thickness 0.55–0.75 mm, hot-dip galvanized to G90/Z275 coating, installed with approved anchors, screws, and accessories, including joint treatment with tape and compound, screw head filling, sanding, and finishing, surface preparation with primer and putty where required, and final finishing with emulsion paint or other specified coating, executed to true line, level, and plumb at any floor level or height, complete in all respects as per approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Sft	30,500		NSI	
548	**INTETRIOR CEILING FINISHES**					
549	**CL-06 (CARBON FIBER VENEER)** Providing, fabricating, and installing 5 mm thick carbon fibre veneer sheets, bonded with silicone adhesive to 12.5 mm thick gypsum board conforming to ASTM C1396 / BS EN 520, including specification of board type, manufacturer, and performance requirements. Installation shall be carried out using a GI ceiling suspension system comprising main channels, furring channels, and perimeter angles, with minimum steel thickness as specified, proper suspension spacing, hanger details, and galvanization, all in compliance with ASTM C645 / ASTM C754 or equivalent standards. The work shall include all required hardware and fixing arrangements, cutting and forming openings for light fixtures and other design features, and finishing with three coats of matte enamel paint of approved make and colour shade, applied over one coat of primer, with surface preparation including putty filling as required. Execution shall be completed at any floor level or height, in full conformity with approved drawings, relevant specifications, standards, and/or as directed by the Engineer.	Sft	2,300		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
550	**CL-07 (BAYRISOL FABRIC CEILING)** Providing, fabricating, and installing Bayrisol PVC/Polyester stretch fabric ceiling system comprising non-flammable vinyl membrane of approved thickness and finish, conforming to EN ISO 9001, EN ISO 14001, EN ISO 50001, EN ISO 45001, EN ISO 11654, EN 14716, and EN 13501-1 fire classification standards, fixed with proprietary perimeter rails in aluminum/PVC profiles, tensioned and installed by heating and stretching method with minimum plenum depth as specified, including accessories such as acoustic backing, luminous integration, light fixtures, diffusers, suspension hardware, stainless steel fasteners, hangers, and fixing arrangements, complete with cutting and forming openings for light fixtures, ducts, sprinklers, and other design features, finished to true line, level, and plumb, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer, complete in all respects.	Sft	1,700		NSI	
551	**CL-08 (MDF ROUND CEILING 24", 18" , 12" DIA)** Providing, fabricating, and installing modular MDF ceiling panels of approved make and finish, fixed on MS pipe support framework comprising main runners, cross tees, perimeter angles, hangers, and suspension system of specified minimum steel thickness, duly galvanized and conforming to relevant ASTM/BS/EN standards, including all required hardware, fixing arrangements, cutting and forming openings for light fixtures, ducts, sprinklers, and other design features, surface preparation with putty, primer, and finishing coats of approved paint and colour shade, executed to true line, level, and plumb at any floor level or height, complete in all respects as per approved drawings, manufacturer's specifications, standards, and/or as directed by the Engineer.	Sft	4,000		NSI	
552	**WALL PARTITIONS & FIXED GLAZING**					
553	**FIXED GLAZING** Providing and installing fixed glazing system comprising clear/coloured/tinted toughened or laminated glass panels of approved make and thickness (minimum 10–12 mm or as specified), conforming to ASTM C1048 / EN 12150 standards for safety glazing, fixed in aluminum framing system with powder-coated/anodized finish, using EPDM gaskets, silicone sealant, spacers, and stainless steel fasteners, including cutting, edge finishing, joint sealing, cleaning, and protection of installed glazing, executed to true line, level, and plumb at any floor level or height, complete in all respects as per approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Sft	12,520		NSI	

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
554	**GLASS PARTITION WALL LOW HEIGHT** Providing and installing low-height glass partition wall comprising toughened/laminated glass panels of approved make and thickness (minimum 8 mm or as specified), conforming to ASTM C1048 / EN 12150 standards for safety glazing, fixed in powder-coated/anodized aluminum framing system with EPDM gaskets, silicone sealant, spacers, and stainless steel fasteners, including cutting, edge finishing, joint sealing, cleaning, and protection of installed partition, executed to true line, level, and plumb at any floor level, complete in all respects as per approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.	Sft	3,440		NSI	
555	**PHENOLIC CUBICAL PARTITION WALL SYSTEM** Providing, fabricating, fixing & Installation Phenolic Partitions wall system in wash room and where required, high-pressure phenolic resin compact laminate conforming to ASTM E84 / EN 438 / EN 13501-1 standards for fire resistance, moisture resistance, and impact durability of approved manufacturer or equivalent including edge trims, all required accessories for framing such as legs, bracket, hinges etc are paid as seaperate item as mentioned below Partitions and doors, of approved colour as per manufacturer's specification up to required height, complete in all respect as per drawing, specifications and entire satisfaction of the Engineer.				NSI	
556	i) Phenolic core Sheet 12mm thick (complete Cubical Partitions wall & Doors) without accessories	Sft	3,200			
557	ii) SS 304 Cubical Partitions hollow leg 200mm high (SS Stain Finished) with fixing accessories.	Each	264			
558	iii) SS 304 Wall Bracket (L type) 3mm thick (SS satin finished)	Each	360			
559	iv) SS 304 Wall Bracket (double " L & T" type) 3mm thick (SS satin finished)	Each	170			
560	iv) SS304 Hinges with cover & screw (SS satin finished)	Each	198			
561	v) SS304 Indicator Turn Lock (SS satin finished)	Each	66			
562	vi) SS304 Head Rail (Required length in one piece with out any joint)	Rft	220			
563	vii) SS304 Coat Hook (SS satin finished)	Each	66			
564	**EXTERNAL DEVELOPMENT WORKS**					
565	**Damp Proof Course (DPC)**					
566	Providing and laying 2 inches (51 mm) thick damp proof course with cement concrete 1:2:4 cast in situ using graded screened bajri of 3/4 inch (19 mm) and down gauge mixed with any approved water proofing agent including compacting, curing form work and its removal etc. complete, but excluding the cost of water proofing agent .				Code #108 Item # 03	
567	i) Boundary Wall	Sft	400			
568	ii) Guard Room & Guard Rest Room	Sft	200			
569	**Pudlo**					
570	Extra for using water proofing agent pudlo in item Nos. 1,2 and 3 (quantity to be used as per manufacturer's specification).	Kg	45		Code #108 Item # 05	
571	**Solid Block Masonry Walls.**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
572	Providing and laying 1:3:6 cement concrete **machine made** solid block masonry 4 to 6 inches (102 mm to 152 mm) thick using **crushed graded boulders 3/4 inch (19 mm) and down gauge** instead of screened bajri, set in **cement sand mortar 1:6** instead of lime cement mortar 1:1:6 including scaffolding, raking out Joints and curing etc. complete in ground floor superstructure.				Code #110 Item # 44 + Code #110 Item # 92+ Code #110 Item # 99+	
573	i) Boundary Wall	per Cft	2,345			
574	ii) Guard & Guard Rest Room	per Cft	1,675			
575	**Rough Cast Cement Plaster**					
576	Providing and applying 3/4" (19 mm) thick rough cast cement rendering consisting of 3/8" or 8.6 mm topping of 1:2 (one cement and two mixed graded bajri 3/8" or 8.5 mm and down gauge) and base of 3/8" or 8.5 mm thick rough plaster 1:4 (one cement four sand) in plinth and ground floor including finishing etc. complete .				Code #122 Item # 22	
577	i) Boundary Wall	Sft	12,500			
578	**Finishing works of Guard Room & Guard Rest Room**					
579	**Cement Plaster**					
580	1/2" (13 mm) thick cement plaster 1:6 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, comers, and curing etc., complete.				Code #122 Item # 06	
581	i) Ceiling	Sft	1,000			
582	ii) Wall	Sft	3,000			
583	**Distemper**					
584	Distempering with vinyle distemper (ICI) Dulux Paintex of approved make and shade in two coats over and including the cost of wall putti, sand papering, dusting, and filling the holes, cracks and inequalities, if any, at any height in any floor.				Code #122 Item # 151	
585	i) Ceiling	Sft	1,000			
586	**Plastic Emulsion Paint**					
587	Painting with (ICI) Dulux plastic emulsion paint VIP of approved shade two coats over and including the cost of one priming coat complete over plastered surface at any height in any floor .				Code #122 Item # 162	
588	i) Wall	Sft	3,000			
589	**Flooring, Skirting & Dado**					
590	**Porcelain Tile Flooring including Skirting & Dado**					
591	Providing and laying light colour, glazed/non skid vitrified Porcelain tiles (Polished) not exceeding 1600 Sqcm each, (Pak made) on walls and floors, in any floor, laid with dry bond (stile bond) over a base of 1" thick cement mortar (1:3) including jointing to tiles with joint filler of approved quality as per direction of the Engineer incharge.				Code #117 Item # 179	
592	Glazed Full Body Porcelain Tiles 24" x 24" x 1/2" thick	Sft	1,000			
593	**Roof Finishes/Treatment**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
594	**PCC Roof Screeding (Flooring)**					
595	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using crushed graded boulders 3/4 inch (19 mm) and down gauge instead of screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.				Code #117 Item # 7+	
596	i) Guard Room Roof (2-Nos)	Sft	162			
597	**EXTERNAL WALL FINISHES**					
598	**Cement Plaster**					
599	3/4" (19 mm) thick cement plaster 1:4 on walls and columns etc. in basement, plinth, mezzanine and ground floor including making edges, corners, and curing etc., complete.	Sft	800		Code #122 Item # 08	
600	**Weather Resistance Paint**					
601	Painting three coats with weather shield paint deluxe (ICI) make of approved shade on plaster surface (External) and including the cost of cleaning the surface, sand papering etc. complete at any height in any floor.	Sft	800		Code #122 Item # 172	
602	**CONCRETE TILES PAVERS AND FLOORING**					
603	**Concrete Pavers**					
604	Providing and laying in floor C.C. 1:2:4: tuff paver 2-1/2" thick of approved design and colour pattren laid on sand cushion filling of joint with sand and warring etc. complete as per direction of Engineer Incharge. (the cost of sand cushion is included)				Code #117 Item # 178	
605	a) Average strength 7000 psi	per Sft	15,000			
606	b) Average strength 5000 psi	per Sft	5,500			
607	Extra for using water proofing agent pudlo in item Nos. 1,2 and 3 (quantity to be used as per manufacturer's specification).	per Kg	125		Code #108 Item # 5	
608						
609	**PCC Flooring**					
610	Providing and laying floors of 3 inches (76 mm) thick 1:2:4 cement concrete using screened bajri in ground floor laid in with or without panels including form work, consolidation, finishing, and curing etc. complete.	per Sft	3,000		Code #117 Item # 7	
611	**Kerb Stone**					
612	Providing and laying kerb stone 18" x 12" x 6" (457 mm x 305 mm x 152 mm) obtained from approved quarry, chisel dressed on top and sides, laid in cement mortar 1:4 ruled cement pointing in cement mortar 1:3 including cost of excavation and back filling of excavated stuff and its disposal within one chain lead as desired.	Rft	1,800		Code #127 Item # 113	
613	**B) Non Schedule Items**					
614	**Decorative Plaster**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
615	Providing and applying decorative plaster system, 6 mm to 8mm thick, comprising cementitious binder, fine aggregate, and special additives with approved colour & shade as per brand listed in the manufacturer list. The decorative plaster system shall comply relevant ASTM C926-22/BS EN 998-1and BS EN 13914-1 and BS EN 13914-2 standards for cementitious decorative coatings. Substrate shall be sound, fully cured, clean, dry, and roughened where required, prepared strictly in accordance. Alkali-resistant fiberglass mesh shall be provided at construction joints, corners, and crack-prone locations where required, works including number of coats, approved texture/finish, curing, protection, scaffolding, alignment, maintaining v-groove edges and dimensions as shown, and be executed at any floor or height, complete in all respects, in accordance with approved drawings, specifications, and directions of the Engineer.				NSI	
616	i) Boundary Wall	Sft	12,500			
617	**Breathable Water repellent**					
618	Providing & applying breathable water repellent over external decorative plaster not less than 2 coats comprising of silane and siloxane based mixture as per BS EN 1504-2 or equivalent standard, serve as high quality general-purpose water repellents impregnation agents permanently protect decorative Plaster/concrete against moisture and microorganisms etc as per approved manufecturer list including scaffolding etc., **at any floor & any height** as per instruction of manufacturer, etc., complete in all respect, as per drawings, specifications and or as directed by the Engineer/ consultant.				NSI	
619	i) Boundary Wall	Sft	12,499			
620	**Coping & Cladding On Boundary Wall**					
621	Providing and fixing approved pre-polished/honed Sill Batta stone coping & cladding using different sizes & thickness as per drawing for wall & column and where required, fixed with approved design pattern including & over 3/4" thick cement-sand mortar 1:2 ratio using grey cement and screened sand, 1/4" thick slurry of polymer-modified stone adhesive comprising C2TES1/C2TES2 or equivalent, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. at any Floor any height. complete in all respect as per drawings, specifications and directions of the Engineer.	Sft	3,000		NSI	
622	Coping with 1-1/2" thick pre-polished Sill Batta stone Half D-Shape gola and drip course	Sft	3,000			
623	Cladding On Boundary Wall with 24" x12" x3/4" thick pre-polished Sill Batta stone	Sft	3,000			
624	**Metal Fence**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
625	Providing, fabricating, welding, erecting, and fixing in position MS fence 6' high, using structural steel conforming to ASTM A36 for solid sections and ASTM A500 Grade B/C for hollow sections (or equivalent BS EN 10025 / EN 10219 standards), Fence posts shall be 25 × 25 mm (1" × 1") solid square bar conforming to ASTM A36, with horizontal members of 50 × 50 × 3.2 mm (2" × 2" × 1/8") hollow tubes conforming to ASTM A500 Grade B/C, provided at top, bottom, and vertical sides. Base plates shall be minimum 200 × 200 × 10 mm thick, fabricated from ASTM A36 steel, fixed with anchor bolts of ASTM F1554 Grade 36/55, minimum M16 size, embedded 200 mm in reinforced concrete foundation. Surface preparation & apply 2 coats of approved industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer. Fabrication and welding shall comply with AWS D1.1 or BS EN ISO 3834 / EN 1090, including grinding, weld finishing, and dimensional tolerances. Works shall include excavation, backfilling, reinforced concrete foundations/pedestals/plinth beams with steel reinforcement, bitumen coating for embedded portions, J-bolt anchoring, accessories, complete in all respects as per drawings, standard, specifications and instruction of the Engineer.	Rft	400		NSI	
626	**MS Gate**					
627	Providing, fabricating, welding, erecting, and fixing in position MS gate comprising outer frame of 50 × 50 × 3.2 mm (2" × 2" × 1/8") outer frame of square hollow section conforming to ASTM A500 Grade B/C (or BS EN 10219), with infill members of 25 × 25 mm (1" × 1") solid square bar conforming to ASTM A36 (or BS EN 10025), spaced at 175 mm (7") c/c horizontally. Gate shall include two vertical posts of 150 × 150 × 5 mm (6" × 6" × 5.16 mm) hollow section conforming to ASTM A500 Grade C (or EN 10219), complete with hinges, L-drops (2 nos), drop bolts/floor bolts (2 nos), heavy-duty bearing wheels, wheel track fabricated from 75 × 75 × 6 mm (3" × 3" × 1/4") MS angle, and hold-fasts at 600 mm (24") c/c. Surface preparation & apply 2 coats of approved industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer. Fabrication and welding shall comply with AWS D1.1 – Steel (or BS EN ISO 3834 / EN 1090), including grinding, weld finishing, and dimensional tolerances. Complete in all respects as per drawings, standard, specifications and instruction of the Engineer.				NSI	
628	Main Gate with wheel & wheel track (17'-0" x 7'-0")	Sft	500			
629	Gate without wheel & wheel track (6'-0" x 7'-0")	Sft	150			
630	**Metal Louvered**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
631	Providing, welding, fabricating and fixing in position MS louvered fixed panels comprising of MS tube 2"x 2"x 12 Swg (50mmx50mmx2.77mm) main frame horizontal & vertical, 14 Swg (2mm) thick MS sheet for louvers @ 1-1/4" center to center as per drawing & design, main frame fixed on wall with hold fast using 9" long hold fast 4 Nos in each sides, shutter fixed with hinges 4 Nos in each sides on the frame, Surface finished with one coat of approved zinc-phosphate epoxy primer & three coats of approved industrial synthetic enamel paint. Installation shall include cutting holes for holdfast, grouting, alignment, and all accessories required for complete fixing, complete in all respects, at any floor and height, in accordance with approved drawings, specifications, and directions of the Engineer.	Sft	1,200		NSI	
632	**Steel Structure Shade with Polyacrbonite sheet Roofing**					
633	Design, drawing, providing, fabricating, welding, erecting, and installing Steel Structure Shade comprising MS steel columns, beams, and bracing, including anchoring, surface preparation, and protective coating. Structural steel shall conform to ASTM A36 for solid members and ASTM A500 Grade B/C for hollow sections (or equivalent BS EN 10025 / EN 10219 standards), with minimum yield strength ≥ 250 MPa (A36) and ≥ 290–345 MPa (A500). All fabrication and welding shall comply with AWS D1.1 – Steel (or BS EN ISO 3834 / EN 1090), including grinding, weld finishing, and dimensional tolerances. Surface preparation & apply 2 coats of approved industrial synthetic enamel paint over 1 one coat of approved zinc-phosphate epoxy primer as required, Roofing shall be covered with polycarbonate sheet panels over ramp of thickness as approved, UV-resistant, fire-retardant, conforming to EN 16153 (or ASTM D3935 for polycarbonate resins, fixed with self-drilling screws and aluminum flashing profiles. Designed and constructed in accordance with ACI 318, with anchor bolts ASTM F1554 Grade 55, non-shrink grout, and installation. Complete in all respects as per drawings, standard, specifications and instruction of the Engineer.	Sft	4,100		NSI	
634	**STAIRCASE GLASS RAILING**					
635	Providing, fabricating, welding & fixing in position Stainless Steel Glass Railing floor moundted 900mm high from FFL with SS grade 304 (IIL or approved), comprising 2" dia SS pipe as hand rail, 10mm thick S.S balustrade welded to handrail, including fixing 10mm thick tempered glass with S.S clamp, 1/4" thick base plate bolted to wall, height and detail as shown in drawing, including all fixing arrangement with SS hardware etc., complete in all respect as per drawing, standard, specifications and direction of the Engineer.	Rft	100		NSI	
636	**Finishing works of Guard Room & Guard Rest Room**					
637	**Flooring, Skirting & Dado**					
638	**Levelling Screed**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
639	Providing & laying 1:4 cement sand mortar levelling screed under tiles or where required at any Floor any height complete in all respect and as per drawings, specifications and directions of the Engineer.	Cft	100		NSI	
640	**Ceramic Tile Flooring including & Dado**					
641	Providing and fixing glazed ceramic tiles measuring 600 × 300 × 10 mm (24" × 12" × 3/8") on floor & wall surfaces, in accordance with the finishing schedule. Tiles shall be fixed using polymer-modified cementitious tile adhesive conforming to EN 12004 (Class C2TE) or ASTM C482/C627, applied over properly prepared substrate. Joints shall be filled with approved polymer-modified grout conforming to EN 13888 (CG2) or ASTM C118. Installation shall include proper jointing, alignment, washing, and grouting with manufacturer - recommended material. Additional tasks such as cutting, edge finishing, cleaning, curing, and protection of finished surfaces are part of the comprehensive installation process. Complete in all respects as per specifications & relevant drawings and all works to the satisfaction of the Engineer.	Sft	350		NSI	
642	**Door Frame, Shutter and Windows**					
643	**Hollow Core Flush Type Metal Door**					
644	Providing, welding, fabricating and fixing in position approved colour powder-coated MS hollow flush door shutter including frame of 2" x 5" x16 gauge (1.6 mm) MS sections with single rebate 38 mm × 12 mm (1-1/2" × 1/2"), shutter 38 mm (1-1/2") thick faced both sides with 20 SWG (0.9 mm) GI sheet conforming to ASTM A653/A653M coating designation, reinforced with "C" channel bracing and cross bracing, filled with honeycomb kraft paper core, with or without vision panel and louvers, including 6 mm clear laminated safety glass fixed with EPDM gasket and metal trim, and all required hardware excluding ironmongery, at any floor and height, in accordance with drawings, specifications, and Engineer's directions. Note: Cost of ironmongery such as hinges, locks, handles, closers, etc. shall be paid under separate items as per hardware schedule.				NSI	
645	a) Type-1 (Without Vision Panel and louvers)	Sft	40			
646	b) Type-2 (Without Vision Panel and with louvers)	Sft	48			
647	c) Type-3 (With Vision Panel and without louvers)	Sft	24			
648	d) Type-4 (With Vision Panel and louvers)	Sft	40			
649	**Aluminum Fixed Glazing with Openable Windows**					

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
650	Providing, fabricating, and fixing in position double-glazed sliding aluminum windows, comprising one fixed panel and one openable shutter, manufactured from approved colour anodized premium quality aluminum sections of 100 mm width × 2 mm thickness, conforming to Alloy 6063-T5 and complying with ASTM B221 or EN 755 extrusion standards, using Prime, Chawla, or equivalent approved sections, securely fixed to RCC/CC structure. Glazing shall consist 6 mm clear laminated safety glass, conforming to ASTM C1172 / EN 14448. Glass shall be sourced from approved local manufacturers (Ghani Glass, Tariq Float, or equivalent) and fitted with EPDM/Neoprene gaskets. All hardware and accessories including hinges, handles, stays, locks, and screws shall be of aluminium or SS304, installed in accordance with manufacturer's recommendations. Silicone sealant conforming to ASTM C920 / EN ISO 11600 shall be applied to all external junctions between structure, wooden packing, and window frame to ensure water- and wind-proof sealing. Surface treatment shall include anodizing or powder coating as per AAMA 2603/2604 or EN 12206. Installation shall include cutting, drilling, grouting, and all allied works, complete in all respects as per approved drawings, specifications, and directions of the Engineer.	Sft	72		NSI	
651	**Roof Finishes/Treatment**					
652	**Rain Water Spouts**					
653	Providing, Making and Fixing in position R.C.C Precast Rain Water spouts (size as shown in drawing)/ 24" x 16" x 2.5", complete in all respect as per drawing, specification and directed by the engineer.	Each	2		NSI	
654	**Water proofing**					
655	Provide and apply cementitious membrane AQUAFIN 2K/M water proofing over concrete slabs of roof including returning 300mm high all around the area/parapet wall complete as per manufacturer's specifications and to the entire satisfaction of the Engineer.				NSI	
656	Guard Room Roof (2-Nos)	Sft	150		i)	
657	Under Concrete Tile & Pavers	Sft	27,750		ii)	
658	**CONCRETE TILES PAVERS AND FLOORING**					
659	**Concrete Tiles**					
660	Providing, laying and fixing Pre-cast concrete tiles 12" x 12" and 18" x 18", 1-1/2" thick complying with ASTMC936/C936M / BS EN 1339, strength of tiles not less than 3000 psi or approved equivalent, The installation process includes laying the tiles over 1-1/2" thick cement-sand mortar mix 1:2 ratio & 1/4" thick neat cement slurry, ensuring jointing, washing and grouting with approved epoxy based grouting material, Additional tasks such as cutting, cleaning, curing, and any other required steps are part of the comprehensive installation process. The entire work is to be completed precisely as outlined in the provided drawings, specifications, and as directed by the Engineer.	Sft	7,000		NSI	
661	**Power float with & without fishbone grooves.**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
662	Applying power floating including making fishboan grooves over PCC concrete flooring (Item # 13 of CSR) on ramp, driveway, parking and or where required, laid in approved size panels as per drawing, including compacting, leveling, finishing and curing etc., complete in all respects as per drawing, standard, specifications and directed by the Engineer.					
663	i) Power float with fishbone grooves. **(FLOOR TYPE - FL 20A)**	Sft	1,500			
664	ii) Power float without fishbone grooves. **(FLOOR TYPE - FL 20B)**	Sft	1,500			
665	**Foam Concrete**					
666	Providing & laying Foam concrete over RCC slab or where required, the density of Foam concrete shall not be greater than be 12kn/m3 and should have minimum compressive strength of 7 Mpa at 28 days including cement, pre-formed foam, admixtures, water, batching, pumping, placing, finishing, testing, curing at any height & any floor as per drawing standard specification etc., complete in all respect as per drawings and as directed by the Engineer.	Cft	10,000		NSI	
667	**Neoprene Rubber Board**					
668	Providing & pasting/fixing10mm thick Neoprene Rubber Board for separating the foam concrete or where required, at any height & any floor as per drawing standard specification etc., complete in all respect as per drawings and as directed by the Engineer.	Rft	150		NSI	
669	**Pavement Marking with Thermoplastic Paint**					
670	Providing and applying pavement marking with hot-applied thermoplastic paint, conforming to BS EN 1871 & BS EN 1436, with glass beads for retro-reflectivity as per ASTM D6359/EN 1423. Material shall be high-strength thermoplastic, resistant to UV radiation, oil, grease, water, abrasion, and vehicular impact, with skid-resistant and anti-fade properties. Surface preparation shall include cleaning, drying, and removal of dust, grease, and laitance, substrate shall be sound. Application shall be carried out using approved thermoplastic applicator machine at a temperature of 180–200 °C, with uniform thickness of 2.5–3 mm, applied in two coats (primer + thermoplastic), ensuring proper bonding with pavement. Markings shall be executed as per approved colour shade, executed at any floor level or height, in full compliance with approved drawings, manufacturer's specifications, relevant standards, and/or as directed by the Engineer.				NSI	
671	Yellow paint 5" Wide	Rft	7,500			
672	White paint 5" Wide	Rft	7,500			
673	For Special persons	Each	8			
674	Straight Arrow 10'-0" x 1'-0"	Each	60			
675	One Side Turning Arrow 10'-0" x 1'-0"	Each	16			
676	Two Sides Turning Arrow 10'-0" x 1'-0"	Each	10			
677	Mid Line Markings	Rft	100			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
678	**Rubber Speed Hump/Breaker**					
679	Providing and fixing reflective rubber speed hump/road breaker, including end caps, manufactured from high-strength recycled or virgin rubber, resistant to UV radiation, oil, grease, water, abrasion, and vehicular impact, with thermal resistance from +120 °C to –12 °C. Modules shall be anti-skid, interlocking, middle section size 20" × 15" × 2" high and end cap size 7" × 15" × 2" high, fitted with integrated yellow reflective inserts/cat-eye reflectors or high-intensity reflective tape suitable for indoor and outdoor use. Installation shall include galvanized or stainless steel anchor bolts of minimum diameter and embedment depth, fixed into RCC/CC pavement using galvanized or stainless steel anchor bolts as per approved fixing system with non-shrink grout. Work shall be complete in all respects, including alignment, drilling, fixing hardware/accessories, and as per approved manufacturer's specifications and directions of the Engineer.	Rft	50		NSI	
680	**Staniless Steel Lettering With Backlight**					
681	Providing, making & fixing Staniless steel Lettering with backlight arrangements on entrance wall of Elevation #1 comprising of SS 304, 1.626mm (16 Swg) thick sheet, size of each letter 250mm x 300mm high. The lettering "SECURITIES & EXCHANGE COMMISSION OF PAKISTAN." in capital letters as per drawing including all required fixing accessories & required hardwares, drilling & epoxy grouting, backlight scaffolding & pranches etc., true line & level, plumb. complete in all respect as per drawing, specifications and direction by the Engineer.	Each letter	39		NSI	
682	**Wall Mounted sign, Logo with Lettering**					
683	Providing, making, and fixing wall-mounted stainless steel signage/logo with lettering, overall size 6'-0" × 7'-0" (1800 mm × 2100 mm), fabricated from SS304 conforming to ASTM A240, minimum 1.6 mm thick, Satin finish as shown on drawings. Signage letters in upper case "SECP" and Urdu lettering with approved colour engraving and symbols, approved SS threaded studs at 300 mm c/c. Signage shall incorporate IP65/IP67 LED backlighting with approved colour temperature (3000K - 6500K), concealed wiring, installation in accordance with IEC standards and manufacturer's recommendations. Mounting shall be with SS304 anchor bolts / chemical anchors, epoxy fixing. Specify concealed conduits, waterproof cable joints and weatherproofing suitable for exterior exposure. Submission of shop drawings, font layout, mock-up, illumination test and manufacturer's warranty shall be required prior to fabrication and installation. Complete in all respects including all required hardware, drilling, grouting, scaffolding, alignment, line, level, and plumb as per approved drawings, specifications, and directions of the Engineer.	Job	1		NSI	
684	**ELECTRICAL WORKS**					
685	**DRY TYPE POWER TRANSFORMERS**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
686	All items under this head to be carried out as per technical specifications and approval, Drawings, relevant BSI /ASTM Standards, IEC regulation, complete in all respect and to the entire satisfaction of the Employer, and as mentioned in General Notes or noted otherwise, Including providing of shop and as built drawings. complete in all respects.					
687	Supply, installation, testing and commissioning of following 11 / 0.4kV, 50 Hz, Dyn11, 3 phase, 4 wire, Dry type Transformer (Alu/Alu) for Indoor use with IP-31 enclosure, including connection with MV cables and Busbars as per manufacturer recommendation, Connection of neutral and body earthing to the provided earthing system and necessary installation accessories etc. as per drawing, specifications, data sheets, complete in all respects including testing at factory Permisses expenditure as mentioned in Clause 8 of specifi provision (specification).					
688	2000 kVA Dry Type Transformer	No.	3			
689	**MEDIUM VOLTAGE SWITCHGEARS**					
690	All items under this head to be carried out as per technical specifications and approval, Drawings, relevant BSI /ASTM Standards, IEC regulation, complete in all respect and to the entire satisfaction of the Employer, and as mentioned in General Notes or noted otherwise, Including providing of shop and as built drawings. complete in all respects.					
691	Supply, installation, testing and commissioning of following 11kV Medium Voltage Switchgears, indoor floor standing totally enclosed, dust protected, vermin proof, sheet metal clad cubical type, 3-phase 3-wire 50Hz in free standing design including all accessories with a set of 3-phase insulated 630 Amp copper bus bars, control wiring with cleats and ferrules, earthing bar connecting studs, manual charging handle, cable sockets, designation labels, holding bolts, incoming and outgoing VCBs, disconnect / earth switches and other components as per drawings, specifications and approvals, complete in all respect.					
692	Consumer MV Switchgear 11kV MV Switchgears Panel with 1 No. Incoming 630A VCB and 3 Nos. Outgoing 630A VCBs including Surge Arrestor, earthing switch etc., complete in all respects as per the relevant authority approval and instructions / guidance of the Engineer-in-Charge.	Job.	1			
693	Supply and installation / laying of following Accessories / Signs as per drawings and specifications, including all mounting accessories, complete in all respects.					
694	Supply and laying of 600mm wide, 6mm thick Rubber mat piece to be installed all along MV & LV Switchgears in substation rooms as per requirements, drawings and specifications, including all accessories, complete in all respects.	Rm.	25			
695	Supply and installation of Danger Boards, Emergency Signs etc.	No.	3			
696	**L.V SWITCH BOARDS, PFI & DISTRIBUTION BOARDS**					
697	LV, PFI & ATS PANELS					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
698	Supply, installation, testing and commissioning of following Free Standing Floor Mounted, totally Enclosed, Cubical type, LV Panels, Power Factor Improvement Panels, Bus Coupler and ATS Panels, (Form-2), complete with incoming and outgoing Circuit Breakers ,incoming protective devices as specified on the drawings and single-line diagram, complete with all internal components and accessories as specified and shown on the drawings. complete with termination of incoming and outgoing cables/busbars at the panel, made with 14 SWG sheet metal housing powder coated with approved colour, (As per Form-2 and specifications). Complete in all respects. **Note: Necessary inter-connected cable / busbar arrangements between ATS Panels to LV Panel included in the scope with all installation accessories.**					
699	MDB with 3 No. 400 kVAR PFI PANELS & 2 No. BUS COUPLER PANELS	No.	1			
700	ATS PANEL-1	No.	1			
701	ATS PANEL-2	No.	1			
702	ATS PANEL-3	No.	1			
703	SUB MAIN DISTRIBUTION BOARDS (SMDB)					
704	Supply, installation, testing and commissioning of following floor mounted Sub Main Distribution Boards (SMDB) (Form-3), with incoming and outgoing circuit breakers and complete with all internal components and accessories as indicated on the SLD and specified. with cable terminations, made with 14 SWG sheet steel metal housing powder coated with approved color (as per specifications), dust protected, vermin proof housing having all the necessary switching & protections, metering/instrumentation as indicated on the Single Line Diagram (SLD) etc. including Pull Boxes and all mounting accessories etc., as per specifications and drawings, complete in all respect.					
705	SMDB-B3	No.	1			
706	SMDB-B1	No.	1			
707	SMDB-LGF	No.	1			
708	SMDB-UGF	No.	1			
709	SMDB-1F	No.	1			
710	SMDB-2F	No.	1			
711	SMDB-3F	No.	1			
712	SMDB-4F	No.	1			
713	SMDB-5F	No.	1			
714	SMDB-6F	No.	1			
715	SMDB-7F	No.	1			
716	SMDB-8F	No.	1			
717	SMDB-9F	No.	1			
718	SMDB-10F	No.	1			
719	SMDB-11F	No.	1			
720	SMDB-13F	No.	1			
721	SMDB-14F	No.	1			
722	SMDB-15F	No.	1			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
723	SMDB-16F	No.	1			
724	SMDB-17F	No.	1			
725	SMDB-18F	No.	1			
726	SMDB-19F	No.	1			
727	SMDB-20F	No.	1			
728	SMDB-21F	No.	1			
729	SMDB-22F	No.	1			
730	DISTRIBUTION BOARDS (DB)					
731	Supply, installation, testing and commissioning of following Wall/Flush/floor mounted Distribution Boards (DB), with incoming and outgoing circuit breakers and other components as per SLD with cable terminations, made with 14 SWG sheet steel metal housing powder coated with approved color (as per specifications), dust protected, vermin proof housing having all the necessary switching & protections, energy analyzer etc. including Pull Boxes and all mounting accessories etc., as per specifications and drawings, complete in all respect.					
732	DB-B1-LP	No.	1			
733	DB-B2-LP	No.	1			
734	DB-B3-LP	No.	1			
735	DB-B4-LP	No.	1			
736	DB-LGF-L	No.	1			
737	DB-UGF-L	No.	1			
738	DB-1F-L	No.	1			
739	DB-2F-L	No.	1			
740	DB-3F-L	No.	1			
741	DB-4F-L	No.	1			
742	DB-5F-LP	No.	1			
743	DB-6F-L	No.	1			
744	DB-7F-L	No.	1			
745	DB-8F-L	No.	1			
746	DB-9F-L	No.	1			
747	DB-10F-L	No.	1			
748	DB-11F-L	No.	1			
749	DB-13F-L	No.	1			
750	DB-14F-L	No.	1			
751	DB-15F-L	No.	1			
752	DB-16F-L	No.	1			
753	DB-17F-L	No.	1			
754	DB-18F-L	No.	1			
755	DB-19F-L	No.	1			
756	DB-20F-L	No.	1			
757	DB-21F-L	No.	1			
758	DB-22F-L	No.	1			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
759	UDB-B1	No.	1			
760	UDB-B2	No.	1			
761	UDB-B3	No.	1			
762	UDB-B4	No.	1			
763	UDB-LGF	No.	1			
764	UDB-UGF	No.	1			
765	UDB-1F	No.	1			
766	UDB-2F	No.	1			
767	UDB-3F	No.	1			
768	UDB-6F	No.	1			
769	UDB-7F	No.	1			
770	UDB-8F	No.	1			
771	UDB-9F	No.	1			
772	UDB-10F	No.	1			
773	UDB-11F	No.	1			
774	UDB-13F	No.	1			
775	UDB-14F	No.	1			
776	UDB-15F	No.	1			
777	UDB-16F	No.	1			
778	UDB-17F	No.	1			
779	UDB-18F	No.	1			
780	UDB-19F	No.	1			
781	UDB-20F	No.	1			
782	UDB-21F	No.	1			
783	UDB-22F	No.	1			
784	DB-LGF-P	No.	1			
785	DB-EXT-LGF	No.	1			
786	DB-DC	No.	1			
787	DB-FCR	No.	1			
788	DB-AD	No.	1			
789	DB-LGF-MECH	No.	1			
790	DB-UGF-P	No.	1			
791	DB-EXT-UGF	No.	1			
792	DB-UGF-MECH	No.	1			
793	DB-1F-P	No.	1			
794	DB-1F-MECH	No.	1			
795	DB-2F-P	No.	1			
796	DB-2F-MECH	No.	1			
797	DB-3F-P	No.	1			
798	DB-3F-MECH	No.	1			
799	DB-MPS	No.	1			
800	DB-4F-P	No.	1			
801	DB-4F-MECH	No.	1			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
802	DB-5F-KT	No.	1			
803	DB-5F-MECH	No.	1			
804	DB-6F-P	No.	1			
805	DB-6F-GYM	No.	1			
806	DB-6F-MECH	No.	1			
807	DB-7F-P	No.	1			
808	DB-7F-MECH	No.	1			
809	DB-8F-P	No.	1			
810	DB-8F-MECH	No.	1			
811	DB-9F-P	No.	1			
812	DB-9F-MECH	No.	1			
813	DB-10F-P	No.	1			
814	DB-10F-MECH	No.	1			
815	DB-11F-P	No.	1			
816	DB-11F-MECH	No.	1			
817	DB-13F-P	No.	1			
818	DB-13F-MECH	No.	1			
819	DB-14F-P	No.	1			
820	DB-14F-MECH	No.	1			
821	DB-15F-P	No.	1			
822	DB-15F-MECH	No.	1			
823	DB-16F-P	No.	1			
824	DB-16F-MECH	No.	1			
825	DB-17F-P	No.	1			
826	DB-17F-MECH	No.	1			
827	DB-18F-P	No.	1			
828	DB-18F-MECH	No.	1			
829	DB-19F-P	No.	1			
830	DB-19F-MECH	No.	1			
831	DB-20F-P	No.	1			
832	DB-20F-MECH	No.	1			
833	DB-21F-P	No.	1			
834	DB-21F-MECH	No.	1			
835	DB-22F-P	No.	1			
836	DB-22F-MECH	No.	1			
837	Supply, installation, testing and commissioning of following Isolator / Load Break Switch in 16 SWG sheet steel enclosure with neutral and earth terminal strips, including all mounting accessories, back box etc. as per specifications and drawings, complete in all respect.					
838	1000A, TPN Weatherproof type Load Break Switch	No.	3			
839	400A, TPN Weatherproof type Load Break Switch	No.	1			
840	300A, TPN Weatherproof type Load Break Switch	No.	2			
841	200A, TPN Weatherproof type Isolator	No.	1			

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
842	160A, TPN Weatherproof type Isolator	No.	3			
843	125A, TPN Weatherproof type Isolator	No.	1			
844	100A, TPN Weatherproof type Isolator	No.	6			
845	63A, TPN Weatherproof type Isolator	No.	2			
846	40A, TPN Weatherproof type Isolator	No.	13			
847	32A, TPN Weatherproof type Isolator (for EV Charging)	No.	12			
848	20A, TPN Weatherproof type Isolator	No.	17			
849	20A, SPN Weatherproof type Isolator	No.	125			
850	16A, SPN Weatherproof type Isolator	No.	1			
851	**MEDIUM VOLTAGE CABLES**					
852	Supply, laying, termination, tagging, testing and commissioning of following size 15KV voltage grade Aluminum conductor, multi core M.V Cable including all required accessories in already laid raceway / cable trench, including all accessories lugs, cable gland, cable ID marker etc. Complete in all respects, as per drawing and specifications and to the entire satisfaction of the engineer and employer. Note: Contractor is advised to confirm the actual lengths as per site conditions before commencement of work / ordering of cables.					
853	3C, 300 Sq.mm AL/XLPE/SWA/PVC, 15kV Cable (from IESCO MV Panel to Client MV Panel and to Transformers)	Rm.	100			
854	Supply, installation, testing and commissioning of following size MV Indoor Termination Kits, including all installation and termination accessories, HT tape, Bi-Metallic Cable Lugs etc. Complete in all respects, as per drawings and specifications.					
855	MV Indoor Termination kit for 15kV 3 Core, 300 Sq.mm AL/XLPE/SWA/PVC cable	No.	10			
856	**BUSWAYS**					
857	Supply, installation, testing and commissioning of following sizes Compact Cast Resin Aluminium Busways TPN+E (4 Bar) including all components and fixing accessories such as couplers, Plug-in units, Tap Off Boxes with interlocking mechanism & breakers, Flanged end, Flexible conductors, Elbows (Vertical and Horizontal), copper link pads (termination to Transformer), ends enclosure, end feed unit, center feed units, spring hangers, terminations, clamps etc. required for completion of work as per description, drawings and standards. Complete in all respects including testing at factory Permisses expenditure as mentioned in Clause 8 of specifi provision (specification). Any mechanical arrangements as per site conditions is also included in this scope. (for Substation)					
858	2500 Amp TPN+E BTD					
859	2500 Amp TPN+E Aluminum Busways, IP-54	Rm.	42			
860	2500 Amp TPN+E Terminal Element, IP-55 (for Panel Connection)	No.	6			
861	2500 Amp TPN+E ATR Element, IP-55 (for Trafo Connection)	No.	3			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
862	2500 Amp TPN+E Breaded Tin Copper Flexible Busbar Connection (Length <=600mm)	Set	9			
863	2500 Amp TPN+E Flatwise Elbow, IP-55	No.	15			
864	Fixing Brackets Accessories	No.	14			
865	Supply, installation, testing and commissioning of following sizes Compact Cast Resin Aluminium Busways TPN+E (4 Bar) including all components and fixing accessories such as couplers, Plug-in units, Tap Off Boxes with interlocking mechanism & breakers, Flanged end, Flexible conductors, Elbows (Vertical and Horizontal), copper link pads, ends enclosure, end feed unit, center feed units, spring hangers, terminations, clamps etc. required for completion of work as per description, drawings and standards. Complete in all respects including testing at factory Permisses expenditure as mentioned in Clause 8 of specifi provision (specification). Any mechanical arrangements as per site conditions is also included in this scope. (for Riser)					
866	2500 Amp TPN+E BTD					
867	2500 Amp TPN+E Aluminum Busways, IP-54	Rm.	369			
868	2500 Amp TPN+E Terminal Element, IP-55 (for Panel Connection)	No.	3			
869	2500 Amp TPN+E Breaded Tin Copper Flexible Busbar Connection (Length <=600mm)	Set	3			
870	2500 Amp TPN+E Flatwise Elbow, IP-55	No.	15			
871	Fixing Brackets Accessories	No.	123			
872	Supply, installation, testing and commissioning of following sizes Tap Off Units as per SLD, drawings and specifications, including circuit breakers (MCB / MCCB), all mounting and installation accessories as per description, drawings, standards and specifications. Complete in all respects.					
873	Tap Off units, 800A TP MCCB (65kA), 3P+N+E, IP55	No.	1			
874	Tap Off units, 630A TP MCCB (65kA), 3P+N+E, IP55	No.	1			
875	Tap Off units, 200A TP MCCB (50kA), 3P+N+E, IP55	No.	1			
876	Tap Off units, 160A TP MCCB (35kA), 3P+N+E, IP55	No.	12			
877	Tap Off units, 125A TP MCCB (35kA), 3P+N+E, IP55	No.	3			
878	Tap Off units, 100A TP MCCB (35kA), 3P+N+E, IP55	No.	4			
879	Tap Off units, 80A TP MCCB (35kA), 3P+N+E, IP55	No.	1			
880	Tap Off units, 63A TP MCCB (35kA), 3P+N+E, IP55	No.	3			
881	Note: 1) Contractor is advised to confirm the running lengths, quantities and termination as per site conditions before commencement of work. 2) Cables for connection between Panel & CFU and Busway & CFU is also included in the Contractor's scope of work. 3) Busway Length will not be measured end to end. Elbow, Flange, Tee, Cable Feed Units are to be subtracted from straight length. 4) The Bidder shall provide the complete Technical Literature for the system offered.					
882	**LOW VOLTAGE CABLES & WIRES**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
883	Supply, laying, termination, tagging, testing and commissioning of following size copper conductor multi core / single core, Cu/PVC, Cu/XLPE/PVC, unarmoured, 600/1000V, 450/750V or 300/500V voltage grade copper cable in already laid PVC conduit / cable tray / trench including all accessories lugs, cable gland etc. as per drawings and specification, complete in all respect. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.					
884	4 Core, Cu/XLPE/PVC Cable (600/1000V)				1	
885	4 Core, 400 Sq.mm Cu/XLPE/PVC	Rm.	5		1	
886	4 Core, 240 Sq.mm Cu/XLPE/PVC	Rm.	85		2	
887	4 Core, 185 Sq.mm Cu/XLPE/PVC	Rm.	60		3	
888	4 Core, 150 Sq.mm Cu/XLPE/PVC	Rm.	10		4	
889	4 Core, 120 Sq.mm Cu/XLPE/PVC	Rm.	55		5	
890	4 Core, 95 Sq.mm Cu/XLPE/PVC	Rm.	85		6	
891	4 Core, 50 Sq.mm Cu/XLPE/PVC	Rm.	10		7	
892	4 Core, 35 Sq.mm Cu/XLPE/PVC	Rm.	65		8	
893	4 Core, 25 Sq.mm Cu/XLPE/PVC	Rm.	15		9	
894	4 Core, 16 Sq.mm Cu/XLPE/PVC	Rm.	555		10	
895	4 Core, 10 Sq.mm Cu/XLPE/PVC	Rm.	745		11	
896	4 Core, 6 Sq.mm Cu/XLPE/PVC	Rm.	680		12	
897	4 Core, 4 Sq.mm Cu/XLPE/PVC	Rm.	360		13	
898	1 Core, Cu/PVC Cable (600/1000V)					
899	1 Core, 6 Sq.mm Cu/PVC	Rm.	300		14	
900	1 Core, 4 Sq.mm Cu/PVC	Rm.	450		15	
901	1 Core, Cu/PVC Cable as ECC (600/1000V)					
902	1 Core, 185 Sq.mm Cu/PVC as ECC	Rm.	35		16	
903	1 Core, 120 Sq.mm Cu/PVC as ECC	Rm.	75		17	
904	1 Core, 70 Sq.mm Cu/PVC as ECC	Rm.	65		18	
905	1 Core, 50 Sq.mm Cu/PVC as ECC	Rm.	85		19	
906	1 Core, 25 Sq.mm Cu/PVC as ECC	Rm.	30		20	
907	1 Core, 16 Sq.mm Cu/PVC as ECC	Rm.	615		21	
908	1 Core, 10 Sq.mm Cu/PVC as ECC	Rm.	745		22	
909	1 Core, 6 Sq.mm Cu/PVC as ECC	Rm.	680		23	
910	1 Core, 4 Sq.mm Cu/PVC as ECC	Rm.	360		24	
911	**CONDUITS & PIPES**					
912	Supply and laying of following size inner dia PVC / uPVC Class-D pipe / Flexible PVC Conduit including all accessories, as per drawings and specification etc., complete in all respect.					
913	25 mm dia PVC Conduit	Rm.	10			
914	38 mm dia PVC Conduit	Rm.	10			
915	50 mm dia PVC Conduit	Rm.	10			
916	75 mm dia PVC Conduit	Rm.	10			
917	100 mm dia PVC Conduit	Rm.	10			

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
918	38 mm dia uPVC Conduit (Class-D)	Rm.	10			
919	50 mm dia uPVC Conduit (Class-D)	Rm.	10			
920	25 mm dia Flexible PVC Conduit	Rm.	10			
921	Supply and laying of following size inner dia UPVC Pipe Class-D for Power Cable, buried in ground / under roads / under floor as per specification, including excavation for laying of pipe, bricks, warning tape and backfilling with new and fresh sand (6" under and 6" above pipe) etc. (whereever required), as shown on the specifications and drawings, complete in all respect.					
922	100mm dia uPVC Pipe (Class-D)	Rm.	10			
923	Supply and laying of following size inner dia G.I Pipe as race ways with all accessories surface / recessed on wall / column / under floor, as per drawings and specification etc., complete in all respect.					
924	25 mm dia G.I. Pipe	Rm.	30			
925	32 mm dia G.I. Pipe	Rm.	20			
926	50 mm dia G.I. Pipe	Rm.	10			
927	Supply and installation of following Pull Boxes with all installation accessories, as per specifications, drawings and approved brands, complete in all respect.					
928	300 mm x 300 mm	No.	5			
929	150 mm x 150 mm	No.	5			
930	Providing and Construction of Manhole Size 3'-0" x 3'-0" x 3'-0" deep, 6"thick, concrete 1:2:4 ratio with round heavy duty cast iron cover, 100% water proof, as per drawings and specification etc., complete in all respect. (For Electrical cables)	No.	1			
931	**WIRING ACCESSORIES**					
932	Supply, installation, testing and commissioning of following 10/13/15/20A, gang type switches, Dimmer Switches, Sockets including 16 SWG Sheet Steel powder coated back boxes with earth terminal, recessed in wall, with all accessories as per specification, complete in all respects.					
933	One Gang Switch 10A	No.	191			
934	One Gang 2-Way Switch 10A	No.	5			
935	Two Gang Switch 10A	No.	139			
936	Two Gang 2-Way Switch 10A	No.	58			
937	Three Gang Switch 10A	No.	144			
938	Four Gang Switch 10A	No.	219			
939	Five Gang Switch 10A	No.	3			
940	13A, International Switch Socket Outlet	No.	767			
941	13A, International Switch Socket Outlet (Weatherproof)	No.	61			
942	13A, 3-Pin Flat Simplex Switch Socket Outlet	No.	943			
943	13A, 3-Pin Flat Duplex Switch Socket Outlet	No.	929			
944	13A, Spur Socket Outlet	No.	331			
945	15A, 3-Pin Switch Socket Outlet	No.	54			
946	20A, Flux Outlet	No.	55			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
947	20A, Double Pole Switch with Neon	No.	55			
948	16A, 3-Pin Industrial socket with Plug top and Angle Iron	No.	11			
949	16A, 5-Pin Industrial socket with Plug top and Angle Iron	No.	27			
950	32A, 5-Pin Industrial socket with Plug top and Angle Iron	No.	14			
951	Supply, installation, testing and commissioning of Floor Box (imported), 14 SWG Sheet Steel with all accessories, as per drawings, specifications and site requirements, complete in all respect. Note: Excluded of all Sockets and Face plates.	No.	723			
952	**LIGHT FIXTURES**					
953	Supply, installation, testing and commissioning of following Light Fixtures complete with starters, Electronic ballast (mention otherwise), lamps, drivers,mounting accessories etc., complete in all respects. Lighting fixtures Sample must be submitted to consultant for approval, (For complete detail references of Light Fixtures, please refer to Light Fixture Schedules).					
954	Ceiling Recessed 1x11 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	296		1	
955	Ceiling Recessed 1x45 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	42			
956	Ceiling Recessed 1x12 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	846			
957	Ceiling Recessed 1x20 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	413			
958	Ceiling Surface 1x22 W LED Down Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	485			
959	Ceiling Surface 1x20 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	75			
960	Ceiling Suspended 1x22 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	18			
961	Ceiling Recessed 1x17 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	181			
962	Wall/Surface Mounted 1x12 W LED Mirror Light Fixture, (IP-44), Pf>0.9,4000k	No.	18			
963	Ceiling Suspended 2x12 W LED Down Light Fixture, Aluminum Profile Housing (IP-44), Pf>0.9,4000k	No.	728			
964	Ceiling Recessed 1x12 W LED Track Light Fixture, (IP-20)	No.	400			
965	Ceiling Recessed 1x18 W LED Track Light Fixture, (IP-20)	No.	708			
966	Ceiling Surface 1x40 W LED 4'x1' Batten Light Fixture, HRS @25°C CRI≥, UGR≤24 (IP-65), Pf>0.9,4000k	No.	386			
967	Ceiling Recessed 1x40 W LED Batten Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	516			
968	Ceiling Surface 1x40 W LED Batten Light Fixture, Polycarbonate Painted Steel Housing, (IP-20)	No.	4			
969	Ceiling Surface 1x24 W LED 1200mm Continuous Batten Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9, 4000k	No.	166			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
970	Ceiling Suspended 1x18 W LED Keen Track Light Fixture, (IP-20)	No.	390			
971	Ceiling Coved 18 W/m LED Strip Light, (IP-65)	Rm.	5627			
972	Ramp Recessed 1x4 W LED Ramp Light Fixture, (IP-67)	No.	119			
973	Wall/Surface Mounted 1x20 W LED Wall Light Fixture Polycarbonate Housing, (IP-20), Pf>0.9,3000k	No.	168			
974	Wall/Surface Mounted 1x6 W LED Wall Light Fixture Decorative Type, (IP-64)	No.	29			
975	Floor Mounted 1x7 W LED Spike Planter Light Fixture Polycarbonate Housing, (IP-65), Pf>0.9,3000k	No.	16			
976	Ceiling Suspended 1x96 W LED Ring Pendent Light Fixture, Aluminum Profile Housing (IP-20), Pf>0.9,4000k	No.	31			
977	Wall/Surface Mounted 1x200 W LED Flood Light Fixture Type, (IP-66)	No.	9			
978	Floor Mounted 1x12 W LED Floor Light Fixture @25°C CRI≥, UGR≤24 (P.F 0.9)	No.	53			
979	1x9 W LED Bollard Light Fixture, (IP-65)	No.	22			
980	Façade Lighting					
981	Philips BGC401, 3000K, 1150 lm, 14W, IP66, 1010 T, ON-OFF Control Type	Rm.	1100			
982	Philips BVP353, 72 LED, RGBWW, 220V, L57 10, DMX Control Type	No.	10			
983	Philips BBP343, G2, 3000K, 24V, 18W, 10 DEGREE, ON-OFF Control Type	No.	4			
984	Philips BVP355, 216 LED, RGBWW, 220V, L57 10, DMX Control Type	No.	7			
985	Philips BVP353, 24 LED, RGBWW, 220V, L24 15, DMX Control Type	No.	1			
986	Philips BGP150, G2, 470 lm, 6W, 36 DEGREE, ON-OFF Control Type	No.	40			
987	**WIRING FOR LIGHTS, FANS & SOCKETS**					
988	Supply, laying, tagging, testing and commissioning of Circuit wiring from DB to Switchboard including wiring between switch on the same circuit with 2x2.5 sq.mm. + 1x2.5 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc., as per drawing and specification, complete in all respect.	No.	335			
989	Supply, laying, tagging, testing and commissioning of Point wiring for light/fan point from Switch Board to Light/fan Point with 3x1.5 sq.mm. single core copper conductor PVC insulated wires in already installed 20mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc. as per drawing and specification, complete in all respect.	No.	1908			
990	Supply, laying, tagging, testing and commissioning of Point wiring from Light/fan point to Light/fan point with 3x1.5 sq.mm. single core copper conductor PVC insulated wires in already installed 20mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc. as per drawing and specification, complete in all respect.	No.	2040			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
991	Supply, laying, tagging, testing and commissioning of Circuit wiring from DB to Ist. light point with 2x2.5 sq.mm. + 1x2.5 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc., as per drawing and specification, complete in all respect.	No.	199			
992	Supply, laying, tagging, testing and commissioning of wiring from Light point to Light Point with 2x2.5 sq.mm. + 1x2.5 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling etc., including with all conduit accessories, back boxes etc., as per drawing and specification, complete in all respect.	No.	1972			
993	Supply, laying, tagging, testing and commissioning of wiring for 13/15A Socket / Spur outlet with 2x4 sq.mm + 1x4 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling, under floor etc, including with all conduit accessories, back boxes etc. as per drawing and specification, complete in all respect.					
994	DB to Socket outlet	No.	1175			
995	Socket outlet to Socket outlet	No.	2020			
996	Supply, laying, tagging, termination, testing and commissioning of wiring for 16A Industrial Socket with 2x4 sq.mm + 1x4 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling, under floor etc., including with all conduit accessories, as per drawing and specification, complete in all respect.	No.	11			
997	Supply, laying, tagging, termination, testing and commissioning of wiring for 20A SPN Isolator with 2x4 sq.mm + 1x4 sq.mm as ECC single core copper conductor PVC insulated wires in already installed 25mm dia PVC conduit, surface / recessed in wall, column, ceiling, under floor etc., including with all conduit accessories, as per drawing and specification, complete in all respect.	No.	125			
998	**CABLE TRAYS**					
999	Supply, fabricating, erecting, fixing and installing of following size of base perforated Cable Tray Complete with covers where indicated on the drawings/specifications. Tray thickness as per the specification based on tray width. Including Manufacturer's standard supports and fixing accessories. complete with factory-made fittings and support system. and necessary required hardware etc. Complete in all respect as shown in drawings and specification or as directed by the Engineer.					
1000	900 mm x 100 mm for Power Cables	Rm.	20			
1001	600 mm x 100 mm for Power Cables	Rm.	230			
1002	450 mm x 100 mm for Power Cables	Rm.	910			
1003	300 mm x 100 mm for Power Cables	Rm.	1,340			
1004	250 mm x 100 mm for Power Cables	Rm.	170			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1005	150 mm x 100 mm for Power Cables	Rm.	1,440			
1006	100 mm x 50 mm for Power Cables	Rm.	1,390			
1007	**LIGHTNING PROTECTION SYSTEM**					
1008	Supply, installation, testing and commissioning of 25mm x 3mm Tinned Copper Tape to be run on roof surface, as required and shown on drawings including all fixing accessories etc., as per specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	40			
1009	Supply, installation, testing and commissioning of Early Streamer Emission (ESE) Air Terminal mounted on 5.5 meter elevation mast, as per drawing, complete in all respect and having following specifications: * Efficiency: 60 micro seconds * Lightning current withstanding test (10/350µs):100 kA * ESE Central Rod: Nickel Plated Copper * Metal Housing: Stainless Steel 316L * Protection Radius: 58 meter at 5.5 meter height	No.	1			
1010	Supply and installation of 5.5 meter high elevation mast consist of mounting bracket for installation and fixing of ESE Air Terminal, as per drawing, specification and site requirements, complete in all respect.	No.	1			
1011	Supply and installation of pyramid holdfasts / studs filled with cement for holding and supporting the flat tape conductor, as per drawing, specification and site requirements, complete in all respect.	No.	12			
1012	Supply and installation of Lightning Flash Counter including control cables from ESE Air Terminal to Flash Counter, as per drawing, specification and site requirement necessary for the system, complete in all respect.	No.	1			
1013	Supply and installation of Test Clamp and Guard Tube 2m in length, as per drawing, specification, and site requirement necessary for the functioning of the system, complete in all respect.	Job.	2			
1014	Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm PVC insulated Cu. Conductor cable in 38 mm dia uPVC conduit run with elevation of the building from Roof Copper Tape network to Test Link at Basement-4 floor in 38mm dia UPVC conduit embelded in columns including clad welding, all accessories lugs, cable glands, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	240			
1015	Testing and commissioning of the complete Lightning Protection System, including verification of earth resistance in accordance with the specifications, complete in all respects.	Job.	1			
1016	**EARTHING SYSTEM**					
1017	Supply, installation, testing and commissioning of following items for complete Earthing system, complete with all materials necessary to achieve the specified earth resistance, other all required materials and connecting accessories, boring, labor, tools, transportation etc., as per drawings and specifications, complete in all respects with detailed test reports.					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1018	Earth pit with Rod type earth electrode, 3/4" dia and 9 Ft. long copper bonded rod to achieve the earthing resistivity as mentioned in drawings.	No.	4			
1019	Supply, installation, testing and commissioning of Copper Earth Bar 475 mm x 90 mm x 96 mm with single disconnecting link for earthing system as per drawings and instruction of consultant, including all mounting accessories etc., complete in all respect.	No.	7			
1020	Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm Bare Copper Conductor from Earth pit to Earth pit as earth continuity conductor (ECC) installed under floor including exothermic (Cadweld) welding or approved jointing method, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	325			
1021	Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm PVC insulated Cu. Conductor cable in already installed cable tray / already installed 38 mm dia uPVC conduit, from Earth pit to Earth Bar / Earth pit and to equipments as earth continuity conductor (ECC) including exothermic (Cadweld) welding or approved jointing method, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.Supply, laying, termination, tagging, testing and commissioning of 70 Sq.mm PVC insulated Cu. Conductor cable in already installed cable tray / already installed 38 mm dia uPVC conduit, from Earth pit to Earth Bar / Earth pit and to equipments as earth continuity conductor (ECC) including exothermic (Cadweld) welding or approved jointing method, all fixing accessories etc., as per drawing, specification and site requirement necessary for the functioning of the system, complete in all respect.	Rm.	730			
1022	**ELV WORKS**					
1023	**VOICE & DATA COMMUNICATION SYSTEMS (Passive Equipment Only)**					
1024	Supply, installation, testing and commissioning of following Data / Voice items on LSOH solution, as per the single line diagram and specification, complete in all respect.					
1025	Supply, installation, testing and commissioning of following Wall / Floor mounted, Data / Voice Cabinets for patch panel, Fiber panels, adapter, PDU's, Fans and space for active switches as it may require to complete the entire passive and active network as per the single line diagram, drawings and specifications, complete in all respect.					
1026	42U Data Rack with PDU's	No.	16			
1027	27U Data Rack with PDU's	No.	10			
1028	9U Data Rack with PDU's	No.	3			
1029	Supply, installation, testing and commissioning of Dual RJ-45, Cat-6 outlet for Voice & Data with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	783			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1030	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for TV with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	36			
1031	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Projector with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	2			
1032	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Wifi with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	165			
1033	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for Data with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	166			
1034	Supply, installation, testing and commissioning of Single RJ-45, Cat-6 outlet for CCTV system with I/O - shutter type and 16 SWG back box including tagging,as per drawing and specification, complete in all respect.	No.	255			
1035	Supply, laying, termination, testing and commissioning of Cat-6, 4 pair cable on LSOH solution for Single RJ-45 outlet (for Data, Voice, TV, Projector & Wifi systems) in already installed 25mm dia PVC conduit concealed / surface from each outlet to IDF rack, including tagging and piping with all necessary accessories, complete in all respect.	Rm.	57480			
1036	Supply, installing, testing and commissioning of 24 port Fiber Patch Panel fully loaded with pigtails, rear cable manager etc., as per drawing and specification, complete in all respect.	No.	30			
1037	Supply, testing and commissioning of 24 port shutter type Cat 6, RJ 45 UTP Patch Panel fully loaded with tool less jacks and rear cable manager, as per drawing and specification, complete in all respect.	No.	95			
1038	Supply, installing, testing and commissioning of 19" front/rear (as required) cable organizer between patch panels and active equipment to provide patch cable management including with all necessary accessories, as per drawing & specification, complete in all respect.	No.	122			
1039	Supply, installation, testing and commissioning of Cat-6 UTP (RJ-45 to RJ-45 on LSOH solution) for the above Patch Panels including with all necessary accessories, as per drawing and specification, complete in all respect. (As per required quantity)					
1040	CAT-6 (1m) Long Patch Cord	No.	1660			
1041	CAT-6 (3m) Long Patch Cord	No.	1660			
1042	Supply, installation, testing and commissioning of following Fiber Optic Patch Cords on LSOH solution (certified) of specified color at both ends for communication with SC/LC/APC connector. (As per requirement depends on active part)					
1043	3m Long Patch Cord	No.	15			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1044	Supply, installation, testing and commissioning of following 19" Tag blocks on LSOH solution in Data rack, as per drawings and specifications, complete in all respect.					
1045	1x50 Pair IDC Block 19" type	No.	14			
1046	1x25 Pair IDC Block 19" type	No.	16			
1047	Supply, laying, termination, testing and commissioning of 8C, Multi Mode Fiber Optic Cable from Server Rack to each floor racks in already installed cable tray / conduit, as shown in drawings including termination and tagging at both ends, as per standard specifications with all termination accessories up to entire satisfaction of IT Engineer. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.	Rm.	2250			
1048	Supply, laying, termination, testing and commissioning of 48C, Single Mode Tight Buffered Fiber Optic Cable to Server Rack in already installed cable tray / conduit, as shown in drawings including termination and tagging at both ends, as per standard specifications with all termination accessories up to entire satisfaction of IT Engineer. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.	Rm.	50			
1049	Supply, laying, termination, testing and commissioning of 25 Pair Cat-5E Copper Jelly filled Cable from Server Rack to IDF racks in already installed cable tray / conduit, as shown in drawings including termination & tagging at both ends, as per standard specifications with all termination accessories up to entire satisfaction of IT Engineer. Note: Contractor is advised to confirm the cable running length before commencement of work and termination as per site requirements.	Rm.	3900			
1050	Installation, testing and commissioning by Manufacturer Authorized Agent / Dealer and handing over complete Voice & Data System to Owner with Providing Training voice data fuke & OTDR Testing,as build drawing,Rack layouts and certification's Principal, complete equipment's Manual and Warranty Documents to Owners representative.	Job.	1			
1051	**ADDRESSABLE FIRE ALARM SYSTEM**					
1052	Supply, installation, testing & commissioning of following items for Addressable Fire Alarm System including all communication, power and controlling accessories, housings, mounting brackets, suspension rods etc. required for completion of the system, as per drawing and specification. Complete in all respect.					
1053	Supply, laying, tagging, termination, testing and commissioning of wiring for complete Fire Alarm System with 2C-1.5 Sq.mm shielded, twisted pair Fire Resistant Cable (2 hrs. rated) (FP-200 gold Equivalent) in already installed 25mm dia PVC conduit concealed, (M.S conduit for surface) etc., including any wiring between fire alarm control panel and other's systems control panel's etc. Complete in all respect.	Rm.	24600			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1054	Supply, installation, testing and commissioning of Addressable Photoelectric Smoke Detector with base and back box, as per drawing and specification, complete in all respect.	No.	1198			
1055	Supply, installation, testing and commissioning of Addressable Photoelectric Heat Detector with base and back box, as per drawing and specification, complete in all respect.	No.	238			
1056	Supply, Installation, Testing and Commissioning of Addressable Dual Action Manual Pull Station / Call Point with base and back box, as per drawing and specification, complete in all respect.	No.	224			
1057	Supply, Installation, Testing and Commissioning of Addressable Dual Action Manual Pull Station / Call Point (Weatherproof type) with base and back box, as per drawing and specification, complete in all respect.	No.	74			
1058	Supply, Installation, Testing and Commissioning of Addressable Sounder with flasher / Strobe with base and back box, as per drawing and specification, complete in all respect.	No.	100			
1059	Supply, Installation, Testing and Commissioning of Addressable Sounder with flasher / Strobe (Weatherproof type) with base and back box, as per drawing and specification, complete in all respect.	No.	122			
1060	Supply, Installation, Testing and Commissioning of Beam Detector (Transmitter & Receiver complete set) with base and back box, complete in all respect.	No.	2			
1061	Supply, Installation, Testing and Commissioning of Input / Output Module (Zone Control Module), including with all required equipments and cabling, complete in all respect.	No.	372			
1062	Supply, Installation, Testing and Commissioning of 10 Loop Analogue Intelligent Addressable Main Fire Alarm Control Panel (MFACP) including all necessary accessories,including Backnet Card for Interfacing of Panels to BMS with soft Programming and integration with EVAC System, required FR cable from panel to GCC, identification, tagging etc. and 3Hrs battery back up as per drawing and specification, complete in all respect.	No.	2			
1063	Supply, Installation, Testing and Commissioning of 4 Loop Analogue Intelligent Addressable Fire Alarm Control Panel (FACP) including all necessary accessories, including Backnet Card for Interfacing of Panels to BMS with soft programming and integration, identification tagging etc. and 3Hrs battery back up, as per drawing and specification, complete in all respect.	No.	2			
1064	Supply, Installation, Testing and Commissioning of Addressable Fire Alarm Repeater Panel including all necessary accessories, including Backnet Card for Interfacing of Panels to BMS with soft programming and integration, identification tagging etc. and 3Hrs battery back up, as per drawing and specification, complete in all respect.	No.	2			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1065	Supply, laying, tagging, termination, testing and commissioning of wiring from Main FACP to FACP and FARP with 2x1.5 sq.mm FP200 Class A cable with 3 hours Fire rating Cable in already installed 25mm dia UPVC conduit buried / surface as per drawings with all conduit accessories, junction boxes, pull boxes etc. complete in all respects as per drawings and specifications.	Rm.	400			
1066	Supply, Installation, Testing and Commissioning of Backnet Card For Interfacing of Panels to BMS with soft programming and integrationm as per drawing and specification, complete in all respect.	Job	1			
1067	Supply, Installation, Testing and Commissioning of Graphic Command Center as per drawing and specification, complete in all respect.	Job	1			
1068	Supply, installation, testing and commissioning of Monitor Module FM 200, as per drawing and specification, complete in all respect.	No.	3			
1069	Supply, Installation, Testing and Commissioning of Distributed Panel, Dual Channel, 100W, complete in all respect.	No.	1			
1070	Supply, Installation, Testing and Commissioning of Fire Phone cabinet including Handset, complete in all respect.	No.	1			
1071	Supply, Installation, Testing and Commissioning of Fire Phone jacks with plates, complete in all respect as per specification and drawings.	No.	120			
1072	Supply, Installation, Testing and Commissioning of Fire Phone cabling with 2C-1.5 Sqmm FP200 2H Fire Resistant cable in already installed 25mm dia PVC conduit concealed, complete in all respects as per drawings and specifications.	Rm.	480			
1073	Installation, Testing & Commissioning, Software, Programming by Manufacturer Authorized Agent / Dealer, License Fee and handing over complete Fire Alarm system & Fire Telephone system to owner with providing training, SOP, cause and effect sheet complete equipment's manual and warranty documents to Owner's Representative.	Job	1			
1074	**PUBLIC ADDRESS SYSTEM**					
1075	Supply, installation, testing and commissioning of following items for Public Address System, described below including all accessories, mounting brackets, installation accessories, wiring etc. as per drawings and specifications, complete in all respect.					
1076	Supply, laying, tagging, termination, testing and commissioning of wiring for complete Public Address System with 2C-1.5 Sq.mm Fire Resistant Cable (2 hrs. rated)(FP-200 gold Equivalent) in already installed 25mm dia PVC conduit, concealed (M.S conduit for surface.) etc. as per drawings and specifications, complete in all respect.	Rm.	4815			
1077	Providing, Wiring and Testing of PA Microphone points with Microphone cable in already installed 25mm dia PVC conduit, recessed / surface in wall and ceiling, complete in all respects.	Rm.	300			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1078	Supply, installation, testing and commissioning of Public Address System complete with all connecting accessories comprising of the following equipment with complete connecting accessories, as per drawing and specification, complete in all respect.					
1079	IP Based System Manager Zone Modular type with voice Alarm controller , EN54 compliant, 20 monitored speaker outputs, 4x500W Class-D Amplifier module, 4 Audio Input Line/Mic, 10 contact inputs, Stand by Amplifier Slot, Matrix EN54 approved, 4 general balanced audio inputs (microphone/line level) and 2 inputs for upto 8 remote microphones including upto two emergency microphones, Frequency range: 40 – 16.000 Hz, Signal-to-noise ratio: > 60 dB (A-rated), THD: < 1% at, Operating voltage: 31 VDC, Voltage range: 20 VDC to 34 VDC, allows a simultaneous broadcast of two different audio signals per frame to achieve an interruption-free BGM operation during a paging, built-in Network Adapter, complete with battery backup, as per drawing and specification, complete in all respects.	No.	1			
1080	IP Based System Manager Zone Modular type with voice Alarm controller , EN54 compliant, 20 monitored speaker outputs, 2x500W Class-D Amplifier module, 4 Audio Input Line/Mic, 10 contact inputs, Stand by Amplifier Slot, Matrix EN54 approved, 4 general balanced audio inputs (microphone/line level) and 2 inputs for upto 8 remote microphones including upto two emergency microphones, Frequency range: 40 – 16.000 Hz, Signal-to-noise ratio: > 60 dB (A-rated), THD: < 1% at, Operating voltage: 31 VDC, Voltage range: 20 VDC to 34 VDC, allows a simultaneous broadcast of two different audio signals per frame to achieve an interruption-free BGM operation during a paging, built-in Network Adapter, complete with battery backup, as per drawing and specification, complete in all respects.	No.	1			
1081	Power supply manager with Battery Backup, RJ45 female connector for connecting the system and cascade connection with shielded twisted pair straight cable and with indications battery check, charging circuit failure, battery failure (EN54 compliant), as per drawing and specification, complete in all respects.	No.	2			
1082	Zone Selection Remote Microphone with 16 programable Keys and fault monitoring, EN54 compliant, as per drawings and specifications, complete in all respect.	No.	2			
1083	Providing & Connecting of Inter Connects cables etc.	No.	2			
1084	27U Rack Cabinet with Perforated Door to accommodate above equipments, located at Security room, as per drawing and specification, complete in all respects.	No.	2			
1085	12U Rack Cabinet with Perforated Door to accommodate above equipments, located at Security room, as per drawing and specification, complete in all respects.	No.	3			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1086	Supply, installation, testing and commissioning of following type Speakers of Architect Approved color with all mounting and installation accessories, steel wire and holding arrangements, as per drawing and specification, complete in all respects.					
1087	6W Ceiling / Surface mounted Speakers with fire dome and Tapping Transformers (1,1.5,3,4.5,6W), EN54 Compliant.	No.	304			
1088	30W Horn Type Speaker IP-65 H, Circular 20", En 54 -24 Compliant, IP65.	No.	9			
1089	30W Wall mounted Premium Sound Cabinet loudspeaker with Tapping, ABS Enclosure IP65.	No.	24			
1090	30W Hanging Type Pendent Speaker IP65 (EN 54-24) Ral Base ReflexType Black Color.	No.	11			
1091	Supply, installing, testing and commissioning of 150W room Mixer Amplifier for Prayer Area, as per drawing and specifications, complete in all respect.	No.	1			
1092	Supply, installing, testing and commissioning of 150W room Mixer Amplifier for Board Room, as per drawing and specifications, complete in all respect.	No.	1			
1093	Supply, installing, testing and commissioning of 240W room Mixer Amplifier for Multipurpose, as per drawing and specifications, complete in all respect.	No.	1			
1094	Supply, installation, testing and commissioning of Push To Talk Microphone, as per drawing and specification, complete in all respects.	No.	2			
1095	Supply, installation, testing and commissioning of Color Microphone for Imam, as per drawing and specification, complete in all respects.	No.	1			
1096	Supply, installation, testing and commissioning of Microphone with boom for Azan, as per drawing and specification, complete in all respects.	No.	1			
1097	Installation, testing and commissioning, Programming by Manufacturer Authorized Agent / Dealer and handing over complete Public Address / Voice Alarm System to Owner with providing training, SOP, complete equipment's manual and warranty documents to Owners representative.	Job	1			
1098	**CENTRAL BATTERY SYSTEM**					
1099	Supply, installation, testing and commissioning of following items for Central Battery System including all communication, power and controlling accessories, housings, mounting brackets, suspension rods etc. required for completion of the system, as per drawing and specification. Complete in all respect.					
1100	Central Battery System (CBS) including Battery bank with min 90 min battery backup of full load and submit calculations for justification of providing load, built-in charger, battery cabinet with Sealed Lead acid batteries, Interface between CBS to BMS / Fire Alarm over BACNET Protocol, interface card, identification tagging etc. as per drawings and specification, complete in all respect.	Job	3			
1101	Central Monitoring System with Software including latest PC, all necessary accessories, programming and integration with building management system over BACNET Protocol, identification tagging etc. as per drawing and specification, complete in all respect.	Job	3			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1102	Supply, installation, testing and commissioning of following Standalone central battery system based Emergency / Exit lights with all drivers and accessories, as per drawing and specification, complete in all respect.					
1103	7W Emergency LED light (Non-maintained type), Ceiling / Surface mounted, IP-20 rated, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	626			
1104	7W Emergency LED light (Non-maintained type), Wall mounted, IP-20 rated, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	85			
1105	7W Emergency LED light (Non-maintained type), Ceiling / Recessed mounted, IP-65 rated, EN Listed, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	12			
1106	7W Emergency LED light (Non-maintained type), Wall mounted, IP-65 rated, EN Listed, Standalone CBS based, EN Listed, as per specification and drawing, complete in all respect.	No.	38			
1107	8W, Exit light (maintained type), Standalone CBS based, 24m viewing, Directional Pandent, IP-65 rated, UL 924 Listed, as per specification and drawing, complete in all respect.	No.	249			
1108	Supply, installation, testing and commissioning of Circuit Wiring from CBS to EM/EXIT Lights and interface each panel with 2C, 1.5 Sq.mm 2 Hours rated Fire rated cable in already installed 25mm dia PVC conduit with all accessories as per drawing & specification, complete in all respect. Actual length at site shall be paid. Note: Contractor is advised to confirm the actual cable running lengths as per site conditions before commencement of work/ordering of cables.	Rm.	9112			
1109	Supply, installation, testing and commissioning of Core i7 Work Station, 6/7th Generation, complete with Dual VGA Card & Licensed windows 10, as per drawing and specifications, complete in all respect.	No.	3			
1110	Testing, Commissioning, Software, Programming by Manufacturer Authorized Agent / Dealer and handing over complete Central Battery System to owner with providing training, SOP, cause and effect sheet complete equipment's manual and warranty documents to Owner's Representative.	Job.	1			
1111	**CONDUITS & PIPES**					
1112	Supply and laying of following size inner dia PVC / uPVC Class-D pipe / Flexible PVC Conduit including all accessories, as per drawings and specification etc., complete in all respect.					
1113	25 mm dia PVC Conduit	Rm.	10			
1114	38 mm dia PVC Conduit	Rm.	10			
1115	50 mm dia PVC Conduit	Rm.	15			
1116	75 mm dia PVC Conduit	Rm.	10			
1117	100 mm dia PVC Conduit	Rm.	10			
1118	38 mm dia uPVC Conduit (Class-D)	Rm.	10			
1119	50 mm dia uPVC Conduit (Class-D)	Rm.	10			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1120	25 mm dia Flexible PVC Conduit	Rm.	10			
1121	Supply and laying of following size inner dia UPVC Pipe Class-D for Telecommunication Cables (copper / optic fiber), buried in ground / under roads / under floor as per specification, including excavation for laying of pipe, bricks, warning tape and backfilling with new and fresh sand (6" under and 6" above pipe) etc., (whereever required), as shown on the specifications and drawings, complete in all respect.					
1122	50mm dia uPVC Pipe (Class-D)	Rm.	10			
1123	Supply and laying of following size inner dia G.I Pipe as race ways with all accessories surface / recessed on wall / column / under floor, as per drawings and specification etc., complete in all respect.					
1124	25 mm dia G.I. Pipe	Rm.	30			
1125	32 mm dia G.I. Pipe	Rm.	20			
1126	Supply and installation of following Pull Boxes with all installation accessories, as per specifications, drawings and approved brands, complete in all respect.					
1127	300 mm x 150 mm	No.	5			
1128	150 mm x 150 mm	No.	5			
1129	Providing and Construction of Manhole Size 3'-0" x 3'-0" x 3'-0" deep, 6"thick, concrete 1:2:4 ratio with round heavy duty cast iron cover, 100% water proof, as per drawings and specification etc., complete in all respect. (For Electrical cables)	No.	1			
1130	**CABLE TRAYS**					
1131	Supply, fabricating, erecting, fixing and installing of following size of base perforated Cable Tray Complete with covers where indicated on the drawings/specifications. Tray thickness as per the specification based on tray width. Including Manufacturer's standard supports and fixing accessories. complete with factory-made fittings and support system. and necessary required hardware etc. Complete in all respect as shown in drawings and specification or as directed by the Engineer.					
1132	450 mm x 100 mm for ELV Cables	Rm.	470			
1133	300 mm x 100 mm for ELV Cables	Rm.	2600			
1134	100 mm x 100 mm for ELV Cables	Rm.	30			
1135	**PLUMBING WORKS**					
1136	**WATER SUPPLY:**					
1137	**PACKAGED PUMP SETS:**					
1138	Supply, Installation, testing & commissioning of below mentioned Packaged pump sets including pump foundation, Pressure vessel, control panel, wiring from panel to pumps, valves, piping, accessories, etc. from Suction header to Discharge header, as indicated on the drawing, as per specifications and Engineers approval.					
1139	Cold Water Booster Pump Set - 01 (Duplex with VFD) **Set: 1 Duty + 1 Support (35 GPM @ 80FT Head) each**	Nos.	1			
1140	Irrigation Booster Pump Set - 01 (Duplex) **Set: 1 Duty + 1 standby (60 GPM @ 100FT Head)**	Nos.	1			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1141	**COOLING TOWER MAKEUP WATER PUMP:**					
1142	Supply, Installation, testing & commissioning of below mentioned Packaged pump sets including pump foundation, Pressure vessel, control panel, wiring from panel to pumps, valves, piping, accessories, etc. from Suction header to Discharge header, as indicated on the drawing, as per specifications and Engineers approval.					
1143	Constant Speed Cooling tower Makeup Pump Set (1 Duty + 1 Standby) **Set: 1 Duty + 1 standby (40 GPM @ 50FT Head)**	Nos.	1			
1144	**TREATED WASTE WATER PUMP:**					
1145	Supply, Installation, testing & commissioning of below mentioned Packaged pump sets including pump foundation, Pressure vessel, control panel, wiring from panel to pumps, valves, piping, accessories, etc. from Suction header to Discharge header, as indicated on the drawing, as per specifications and Engineers approval.					
1146	Constant Speed Treated water transfer Pump Set (1 Duty + 1 Standby) **Flow = 200 GPM @ 430FT head**	Nos.	1			
1147	**ELECTRIC WATER HEATER:**					
1148	Providing and fixing of Ceiling hung electric Water heater of below mentioned capacity with all accessories, Thermostat, Drain Tank, inlet and outlet valves, Air Vent, Pressure relief valve, Air relief valves as indicated in the drawings, as per specifications and engineers approval					
1149	EWH -(Capacity 50 Litres)	Nos.	6			
1150	EWH -(Capacity 80 Litres)	Nos.	4			
1151	EWH -(Capacity 100 Litres)	Nos.	58			
1152	EWH -(Capacity 150 Litres)	Nos.	4			
1153	**COLD & HOT WATER PIPING:**					
1154	Supply, installation, testing and Commissioning of PPR PN - 20 Cold/Hot water pipes as per DIN 8077-8078 with molded fittings PN - 25 as per DIN 16962 of below mentioned Outer Diamaters, including pipe Hangers and supports, Anchors cutting, filling, testing/commissioning and all accessories like SS Unions, flanges, gaskets, nuts and bolts as indicated on the drawing, as per specifications and Engineers approval.					
1155	15mm dia	RFT.	70			
1156	20mm dia	RFT.	8,360			
1157	25mm dia	RFT.	1,210			
1158	32mm dia	RFT.	1,000			
1159	40mm dia	RFT.	400			
1160	50mm dia	RFT.	680			
1161	65mm dia	RFT.	240			
1162	75mm dia	RFT.	990			
1163	90mm dia	RFT.	50			
1164	110mm dia	RFT.	1,090			
1165	125mm dia	RFT.	40			
1166	160mm dia	RFT.	30			
1167	**ISOLATION VALVES:**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1168	Providing and fixing of Gate valves of bronze material for diameter 50mm and smaller and Cast Iron material for Diameter greater than 50mm as per specifications and Engineers approval.					
1169	20mm dia	Nos.	30			
1170	25mm dia	Nos.	55			
1171	32mm dia	Nos.	62			
1172	40mm dia	Nos.	25			
1173	50mm dia	Nos.	8			
1174	65mm dia	Nos.	50			
1175	75mm dia	Nos.	12			
1176	100mm dia	Nos.	18			
1177	**NON RETURN VALVES:**					
1178	Providing and fixing of non return Valve of Bronze Material for diameter 50mm and smaller and Cast Iron material for Diameter greater than 50mm as per type indicated in specifications and as per Engineers approval.					
1179	32mm dia	Nos.	4			
1180	50mm dia	Nos.	2			
1181	65mm dia	Nos.	2			
1182	75mm dia	Nos.	10			
1183	100mm dia	Nos.	16			
1184	125mm dia	Nos.	0			
1185	150mm dia	Nos.	2			
1186	200mm dia	Nos.	2			
1187	**PRESSURE REGULATING VALVE:**					
1188	Providing and fixing of pilot controlled, hydraulically operated, diaphragm type Pressure Reducing Valve Assembly with a low by-pass capability of below mentioned diameter as per drawings, specifications and Engineers approval.					
1189	50mm dia	Nos.	2			
1190	65mm dia	Nos.	2			
1191	75mm dia	Nos.	2			
1192	100mm dia	Nos.	6			
1193	**MIXING VALVES:**					
1194	Supply and installation Thermostatic Type Missing Valve of Lead free Cast Copper Silicon alloy construction capable of withstanding 150 PSi pressure and 90C Temperature as indicated on the drawing, as per Specifications and Engineers approval.					
1195	20mm dia	Nos.	2			
1196	25mm dia	Nos.	2			
1197	32mm dia	Nos.	4			
1198	**PLUMBING SPECIALITIES:**					
1199	Supply and installation of the following including all fittings, fixings, accessories, etc., as indicated on the drawing, as per Specifications and Engineers approval.					
1200	1/2" dia. Bib Tap	Nos.	85			

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1201	1" dia Air Relief Valve	Nos.	50			
1202	4" dia foot valve	Nos.	1			
1203	3" dia foot valve	Nos.	1			
1204	4" Y-type Strainer	Nos.	2			
1205	3" Y-type Strainer	Nos.	2			
1206	**WATER TANK CONNECTIONS:**					
1207	4" dia Connection to existing Tubewell in Basement-4 including water meter, Gate valves, Level Indicate and Modulating Valve for Auto Shit off l etc. complete all in accordance with the drawing and specifications.	Job	1			
1208	3" dia Connection to existing City Network including water meter, Gate valves, Level Indicate and Modulating Valve for Auto Shit off l etc. complete all in accordance with the drawing and specifications.	Job	1			
1209	4" Goose neck for underground Water Tank & Grey Water tanks with Stainless steel Insect Mesh for insect as per drawing and specifications.	Nos.	4			
1210	Connection to overhead water tanks using Float switch or Pressure Switch	Nos.	2			
1211	Medium Duty PVC Cover For RCC water tanks	Nos.	6			
1212	Heavy Duty Covers For Sump pits	Nos.	3			
1213	Heavy Duty Covers For Sump pits	Nos.	3			
1214	**IRRIGATION PIPING & ISOLATION VALVES:**					
1215	Supply, installation, testing and commissioning of PVC class E pipe as per BS 4660, or conforming to ASTM D2241 with solvent joints including the cost of excavation, backfill and other fittings, all connections to be sealed properly with water proof material. Warning tape to be laid over the buried pipes, as per drawings, specifications and Engineer's approval.					
1216	1" dia	RFT.	550			
1217	1 1/4" dia	RFT.	385			
1218	1 1/2" dia	RFT.	410			
1219	2"' dia	RFT.	720			
1220	**ISOLATION VALVES**					
1221	Supply, installation, testing and commissioning of PN-16 Ball Valves of PVC / cPVC material for diameter 50mm and smaller and Cast iron for Diameter above 50mm of Same brand as of piping, as per drawings, specifications and Engineer's approval.					
1222	1" dia	Nos.	26			
1223	1 1/4" dia	Nos.	3			
1224	1 1/2" dia	Nos.	3			
1225	2"' dia	Nos.	6			
1226	**SUBMERSIBLE PUMPS:**					
1227	Supply, Installation of below mentioned Stainless Steel Submersible pumps sets including, Guide Rails with Chain, Automatic control panel, Level indicator and High level warning indicator, connection with BMS System, wiring, Gate valves, Non Return Valves piping, accessories, etc., as indicated on the drawing, as per specifications and Engineers approval.					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1228	S.Steel Submersible Pump 01 & 02 (1 Duty + 1 Support/Standby) **(70 GPM @ 100FT Head)**	Set	1			
1229	S.Steel Submersible Pump 03 & 04 (1 Duty + 1 Support/Standby) **(60 GPM @ 100FT Head)**	Set	1			
1230	S.Steel Submersible Pump 05 & 06 (1 Duty + 1 Support/Standby) **(60 GPM @ 100FT Head)**	Set	1			
1231	**SOIL, WASTE & VENT PIPING:**					
1232	Providing and fixing, Sound Proof PP Pipes and fittings as per DIN 4109 and 4102 and Flame Retardant as per BS 4102 for above ground installations for Soil, Waste, Vent pipes including cleanout plug, clamps, hangers collars, supports, specials (bend, tees, Y-tee etc.) as indicated on the drawing, as per specifications and Engineers approval.					
1233	1 1/2" dia	RFT.	50			
1234	2" dia	RFT.	1,780			
1235	3" dia	RFT.	6,490			
1236	4" dia	RFT.	3,120			
1237	6" dia	RFT.	2,390			
1238	8" dia	RFT.	20			
1239	Providing and fixing, uPVC pipes and fittings as per BS EN 1401 (BS 4660) for below ground installations for Soil pipes including excavation, backfill, fittings (bend, tees, Y-tee etc.) as indicated on the drawing, as per specifications and Engineers approval.					
1240	3" dia	RFT.	700			
1241	4" dia	RFT.	280			
1242	**PRESSURE PIPES:**					
1243	Providing and fixing, uPVC pipes (Class D) and fittings as per BS 3505 and fittings to BS 4346 for Sump pit Drainage pipes and below ground installations for Soil pipes including fittings (bend, tees, Y-tee etc.) All connections to be sealed properly with water proof material. Warning tape to be laid over the buried pipes as indicated on the drawing, as per specifications and Engineers approval.					
1244	2" dia	RFT.	450			
1245	3" dia	RFT.	50			
1246	**DRAINAGE SPECIALITIES:**					
1247	Providing and fixing of Sound Proof PP Multi floor trap with multiple dia inlet and Single outlet and cleanout plug of the approved self cleaning design with S.Steel grating as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	280			
1248	Providing and fixing of PVC Roof Drains with Over Drain of Dome Type with PVC/Stainless Steel Dome with 150mm Outlet, as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	12			

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1249	Providing and fixing of PVC Balcony Drains Skupper type with PVC Grating with 50mm side of bottom Outlet (as approved), as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	38			
1250	Providing and fixing of catch basin of 304 s.steel body of 2mm thickness with ductile iron grating of 25mm thickness and s.steel bucket 1.25mm thickness with perforated holes (detail as shown in b-3 as specified by the architect, as indicated on the drawing, as per specifications, architectural finishing schedule and engineers approval.	Nos.	12			
1251	Providing and fixing of Duco coated Ductile iron body Area drain 200mm diameter circular type with flashing flange, S.Steel strainer and heavy duty Stainless Steel grating with 110mm bottom outlet to BS EN 1329 push-fit piping COMPLETE SET WITH CONNECTORS as indicated on the drawing, as per specifications, architectural finishing schedule and Engineers approval.	Nos.	48			
1252	Providing and fixing of floor drain channel with 8" wide and 6" deep ductile Iron grating for Waste and Storm Water collection as indicated on the drawing, as per specifications and Engineers approval.	RFT.	260			
1253	Providing and fixing UPVC cowl for vent pipe of the following dia including all accessories complete in all respects.					
1254	50 mm dia	Nos.	60			
1255	100 mm dia	Nos.	140			
1256	150 mm dia	Nos.	140			
1257	**OIL & SAND INTERCEPTORS:**					
1258	Supply and installation of Stainless Steel Centralized Oil & Sand interceptor (50 gpm) with Automatic Oil & Sand Recovery System, Stainless Steel Strainer, removable baffle assembly to be installed with Vent piping specified and shown on the drawing, as per specifications and Engineers approval.	Nos.	1			
1259	**MANHOLES & GULLYTRAPS:**					
1260	Construction of 32" x 32" Sanitary sewage manhole with 24" x 24" Heavy duty HDPE/ Polypropylene Man Hole Access covers with frame Medium Duty with 1000KG minimum bearing capacity As per BS-497:1976 (BS EN124:1994) cover as specified and shown on the drawing, as per specifications and Engineers approval.	Nos.	2			
1261	Construction of 32" x 32" Storm Water manhole with 24" x 24" Heavy duty HDPE/ Polypropylene Man Hole Access covers with frame Medium Duty with 1000KG minimum bearing capacity As per BS-497:1976 (BS EN124:1994) cover as specified and shown on the drawing, as per specifications and Engineers approval.	Nos.	2			
1262	**EXTERNAL CONNECTION:**					
1263	Connection to external Sewage network, after obtaining approval from CDA / local authorities including the cost of excavation, Piping as specified and shown on the drawing, as per specifications and Engineers approval.	Job	1			
1264	**PLUMBING FIXTURES:**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1265	Providing and fixing of Floor mounted European type water closet, with dual flush Tank having 6.0 liters main flush tank and 4.0 liters secondary flush tank, build in S-Trap , Stop cock, flexible pipe as specified by the architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	130			
1266	Fixing Asia type water closet with dual flush Tank of 6.0 liters main flush and 3 liters secondary flush, build in S/P-Trap , Stop cock with flexible pipe as specified by architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	35			
1267	Providing & Fixing semi pedestal type wash basin with mixer having flow of 6.0 lpm or less with two (2) nos. Stop cocks, Flexible Connection , flexible drain pipe to floor drain as specified by architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	135			
1268	Providing & Fixing of Shower head with shower mixer having maximum flow of 8.5 lpm, as specified by architect in Fixture schedule, per drawings, specifications and Engineers Approval.	Nos.	6			
1269	Providing & Fixing Single Compartment 304 stainless Steel kitchen Sink with mixer having maximum flow of 6.0 lpm, waste trap, Stop cocks with flexible pipes, Flexible drain pipe as specified by architect and kitchen Consultant in Fixture schedule, as per drawings, specifications and Engineers Approval.	Nos.	28			
1270	**ACCESSORIES:**					
1271	Supply, Installation and fixing bath toilet accessories as under:					
1272	Toilet Paper Holder	Nos.	130			
1273	Hand Spray / Muslim shower	Nos.	165			
1274	Liquid Soap Dispenser/ Soap dish	Nos.	145			
1275	WC Cleaning Brush	Nos.	130			
1276	Robe Hooks	Nos.	209			
1277	Towel Railing	Nos.	60			
1278	Hand Dryer	Nos.	48			
1279	**GENERAL MECHANICAL SYSTEM:**					
1280	**Specification Section 15440, 15519:**					
1281	**Painting and Finishes**					
1282	Providing Painting and Finishing including stenciling and identification tags as specified in technical specifications and as directed by the Engineer In charge, complete in all respect.	Job	1			
1283	**Shop Drawing & As-Built Drawings**					
1284	Providing Shop Drawings and As Built Drawings in A1 size with Electronic Copies, as specified in specifications, complete in all respect and as directed by the Engineer in charge.	Job	1			
1285	**Test Run**					
1286	Providing two months Test Run in summer / winter, as specified in specifications, as advised by the Consultant/Client and as directed by the Engineer in charge. After satisfactory completion of test run, a certificate will be issued to the Contractor.	Job	1			
1287	Providing and installation of 10 inch dia test bore complete in all respect (if sub soil water is not achieved)	Job	1			
1288	**TUBE WELL**					

	Description	Unit	Qty	Rate	PWD Schedule-2022 Reference No	Amount
1289	**Drilling, construction, development and testing of one perfectly vertical 16-inch dia tube well to a minimum depth of 600 ft**, complete with 12-inch dia PVC Class-E plain and slotted screen casing, couplers and accessories, approved graded gravel filter pack, cement/bentonite grouting and sanitary sealing, borehole development, flushing and disinfection, water-level measurements, step-drawdown, constant-rate pumping and recovery tests, water sampling and laboratory testing, and all necessary materials, labour, equipment, transportation, mobilization and demobilization, including coordination and acquiring **NOC from CDA** before start of work and all incidental works necessary to complete and commission a fully operational tube well capable of demonstrating a **minimum sustainable yield of 60,000 gallons/day**, complete in accordance with the specifications and to the satisfaction of the Engineer.	Job	1			
1290	Supply, install, test and commission one stainless steel submersible borehole pump complete with submersible motor, control panel, power cable, riser pipe, non-return valve, isolation valve, wellhead assembly, piping, fittings, supports, accessories, electrical connections, testing and commissioning, having a duty of 100 GPM at 600 ft total dynamic head with a 30 HP motor, complete in accordance with the drawings, specifications, and Engineer's approval	Job	1			
1291	Providing and installation of 16 inch dia test bore(minimum 600ft depth) complete in all respect (if sub soil water is not achieved)	Job	1			
1292	Submission of water quality report as per WHO standards and as mentioned in specification.	Job	1			
	Total Amount Of Package-2a (Arch, Elect, Plumb Works) (Rs.)					

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Securities & Exchange Commission of Pakistan

SECP HEAD OFFICE BUILDING PROJECT PACKAGE-2a

CONDITION OF CONTRACT (VOLUME-I)

Sep-2026

EA Consulting Pvt Ltd
(Formerly Engineering Associates)
Engineering, Architecture & Project Management
Head Office: AL-9, 15th Lane, Khayaban-e-Hilal,
Phase VII, D.H.A., Karachi-75500.,
Tel: UAN: 111-111-584, Fax: (021) 3584-1825

TABLE OF CONTENTS

INVITATION FOR BIDS …….. 1

INSTRUCTIONS TO BIDDERS (IB) …….. 5

BIDDING DATA (BD) ……... 27

EVALUATION CRITERIA AND QUALIFICATION UPDATING FORMS ……. 33

LETTER OF BID AND SCHEDULES TO BID …….. 47

STANDARD FORMS ……. 81

CONDITIONS OF CONTRACT …….. 95

GENERAL CONDITIONS (GC) …….. 97

PARTICULAR CONDITIONS (PC) …… 98

Part A - Contract Data…….... 98

Part B - Special Provisions …… 106

SPECIFICATIONS (SP) …… 119

Part A - Specific Provisions ……... 119

Part B - Technical Provisions …… 123

INVITATION FOR BIDS

Advertisement published in National Dailies for Contractor's prequalification on _____

_____
[*Name of the Bidder*]

INVITATION FOR BIDS

Date: _____

Bid Reference No. (if any): _____

1. This is with reference to your application for the Tender titled "**Construction of SECP Head Office Building Mauve Area, G-11 Islamabad. (Package-2a - Architecture, ID & External Works, Electrical & ELV and Plumbing Works)**".

2. The Employer invites sealed bids on single stage two envelope bidding procedure basis from eligible prequalified bidders for the above stated Works. Bidders may download the Bidding Documents from PPRA's **e-Pak Acquisition & Disposal System (EPADS)** i.e. https://eprocure.gov.pk/.

3. Bids must be accompanied by a Bid Security in the amount of PKR. 40,000,000 (Pak Rupees Forty Million only). Scan copy of Bid Security must be attached with the **Technical Bids** and **original instrument of the Bid security must be delivered to NICL Building, 63 Jinnah Avenue, Blue Area Islamabad on or before the deadline of bids submission, failing which the bids will be reject**.
Bids prepared in accordance with the instructions, should be submitted ONLY through EPADS on or before **November 04, 2026 by 1100Hrs** and will be opened on the same day at **1130Hrs** Bidders may obtain further information/clarification at NICL Building, 63 Jinnah Avenue, Islamabad.

   In case of any technical difficulty in using EPADS prospective bidders may contact PPRA at https://www.ppra.org.pk/

4. Bidders wishing to offer discounts, shall be allowed to do so, provided those discounts are included in the Bids.

   Applicants will be informed, in due course, of the result of the evaluation only through EPADS.
Bidders may obtain further information/clarification from Admin Department on Telephone No. 051-9195551/051-9195437 during office hours (Monday to Friday excluding Public Holidays)

Engr. Anwar Ghani
Project Director /Head Project Management Unit
NICL Building, 63 Jinnah Avenue, Blue Area Islamabad
051-9195551/051-9195437/051-9195474
Email: *anwar.ghani@secp.gov.pk; Procurement.info@secp.gov.pk*

INSTRUCTIONS TO BIDDERS (IB)

INSTRUCTIONS TO BIDDERS
Table of Contents

A. General 9
IB 1. Scope of Bid 9
IB 2. Source of Funds 9
IB 3. Eligible Bidders 9
IB 4. Eligible Materials, Equipment and Services 10
IB 5. One Bid per Bidder 10
IB 6. Site Visit 10

B. Bidding Documents 10
IB 7. Contents of Bidding Documents 10
IB 8. Clarification of Bidding Documents, Pre-Bid Meeting 11
IB 9. Amendment of Bidding Documents 12

C. Preparation of Bids 12
IB 10. Cost of Bidding. 12
IB 11. Language of Bid 12
IB 12. Documents Comprising the Bid 12
IB 13. Bid Prices 14
IB 14. Currencies of Bid and Payment 15
IB 15. Bid Validity 15
IB 16. Bid Security 15
IB 17. Alternate Proposals by Bidder 16
IB 18. Format and Signing of Bid 17

D. Submission of Bids 18
IB 19. Sealing and Marking of Bids 18
IB 20. Deadline for Submission of Bids 18
IB 21. Late Bids 19
IB 22. Modification, Substitution and Withdrawal of Bids 19

E. Bid Opening and Evaluation 19
IB 23. Bid Opening 19
IB 24. Process to be Confidential 20
IB 25. Clarification of Bids 20
IB 26. Examination of Bids and Determination of Responsiveness 21
IB 27. Nonmaterial Nonconformities 21
IB 28. Correction of Arithmetic Errors 22
IB 29. Evaluation and Comparison of Bids 22
IB 30. Abnormally Low Bids 23
IB 31. Unbalanced or Front-Loaded Bids 23

F. Award of Contract.....23
IB 32. Award Criteria.....23
IB 33. Employer's Right to Annul the Bidding Process.....24
IB 34. Notification of Award.....24
IB 35. Performance Security.....24
IB 36. Signing of Contract Agreement.....24
IB 37. Integrity Pact.....25
IB 38 Instructions not Part of Contract.....25
IB 39 Corrupt and Fraudulent Practices.....25

Bidding Data.....27

Evaluation Criteria and Qualification Updating Forms.....33

Letter of Bid and Schedules to Bid.....47

Letter of Bid 49
Schedule-A to Bid: Schedule of Adjustment Data 51
Schedule-B to Bid: Bill of Quantities 56
Schedule-C to Bid: Construction Schedule 71
Schedule-D to Bid: Method of Performing the work 72
Schedule-E to Bid: List of Major Equipment 73
Schedule-F to Bid: Organization chart for the supervisory staff and labour 76
Schedule-G to Bid: List of Subcontractors 77
Schedule-H to Bid: Estimated Progress Payments 78
Schedule-I to Bid: Construction camp and housing facilities 79
Schedule-J to Bid: Integrity Pact 80

INSTRUCTIONS TO BIDDERS

(Note: These Instructions to Bidders along with Bidding Data will not be part of the Contract and will cease to have effect once the contract is signed.)

A. GENERAL

IB.1 Scope of Bid

1.1 The Employer as defined in the **Bidding Data** hereinafter called "the Employer" wishes to receive bids for the construction and completion of works as described in these Bidding Documents, and summarized in the **Bidding Data** hereinafter referred to as the "Works".

1.2 The successful Bidder will be expected to complete the Works within the time specified in the **Bidding Data**.

IB.2 Source of Funds

2.1 The Employer has applied for/received a funding from the source(s) in various currencies towards the cost of the project specified in the **Bidding Data** and it is intended that part of the proceeds of this funding will be applied to eligible payments under the Contract for which these Bidding Documents are issued.

IB.3 Eligible Bidders

3.1 This Invitation for Bids is open to all Bidders meeting the following requirements at the time of submission of Bids and thereafter:

(a) Duly prequalified for this bidding process;

(b) Duly licensed by the Pakistan Engineering Council (PEC) in the category relevant to the value of the Works in the relevant field of specialization.

However, a Foreign Constructor can submit provisional license with its Bid but the Foreign Constructor will be required to submit standard license after award of Contract and before start of work.

Foreign Constructor shall not be eligible to participate in bidding individually. Foreign Constructor shall enter into joint venture with Pakistani Constructor registered with the Pakistan Engineering Council in equivalent/compatible category and submit the joint venture agreement to the Employer before participating in bidding in accordance with PEC Construction and Operation of Engineering Works Bye-laws, 1987;

Not Applicable

(c) Must be on Active Taxpayer List of the Federal Board of Revenue and provincial revenue authority/ board where applicable; and

(d) All partners constituting the Bidder including proposed subcontractors do not appear in the list of debarred/ blacklisted firms and individuals on the websites of PEC and Federal & Provincial Procurement Regulatory Authorities and have not been declared debarred/ blacklisted by foreign country, international organizations or other foreign institutions.

IB.4 Eligible Materials, Equipment and Services

4.1 All materials, equipment and services to be supplied under this Contract shall have their origin in eligible countries described under paragraph 4.4 hereunder.

4.2 For purpose of this Clause, "origin" means the place where the Goods are mined, grown or produced or from where the ancillary services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

4.3 The origin of Goods and Services is distinct from the nationality of the Bidder.

4.4 Eligible countries to participate in this bidding process are those which have been notified by Ministry of Interior, Government of Pakistan as Business-Friendly Countries (BVL); information can be accessed through following link:

http://www.dgip.gov.pk/Files/Visa%20Categories.aspx#L

IB.5 One Bid per Bidder

5.1 Each Bidder shall submit only one Bid either by himself, or as a partner in a joint venture. A Bidder who submits or participates in more than one Bid (other than alternatives pursuant to Clause IB.17) will be disqualified.

IB.6 Site Visit

6.1 The Bidders are advised to visit and examine the Site ofWorks and its surroundings and obtain for themselves on theirown responsibility all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. All cost in this respect shall be at the Bidder's own expense.

6.2 The Bidders and any of their personnel or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the Bidders, their personnel and agents, will release and indemnify the Employer, his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of such inspection.

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

7.1 The Bidding Documents, in addition to Invitation for Bids, are those stated below and should be read in conjunction with any Addenda issued in accordance with Clause IB.9:

1. Instructions to Bidders;
2. Bidding Data;
3. Evaluation Criteria and Qualification Updating Forms;
4. General Conditions (GC);
5. Particular Conditions (PC):
   Part A - Contract Data;
   Part B - Special Provisions;
6. Specifications (SP):
   Part A - Specific Provisions;
   Part B - Technical Provisions;
7. Letter of Bid;
8. Schedules to Bid;
9. Standard Forms:
   (i) Form of Bid Security;
   (ii) Letter of Acceptance;
   (iii)(iii)Form of Contract Agreement;
   (iv) Form of Performance Security;
   (v) DAAB Agreement;
   (vi) Form of Mobilization Advance Guarantee;
10. Drawings.

7.2 The Bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of Bid submission will be at the Bidder's own risk. Pursuant to Clause IB.26, bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.8 Clarification of Bidding Documents, Pre-Bid Meeting

8.1 Any prospective Bidder requiring any clarification(s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in theInvitation for Bids. The Employer will respond to any request for clarification which he receives earlier than the period specified in the **Bidding Data**, prior to the deadline for submission of bids.

8.2 Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying its source.

8.3 The Employer may, on his own or at the request of any prospective Bidder(s), hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents. The date, time and venue of pre-bid meeting, if convened, are as stipulated in the **Bidding Data**. All prospective Bidders or their authorized representatives shall be invited to attend such a pre-bid meeting.

8.4 The Bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than seven (7) days before the proposed pre-bid meeting.

8.5 Minutes of the pre-bid meeting, including the text of the questions raised and the replies given, will be transmitted without delay to all purchasers of the Bidding Documents. Any modification of the Bidding Documents listed in Sub-Clause IB.7.1 hereof which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause IB.9 and not through the minutes of the pre-bid meeting.

8.6 Absence at the pre-bid meeting will not be a cause for disqualification of a Bidder.

IB.9 Amendment of Bidding Documents

9.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Documents by issuing addendum.

9.2 Any addendum thus issued shall be part of the Bidding Documents listed in Sub-Clause IB.7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective Bidders shall acknowledge receipt of each addendum in writing to the Employer.

9.3 Such addendum shall be issued not later than number of days prior to the deadline for submission of bids, specified in the **Bidding Data**. To afford prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids in accordance with Clause IB.20.

C. PREPARATION OF BIDS

IB.10 Cost of Bidding

10.1 The Bidders shall bear all costs associated with the preparation and submission of their respective bids and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

IB.11 Language of Bid

11.1 The Bid and all correspondence and documents related to the Bid exchanged by a Bidder and the Employer shall be in the Bid language stipulated in the **Bidding Data** and Particular Conditions of Contract. Supporting documents and printed literature furnished by the Bidders may be in any other language provided the same are accompanied by duly certified translation of the relevant parts in the Bid language, in which case, for purposes of evaluation of the bid, the translation in Bid language shall prevail.

IB.12 Documents Comprising the Bid

12.1 Each Bidder shall:

(a) submit duly filled in, signed and stamped Letter of Bid and completed Schedules to Bid as required, including priced Bill of Quantities, in accordance with ClauseIB.18 hereof;

(b) submit Bid Security in accordance with Clause IB.16 hereof;

(c) submit alternative proposal, if permissible in accordance with Clause IB.17;

(d) Submit a written power of attorney authorizing the signatory of the Bid to act for and on behalf of the Bidder. The name and position held by each personsigning the authorization must be typed or printed below the signature;

(e) submit the Qualification Updating Forms duly filled in, signed and stamped along with requisite attachments, to establish that the Bidder continues to meet the Eligibility and Qualification Criteria set out in the Pre- Qualification Documents and as provided in the Section"Evaluation Criteria and Qualification Updating Forms";

(f) furnish a technical proposal taking into account the various Schedules to Bid, especially the following:

Schedule-C to Bid, Proposed Construction Schedule; Schedule-D to Bid, Method of Performing the Work; Schedule-E to Bid, List of Major Equipment; Schedule-F to Bid, Organization Chart for Supervisory Staff;
and other pertinent information, such as mobilization programme, etc.

12.2 Bids submitted by a joint venture of two (2) or more firms specified in **Bidding Data**, shall comply with the following requirements:

(a) the bid, and in case of a successful bid, the Form of Contract Agreement shall be signed by all members so as to be legally binding on all partners;

(b) one of the joint venture partners shall be nominated as being in-charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners;

(c) the partner-in-charge shall always be duly authorized to deal with the Employer regarding all matters related with and/or incidental to the execution of Works as per the terms and Conditions of Contract and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf of the joint venture;

(d) all partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the

Contract terms and a statement to this effect shall be included in the authorization mentioned under Sub-Para(b) above as well as in the Letter of Bid and in the Form of Contract Agreement (in case of a successful bid); and

(e) a copy of the agreement entered into by the joint venture partners shall be submitted with the bid stating the conditions under which it will function, its period of duration, the persons authorized to represent andobligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation and corresponding duties& responsibilities of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. No amendments/ modifications whatsoever in the joint venture agreementshall be agreed to between the joint venture partners without prior written consent of the Employer.

12.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the Bidders' proposals to meet the technical specifications and the completion time referred to in Sub-Clause IB.1.2 hereof.

IB.13 Bid Prices

13.1 The price and discount if any quoted by the Bidders in the Letter of Bid and in the Bill of Quantity shall conform to the requirement specified below:

13.2 The Bidder shall quote any discounts and the methodology for their application.

13.3 If bids are being invited for individual lots (contracts) or for any combination of lots, the Bidders can offer discounts for the individual lots (contracts) as well as for award of more than one Contract and shall specify in their bid.

13.4 Unless stated otherwise in the Bidding Documents, the Contract shall be for the whole of the Works as described in Sub-Clause IB.1.1 hereof, based on the unit rates and/or prices.

13.5 The Bidders shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by a Bidder will not be paid for by the Employer when executed and shall be deemed covered by rates and prices for other items in the Bill of Quantities.

13.6 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a Bidder.

Additional/reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed/ deducted as per Sub Clause 13.6 [*Adjustment for Changes in Laws*] of the Conditions of Contract.

13.7 The rates and prices quoted by the Bidders are subject to adjustment during the performance of the Contract in accordance with the provisions of Sub-Clause 13.7 [*Adjustments for Changes in Cost*] of the General Conditions of Contract. The Bidders shall furnish the prescribed information for the price adjustment formulae in Schedule-A to Bid, and shall submit with their bids such other requisite supporting information if required under the said Schedule.

IB.14 Currencies of Bid and Payment

14.1 The unit rates and the prices shall be quoted by the Bidder entirely in Pak Rupee and shall be paid accordingly in same currency.

A Bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country (referred to as the "Foreign Currency Requirements") shall indicate in Table III of Schedule-A to Bid the proportion of the Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements; in such case the unit rates and the prices shall be quoted by the Bidder in Equivalent PKR.

14.2 The rates of exchange to be used by the Bidder for currency conversion shall be the TT Selling Rates published or authorized by the State Bank of Pakistan prevailing on the date twenty-eight (28) days prior to the deadline for submission of bids. Such rates shall be notified by the Employer not later than fourteen (14) days prior to the deadline for submission of Bids.

For the purpose of payments, the exchange rates used in Bid preparation shall apply for the duration of the Contract.

IB.15 Bid Validity

15.1 Bids shall remain valid for the period stipulated in the **Bidding Data** after the date of Bid Opening specified in Clause IB.23.

15.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the Bidders extend the period of validity for a specified additional period which normally may not be more than the original bid validity period. The request and the responses thereto shall be made in writing. A Bidder may refuse this request of the Employer without his Bid Security being forfeited. A Bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.16 in all respects.

IB.16 Bid Security

16.1 Each Bidder shall furnish, as part of his bid, a Bid Security in original form in the amount stipulated in the **Bidding Data** in PKR.

16.2 The Bid Security shall be in the form of Call Deposit Receipt (CDR) / Pay Order issued by a Scheduled Bank in Pakistan in favor of the Employer valid for a period 14 days beyond the Bid Validity date.

Bid Price (In Eq. million PKR)	Minimum Rating of Insurance Companies
Up to 1000	A (+)
1001 to no limit	AA

16.3 Any Bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive.

16.4 The Bid Securities of the Bidders except the lowest three will be returned by the Employer within twenty-eight (28) days from the opening of Bids, provided a Bidder request for the return of its Bid Security, or upon the expiry of original validity of Bid Security or as extended, whichever is earlier.

16.5 The Bid Security of the lowest three Bidders including the successful Bidder will be returned when the successful Bidder has furnished the required Performance Security.

16.6 The Bid Security may be forfeited:

(a) if the Bidder withdraws his bid except as provided in Sub Clause IB.22.1;

(b) if the Bidder does not accept the correction of his Bid Price pursuant to Sub Clause IB.28.2 hereof; or

(c) in the case of successful Bidder, fails to furnish the required Performance Security.

16.7 In case of annulment, all Bids submitted and specially, Bid securities, shall be returned to the Bidders within 14 days of annulment.

IB.17 Alternative Proposals by Bidder

17.1 Unless otherwise specified in the **Bidding Data**, alternative proposal(s) shall not be considered.

17.2 Should any Bidder consider that he can offer any advantages to the Employer by a modification to the designs, specifications or other conditions, he may, in addition to his Bid to be submitted in strict compliance with the Bidding Documents, submit any alternative proposal(s) containing (a)

relevant design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any other relevant details/conditions, provided always that the total sum entered on the Letter of Bid shall be that which represents complete compliance with the Bidding Documents.

17.3 Alternative proposal(s), if any, of the Bidder having submitted most advantageous Bid only may be considered by the Employer as the basis for the award of Contract to such Bidder.

IB.18 Format and Signing of Bid

18.1 Bidders are particularly directed that the amount entered on the Letter of Bid shall be for performing the Contract strictly in accordance with the Bidding Documents.

18.2 All Schedules to Bid are to be properly completed and signed.

18.3 No alteration is to be made in the Letter of Bid nor in the Schedules thereto except in filling up the blanks as directed.If any such alterations be made or if these instructions be not fully complied with, the Bid may be rejected.

18.4 Each Bidder shall prepare by filling in the forms completely and without alterations one (1) original and number of copies, specified in the **Bidding Data**, of the documents comprising the Bid as described in Clause IB.12 and clearly mark them "ORIGINAL" and 'COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

The Bidder shall also provide complete searchable PDF versions as well as Word, Excel, etc., versions of the Bid if so required in the **Bidding Data**.

18.5 The original of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized **t**o sign on behalf of the Bidder pursuant to Sub-Clause IB.12.1(d) hereof. All pages of the Bid shall be initialed and stamped by the person or persons signing the bid.

18.6 The Bid shall contain no alterations, omissions or additions, except to comply with instructions issued by the Employer, or as are necessary to correct errors made by the Bidder, inwhich case such corrections shall be initialed by the personor persons signing the Bid.

18.7 Bidders shall indicate in the space provided in the Letter of Bid their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their bids and the Contract is to be sent.

18.8 Bidders should retain a copy of the Bidding Documents and the Bid as their file copy.

18.9 All documents executed outside Pakistan required to be submitted with the Bid must be certified by Pakistani Embassy in the respective country(ies).

D. SUBMISSION OF BIDS

IB.19 Sealing and Marking of Bids

19.1 Each Bidder shall submit his Bid as under:

(a) ORIGINAL and each copy of the Bid shall be separately sealed and put in separate envelopes and marked as such.

(b) The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed / identified as given in Sub Clause IB.19.2 hereof.

19.2 The inner and outer envelopes shall:

(a) be addressed to the Employer at the address provided in the **Bidding Data**;

(b) bear the specific identification of this bidding process as specified in the **Bidding Data**; and

(c) Provide a warning not to open before the time and date for bid opening, as specified in the **Bidding Data**.

19.3 In addition to the identification required in Sub-Clause IB.19.2 hereof, the inner envelope shall indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared "late" pursuant to Clause IB.21.

19.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

IB.20 Deadline for Submission of Bids

20.1 (a) Bids must be received by the Employer at the address specified no later than the time and date stipulated in the **Bidding Data**.

(b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of Bids. No claims will be entertained for refund of such expenses.

(c) Where delivery of a Bid is by mail and the Bidder wishes to receive an acknowledgment of receipt of such Bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed Bid envelope.

(d) Upon request, acknowledgment of receipt of Bids will be provided to those making delivery in person or by messenger.

20.2 The Employer may, at his discretion, extend the deadline for submission of Bids by issuing an amendment in accordance with Clause IB.9, in which case all rights and obligations of the Employer and the Bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.21 Late Bids

21.1 (a) Any Bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 shall be declared late, rejected and returned unopened to such Bidder.

(b) Delays in the mail, delays of person in transit, or delivery of a Bid to the wrong office shall not be accepted as an excuse for failure to deliver a Bid at the proper place and time. It shall be the Bidder's responsibility to determine the manner in which timely delivery of his Bid will be accomplished either in person, by messenger or by mail.

IB.22 Modification, Substitution and Withdrawal of Bids

22.1 Any Bidder may modify**,** substitute or withdraw his Bid after Bid submission provided that the modification, substitution orwritten notice of withdrawal is received by the Employer prior to the deadline for submission of bids.

22.2 The modification, substitution, or notice for withdrawal of any Bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.19 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" as appropriate.

22.3 No Bid may be modified by a Bidder after the deadline for submission of Bids except in accordance with Sub Clauses IB.22.1 and 28.2.

22.4 Withdrawal of a Bid during the interval between the deadline for submission of Bids and the expiration of the period of Bid validity specified in the Letter of Bid may result in forfeiture of the Bid security in pursuance to Clause IB.16.

E. BID OPENING AND EVALUATION

IB.23 Bid Opening

23.1 The Employer will open the Bids including withdrawals, substitution and modifications made pursuant to Clause IB.22, in the presence of Bidders' representatives who choose to attend, at the time, date and location stipulated in the **Bidding Data**. The Bidders' representatives who are present shall sign a register evidencing their attendance.

23.2 Envelopes marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause IB.22 shall not be opened. Only bids that are opened and read out at Bid opening shall be considered further.

23.3 The Bidder's name, total Bid Price and price of any alternative proposal(s), any discounts, Bid modifications**,** substitution and withdrawals, the presence or absence of Bid security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening of Bids. Only discounts and alternative proposals

read out at Bid opening shall be considered for evaluation. The Letter of Bid and the Summary Bill of Quantities are to be initialed by representative(s) of the Employer attending Bid opening. The Employer shall neither discuss the merits ofany Bid nor reject any Bid (except for late Bids, in accordance with Sub-Clause IB 21.1).

23.4 The Employer shall prepare minutes of the Bid opening, including the information disclosed to those present in accordance with the Sub-Clause IB.23.3.

IB.24 Process to be Confidential

24.1 Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of Contract shall not be disclosed to Bidders or any other person not officially concerned with such process before the announcement of the result of Bid evaluation in the form of final evaluation report giving justification for acceptance or rejection of Bids which shall be done at least fifteen (15) days prior to award of Contract. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the Bids evaluated. Any effort by a Bidder to influence the Employer's processing of Bids or Contract award decisions may result in the rejection of such Bidder's Bid. Whereas any Bidder feeling aggrieved maylodge a written complaint not later than five (5) days after the announcement of the final evaluation report.

IB.25 Clarification of Bids

25.1 To assist in the examination, evaluation and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of unit rates and lump sum prices. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The request for clarification and the response shall be in writing. No change in the price or substance of the Bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause IB.28.

25.2 The Employer may, at his discretion, ask any Bidder for confirmation/submission of missing information to clarify its Bid. However, the Employer does not have an obligation to request any additional information or clarification with respect to missing or deficient information in a Bid. The Employer may reject any Bid as non-responsive if found materially incomplete, obscure, irregular or omitting any material information required to be submitted in accordance with the Bidding Documents.

25.3 If a Bidder does not provide clarifications of its Bid by the date and time set reasonably (not less than seven (7) days) in the Employer's request for clarification, the Employer may proceed with the evaluation based on the informationsubmitted in the Bid without waiting for the Bidder's response.

IB.26 Examination of Bids and Determination of Responsiveness

26.1 Prior to the comparison of Bids, the Employer will determine whether each Bid is substantially responsive to the requirements of the Bidding Documents.

26.2 The Employer's determination of a Bid's responsiveness is to be based on the contents of the Bid itself, as defined in Sub-Clause IB.12.

26.3 A substantially responsive Bid is one which meets the requirements of the Bidding Documents, without material deviation, reservation or omission. A material deviation, reservation or omission is one that,

(a) if accepted, would:

(i) affect in any substantial way the scope, quality or performance of the Works; or

(ii) limit in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the Bidder's obligations under the proposed Contract; or

(b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.

26.4 During the evaluation of Bids, the following definitions apply:

(a) "Deviation" is a departure from the requirements specified in the Bidding Documents;

(b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Documents; and

(c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Documents.

26.5 The Employer shall examine the technical aspects of the Bid submitted in accordance with Sub-Clause IB.12.1(f), in particular, to confirm that all requirements stated in Specifications have been met without any material deviation, reservation or omission.

26.6 If a Bid is not substantially responsive to the requirements of the Bidding Documents, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation, reservation or omission.

IB.27 Nonmaterial Nonconformities

27.1 Provided that a Bid is substantially responsive, the Employer may waive any nonconformities in the Bid.

27.2 Provided that a Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Bid related to documentation requirements. Requesting information or

documentation on such nonconformities shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

27.3 Provided that a Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component, by adding the average price of the item or component quoted by other lowest two evaluated substantially responsive Bidders. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Employer shall use a suitable CSR, adjusted to the date 28 days earlierto the Bid submission date or its best assessment.

IB.28 Correction of Arithmetic Errors

28.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errorswill be corrected by the Employer as follows:

(a) where there is a discrepancy between the amounts in figures and in words, the amount in words will govern.

(b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line item total as quoted will govern and the unit rate will be corrected.

(c) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.

28.2 The amount stated in the Letter of Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected Bid Price, his Bid will be rejected, and the Bid security shall be forfeited in accordance with Sub Clause IB.16.6(b) hereof.

IB.29 Evaluation and Comparison of Bids

29.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause IB.26. The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.

29.2 In evaluating and comparing the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:

(a) making any correction for arithmetic errors pursuant to Clause IB.28;

(b) price adjustment due to discounts offered in accordance with Sub-Clause IB.23.3;

(c) excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced daywork;

(d) making an appropriate price adjustment for any quantifiable nonmaterial nonconformities in accordance with Sub-Clause IB.27.3; and

(e) the additional evaluation factors are specified in Section Evaluation Criteria and Qualification Updating Forms.

29.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bids' comparison.

IB.30 Abnormally Low Bids

30.1 If the Bid Price of the successful Bidder is more than 15% below the lower of the Employer's estimate of the cost of work to be performed under the Contract or average of other lowest two evaluated substantially responsive Bids, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities todemonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require anadditional Performance Security by 10% of the difference of the Bid Price as determined hereinabove up to issuance of Taking Over Certificate at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract. The Bids having Bid Price lower than25% shall be liable to be rejected.

IB.31 Unbalanced or Front Loaded Bids

31.1 If the Bid of the successful Bidder is seriously unbalanced (Front Loaded) in relation to the average of other evaluated substantially responsive Bids, the Employer during execution of contract may pay against measured quantities of significantly higher quoted line item(s) rate(s) with respect to same line item(s) rate(s) determined from the average of other lowest two evaluated substantially responsive Bids as instructed by the Engineer. The balance line item(s) rate(s) may be paid against the same measured quantities at the time of issuance of Taking Over Certificate or as instructed by the Engineer.

F. AWARD OF CONTRACT

IB.32 Award Criteria

32.1 Subject to Clauses IB.33 and IB.39, the Employer will award the Contract to the Bidder who's Bid has been determined as most advantageous Bid (substantially responsive to requirements of the Bidding Documents with the lowest evaluated Bid Price).

IB.33 Employer's Right to Annul the Bidding Process

33.1 Notwithstanding Clause IB.32, the Employer reserves the right to annul the bidding process and reject all Bids, at any time prior to award of Contract, without thereby incurring any liability to the affected Bidders or any obligation.

The Employer shall upon request communicate to any Bidder who submitted a Bid, the grounds for its rejection of all Bids but is not required to justify those grounds. Rejection of all Bids shall be notified to all Bidders promptly.

IB.34 Notification of Award

34.1 Prior to expiration of the period of Bid validity prescribed by the Employer, the Employer will notify the successful Bidder in writing ("Letter of Acceptance") that his Bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the "Accepted Contract Amount").

The Letter of Acceptance will also state the remedies with respect to Sub-Clauses IB.30 & IB.31 if applicable.

34.2 No negotiation with the Bidder having submitted most advantageous Bid or any other Bidder shall be permitted, however, Employer may have clarification meetings before issuing Letter of Acceptance to get clarified any item in the Bid evaluation report.

34.3 The Letter of Acceptance/ notification of award and its acknowledgement/acceptance by the Bidder will constitutethe formation of the Contract, binding the Employer and the Bidder till signing of the formal Contract Agreement.

34.4 Upon furnishing by the successful Bidder of a Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful and return their Bid securities in accordance with Sub-Clause IB.16.5.

IB.35 Performance Security

35.1 The successful Bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Conditions of Contract and additional Performance Security if applicable under IB.30 as stated in the Letter of Acceptance, within a period of 28 days after the receipt of Letter of Acceptance.

35.2 Failure of the successful Bidder to comply with the requirements of Sub Clause IB.35.1 or Clauses IB.36 or IB.37 shall constitute sufficient grounds for the annulment of the award, forfeiture of the Bid security and to award the Contract to the Bidder having submitted next advantageous Bid.

IB.36 Signing of Contract Agreement

36.1 Within 14 days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will notify the successful Bidder to depute its representative with appropriate Power of Attorney to sign the Contract Agreement in the form provided in the Bidding Documents, incorporating all agreements between the parties.

36.2 The formal Agreement between the Employer and the successful Bidder shall be executed within 14 days of the receipt of the above stated notification by the successful Bidder from the Employer.

IB.37 Integrity Pact

37.1 The Bidder shall sign and stamp the Integrity Pact provided at Schedule-J to Bid in the Bidding Documents for all Federal Government procurement contracts exceeding PKR ten million. Failure to provide such Integrity Pact shall make the Bidder non-responsive.

IB.38 Instructions not Part of Contract

38.1 Bids shall be prepared and submitted in accordance with the Instructions to Bidders which are provided to assist the Bidders in preparing Bids but do not constitute part of the Contract.

IB.39 Corrupt and Fraudulent Practices

39.1 The Employer will reject a Bid if it determines that the Bidder recommended for award, or any of its personnel, or its agents, or its sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract under this bidding.

39.2 The Employer will blacklist and hence forthwith debar a Constructor or individual, at any time, in accordance with the prevailing Public Procurement Rules 2004.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

BIDDING DATA (BD)

BIDDING DATA

IB Clause Reference	Bidding Data
1.1	**Name and address of the Employer:** Securities and Exchange Commission of Pakistan (SECP) NIC Building, 63 Jinnah Avenue, Blue Area, Islamabad. 051-9195551/051-9195437 *anwar.ghani@secp.gov.pk*
1.1	**Name of the Project & Summary of the Works:** Construction of SECP Head Office Building, Mauve Area, G-11/1, Islamabad. **(Package 2a – Architecture, ID & External Glass/Aluminum Works, Electrical & ELV and Plumbing Works)** **Summary of Package-2a Works: -** **ARCHITECTURE, ID, ELECTRICAL AND PLUMBING WORKS** Architecture, Electrical, Plumbing, External Works
1.2	**Time for Completion for the Works**: 660 days (22 Months)
2.1	**Name of the Borrower/Source of Funding:** *Self-Financed Scheme*
3.1	**Foreign Constructors are not allowed**
8.1	**Time limit for clarification**: 5 days prior to submission of bids.
8.3	**Venue, time, and date of the pre-Bid meeting:** SECP Head Office NICL Building Jinnah Avenue, Blue Area Islamabad on **August __, 2026 at 11:00 am**
9.3	**Number of days**: Five (05)
11.1	**Bid language**: ENGLISH
12.2	**Not Applicable**
14.1	Bidders to quote entirely in Pakistan Rupees (PKR)
15.1	**Period of Bid Validity**: 120 days after the deadline for bids submission.

16.1	**Amount of Bid Security**: The Bid Security shall be for an amount of **Rs. 50 Million**. The ORIGINAL Bid Security must be submitted to the procuring agency any time before the closing time of bid submission, failing which the bid shall be rejected.
16.2	The Bid Security shall be, at the option of the Bidder, in the form of Call Deposit Receipt (CDR) / Pay Order or a Security issued in the prescribed form included in the Bidding Documents, by a Scheduled Bank in Pakistan in favor of the Employer valid for a period 14 days beyond the Bid Validity date. **List of Insurance Companies:** *(Not Applicable)*
17.1	**Alternative Proposal(s**) by the Bidder shall not be considered.
18.4	Each Bidder shall prepare by filling in the forms completely and without alterations. The bid, properly filled in, must be submitted ONLY through e-Pak Acquisition & Disposal System (EPADS) EPADS at or before deadline mentioned in the invitation to bid. The bids will be opened promptly thereafter in public and in the presence of bidders' representatives who choose to attend in the opening at the Securities and Exchange Commission of Pakistan (SECP), NICL Building, Jinnah Avenue, Blue Area, Islamabad. Searchable PDF versions as well as word, excel etc. versions of the Bid are required.
19.1	The original Technical and Financial bid, properly filled in, must be submitted ONLY through e-Pak Acquisition & Disposal System (EPADS) at or before deadline as mentioned in invitation to bids. The Technical bids will be opened promptly thereafter in public and in the presence of bidders' representatives who choose to attend in the opening at the Securities and Exchange Commission of Pakistan (SECP), NICL Building, Jinnah Avenue, Blue Area, Islamabad.
19.5	The Bidder shall submit with its **Technical Bid** the following documents (a) Original Bid Security as per 16.1 and 16.2 (b) Conditions of Contract (c) Specification- (Part A – Specific Provisions) (d) Proposed Construction Schedule (appendix –C-1) (e) Method of Performing the Work (appendix –D-1) (f) Availability of Critical Equipment (appendix –E-1 to 3) (g) Construction Camp and Housing Facilities (appendix –I-1) (h) List of Sub-contractors (as required) (appendix –G-1) (i) Organization Chart for Supervisory Staff (appendix –F-1) (j) Integrity Pact (appendix –J-1) The Bidder shall submit with its **Financial (Price) Bid** the following documents: (k) Letter of Price Bid (l) Schedule of Adjustment data (appendix –A-1 & A-2)

	(m) Bill of Quantities (appendix –B-1 & B-2) (n) Estimated Progress Payments (appendix –H-1)
20.1(a)	**Deadline for submission of Bids:** As stated in Notice for Invitation of Bids.
23.1	**Bid opening:** The Employer shall open the Technical Bids, received only through EPADS in the presence of the prospective bidders or their designated reps at the address, date and time specified in the Invitation for bids. The Price Bids (Financial Proposals) of those bidders will be opened who are meeting eligibility criteria and responsive to criteria.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

EVALUATION CRITERIA AND QUALIFICATION UPDATING FORMS

EVALUATION CRITERIA AND QUALIFICATION UPDATING FORMS

1. General

This Section contains Eligibility and Qualification Criteria that the Employer shall use to evaluate Bids and qualify Bidders in accordance with Clauses IB.26 of Instructions to Bidders. The Bidder shall provide all the information requested in the relevant forms contained in Bidder's Qualification Updating Forms provided herein.

The information provided in the forms shall be substantiated with valid documentary evidences otherwise the requirement will not be considered as complied.

Wherever a Bidder is required to state a monetary amount, Bidders shall indicate the PKR equivalent using the rate of exchange determined as follows:

- For financial data - Exchange rate prevailing on the last day of the respective calendar year (in which the amounts for that year is to be converted) was originally established.

Exchange rates shall be taken from the publicly available source identified in the Sub-Clause IB.14.2. Any error in determining the exchange rates in the Bid may be corrected by the Employer.

2. Evaluation (IB 29.2)

The evaluation of Bids will be carried out according to criteria listed in IB 29.2

Bidders Qualification Updating Forms

To establish its qualifications to perform the contract in accordance with Section (Evaluation Criteria and Qualification Updating Forms) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

3.1 General

Technical evaluation will be based on all the criteria given in succeeding paras regarding the Applicant's Financial Soundness, Experience Record, Personnel Capabilities and Equipment Capabilities as demonstrated by the Applicant's responses in the forms attached to this letter. The Employer reserves the right to waive minor deviations, if these do not materially affect the capability of an applicant to perform the contract. Sub-contractor's experience and resources shall not be considered in determining the Applicant's compliance with the qualifying criteria.
Only those bidders who successfully meet all the Eligibility and Mandatory Requirements shall qualify for detailed evaluation, in accordance with the given criteria. The detailed qualification shall be carried out on the basis of the criteria for the different categories and minimum passing marks prescribed hereunder;

ELIGIBILTY AND MANDATORY REQUIREMENT	
PEC Registration Certificate	C-B or above Category with specialized code BC03
Audited Financial Statements	Last 3 years
Tax Returns of Company	Last 3 Years
Litigation History and Blacklisting from any Agency	Affidavit on Rs.100 Stamp Paper
Declaration of Ultimate Beneficial Owners Information	Format attached

OTHER PREQUALIFICATION REQUIREMENT	
CATEGORY	**WEIGHTAGE /MARKS**
EXPERIENCE	55
PERSONNEL CAPABILITIES	08
EQUIPMENT CAPABILITIES	07
FINANCIAL SOUNDNESS	30
TOTAL:	**100**

Note: For the purpose of qualification, the applicant must score at least 60% each in Experience, Financial Soundness Category. The overall score must be 70% or above to be considered as technically qualified.

3.1.1 Experience (55 Marks)

Credit Marks for experience shall be awarded on the basis of the following qualifications. Projects executed or in-hand within Pakistan will be considered for evaluation.
Similar nature work includes: Architectural / Finishing works, Electrical & ELV Works, Plumbing Work

S. No.	Category	Marks
i).	**Completed Similar Package-2a Works Experience — Current value of project / relevant package:** Four projects, of similar nature and complexity, substantially completed over the last 10 years (each with min. 05 Floors or more) as main contractor. Similar nature and complexity work include: Architectural / Finishing works, Electrical & ELV Works, Plumbing Works in multi-storey with high end finishing of office, hotel, shopping mall and related buildings. For evaluation of similar nature & complexity projects, the value of previously completed projects shall be adjusted to the current price level using the inflation indices or cost escalation factors notified by the Planning Commission of Pakistan or any other officially notified Government index. The adjusted value shall be considered for qualification purposes. Bidders shall provide information as per the Proforma attached as Annexure 3.1 (i) along with documentary evidences mentioned therein, failing which shall result in zero marks. In addition, the Procuring agency may require random physical verification of the projects. The bidder shall provide smooth access for the verification where required. As documentary evidence, contract agreement / letter of award / work order must be provided for public sector projects. For private sector projects, random physical verification, BOQ / scope of work, physical progress checks, and banking transactions shall be required. In absence of proof, no marks shall be awarded. **Scoring:** • 1 completed similar nature of project worth Rs. 1.5 Billion or above = 5 marks • Maximum marks = 20 (Maximum 4 Projects will be evaluated) For individual project of similar nature and complexity having value less than Rs.1.50 billion shall be evaluated as per following pro-rata basis, i. Above 1.2 Billion & Upto Rs. 1.50 Billion = 4 Marks ii. Above 900 Million & Upto 1.2 Billion = 3 Marks iii. Above 700 Million & Upto 900 Million = 2 Marks iv. Above 500 Million & 700 Million = 1 Mark Projects having financial value less than 500 Million shall not be considered for evaluation	20

ii)	**In-Hand Similar Package-2a Works Experience — Current value of project / relevant package** Four projects of similar nature and complexity in-hand, awarded within the last 5 years as main contractor. Similar works shall include Architectural / Finishing, Electrical & ELV, Plumbing Works in multi-storey with high end finishing of office, hotel, shopping mall and related buildings (with Min. 08 or more floors) and at least 15% achieved progress/completion. Bidders shall provide information as per the Proforma attached as Annexure 3.1(ii) along with documentary evidences mentioned therein, failing which shall result in zero marks. As documentary evidence, contract agreement / letter of award / work order must be provided for public sector projects. For private sector projects, random physical verification, BOQ / scope of work, physical progress checks, and banking transactions shall be required. In absence of proof, no marks shall be awarded. For evaluation of similar projects, the value of projects shall be adjusted to the current price level using the inflation indices or cost escalation factors notified by the Planning Commission of Pakistan or any other officially notified Government index. The adjusted value shall be considered for qualification purposes. **Scoring:** 1 in-hand similar nature of project worth Rs. 1.5 Billion or above = 5 marks Maximum marks = 20 (Maximum 4 Projects will be evaluated) For individual project of similar nature and complexity having value less than Rs.1.50 billion shall be evaluated as per following pro-rata basis, i. Above 1.2 Billion & Upto Rs. 1.50 Billion = 4 Marks ii. Above 900 Million & Upto 1.2 Billion = 3 Marks iii. Above 700 Million & Upto 900 Million = 2 Marks iv. Above 500 Million & 700 Million = 1 Mark Projects having financial value less than 500 Million shall not be considered for evaluation	20
iii)	**Local/Regional Experience i.e. Completed / In-Progress Project in Islamabad / Rawalpindi / Lahore Region.** Relevant completed (during last 10 Years) or In-progress projects of Financial value Rs. 700 Million or above (awarded during last 3 Years) in Islamabad / Rawalpindi / Lahore region involving Architectural/ finishing, Electrical/ELV, Plumbing or similar Package-2a works. 1 project = 2 marks on the basis of project location as per agreement, work order or completion certificate Maximum marks = 6 (Maximum 3 Projects will be evaluated)	6
iv)	**Local/Regional Presence i.e. Head Office/Regional in Islamabad / Rawalpindi / Lahore Region with Procurement, Project Management and Account team** Head Office in above mentioned location = 9 Marks Regional office in above mentioned location = 4 Marks The bidder shall provide document with office address with detail of deployed team. The employer may physically verify the office (s) and Project (s)	9

Mandatory Experience as Main Contractor: Only projects where the Bidder was fully responsible for the execution of the works, including procurement and supply of materials and equipment, shall be considered.
Projects executed solely on a labour-rate basis, manpower supply basis, or where the Employer/Client provided the materials and/or equipment shall not be considered for evaluation of this requirement.
The Employer reserves the right to independently verify the Applicant's past performance by conducting reference checks with the respective Employers, Clients, Consultants, Project Management Consultants (PMCs), Engineers, or other relevant stakeholders associated with the submitted projects. Such verification may include, but shall not be limited to, confirmation of the Applicant's technical performance, quality of work, timely completion, financial capability, contract administration, professional conduct, and the actual scope of works executed.

Marks for Delayed/Descoped/Terminated Projects:

The Procuring Agency may deduct marks where delay, descoping, or termination of a project is attributable to the contractor. The extent of deduction shall be determined based on the duration and severity of the delay, the reasons and circumstances leading to the descoping or termination, and other relevant factors affecting the contractor’s performance.

Important Note: If at any stage any information/document provided by the Applicant/bidder is found to be false, misleading, materially inconsistent, or if the reference verification reveals unsatisfactory performance on the submitted projects, the Employer may reject the application by declaring the bid non-responsive without incurring any liability and may take any other action permissible under the applicable procurement rules and the bidding documents.

3.1.2 Personnel Capabilities (8 marks)

Marks shall be awarded under this category using the following criteria:

S. No.	Position & Evaluation Criteria Reference	Minimum Qualification & Relevant Experience Breakdown	Max Marks
i).	***Project Manager***	**B.Sc. / B.E. (Civil Engineering) registered as Professional Engineer (PE) with PEC.**	2
		≥ 15 years overall experience with at least 5+ years managing high-rise building finishing, architectural, or MEP coordination works (1 PE = 1 marks)	
		Between 8 to less than 15 years overall experience with at least 3+ years high-rise experience (1 PE = 0.50 marks)	
ii).	***Finishing / Architectural Engineer***	**B.Sc. / B.E. (Civil / Architecture) registered (RE) with PEC.**	1
		≥ 8 years relevant experience in high-rise interior/exterior architectural finishes, dry lining, ceiling, flooring, marble/joinery, exterior development works (1 RE = 0.50 marks)	
		Between 5 to less than 8 years relevant experience (1 RE = 0.25 marks)	
iii).	***MEP Coordinator / Engineer (Mechanical / Electrical)***	**B.Sc. / B.E. (Mechanical / Electrical Engineering) Registered (RE) with PEC.**	1
		≥ 8 years relevant experience in high-rise building MEP services coordination, plumbing/fire-suppression, or electrical distribution (1.0 Mark)	
		Between 5 to less than 8 years relevant experience (0.50 Mark)	
iv).	***Planning & Site Coordination Engineer***	**B.Sc. / B.E. (Civil / Arch / Engg.) Registered (RE) with PEC.**	1
		≥ 8 years experience in project planning, scheduling (Primavera P6), site progress monitoring, and trade sequencing for multi-story buildings (1.0 Mark)	
		Between 5 to less than 8 years relevant experience in project planning, scheduling (Primavera P6), site progress monitoring, and trade sequencing for multi-story buildings (0.50 Mark)	
v).	***Associate Engineers / Supervisory Technical Staff (DAE) - 3 Nos. each trade***	**3-Year Diploma of Associate Engineer (DAE) in Finishes/Civil, Electrical, and/or Mechanical/Plumbing (01 Nos. each)**	1.5
		≥ 10 years relevant experience (0.50 Mark)	
		Between 6 to less than 10 yrs (0.25 Mark)	
	Quantity Surveyor - 1 No.	**DAE (Civil) with ≥ 10 years relevant measurement & billing experience (0.50 Mark)**	0.5
		Between 6 to less than 10 years (0.25 Mark)	
viii).	***Specialist Finishing Supervisor***	**DAE / Certified Technical Specialist in structural glazing, or high-end joinery/masonry, flooring/wall/ceiling finishes.**	1.0
		≥ 10 years relevant specialized field installation experience (1.0 Mark)	
		Between 6 to less than 10 years relevant experience (0.50 Mark)	
	SUB-TOTAL (PERSONNEL CAPABILITIES):		**8**

3.1.3 Equipment Capabilities (07 Marks)

Marks shall be given based on the following:

S. No.	Specialized Equipment Description	Min. Required Quantity	Max. Allocated Marks
1	*Surveying Equipment including Total Station, Auto-Level / Multi-line 3D Green Laser Levels*	2 sets	1.0
2	*Finishing Tools including Tile/ Marble / Stone Cutter, Grinder and Polisher*	4	0.5
3	*Tile/Marble slab Handling, Placing, Alignment Tool with vacuum suction*	4	0.5
7	*Material Handling Equipment including Chain Block, Hoist / Material Lift/Tower Crane*	3	1.0
8	*Scaffolding / Mobile Platforms*	2	1.0
10	*Generator 100 KVA with Temporary DBs and Site Lighting*	2	1.0
11	*Electrical Testing Instruments including Insulation Tester and Earth Tester*	1 set	1.0
12	*Plumbing / Mechanical Testing Equipment including Pressure Gauges and Flow Meter*	1 set	1.0
	SUB TOTAL (EQUIPMENT CAPABILITIES):		**07**

3.1.4 Financial Soundness (Max 30 Marks)

a) Current Ratio (Current Assets ÷ Current Liabilities)
   i. 1.5 or above **(3)**
   ii. 1.00 to below 1.50 **(2)**
   iii. Below 1.00 **No marks**

b) Debt Equity (Total Liabilities ÷ Owner's Equity)
   i. Up to 1 **(4)**
   ii. Between 1-1.5 **(2)**
   iii. Above 1.5 - 2 **(1)**

c) Interest Cover Ratio (Profit before interest and tax ÷ Interest Expense)
   i. Above 1.5 & up to 3 **(4)**
   ii. Up to 1.5 **(2)**

d) Working capital (Current Assets – Current Liabilities)
   i. Above Rs. 1.5 Billion & up to 3 Billion **(4)**
   ii. Up to 1.5. Billion **(2)**

e) Annual Turnover (Audited Financials will be considered)
   i. Above Rs. 1.20 Billion & upto Rs. 1.50 Billion **(5)**
   ii. Above Rs. 900 Million and upto Rs. 1.20 Billion **(3)**
   iii. Above Rs. 700 Million & upto 900 Million **(1)**

f) Cash Flow (Bank balance plus credit facility – commitments towards banks/borrowings/clientele) (Bank confirmation will be obtained)
   i. Above Rs. 3 Billion & upto Rs. 4 Billion **(10)**
   ii. Above Rs. 2 and upto Rs. 3 Billion **(6)**
   iii. Above Rs. 1 & upto 2 billion **(3)**

Marks shall be awarded based on the above criteria

3.2 Conflict of Interest

The Applicant must not be associated, nor have been associated in the past, with the consultant or any other entity that has prepared the design, specifications, and other prequalification and bidding documents for the project, or was proposed as Engineer for the contract, over the last five years. Any such association may result in disqualification of the Applicant.

ANNEXURE 3.1 (i) - Completed Projects
BIDDER'S EVALUATION PROFORMA (PACKAGE-2a)

Priority Ranking	Name of Project *(05 Top Priority Projects will be considered for evaluation, Bidder is required to arrange projects accordingly)*	Financial Value of Project *(in Rs. Million)*	Start Year	Completion Year	Scope of Work *(Structure, Architecture, Electrical & Plumbing, HVAC, Finishing, etc.)*	No. of Floors	Name of Consultant *(with Contact No., Email & Address)*	Name of Client *(with Contact No., Email & Address)*	Contract Duration		Delays *(No. of Days)*	Reasons of Delays	List of Projects Descoped/ Terminated (Completely/Partially) during last 10 years/ Suspension of Work >6 Months *(if Yes, provide details; Name of Project, Employer, with Reasons)*		
									Original	Revised					
		Attach Contract Agreement /Letter of Commencement/Work Order	Attach Contract Agreement /Letter of Commencement/Work Order	Attach Completion Certificate	Attach BOQ (Priced or unpriced)	Attach Drawings	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	Attach Contract Agreement /Letter of Commencement/Work Order	Attach EOT Proof	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	*Attach proof on the duly signed and stamp letterhead of the bidder*		
1															

(**Declaration:** I solemnly declare that the information provided in this Performa is true to the best of my knowledge & if at any stage any information found to be false/misleading/incorrect, the Employer may declare my bid as non-responsive & disqualify my bid). Bidder is required to submit this declaration on the stamp paper duly notarized.

Signature & Name of Bidder: _____

ANNEXURE 3.1 (ii) -Projects in Hand
BIDDER'S EVALUATION PROFORMA (PACKAGE-2a)

Priority Ranking	Name of Project *(05 Top Priority Projects will be considered for evaluation, Bidder is required to arrange projects accordingly)*	Financial Value of Project *(in Rs. Million)*	Start Year	%Completion as on August 31, 2026	Scope of Work *(Structure, Architecture, Electrical & Plumbing, HVAC, Finishing, etc.)*	No. of Floors	Name of Consultant *(with Contact No., Email & Address)*	Name of Client *(with Contact No., Email & Address)*	Contract Duration		Delays *(No. of Days)*	Reasons of Delays	List of Projects Descoped/ Terminated (Completely/Partially) during last 10 years/ Suspension of Work (>6 Months) *(if Yes, provide details; Name of Project, Employer, with Reasons)*		
									Original	Revised					
		Attach Contract Agreement /Letter of Commencement/Work Order	Attach Contract Agreement /Letter of Commencement/Work Order	Attach % completion Evidence by Employer/ Engineer	Attach BOQ (Priced or unpriced)	Attach Drawings	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	Attach Contract Agreement /Letter of Commencement/Work Order	Attach EOT Proof	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	*Attach proof on the duly signed and stamp letterhead of the bidder*		
1															
2															
3															
4															
5															

(**Declaration:** I solemnly declare that the information provided in this Performa is true to the best of my knowledge & if at any stage any information found to be false/misleading/incorrect, the Employer may declare my bid as non-responsive & disqualify my bid). Bidder is required to submit this declaration on the stamp paper duly notarized.

Signature & Name of Bidder: _____

Form ELI -1.1

Bidder Information Form

Date: _____

Bid Reference No. (if any) and title: _____

Page_____of_____ pages

Bidder's name
Bidder's country of registration: *[indicate country of Constitution]*
Bidder's year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information Name:_____ Address:_____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents, in accordance withSub-Clause IB 3.1.

Form ELI -1.2

Bidder's JV Information Form
(to be completed for each member of Bidder's JV)

Date: _____
Bid Reference No. (if any) and title:_____
Page _____of_____pages

Bidder's JV name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information Name:_____ Address:_____ Telephone/Fax numbers: _____ E-mail address: _____

Not Applicable

Form CON – 1

Pending Litigation

Bidder's Name: _____

Date: _____

Bid Reference No. (if any) and title: _____

Page _____ of _____ pages

Pending Litigation, in accordance with Eligibility and Qualification Criteria			
☐ No pending litigation in accordance with Eligibility and Qualification Criteria, Sub-Factor 2.1.			
☐ Pending litigation in accordance with Eligibility and Qualification Criteria, Sub-Factor 2.1 as indicated below.			
Year of dispute	**Amount in dispute (currency)**	**Contract Identification**	**Total Contract Amount (currency), Eq. PKR (exchange rate)**
		Contract Identification: _____ Name of Employer: _____ Address of Employer: _____ Matter in dispute: _____ Party who initiated the dispute: _____ Status of dispute: _____	
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute: Party who initiated the dispute: Status of dispute:	

Form FIN – 3.1:

Financial Situation and Performance

Bidder's Name: _____
Date: _____

Bid Reference No. (if any) and title: _____
Page _____ of _____ pages

1. Financial data

Type of Financial information in (currency)	**Historic information for last year, (amount in currency, currency, exchange rate*, Eq. PKR)**
Statement of Financial Position (Information from Balance Sheet)	
Total Assets (TA)	
Total Liabilities (TL)	
Total Equity/Net Worth (NW)	
Current Assets (CA)	
Current Liabilities (CL)	
Working Capital (WC)	
Information from Income Statement	
Total Revenue (TR)	
Profits Before Taxes (PBT)	
Cash Flow Information	
Cash Flow from Operating Activities	

Not Applicable

*Refer to IB 14.2 for the exchange rate

2. Financial documents

The Bidder and its parties shall provide copies of financial statements for last year pursuant to Eligibility and Qualification Criteria, Sub-factor 3.1. The financial statements shall:

(a) reflect the financial situation of the Bidder, and not an affiliatedentity (such as parent company or group member).

(b) be independently audited or certified in accordance with local legislation.

(c) be complete, including all notes to the financial statements.

(d) correspond to accounting periods already completed and audited.

Attached are copies of financial statements[1] for the last year required above; and complying with the requirements[1]

If the most recent set of financial statements is for a period earlier than 12 months from the date of bid, the reason for this should be justified.

Form FIN – 3.2:

Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Eligibility and Qualification Criteria.

No.	**Source of financing**	**Amount (Eq. PKR)**
1		
2		
3		

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Form FIN – 3.3:

Current Contract Commitments / Works in Progress

Bidders should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
No.	**Name of Contract**	**Employer's Contact Address, Tel, Fax**	**Value of Outstanding Work [Current Eq. PKR]**	**Estimated Completion Date**	**Average Monthly Invoicing Over Last Six Months [Eq. PKR /month)]**
1					
2					
3					
4					
5					

Not Applicable

LETTER OF BID
AND
SCHEDULES TO BID

LETTER OF BID

Bid Reference No. _____

[Name of Contract/ Works]

To: _____

_____

Gentleman,

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract, Specifications, Schedules to Bid including Bill of Quantities, Drawings and Addenda Nos._____for the execution of the above-named Works, we, the undersigned, offer to execute and complete such Works and remedy any defects therein in conformity with the said Bidding Documents and Addenda for the sum of Equivalent PKR_____(Eq. Pak Rupees _____ _____) or such other sum as may be ascertained in accordance with the said conditions.

2. We meet the eligibility requirements in accordance with IB.3.

3. We, including any Subcontractors for any part of the Contract, are not debarred/ blacklisted by the Employer, any Government/Semi Government/Public Department in Pakistan or foreign country, international organizations or other foreign institutions.

4. Our subcontractors or suppliers for any part of the Contract, if any, shall have nationalities from eligible countries, in accordance with IB.4.4.

5. We understand that all the Schedules attached hereto form part of this Bid.

6. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of PKR_____(Pak. Rupees. _____) drawn in your favour or made payable to you and valid for a period of_____days beginning from the date Bids are opened.

7. We undertake, if our Bid is accepted, to commence the Works and to complete the whole of the Works comprised in the Contract within the time stated in Contract Data.

8. We agree to abide by this Bid for the period of_____days, inclusive of 14 days beyond Bid validity period (as mentioned at Sr. No. 6 above) and it shall remain binding upon usand may be accepted at any time before the expiration of that period.

9. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

10. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other Bidder for the Works.

11. We understand that you are not bound to accept the lowest or any Bid you may receive.

12. We undertake that all the information and documents submitted with the Bid are genuine, and in case of incorrect information of fake documents we shall be liable for punitive action under the Applicable Law.

Dated this_____day of_____20_____

Signature: _____

in the capacity of_____duly authorized to sign Bids for and on behalf of

_____

(Name of Bidder in Block Capitals)
(Seal)

Address:_____

_____

_____

Witness:

Signature:_____

Name: _____

Address. _____

_____

Occupation_____

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

A-1
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Schedule of Cost Indexation

[The Employer is to engage a professional with experience in construction costs and the inflationary effect on construction costs when preparing the contents of the Schedule of Cost Indexation. In the case of very large and/or complex works contracts, it may be necessary to specify several families of price adjustment formulae corresponding to the different works involved.]

[The formulae for price adjustment shall be of the following general type:]

Pn= a + b Ln / Lo + c En/ Eo + d Mn/Mo + ...

where:

"Pn" is the adjustment multiplier to be applied to the estimated Contract value in the relevant currency of the work carried out in period "n", this period being a month;

"a" is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

"b", "c", "d", ... are coefficients representing the estimated proportion of each cost element related to the execution of the Works as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

"Ln", "En", "Mn", are the current cost indices or reference prices for period "n", expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particular Payment Certificate relates); and

"Lo", "Eo", "Mo", are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

The weightings (coefficients) for each of the factors of cost stated in the following table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalancedor inapplicable, as a result of Variation(s).

If the currency in which the Contract price is expressed is different from the currency of the country of origin of the indices, a correction factor will be applied to avoid incorrect adjustments of the Contract price. The correction factor shall be: Z_0 / Z_1, where,

Z_0 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price on the Base date, and

Z_1 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price on the Date of Adjustment.

A-2
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Table I. Local Currency (LC) For Bill Nos._____

[In the Table below, the Bidder shall (a) indicate amount of local currency payment, and the Employer shall (b) enter the Index description and source of indices for the different elements of cost, and (c) derive weightings for local currency payment including nonadjustable fixed portion. PEC Standard Procedure and Formula for Price Adjustment (Second Edition), May, 2022 as amended time to time shall be applied for preparation of the following Table.]

Index code	Index description	Source of index	Bidder's related currency amount	Weightages
(i)	**Non-adjustable / Fixed Portion**	Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin	—	0.76
(iii)	**Labour**			0.20
(v)	**High Speed Diesel (HSD)**			0.04
	TOTAL =			**1.00**

A-3
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Table II. Foreign Currency (FC) For Bill Nos._____

[In the Table below, the Bidder shall (a) indicate amount of foreign currency payment, (b)indicate the source and base values of indices for the different foreign currency elements of cost,

(c) derive its proposed weightings of foreign currency payment, except the non-adjustable portion which will be filled in by the Employer.

If the Bidder wishes to incur in more than one foreign currency (up to two currencies permitted)then this table should be repeated for each foreign currency.]

Index code	Index description	Source of index	Base value and date	Bidder's related source currency in type/amount	Equivalent in FC1	Bidder's proposed weighting
(i) **(ii)** **(iii)** **(iv)** **(v)**	Non-adjustable	_	_	_		**A:** _____ **B:** _____ **C:** _____ **D:** _____ **E:** _____
				Total		**1.00**

Not Applicable

A-4
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Table III. Foreign Currency Requirements

[With reference to Sub Clause IB.14.1, the Bidder shall provide information below on the proportion of various currencies in which he requires payment to be made. The Bidders shall also indicate Factors (inputs) related to the requirement of respective currencies.]

Sr. No	Currency (name)	Percentage payable in currency	Factors (inputs) to which the Requirements Refer
1.	**LC** (Pak. Rs.)		* *General Expenses Manpower, Local Staff, Expatriate Staff, Spare Parts, Fuel & Lubricants, Hydraulic Binder, Timber & Plywood, Additives & Protectives, Joints & Waterstops, Explosives-Fuses-Detonators, Re-Steel & Wire mesh, Metal Pipes & Fittings, Structural Steel, Miscellaneous Metals, Concrete Pipes, PVC Pipes, Build Materials, Sub-Contractor, Drilling & Grouting Sub-Contractor Third Party Supplies, Import Charges, General Expenses, Plants.*
2.	**FC1** *(US $ Dollar)*		* *Expatriate Staff, Spare Parts, Hydraulic Binder, Timber & Plywood, Additives & Protectives, Drilling Materials, Miscellaneous, Sub-Contractor, Import Charges, General Expenses, Plants.*
3.	**FC2** *(EUR € EURO)*		* *Expatriate Staff, Spare Parts, Additives & Protectives, Welding Materials, Miscellaneous, Electrical Sub-Contractor, Import Charges, General Expenses, Equipment, Plants.*
	TOTAL	**100.00**	

Not Applicable

*[*The above Factors (Inputs) related to the requirement of respective currencies, are for guidance only, and shall be indicated specific to the Contract.]*

A-5
Schedule-A to Bid

SCHEDULE OF ADJUSTMENT DATA

Table IV. Summary of Payment Currencies

[In the Table below, the Bidder shall list the exchange rates used in the currency conversion with reference to Sub Clause IB.14.2.]

Name of payment currency	a Amount of currency	b Rate of exchange (local currency per unit of foreign)	c Local currency equivalent c =a x b	d Percentage of Total Bid Price (TBP) 100xc / TBP
Local currency (Pak. Rs)		1.00		
FC1				
FC2				
Total Bid Price				100.00
Provisional sums expressed in local currency	*[To be entered by the Employer]*		*[To be entered by the Employer]*	
TOTAL BID PRICE (including provisional sum)				

Not Applicable

B-1
Schedule-B to Bid

BILL OF QUANTITIES

A. Preamble:

1. The Bill of Quantities shall be read in conjunction with the Conditions of Contract, Specifications and Drawings.

2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work executed and measured by the Contractor and verified by the Engineer andvalued at the rates and prices as given in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix as per the Contract.

3. The rates and prices as given in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract include all costs of Contractor's plant, labour, supervision, materials, execution, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract. Furthermore,all duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to deadline for submission of Bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.

4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor will have failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

5. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works, or the same shall be determined by the Engineer in accordance with Clause 13, General Conditions.

6. General directions and description of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the Bill of Quantities.

7. Provisional sums included and so designated in the Bill of Quantities shall be expended inwhole or in part at the direction and discretion of the Engineer in accordance with Sub- Clause 13.4 of General Conditions of Contract.

8. The following abbreviations for units have been used in Bill of Quantities:

Units		Abbreviations
Cubic Meter	=	cum
Square Meter	=	sqm
Kilogram	=	kg
Provisional Sum	=	PS
Lump-Sum	=	LS

B-2
Schedule-B to Bid

BILL OF QUANTITIES

(Refer Vol-III)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

C-1
Schedule-C to Bid

CONSTRUCTION SCHEDULE

Pursuant to Sub-Clause 8.3 of the General Conditions, the whole of the Works, and each Section (if any), shall be completed within the Time for Completion for the Works or Section (as the case may be) stated as hereunder and mentioned in Contract Data:

Milestones	Time for Completion (days)
a) Milestone 1	_____ days
b) Milestone 2	_____ days
c) Milestone 3	_____ days
d) Milestone 4	_____ days
e) Milestone 4	_____ days
f) Milestone 5	_____ days
g) Till Completion	_____ days
TOTAL	**660 Days**

[The Bidder shall provide, the Construction Schedule in the bar chart (CPM, PERT or any other to be specified herein) showing the sequence of work items and the period of time during which he proposes to complete each work item in such a manner that his proposed programme for completion of the whole of the Works and Sections of the Works may meet Employer's completion targets in days noted above and counted from the Commencement Date (Attach sheets as required for the specified form of Construction Schedule)]

D-1
Schedule-D to Bid

METHOD OF PERFORMING THE WORK

[The Bidder is required to submit a narrative outlining the method of performing the Work. The narrative should indicate in detail and include but not be limited to:

1. Organization Chart:

   Shall indicate head office and field office personnel involved in management and supervision, engineering, equipment maintenance and purchasing.

2. Mobilization:

   In Pakistan, the type of facilities including personnel accommodation, office accommodation, provision for maintenance and for storage, communications, security and other services to be used.

3. Method of executing the Works:

   The procedures for installation of equipment and machinery and transportation of equipment and materials to the site.]

E-1
Schedule-E to Bid

LIST OF MAJOR EQUIPMENT

[The Bidder will provide on Sheet E-2 of this Schedule *a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment.*

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Sheet E-3.]

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

E-2
Schedule-E to Bid

LIST OF MAJOR EQUIPMENT

Owned, Purchased or Leased

Owned Purchased or Leased	Description of Unit (Make, Model, Year)	Capacity HP Rating	Condition	Present Location or Source	Date of Delivery at Site	Period of Work on Project
1	2	3	4	5	6	7
a. Owned						
b. To be Purchased						
c. To be arranged on Lease						

E-3
Schedule-E to Bid

LIST OF MAJOR EQUIPMENT

Equipment details

Item of equipment		
Equipment information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment □ Owned □ Rented □ Leased □ Specially manufactured	
The following information shall not be applicable for equipment owned by the Bidder		
Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

[This Table shall be used for each item of Equipment separately]

F-1
Schedule-F to Bid

ORGANIZATION CHART
FOR THE
SUPERVISORY STAFF AND LABOUR

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

G-1
Schedule-G to Bid

LIST OF SUBCONTRACTORS

I/ We intend to subcontract the following parts of the Work to subcontractors. In my/ our opinion, the subcontractors named hereunder are reliable and competent to perform that part of the work for which each is listed.

Enclosed are documentation outlining experience of subcontractors, the curriculum vitae and experience of their key personnel who will be assigned to the Contract, equipment to be supplied by them, size, location and type of contracts carried out in the past.

Part of Works (Give Details)	Subcontractor (With Complete Address)
1	2

Note: *This package requires the engagement of specialized sub-contractors.* ***Specialized finishing works*** *to be executed by subcontractors pre-approved in writing by the Employer on the recommendation by the Engineer.*

H-1
Schedule-H to Bid

ESTIMATED PROGRESS PAYMENTS

Bidder's estimate of the value of work which would be executed by him during each of the periods stated below, based on his Programme of the Works and the Rates in the Bill of Quantities, expressed in thousands of PKR:

Quarter	Amounts (1,000 PKR)
1st	
2nd	
3rd	
4th	
5th	
6th	
7th	
8th	
9th	
10th	
Bid Price	

I-1
Schedule-I to Bid

CONSTRUCTION CAMP AND HOUSING FACILITIES

[The Bidder in accordance with Clause 6 of the Conditions of Contract shall provide description of his construction camp's facilities and staff housing requirements.

The Bidder shall list or explain his plans for providing these facilities for the service of the Contract as follows:

1. *Site Preparation (clearing, land preparation, etc.).*

2. *Provision of Services.*

a) Electrical power (expected power load, etc.).

b) Water (required amount and system proposed).

c) Sanitation (sewage disposal system, etc.)

3. *Construction of Facilities*

a) Contractor's Office. Workshop and Work Areas (areas required and proposed layout, type of construction of buildings, etc.).

b) Warehouses and Storage Areas (area required, type of construction and layout).

c) Housing and Staff Facilities (Plans for housing for proposed staff, layout, type of construction, etc.).

4. *Construction Equipment Assembly and Preparation (detailed plans for carrying out this activity).*

5. *Other Items Proposed (Security services, etc.)]*

Note:

The Contractor shall be responsible for pumps, electrical power, water and electrical distribution systems, and sewerage system including all fittings, pipes and other items necessary for servicing the Contractor's construction camp

J-1
Schedule-J to Bid

INTEGRITY PACT

DECLARATION OF FEES, COMMISSION AND BROKERAGE, ETC. PAYABLE BY THE BIDDERS/CONTRACTORS OF GOODS, SERVICES & WORKS IN CONTRACTS WORTH PAK. RS. 10.00 MILLION OR MORE

Contract No._____ Dated _____
Contract Value: _____
Contract Title: _____

…… [Name of Bidder/Contractor] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan (GoP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GoP through any corrupt business practice.

Without limiting the generality of the foregoing, [Name of Bidder/ Contractor] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.

[Name of Bidder/Contractor] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[Name of Bidder/Contractor] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, [name of Bidder/Contractor] agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [name of Bidder/Contractor] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

Name of Employer: ……	Name of Bidder/Contractor: ……
Signature: ……	Signature: …….
[Seal]	[Seal]

STANDARD FORMS

BS-1

FORM OF BID SECURITY

Security Executed on _____
(Date)

Expiry on _____
(Date)

Name of Surety with Address: _____

_____

Name of Principal (Bidder) with Address _____

_____

Penal Sum of Security PKR_____(Pak Rupees _____
_____)

Bid Reference No. _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal (Bidder) we, the Surety above named, are held and firmly bound unto_____
(hereinafter called the 'Employer') in the sum stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Bidder has submitted the accompanying Bid dated_____for _____
_____(*Particulars of Bid*) to the said Employer; and

(1) WHEREAS, the Employer has required as a condition for considering said Bid that the Bidder furnishes a Bid Security in the above said sum to the Employer, conditioned as under: that the Bid Security shall remain in force for a period fourteen (14) days beyond the Bid Validity date i.e., up to_____.

(2) that the Bid Securities of the Bidders except the lowest three will be returned by the Employer within twenty eight (28) days from the opening of Bids, provided a Bidder request for the return of its Bid Security, or on the expiry of original validity of Bid Security or as extended, whichever is earlier;

(3) that the Bid Security of the lowest three Bidders comprising the successful Bidder will be returned when the successful Bidder has furnished the required Performance Security; and

(4) that in the event of failure of the successful Bidder to furnish the required Performance Security, the entire said sum be paid immediately to the said Employer pursuant to IB.16 and IB.35 of the Instructions to Bidders for the successful Bidder's failure to perform.

NOW THEREFORE, if the successful Bidder shall, within the period specified therefor, on the prescribed form presented to him for signature enter into a formal Contract with the said Employer in accordance with his Bid as accepted and furnish within twenty eight (28) days of his being requested to do so, a Performance Security with good and sufficient surety, as may be required, upon the form prescribed by the said Employer for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified for its validity then this obligation shall be void and of no effect, but otherwise toremain in full force and effect.

BS-2

PROVIDED THAT the Surety shall forthwith pay the Employer the said sum upon first written demand of the Employer (without cavil or argument) and without requiring the Employer to prove or to show grounds or reasons for such demand, notice of which shall be sent by the Employer by registered post duly addressed to the Surety at its address given above.

PROVIDED ALSO THAT the Employer shall decide, whether the Principal (Bidder) has duly performed his obligations to sign the Contract Agreement and to furnish the requisite Performance Security within the time stated above, or has defaulted in fulfilling said requirements and the Surety shall pay without objection the said sum upon demand from the Employer forthwith and without any reference to the Principal (Bidder) or any other person.

IN WITNESS WHEREOF, the above bounden Surety has executed the instrument under its seal on the date indicated above, the name and seal of the Surety being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

SURETY
(Schedule Bank/Insurance Company)

WITNESS: Signature _____

1. _____ Name _____

_____ Title _____

Corporate Secretary (Seal) Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

PS-1

FORM OF PERFORMANCE SECURITY

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor with address: _____

_____

Name of Principal (Contractor) with address:_____

_____

Penal Sum of Security (*express in words and figures*) _____

_____

Letter of Acceptance No._____Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the _____ (hereinafter called the Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has accepted the Employer's above said Letter of Acceptance for_____

_____(*Name of Contract*) for the _____

_____(*Name of Project*).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause11, Defects After Taking Over, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We,_____(the Guarantor), waiving all objections and defense under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments

PS-2

and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall decide, whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above-bounden Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Guarantor
(Schedule Bank/ Insurance Company)

WITNESS: Signature _____

1. _____ Name _____

_____ Title _____

Corporate Secretary (Seal) Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

LOA-1

Letter of Acceptance

[Letter head paper of the Employer]

NAME OF CONTRACT:_____ CONTRACT

NUMBER:_____

TO:_____

Date:_____

Your Reference:_____

Our Reference:_____

We thank you for your Bid dated_____for the execution and completion of the Works comprising the above-named Contract and remedying of defects therein, all in conformity with the terms and conditions contained in the Contract.

We have pleasure in accepting your Bid for the Accepted Contract Amount of:

_____
[currency and amount in figures]

_____
[currency and amount in words]

In consideration of you properly and truly performing the Contract, we agree to pay you the Accepted Contract Amount or such other sums to which you may become entitled under the terms of the Contract, at such times and as prescribed by the Contract.

We acknowledge that this Letter of Acceptance creates a binding Contract between us, and we undertake to fulfil all our obligations and duties in accordance with the terms of this Contract.

Signature:_____

Signed by: _____

For and on behalf of:_____

Date:_____

CA-1

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____ (month) 20_____ between _____

_____(hereinafter called the "Employer") of the one part and_____(hereinafter called the "Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works, viz., _____ _____should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnessed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents, in the order of priority, after incorporating addenda, if any, except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement:
   a) This Contract Agreement;
   b) The Letter of Acceptance;
   c) The Letter of Bid;
   d) The Particular Conditions Part A - Contract Data;
   e) The Particular Conditions Part B - Special Provisions;
   f) The General Conditions;
   g) The Specifications Part A - Specific Provisions;
   h) The Specifications Part B - Technical Provisions;
   i) The Drawings;
   j) The Completed Schedules to Bid including Schedule of Prices;
   k) *[Employer to insert any other documents forming part of the Contract*]

   The addenda/corrigenda, if any, (Excluding part relating to Instructions to Bidders alongwith Bidding Data) shall be deemed to have been incorporated at the appropriate places in the "Documents forming the Contract".

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed on the day, month and year first before written in accordance with their respective laws.

Signature of Contactor	Signature of Employer
(Seal)	(Seal)
Signed, Sealed and Delivered in the presence of:	
Witness	Witness
(Name, Title and Address)	(Name, Title and Address)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

DAAB-1

DAAB Agreement

[*All italicized text and any text within square brackets (except sub-clause headings) in this form of agreement is for use in preparing the form and should be deleted from the final product*].

Name and details of the Contract _____

_____

This Agreement made the_____day of_____[*month*],_____[*year*], between

Name and contact details of the Employer _____(name)
_____(*address*)
_____(*telephone*)
_____(*email / other contact details*);

Name and contact details of the Contractor _____(name)
_____(*address*)
_____(*telephone*)
_____(*email / other contact details*);

Name and contact details of the DAAB Member _____(name)
_____(*address*)
_____(*telephone*)
_____(*email / other contact details*);

("**DAAB Agreement**")

Whereas:

A. the Employer and the Contractor have entered (or intend to enter) into the Contract;
B. under the Contract, the "**DAAB**" or "**Dispute Avoidance/Adjudication Board**" means the sole member or three members (as stated in the Contract Data of the Contract) so named in the Contract, or appointed under Sub-Clause 21.1 [*Constitution of the DAAB*] orSub-Clause 21.2 [*Failure to Appoint DAAB Members*] of the Conditions of Contract;
C. the Employer and the Contractor desire jointly to appoint the above-named DAAB Member to act on the DAAB as:
    a. the sole member of the DAAB, and where this is the case, all references to the "Other Members" do not apply; or
    b. one of three members / chairman [*delete the one which is not applicable*] of the DAAB and, where this is the case, the other two persons are:

DAAB-2

(name)	*(name)*
(address)	*(address)*
(telephone)	*(telephone)*
(email/ other contact details)	*(email/ other contact details)*

the "**Other Members**"; and

D. the DAAB Member accepts this appointment.

The Employer, Contractor and DAAB Member jointly agree as follows:

1. The conditions of this DAAB Agreement comprise:

   (a) Clause 21 [*Disputes and Arbitration*] of the Conditions of Contract, and any other provisions of the Contract that are applicable to the DAAB's Activities; and

   (b) the "General Conditions of Dispute Avoidance/Adjudication Agreement", which is appended to the General Conditions of the "Conditions of Contract for Construction" Second Edition 2017 published by FIDIC ("GCs"), as amended and/or added to by the following provisions.

2. [Details of amendments to the GCs, if any. For example:

   In the procedural rules annexed to the GCs, Rule _ is deleted and replaced by: " … "]

3. The DAAB Member shall be paid in accordance with Clause 9 of the GCs. The currency of payment shall be_____.

   In respect of Sub-Clauses 9.1 and 9.2 of the GCs, the amounts of the DAAB Member's monthly fee and daily fee shall be:

   monthly fee_____per month, and

   daily fee of_____per day

   (or as otherwise set under Sub-Clause 9.3 of the GCs).

4. In consideration of the above fees, and other payments to be made to the DAAB Member in accordance with the GCs, the DAAB Member undertakes to act as DAAB Member in accordance with the terms of this DAAB Agreement.

5. The Employer and the Contractor shall be jointly and severally liable for the DAAB Member's fees and other payments to be made to the DAAB Member in accordance with the GCs.

6. This DAAB Agreement shall be governed by the law of_____(if not stated, the law that governs the Contract under Sub-Clause 1.4 of the Conditions of Contract).

DAAB-3

SIGNED by:_____	SIGNED by:_____	SIGNED by:_____
Print name:_____	Print name:_____	DAAB Member
Title:_____	Title:_____	Title:_____
for and on behalf of the Employer	for and on behalf of the Contractor	
in the presence of	in the presence of	in the presence of
Witness:_____	Witness:_____	Witness:_____
Name:_____	Name:_____	Name:_____
Address:_____	Address:_____	Address:_____
_____	_____	_____
Date:_____	Date:_____	Date:_____

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

MG-1

FORM OF MOBILIZATION ADVANCE GUARANTEE/ BOND

Guarantee No._____Date _____

WHEREAS_____(hereinafter called the 'Employer')

has entered into a Contract for _____
(Particulars of Contract)
with_____(hereinafter called the "Contractor').

AND WHEREAS, the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Pak Rupees_____(PKR_____) which amount shall be advanced to the Contractor as per provisions of the Contract.

AND WHEREAS, the Employer has asked the Contractor to furnish Guarantee to secure the mobilization advance for the performance of his obligations under the said Contract.

AND WHEREAS, _____

(hereinafter called the "Guarantor") at the request of the Contractor and in consideration of the Employer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW, THEREFORE, the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails and commits default in fulfilment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.

Notice in writing of any default, on the part of the Contractor, of which the Employer at his discretion of making decision, shall be given by the Employer to the Guarantor, and on such first written demand, payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This Guarantee shall remain in force until the advance is fully adjusted against payments from the Interim Payment Certificates of the Contractor or until_____whichever is earlier.
(Date)

The Guarantor's liability under this Guarantee shall not in any case exceed the sum of PKR _____ (Pak Rupees _____ _____).

This Guarantee shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against payments from Interim Payment Certificates of the Contractor provided that the Guarantor

MG-2

agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted.

Guarantor
(*Scheduled Bank/ Insurance Company*)

WITNESS: Signature _____

1. _____ Name _____

_____ Title _____

Corporate Secretary (Seal) Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

CONDITIONS OF CONTRACT

CONDITIONS OF CONTRACT

The Conditions of Contract comprise two parts:

(a) General Conditions
(b) Particular Conditions

General Conditions

These Conditions are the "General Conditions" which form part of the "FIDIC Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer Second Edition (2017 Red book)" published by:

International Federation of Consulting Engineers
(Fédération Internationale des Ingénieurs – Conseils) – (FIDIC)
World Trade Center II - Geneva Airport
P. O. Box 311
CH-1215 Geneva 15
Switzerland
Email: fidic@fidic.org, fidic.pub@fidic.org
Website: https://fidic.org/bookshop

The successful Bidder after award of Works shall have to provide two (02) copies of above said "General Conditions" for incorporation in the Contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Particular Conditions

The Particular Conditions (PC) complement the General Conditions (GC) to specify dates, contractual requirements, and special circumstances related to the Works. The PC consists of two parts, Part A - Contract Data and Part B - Special Provisions. The provisions to be found in the Special Provisions (Particular Conditions - Part B) take precedence over the equivalent provisions found under the same Sub-Clause number(s) in the General Conditions, and the provisions of the Contract Data (Particular Conditions - Part A) take precedence over the Special Provisions (Particular Conditions - Part B).

Part A - Contract Data

Sub-Clause	Data to be Given	Data
1.1.27	Defects Notification Period (DNP):	365 days
1.1.31	Employer's name and address:	Securities and Exchange Commission of Pakistan NIC Building, 63 Jinnah Avenue Blue Area Islamabad
1.1.35	Engineer's name and address:	The Engineer of project will be notified in the letter of acceptance.
1.1.73	Sections:	*None*
1.1.84	Time for Completion:	660 days (22 Months) for whole of the Works
1.3(a)(ii)	Agreed methods of electronic transmission:	*[insert systems of electronic transmission, if any, at the time of signing of the Contract]*
1.3(d)	address of Employer for communications:	*Project Director/Head PMU,* *Add: Construction of SECP Head Office Building, Plot No. 25, Mauve Area, G-11/1, Islamabad.*
	address of Engineer for communications:	***The Engineer*** *Add: Construction of SECP Head Office Building, Plot No. 25, Mauve Area, G-11/1, Islamabad.*
	address of Contractor for communications:	_____ *[insert Contractor's address at the time of signing of the Contract]*
1.4	Contract shall be governed by the law of:	Islamic Republic of Pakistan
	Ruling language:	English

	Language for communications:	English

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sub-Clause	Data to be Given	Data
1.8	Number of additional paper copies of Contractor's Documents:	*Only via EPADS*
2.1	after receiving the Letter of Acceptance, the Contractor shall be given right of access to only those parts/floors/areas that are completed and further floors will be given access to upon completion gradually floor by floor within:	Immediately upon receipt of Notice to Commence.
2.4	Employer's financial arrangements	**Self-Financed**
3.2 (e)(ii)	Engineer's Duties and Authority	Variation resulting in an increase of the Accepted Contract Amount in excess of one percent (1%) subject to accumulative Variations not exceeding five percent (5%) of the Accepted Contract Amount
4.2	Performance Security (as percentage of the Accepted Contract Amount in Currencies) percent: currency:	Ten percent (10%) of Accepted Contract Amount in the form of a bank guarantee from local bank
4.2.1	List of Insurance Companies	Not Applicable
4.7.2	Period for notification of errors in the items of reference	Twenty-Eight (28) days
4.19	Period of payment for temporary utilities	each month
4.20	Number of additional paper copies of progress reports	*02 Nos. copies*
5.1(a)	Maximum allowable accumulated value of work subcontracted (as a percentage of the Accepted Contract Amount)	Thirty percent (30%)

Sub-Clause	Data to be Given	Data
5.1(b)	Parts of the Works for which subcontracting is not permitted	_____ *[Employer to provide his requirement according to the nature and complexity of the Works or state "None"]*
6.5	Normal working hours on the Site	*Eight (08) hours per day and 6 days in a week*
8.3	Number of additional paper copies of programmes	*three(03) copies*
8.8 & 14.15(b)	Delay Damages payable for each day of delay	10% of Awarded Cost divided by 660 days
8.8	Maximum amount of Delay Damages	Ten percent (10%) of the Accepted Contract Amount
8.14	Applicability of Incentives for Early Completion	No
10.1 & 10.2	Taking-Over of Works by Parts/Sections & as a Whole	Taking-Over may be issued either for the **Works as a whole**, or **by Sections/Parts**, as instructed by the Engineer and approved by the Employer from time to time during execution.
12.3	Percentage profit	Ten percent (10%)
13.4.(b)(ii)	Percentage rate to be applied to Provisional Sums for overhead charges and profit	Fifteen percent (15%)
14.2	Total Advance Payment	Fifteen percent (15%) of the Accepted Contract Amount excluding Provisional Sums payable in the currencies and proportions in which the Accepted Contract Amount is payable. The Advance payment shall be payable in the currency of the contract, in two equal parts. 1. First part within twenty (21) days after the Procuring agency/Employer receives the Advance Payment Certificates from the Engineer; and 2. Second part within forty-two (42) days from the date of payment of the first part, subject to the satisfaction of the Engineer as to the state of mobilization of the Contractor, payable

Not Applicable

		in the currency and proportion of the contract. Advance Payment Guarantee shall remain valid one month beyond the stipulated date of completion of Project. The Advance Payment Guarantee shall be progressively reduced to the balance amount of Advance indicated in the IPCs certified by the Engineer.
14.2.1	List of Insurance Companies	1. _____ 2. _____ 3. _____ *[insert list of Insurance Companies acceptable to the Employer as per criteria given in PC 14.2.1]*

Not Applicable

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Sub-Clause	Data to be Given	Data
14.2.3	Percentage deductions for the repayment of the Advance Payment	Deduction shall be made at the amortization rate of 17.5 % of the value of the Works executed of each IPC as provided in paragraph (i) of Sub-Clause GCC 14.3, starting from 2nd IPC provided that the advance payment shall be completely repaid prior to the time when 90% of the Accepted Contract Amount less Provisional Sums has been certified for payment. It may be more than 17.5% in the last instalment to ensure full repayment.
14.3	Period of Interim payment	50% Adhoc payment to be made within 10 working days and one month for balance amount. Deductions for Mobilization Advance, Retention Money, Applicable Taxes shall be made at the remaining payment stage.
14.3(b)	Number of additional paper copies of Statements	*Original plus one hard copy plus one electronic copy*
14.3 (iii)	Percentage of retention per IPC	Seven percent (7%)
14.3 (iii)	Limit of Retention Money (as a percentage of the Contract Price)	Five percent (5%)
14.5(b)(i)	Plant and Materials for payment when shipped	Plant and Materials under Bill of "Imported Plant and Materials" or _____ [*Employer shall list accordingly*].
14.5(c)(i)	Plant and Materials for payment when delivered to the Site	Plant and Non Perishable Materials _____ [*Employer shall list accordingly*].
14.6.2	Minimum amount of Interim Payment Certificate (IPC)	35 million _____
14.7(a)	Period of payment of Advance Payment to the Contractor	14 days
14.7b(i)	Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.6 [Interim Payment]	30 days

Sub-Clause	Data to be Given	Data
14.7b(ii)	Period for the Employer to make interim payments to the Contractor under Sub-Clause 14.13 (Final Payment)	56 days
14.7(c)	Period for the Employer to make final payment to the Contractor	56 days
14.8	Financing charges for delayed payment	KIBOR+3% per annum for local currency and SOFR (Secured Overnight Financing Rate) +1% per annum for foreigprn currency.
14.11.1(b)	Number of additional paper copies of draft Final Statements	02 Copies
14.15	Currencies of payment of Contract Price	Pak Rupees
14.15(a)(i)	Proportions or amounts of Local and Foreign currencies	as stated in the Table IV of Schedule A [*Schedule of Adjustment Data*]
14.15(c)	currencies and proportions for payment of Delay Damages	as stated in the Table IV of Schedule A [*Schedule of Adjustment Data*]
14.15(f)	rates of exchange	as stated in the Table IV of Schedule A [*Schedule of Adjustment Data*]
17.2(d)	Forces of nature, the risks of which are allocated to the Contractor	The Contractor is responsible for the safety of all works and shall be liable for any loss or damages caused to the awarded works.
19.1	Permitted deductible limits: i) insurance required for the Works ii) insurance required for Goods iii) insurance required forliability for breach of professional duty iv) insurance required against liability for fitness forpurpose (if any is required) v) insurance required for injury to persons and damage to property vi) insurance required for injury to employees vii) other insurances required by Laws and by local practice	i) Ten percent (10%) of loss amounton each & every loss ii) Nil iii) Nil iv) Nil v) Nil vi) Nil vii) Nil

Not Applicable
Not Applicable

Sub-Clause	Data to be Given	Data
19.1	Periods for submission of insurance: a) evidence of insurance b) relevant policies	Not later than the Commencement Date Within twenty-eight (28) day from the Commencement Date
19.2.1(b)	Additional amount to be insured (as a percentage of the replacement value)	15% of the replacement value (Accepted Contract Amount)
19.2.2	Extent of insurance required for Goods Amount of insurance required for Goods	from Ex-Works (i.e., works, factory, warehouse, etc) to delivery at the Site Full replacement value
19.2.3(a)	Amount of insurance required for liability for breach of professional duty	Full replacement value of the Works to be designed by the Contractor
19.2.3(b)	Insurance required against liability for fitness for purpose	Yes
19.2.3	Period of insurance required for liability for breach of professional duty	Until the date of issuance of Performance Certificate
19.2.4	Amount of insurance required for injury to persons and damage to property	Injury to person and Fatal case: in accordance with Workmen Compensation Act Damage to Property: 30 M
19.2.6	Other insurances required by Laws and by local practice	All insurances as applicable, to the extent of execution of the project, under Federal and Provincial laws of Islamic Republic of Pakistan
21.1	Time for appointment of the DAAB (Dispute Avoidance and Adjudication Board)	appointment of the DAAB shall be made when Dispute arises between the Parties or as per the mutual consent of the parties of the Contract

Sub-Clause	Data to be Given	Data
21.1	the DAAB shall comprise	**3 Members** _____ *[insert either "a sole Member" or "Three Members"]* *[For a Contract estimated to cost above PKR 2.5 billion, the DAAB shall comprise of three members. For a Contract estimated to cost between PKR 1 billion and PKR 2.5 billion, the DAAB may comprise of three members or a sole member. For a Contract estimated to cost less than PKR 1 billion, a sole member isrecommended.]*
21.1	List of proposed members of DAAB - Proposed by Employer - Proposed by Contractor	*[to be inserted at the time of signing of the Contract]* 1._____ 2._____ 3._____ 1._____ 2._____ 3._____
21.2	Appointing entity (official) for DAAB members	Chairman Pakistan Engineering Council (PEC) from the list of PEC approved arbitrators published at its website
21.6	Rules of Arbitration	PEC Rules of Conciliation and Arbitration or Pakistan Arbitration Act of 1940, if the former is inactive. The place of Arbitration shall be SECP Head Office Islamabad

Summary of Sections of the Works

Section Name/Description of parts of the Works that shall be designated a Section for the purposes of the Contract (Sub-Clause 1.1.73)	Value: Percentage* of Accepted Contract Amount (Sub-Clause 14.9)	Time for Completion (Sub-Clause 1.1.84)	Delay Damages (Sub-Clause 8.8)
A			
B			
C			

* These percentages shall also be applied to each half of the Retention Money under Sub-Clause 14.9.

Section Name/Description (Sub-Clause 1.1.73)	Time for Completion (Sub-Clause 1.1.84)	Incentives for Early Completion (Sub-Clause 8.14)
A		
B		
C		

Particular Conditions

Part B - Special Provisions

1.1 Definitions

1.1.76 "Specification"

Following is added at the end:

"and consists of two parts i.e.,

i) "Part A - Specific Provisions"; and

ii) "Part B - Technical Provisions"."

1.2 Interpretation

"and" is deleted from the end of sub-paragraph (i) and added at the end of sub-paragraph (j).

Sub-paragraph (k) is added:

"(k) The word "tender" is synonymous with "bid" the word tenderer with "bidder", the words "tender documents"with "bidding documents" and "Schedule of Prices" with "Bill of Quantities", as applicable."

1.5 Priority of Documents

The documents listed at (a) through (k) of this Sub-Clause are deleted and substituted with the following:

(a) the Contract Agreement;
(b) the Letter of Acceptance;
(c) the Letter of Bid;
(d) the Particular Conditions Part A - Contract Data;
(e) the Particular Conditions Part B - Special Provisions;
(f) the General Conditions;
(g) the completed Schedules to Bid including Bill of Quantities;
(h) the Specification Part A - Specific Provisions;
(i) the Specification Part B - Technical Provisions;
(j) the Drawings;
(k) the JV Undertaking (if the Contractor is a JV); and
(l) any other documents forming part of the Contract.

The addenda/corrigenda, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

2.1 Right of Access to the Site

Right of access to "only those parts/areas/floors that are completed and access to further floors/areas shall be given upon the Engineer's approval" *Immediately upon receipt of Notice to Commence."*. The partial, floor-by-floor handover and any overlapping logistical requirements with the Package-1 contractor shall not entitle the Contractor to any Extension of Time (EOT) under Sub-Clause 8.5, nor to any additional payment or compensation for extended site overheads, idle labor, or disrupted resource allocation.

3.1 The Engineer

In sub-paragraph (a) the text **"as defined in the Pakistan Engineering Council Act, 1975 (Act No. V of 1976)"** are added after the words **"professional engineer"**.

3.2 Engineer's Duties and Authority

The Engineer shall obtain the consent in writing of the Employer before taking action under the following Sub-Clauses of these Conditions:

(a) Consenting to the subcontracting of any part of the Works under Sub-Clause 5.1 [Subcontractors]

(b) Any action under Sub-Clauses 8.9 [Employer's Suspension] and 8.12 [Prolonged Suspension]

(c) Issuance of "Taking Over Certificate" under Sub-Clause 10.1 [Taking Over the Works and Sections].

(d) Issuing the "Performance Certificate" under Sub-Clause 11.9 [Performance Certificate].

(e) Sub-Clause 13.1 [Right to Vary]: instructing a Variation, except;

(i) in an emergency situation as determined by the Engineer, or

(ii) if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the Contract Data.

(f) Sub-Clause 13.3 [Variation Procedure]: approving a proposal for Variation submitted by the Contractor in accordance with Sub-Clause 13.3.2 [Variation by Request for Proposal] or 13.2 [Value Engineering].

(g) Certifying release of second half of the Retention Money under Sub-Clause 14.9 [Release of Retention Money].

(h) Issuing Final Payment Certificate under Sub-Clause 14.13 [Issue of FPC].

(i) The Engineer shall obtain the Employer's prior written consent before approving, accepting, or testing any material, equipment, mock-up, or sample submitted by the Contractor.

(j) If any item(s) missing in the Approved Manufacturers List is required for inclusion into permanent works, prior written consent regarding identifying, sampling, testing, approval of material/manufacturer must be obtained from the Employer. Notwithstanding the above, the materials/items in the Approved Manufacturers list shall be used.

Any such requirement shall not be applied to any action by the Engineer under Sub-Clause 3.7 [Agreement or Determination], as stated in Sub-Clause 3.2 [Engineer's Duties and Authority] of the General Conditions.

Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite

the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Employer.

Following is added after the words "the Employer's consent is required" in 4th paragraph:

stating that "the Employer's consent has been obtained for that specified authority"

4.2 Performance Security

4.2.1 Contractor's Obligations

The entity issuing the Performance Security and its form shall be as under:

The Performance Security shall be, at the option of the Contractor, issued in the prescribed form included in the Bidding Documents, by (a) a Scheduled Bank in Pakistan or (b) a foreignbank duly counter-guaranteed by a Scheduled Bank in Pakistan.

In case of Joint Venture, the Performance Security shall be in the name of the Joint Venture or in the name of Lead/either firm of the JV or in ratio of shares of the individual JV partners.

Not Applicable

Following paragraph is added at the end of this Sub-Clause:

"The amount of Performance Security shall be reduced to 50% following issue of the Taking-Over Certificate for the whole of the Works under Clause 10 of Conditions of Contract."

4.3 Contractor's Representative

In second paragraph the text "professional engineer as defined in the Pakistan Engineering Council Act, 1975 (Act No. V of 1976) (having temporary license in case of foreign engineer under Section 12 of the Pakistan Engineering Council Act, 1975 (Act No. V of 1976)" are added after the words "qualified, experienced".

In the 3rd paragraph the words "28 days" are substituted by "14 days". In 2nd line of 4th paragraph the text "or appoint a replacement" is substituted by "except appointment of a suitable temporary replacement is deployed at the Site"

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.4 Contractor's Documents

4.4.1 Mandatory Coordinated Services Drawings (CSD) and BIM Coordination / Clash Resolution

The Contractor shall be solely responsible for reviewing, verifying, and coordinating all Architectural, Structural, Electrical, Mechanical, Plumbing, Fire Fighting, ICT, ELV, and all other relevant design documents prior to execution of the Works. The Contractor shall promptly notify the Engineer of any discrepancies, conflicts, omissions, or inconsistencies identified during such review and shall not proceed with the affected Works until the Engineer's instructions have been obtained. Prior to the commencement of any overhead or concealed services installation, including works within false ceilings, risers, service shafts, plant rooms, and other congested areas, the Contractor shall prepare and submit comprehensive **Coordinated Services Drawings (CSDs)** and, where specified, **Building Information Modelling (BIM)-based coordinated models** integrating all relevant building services, including but not limited to HVAC ducts, chilled water piping, plumbing and drainage systems, fire fighting and sprinkler systems, electrical conduits, cable trays, bus ducts, ICT/ELV systems, and other associated services.

The Contractor shall undertake comprehensive BIM-based clash detection and coordination among all disciplines and shall resolve all identified clashes before commencing installation. The Contractor shall conduct coordination meetings with all specialist subcontractors as necessary to ensure complete integration of the Works.

No installation of any individual service shall commence unless the corresponding integrated CSD/BIM coordination model has been reviewed by the Engineer and a **Notice of No-Objection (NNO)** has been issued. Such review or issuance of an NNO shall not relieve the Contractor of any responsibility for the completeness, accuracy, coordination, constructability, or performance of the Works.

Any installation executed without the approved coordinated drawings or BIM coordination, or any work requiring modification due to inadequate coordination by the Contractor, shall be removed, rectified, and reinstated entirely at the Contractor's own cost and without any extension of time or additional payment.

No measurement, certification, or payment shall be made for overhead or concealed building services installed without the applicable coordinated drawings and the Engineer's Notice of No-Objection.

4.4.2 As-Built Records

First paragraph is deleted and the text in the last paragraph is substituted with the following:

"The Contractor shall furnish to the Engineer 6 copies, one reproducible and one electronic copy (provided the Engineer has made available to the Contractor editable form of the Drawings) of all Drawings amended to conform to the Works as built. In case the Engineer does not make available to the Contractor editable form of the Drawings, the Contractor shall furnish to the Engineer as-built data for incorporation in the Drawings. Upon receipt of PDF versions of the as-built drawings prepared by the Engineer, the Contractor shall furnish to the Engineer 6 copies and one reproducible of these Drawings. The price of such Drawings shall be deemed to be included in the Contract Price."

Following Sub-Clause is added:

4.4.4 Shop Drawings

The Contractor shall submit to the Engineer for review 3 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.

Review and approval by the Engineer shall not exceed 21 days and be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory and the Engineer's review or approval shall not relieve the Contractor of any of his responsibilities under the Contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

4.6 Cooperation:

Contractor's Sole Responsibility

The Contractor shall be solely responsible for planning, providing, operating, maintaining, relocating, and removing all temporary works, construction plant, lifting equipment, vertical transportation systems, material handling arrangements, concrete placement equipment, and all other facilities necessary for the proper execution and completion of the Package-2a Works. No reliance shall be placed upon the facilities established by any other contractor unless expressly permitted under this Clause.

(a) Independent Arrangements

For the purpose of pricing and execution of the Works, the Contractor shall assume that all temporary works and construction facilities required for its scope shall be independently arranged at its own cost, including, but not limited to:

- Passenger and material hoists;
- Tower cranes (if required);
- Mobile cranes and lifting equipment;
- Concrete pumps and concrete placing booms (if required);
- Scaffolding, staging and working platforms;
- Temporary access systems;
- Temporary electrical distribution, lighting and water supply;
- Material storage facilities; and
- Any other temporary works or construction plant required for execution of the Works.

The cost of providing, operating, maintaining and removing all such facilities shall be deemed to be included in the Contract Price, and no separate payment shall be made.

(b) Optional Shared Use of Package-1 Facilities

Notwithstanding Sub-Clause (a), the Contractor may, entirely at its own discretion and convenience, utilize certain temporary works or construction facilities installed by the Package-1 (Structural Works) Contractor, including passenger/material hoists, tower cranes, concrete placing booms, or other construction equipment, provided that:

i. such use is acceptable to the Package-1 Contractor;

ii. all commercial, operational, insurance and maintenance arrangements are agreed directly between the respective contractors without any involvement of the Employer or the Engineer; and

iii. such arrangements do not interfere with the progress, safety or contractual obligations of the Package-1 Works.

(c) Contractor's Sole Risk

Where the Contractor elects to utilize any facility provided by the Package-1 Contractor, such use shall be entirely at the Contractor's own commercial, operational and safety risk. The Contractor shall:

- maintain continuous coordination with the Package-1 Contractor;
- comply with all operating procedures and safety requirements established for the shared facilities;
- avoid interference with other contractors' activities; and
- remain fully responsible for the safety of its personnel, subcontractors, materials and equipment.

(d) Employer's Disclaimer

The Employer and the Engineer do not warrant or guarantee the availability, adequacy, capacity, suitability, operating condition or uninterrupted use of any temporary works, construction plant or facilities provided by other contractors.

Neither the Employer nor the Engineer shall bear any liability whatsoever arising from:

- unavailability of shared facilities;
- mechanical or electrical breakdown;
- maintenance shutdowns;
- scheduling conflicts;
- reduced operating capacity;
- access restrictions;
- operational delays; or
- damage or loss arising from the use of such facilities.

Accordingly, no delay, disruption, loss of productivity, idle resources, or additional cost arising from the Contractor's decision to utilize such shared facilities shall constitute grounds for any Extension of Time, additional payment, variation, disruption claim, prolongation cost or other entitlement under the Contract.

Inter-Contractor Coordination, Protection of Completed Works and Cross-Recovery of Costs

The Contractor acknowledges that the Works shall be executed concurrently with other contract packages within the Project. The Contractor shall plan and execute its Works in close coordination with all other contractors and shall cooperate fully to avoid interference, delay or damage.

(a) Inspection of Handed-Over Areas

Before commencing work in any area handed over by another contractor, the Contractor shall jointly inspect the relevant

structural elements, including slabs, beams, columns, walls, shafts, blockwork, embedded items and service openings.

Any defects, dimensional discrepancies, unfinished work or non-conformities shall be notified to the Engineer in writing within fourteen (14) days of access to the relevant area. Failure to provide such notice within the prescribed period shall constitute acceptance of the handed-over works for the purpose of commencement of the Contractor's activities, without relieving the original contractor of liability for latent defects.

(b) Protection of Existing Works

The Contractor shall adequately protect all completed works, finishes, installations and permanent structures from damage during execution of its Works and shall immediately repair, at its own cost, any damage caused by its personnel, subcontractors or suppliers.

No cutting, drilling, chasing, coring, demolition or modification affecting structural members shall be undertaken without the prior written approval of the Engineer.

(c) Liability for Damage

The Contractor shall be fully responsible for all loss or damage resulting from its activities to completed works executed by other contractors, including structural works, architectural finishes, MEP installations and permanent building components.

The Contractor shall promptly restore such damaged works to the satisfaction of the Engineer at its own cost.

(d) Cross-Recovery Between Contractors

Where the Engineer determines, based upon inspections, site records, photographs, correspondence or other contemporaneous evidence, that damage to completed works has been caused by a particular contractor, the Engineer may certify the reasonable cost of rectification.

The Employer shall be entitled to recover such certified cost by deduction from monies otherwise due or becoming due to the defaulting contractor under its Interim Payment Certificates or otherwise recoverable under the Contract.

Such recovery shall not relieve the defaulting contractor of any further contractual liability arising from its actions, nor prejudice any other rights or remedies available to the Employer under the Contract.

4.8 Health and Safety Obligations

The following text is added at the end of this Sub-Clause:

In the event of work being carried out outside the normal working hours and in the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer.

4.20 Progress Reports

At the end of sub-paragraph (g) the word "and" is deleted and at the end of sub-paragraph (h) the full stop (.) is replaced with ";", and the following new sub-paragraphs are added as:

(i) planned programme for the execution of the Works for next 56 days to enable the Engineer to determine its programme of inspection and testing;

(j) monthly summery of daily job record indicating weather conditions, deployment of Contractor's Equipment, labour employment, local material procurement and material import, if any; and

(k) salient contractual and project information.

5.1 Subcontractors

Add the following text at the end of paragraph (ii):

"under Schedule to Bid"

The following is added at the end of the last paragraph of Sub-Clause 5.1:

"All subcontracts relating to the Works shall include provisions which entitle the Employer to require the subcontract to be assigned to the Employer under sub-paragraph (a) of Sub- Clause 15.2.3 [*After Termination*].

The Contractor shall give reasonable opportunity to contractors from Islamic Republic of Pakistan for subcontracts for the Works, and endeavor to employ such contractors as Subcontractors."

5.2 Nominated Subcontractors

5.2.2 Objection to Nomination

In sub-paragraph (c), "and" is deleted from the end of (i);

"." at the end of (ii) is replaced with: ", and".

The following is then added as (iii):

"(iii) be paid only if and when the Contractor has received from the Employer payments for sums due under the Subcontract referred to under Sub-Clause 5.2.3 [*Paymentto nominated Subcontractors*]."

6.1 Engagement of Staff and Labour

The following paragraph is added at the end of the Sub-Clause:

"The Contractor shall, to the extent practicable and reasonable, employ staff (not less than 50%) and labour (not less than 85%) with appropriate qualifications and experience from sources within the Islamic Republic of Pakistan."

6.7 Health and Safety of Personnel

The existing text is substituted with the following:

"In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorize or direct and the Contractor shall take orcause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose. The Contractor shall alsoprovide all other medical services and appoint a health and safetyofficer at Site if stated in the Specifications. In case of anyfatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means."

6.8 Contractor's Superintendence

Insert at the end of sub-paragraph (a) of this Sub-Clause:

"or, if not, the Contractor shall make competent interpreters available during all working hours, in a number sufficient for those persons to properly perform their superintendence duties"

The following text is added at the end of this Sub-Clause:

"The Contractor's authorized representative and his other engineers working at site shall possess valid registration with the Pakistan Engineering Council.

The Contractor's authorized representative at Site shall be authorized to exercise adequate administrative and financial powers on behalf of the Contractor so as to achieve completion of the Works as per the Contract."

6.12 Key Personnel

The following is inserted at the end of the last paragraph:

"If any of the Key Personnel are not fluent in this language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer."

The following Sub-Clauses 6.13 to 6.26 are added at the end of Sub-Clause 6.12:

6.13 Foreign Personnel

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use all reasonable endeavours in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.

Not Applicable

The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

6.14	**Supply of Foodstuffs**	The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.
6.15	**Supply of Water**	The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.
6.16	**Measures against Insect and Pest Nuisance**	The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.
6.17	**Alcoholic Liquor or Drugs**	The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereto by Contractor's Personnel.
6.18	**Arms and Ammunition**	The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.
6.19	**Festivals and Religious Customs**	The Contractor shall respect the Country's recognized festivals, days of rest and religious or other customs.
6.20	**Funeral Arrangements**	The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for anyof its local employees who may die while engaged upon the Works.
6.21	**Forced Labour**	The Contractor, including its Subcontractors, shall not employ or engage forced labour which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntaryor compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.
6.22	**Child Labour**	The Contractor, including its Subcontractors, shall not employ or engage child labour in accordance with relevant law(s) in force in Islamic Republic of Pakistan.

6.23 Employment Records of Workers

The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [*Contractor's Records*].

6.24 Workers' Organizations

The Contractor shall comply with the relevant labour laws of Pakistan which recognize workers' rights to form and to join workers' organizations/Trade Union of their choosing and to bargain collectively without interference.

6.25 Non-Discrimination and Equal Opportunity

The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment of Contractor's Personnel on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits),working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices.

Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide protection and assistance as necessary to ensure nondiscrimination and equal opportunity, including for specific groups such as women, persons with disabilities, migrant workers and children (of working age in accordance with Sub-Clause 6.22).

6.26 Epidemics

In the event of any out-break of illness of epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government or the local medical or sanitary authorities for the purpose of overcoming the same.

7.2 Samples:

Architectural Sample & Mock-Up Approval Protocol

Prior to mass ordering or procurement of typical finishes, the Contractor shall construct full-scale, on-site **Mock-Up Rooms** (e.g., a typical executive office, public washroom cubicle, and typical corridor section) showing finalized paint finishes, acoustic tiles, installed lights, and sanitary fittings. Mass execution shall only proceed once these mock-ups receive written approval from the Employer and the Engineer. Approved mock-ups shall serve as the minimum quality baseline for the contract."

7.7 Ownership of Plant and Materials

The following is added before the first paragraph:

"Except as otherwise provided in the Contract,"

The following is added at the end of the Sub-Clause:

"No Plant and/or Materials that is the property of the Employer shall be removed from the Site. If it becomes necessary to:

(i) remove any item of such Plant from the Site for the purposes of repair, the Contractor shall give a Notice, with reasons, to the Engineer requesting consent to remove the defective or damaged item off the Site. This Notice shall clearly identify the item of defective or damaged Plant, and shall give details of: the defect or damage to be repaired;the place to which defective or damaged item of Plant is to be taken for repair; the transportation to be used (and insurance cover for such transportation); the proposed inspections and testing off the Site; and the planned duration required before the repaired item of Plant shall be returned to the Site. The Contractor shall also provide any further details that the Employer may reasonably require; or

(ii) replace any item(s) of such Plant and/or Materials, the Contractor shall give a Notice, with reasons, to the Engineer clearly identifying the item(s) of Plant and/or Materials to be replaced, and giving details of the due date of delivery to the Site of the replacement item(s).

Where any item of Plant and/or Materials has become the property of the Employer under this Sub-Clause before it has been delivered to the Site, the Contractor shall ensure that such an item is not moved except for its delivery to the Site.

The Contractor shall indemnify and hold the Employer harmless against and from the consequences of any defect in title or encumbrance or charge (except any reasonable restriction arising from the intellectual property rights of the manufacturer or producer) on any item of Plant and/or Materials that has become the property of the Employer under this Sub-Clause."

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

The following Sub-Clause 7.9 is added after Sub Clause 7.8:

7.9	**Use of Pakistani Materials and Services**	The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.
8.1	**Commencement of Works**	The following is added before the first paragraph: "After signing of the Contract Agreement by both Parties," and thereafter the word "The" is replaced with the word "the".
8.5	**Extension of Time for Completion**	The following is added after paragraph (c): "for last five years".

The following Sub-Clause 8.14 is added after Sub-Clause 8.13:

8.14	**Incentives For Early Completion**	If Contract Data does not state applicability of incentives for early completion, this Sub-Clause shall not apply. The Contractor shall be entitled subject to Sub-Clause 20.2 [*Claims for Payment and/or EOT*] to bonus payment if the Works and/or each Section is completed earlier than the Time for Completion for the Works or Section (as the case may be). The amount of bonus for early completion of the Works and/or each Section shall be upto a limit and at a rate to 50% of the relevant limit and rate of delay damages prescribed in Contract Data and shall be paid for every day which shall elapse between the relevant Date of Completion of the Works or Section and the relevant Time for Completion. For the purposes of calculating any bonus payment, the applicable Time for Completion stated in the Contract Data is fixed and no adjustments of this time by reason of granting an EOT will be allowed.

The following Sub-Clause 11.12 is added after Sub-Clause 11.11:

11.12 Supervisory Assistance During DNP

If provided under the Schedule of Prices, the Contractor shall provide supervisory assistance to the Employer during the DNP for the Works. Such supervisory assistance shall be as described in the Specification for the purpose of supporting the Employer's operation and maintenance of the Plant for the period specified in the Schedule of Prices after the Date of Completion.

12.2 Method of Measurement

The following paragraph is added at the end of the Sub-Clause:

"Summary of measured quantity for payment shall be delineated item-wise under four heads namely; "Schedule of Prices Quantity", "Quantity Executed To-date", "Quantity Certified Previously" and "Net Quantity Executed under this Certificate".

12.3 Valuation of the Works

The following text is added at the end of fifth paragraph of the Sub-Clause:

"Sum of overhead charges and profit for sub-paragraph (a) shall be Fifteen percent (15%)".

13.4 Provisional Sums

The following paragraph is inserted as the penultimate paragraph:

"The Provisional Sum shall be used to cover the Employer's share of the DAAB members' fees and expenses, in accordance with Clause 21. No prior instruction of the Engineer shall be required with respect to the work of the DAAB. The Contractor shall submit the DAAB members' invoices and the satisfactory evidence of having paid 100% of such invoices as part of the substantiation of those Statements submitted under Sub-Clause 14.3.

13.6 Adjustments for Changes in Laws

The following paragraphs are added at the end of the Sub- Clause:

"Notwithstanding the foregoing, the Contractor shall not be entitled to an extension of time if the relevant delay has already been taken into account in the determination of a previous extension of time and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the Table of Adjustment Data in accordance with the provisions of Sub-Clause 13.7 [*Adjustments for Changes in Cost*]."

14.1 The Contract Price

The following is added at the end of the Sub-Clause:

"Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts,imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the port of entry an approved re-export bond or bank guarantee, valid until the Time for Completion plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment andspare parts, and callable in the event the Contractor's Equipment is not re-exported from the Country on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the Employer upon the importation of individual items of Contractor's Equipment and spare parts. Upon re-export of individual items of Contractor's Equipment or spare parts, or upon the completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment and spare part to be re-exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable Laws. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to re-exported; and (b) on the initial imported valueof the Contractor's Equipment and spare parts remaining in the Country after completion of the Contract. Upon payment of suchdues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise,the security shall be called in the full amount remaining."

14.2 Advance Payment

14.2.1 Advance Payment Guarantee

The entity issuing the Advance Payment Guarantee and its form shall be as under:

The Advance Payment Guarantee shall be in the form of Guarantee issued by (a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in

Pakistan.

14.5(a)(iv) Plant and Materials intended for the Works

The Contractor shall obtain in advance prior consent in written from the Engineer/Employer before procurement of material. Notwithstanding the above, no secure advance statement/claim will be entertained.

14.6 Issue of IPC

14.6.1 The IPC

In the first line of the 1st paragraph the words "28 days" are substituted by "14 days".

Add this paragraph at the end of this sub-clause "The Employer have the right to amend or change the Interim Payment Certificate (IPC) and/or the monthly Statement in accordance with the Contract. In the event of any such change or amendment made by the Employer in the IPC, the Engineer shall be notified accordingly in writing."

14.7 Payment

The words "or through crossed cheque in favour of the Contractor or JV partners. The Payment to JV partners shall be made at the request of the Joint Ventures in the ratio of their shares specified by them" are added at the end of theSub-Clause.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

14.8 Delayed Payment

In the first paragraph, third line, the words "compounded monthly" are deleted.

The text of 2nd paragraph is deleted and substituted with the following:

"The Employer shall pay to the Contractor compensation at the rate stated in the Contract Data."

15.2 Termination for Contractor's Default

15.2.1 Notice

Following text is added at the end of sub-paragraph (h) of this Sub-Clause:

"For the purposes of this Contract, corrupt and fraudulent practices have been defined in Public Procurement Rules 2004."

15.2.1(c) Failure to Proceed with the Works
The Contractor fails to comply with, or proceed with, the Works in accordance with Clause 8 [Commencement, Delays and Suspension], including failure to maintain the Rate of Progress necessary to achieve the Time for Completion.

For the purposes of this Sub-Clause, the Contractor shall be deemed to have failed to proceed with the Works where:

(i) the actual cumulative physical progress falls behind the approved Baseline Programme by more than **15%** of the planned cumulative progress, or by **60 calendar days**, whichever occurs first; and

(ii) following receipt of a notice from the Engineer requiring corrective measures pursuant to Clause 8, the Contractor fails to recover the delay or submit and effectively implement an acceptable recovery programme within **28 days**; and

(iii) such default materially endangers timely completion of the Works.

The above circumstances shall constitute a substantial failure to proceed with the Works and shall entitle the Employer, after giving the notice required under this Clause, to terminate the Contract for Contractor's Default.

15.2.3 After Termination

The word "and" at the end of sub-paragraph (ii) of paragraph (b) is deleted the following paragraph is added after sub-paragraph (iii):

"(iv) all Employer-Supplied Materials and/or Employer's Equipment made available to the Contractor in accordance with Sub-Clause 2.6 *[Employer-Supplied Materials and Employer's Equipment],* and"

15.4 Payment after Termination

The following text is added at the end of this Sub-Clause:

"The Employer shall be entitled to sell any of the Contractor's Equipment, Temporary Works and unused materials and apply the proceeds of sale towards payment of any debt due from the Contractor to the Employer under this Clause including any outstanding payments to the Subcontractors.

16.2 Termination by Contractor

16.2.1 Notice

The sub-paragraph (j) is deleted in its entirety.

At the end of sub-paragraph (i) "; or" is replaced with "." and at the end of sub-paragraph (h) ";" is replaced with "; or".

In sub-paragraph (f) "84 days" are replaced with "180 days" and text "for reasons not attributable to the Contractor" is added at the end.

16.3 Contractor's Obligations After Termination

Sub-paragraph (c) is deleted and replaced with:

"(c) deliver to the Engineer all Employer-Supplied Materials and/or Employer's Equipment made available to the Contractor in accordance with Sub-Clause 2.6 *[Employer-Supplied Materials and Employer's Equipment];* and

(d) remove all other Goods from the Site, except as necessary for safety, and leave the Site."

17.1 Responsibility for Care of the Works

After the two instances of "Goods" in the last paragraph, the words "Employer-Supplied Materials and/or Employer's Equipment" are added.

The following Sub-Clause 17.7 is added after Sub-Clause 17.6:

17.7 Use of Employer's Accommodation/ Facilities

The Contractor shall take full responsibility for the care of the items of the Employer's facilities and/or accommodation, if any, as detailed in the Specification, from the date of use and/or occupation by the Contractor until the date on which such use and/or occupation is re-vested in the Employer.

If any loss or damage happens to any of the above items during atime while the Contractor is responsible for its care, arising fromany cause other than a cause for which the Employer is responsible or liable, the Contractor shall promptly rectify the loss or damage at the Contractor's risk and cost.

18.1 Exceptional Events

The words "or disorder" are replaced with "disorder or sabotage" in sub-paragraph (c) of the Clause.

18.4 Consequences of an Exceptional Event

If the Contractor is the affected Party and suffers delay and/or incurs Cost by reason of the Exceptional Event of which he/she gave a Notice under Sub-Clause 18.2 [Notice of an Exceptional Event], the Contractor shall be entitled subject to Sub-Clause 20.2 [Claims For Payment and/or EOT] to:

(a) EOT; and/or

(b) If the Exceptional Event is of the kind described in sub-paragraphs (a) to (e) of 18.1 [Exceptional Events] and, in the case of sub-paragraphs (b) to (e) of that Sub-Clause, occurs in the Country, payment of such Cost.

The following is added at the end of sub-paragraph (b) after deleting the ".":

", including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Exceptional Events, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 19.2 [*Insurance to be provided by the Contractor*]."

18.5 Optional Termination

In sub-paragraph (c), the words "and necessarily" are added after the words "was reasonably".

19.1 General Requirements

Following text is added at the end of first paragraph:

"The Contractor shall immediately after the date of the Letter of Acceptance submit the draft of insurance policies for the Employer's consent."

Following text is added at the end of third paragraph:

"The Contractor shall, within the respective periods stated in the Contract Data submit to the Engineer and the Employer a) evidence that the insurances described in this Clause have been effected, and b) copies of policies of the insurances described in Sub-Clauses 19.2.1, 19.2.4 and 19.2.5."

19.2 Insurance to be provided by the Contractor

19.2.5 Injury to employees

The words "sickness, disease" are deleted in the fourth line of firstparagraph:

The Contractor shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising out of the execution of the Works in respect of injury, ~~sickness, disease~~ or death of any person employed by the Contractor or any of the Contractor's other personnel.

The Employer and the Engineer shall also be indemnified under the policy of insurance, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel.

The insurance shall be maintained in full force and effect during the whole time that the Contractor's Personnel are assisting in the execution of the Works. For any person employed by a Subcontractor, the insurance may be effected by the Subcontractor, but the Contractor shall be responsible for the Subcontractor's compliance with this Sub-Clause.

The following Sub-Clause is added after Sub-Clause 19.2.6:

19.2.7 Insurance Company

The Contractor shall be obliged to place all insurances described in this Clause with **M/s National Insurance Company Limited (NICL)** and rated by PACRA/VIS of rating as provided in Table below:

Accepted Contract Amount (Million PKR)	Minimum Rating of Insurance Companies
Up to 1000	A (+)
1001 to no limit	AA

The following Sub-Clause is added after Sub-Clause 19.2.7:

19.2.8 Workman Compensation Policy

The Contractor must secure a proper Workmen's Compensation Policy exclusively from M/s National Insurance Company Limited (NICL). This policy should enable the Contractor to compensate their employees for work-related injuries, as well as provide suitable compensation to the dependents in case of unfortunate death or permanent and total disablement of an employee. The Client bears no liability in this regard. For all publicly financed CAR/EAR projects, the Contractor must engage M/s NICL, ensuring compliance with Section-166 of the Insurance Ordinance, 2000. This applies specifically to Contractors All Risk/Erection All Risk Policies related to the construction, renovation, or maintenance of 'public property'. Additionally, the Contractor is responsible for indemnifying the Client as well as the Consultant staff against any third-party claims arising from accidents or injuries that occur at the site during the execution of works.

21.6 Arbitration

The word "international" is deleted in the sixth line of first paragraph. The text of sub-paragraph (a) is substituted with the following:

"the Dispute shall be finally settled under the Rules of Arbitration, specified in the Contract Data;"

The following Clauses are added after Clause 21

23 Taxes

The Contractor, Subcontractors and their employees shall beliable to pay income tax, withholding tax, super tax and other taxes on income arising out of the Contract. The rates and prices as stated in the contract shall be deemed to cover all such taxes.

24 Integrity Part

If it is found and established at any stage that the Contractor or any of his Subcontractors, agents or servants have violated or involved in violation of the Integrity Pact signed by the Contractor then the Employer shall be entitled to :

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agent or servants;

(b) terminate the Contract; and

(c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agent or servants.

The termination under sub-paragraph (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clause 15.1 to 15.4 and the payment under Sub-Clause 15.4 shall be made after having deducted the amounts due to the Employer under sub-paragraph (a) and (c) of this Sub-Clause.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SPECIFICATIONS
PART A - SPECIFIC PROVISIONS

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

v

TABLE OF CONTENTS OF SPECIFIC PROVISIONS

SP. No.	Description
SP-1	The Site
SP-2	Work Under the Contract
SP-3	Work by Others
SP-4	Care and Handling of Water
SP-5	Drawings
SP-6	Physical and Other Data Available to Contractor
SP-7	Layout of Work and Surveys
SP-8	Approval of Materials and Equipment
SP-9	Contractor's Quality Assurance Plan
SP-10	Construction Schedule
SP-11	Facilities Provided by the Employer
SP-12	Construction Camps and Colonies
SP-13	Other Facilities for Engineers and Employers Personnel
SP-14	Equipment Furnished by the Employer
SP-15	Cooperation with other Contractors
SP-16	Safety and Health
SP-17	Construction Utilities
SP-18	Traffic, Roads, Bridges
SP-19	Rock Quarries
SP-20	Flood Warning System
SP-21	Environmental Protection
SP-22	Standards of Countries other than those Specified
SP-23	Progress Reports and Photographs
SP-24	Unit Price Breakdown

Sp. No.	Description
SP-25	Transport and Handling of Cargo
SP-26	Directed and Required
SP-27	Communications to the Engineer
SP-28	Any Other Provision
SP-29	Measurement and Payment – General
SP-30	Measurement and Payment

1. THE SITE

Site of Works is the area for construction lying within the line of boundaries and limits shown on the Drawings and any such additional areas adjacent thereto as may be designated by "The Engineer" from time to time for the construction to be performed under the contract and all such areas and additional areas shall be comprised in the site defined in clause 1 Conditions of Contract.

The Employer will give to the contractor, possession of the area designated and defined as "the site" only completed floors/areas will be given access to and possession of site will be gradual floor-by-floor wise subject to the Engineer's instructions when The Engineer' Notice to Commence the Work is given.

2. WORK UNDER THE CONTRACT

The contract comprises the execution and completion of the works, remedying of any defects therein maintenance of utility services and the provisions of all labor, materials equipment plant and everything whether of a temporary or permanent nature required in the such execution, completion, remedying and maintenance so far as the necessity for providing the same is specified or can reasonably be inferred from the Contract.

The carrying out of all work included in the Contract is to be supervised by a sufficient number of qualified representatives of the Contractor and full facilities and assistance are to be afforded by the Contractor for the Engineer or his Representative to check and examine the execution of the work.

The Engineer reserves the right to inspect all parts of the works but may at his discretion waive inspection on certain items. This shall in no way absolve the Contractor from his responsibilities. This particularly applies to the checking of materials, the accurate setting out of foundations, and to the leveling, setting and aligning of the various parts, and to the proper fitting and adjustment of manufactured and finished materials and fixtures in position.

The Contractor shall submit to "The Engineer" in due time for approval and discussion, his proposals and plans as to the method and procedure to be adopted for the temporary and permanent works involved.

Submission of the proposals & plans, methodology and procedure for execution of works and approval thereof by the Engineer shall not relieve the Contractor of his responsibilities and duties under the Contract.

If the Engineer or his Representative find that the work progress is slow in such a way that the works or parts thereof will not be completed in the time specified, then he shall order the Contractor to work overtime or in shifts and the Contractor shall comply. These arrangements will be free of all financial encumbrances and at no additional costs to the Employer.

In the event of night work, the Contractor shall provide sufficient and adequate lighting to the satisfaction of the Engineer or his Representative and shall supply the necessary manpower for satisfactory continuation of the work after normal hours.

3. PROJECT FEATURES

SECP Head office Building

4. CARE AND HANDLING OF WATER

The Contractor shall take all necessary measures to prevent water from the Site causing a nuisance on or, in any neighboring land or property either by causing flooding or by depositing sediment on the surface of the ground or in drains or watercourses. Wherever necessary to prevent this, the Contractor shall construct temporary drainage channels, layer sumps and traps (in addition to those shown on the Contract) discharging into existing drain, ditches or watercourses. The Contractor snail removes over all sediment, which may accumulate on any land or in any drains, ditches or watercourses or in any other property as a result of his operations.

All works including those below sub-soil standing water level shall be carried out in the dry unless specified otherwise. The Contractor's arrangements for controlling the inflow of water into the parts of the excavation being worked and during the placing of concrete and other works therein and for the collection and disposal of water shall be to the Engineer's Approval. Such arrangements may include interalia temporary cofferdams, well-point systems, pumps; drains trenches, flumes and other recognized means. All Costs and charges in dealing with water in any way whatsoever and the effects thereof will be deemed to be included in the Contract Price and in the unit rates or prices of the Contractor for excavations.

Water flowing into excavations shall be carried by trenches, drainage layers or open jointed drains to sumps from which it shall be pumped. Such trenches drains or sands shall generally be clear of the Permanent Works unless approved otherwise by the Engineer. If the Approval of the Engineer for trenches drains or sumps are excavated under or immediately adjacent the Permanent Works, these shall comprise open-jointed pipes with gravel mounds. When no longer required and when approved by the Engineer they shall be filled with a cement /sand grout injected under pressure so as to fill the pipe and all voids completely.

The Contractor shall keep all surfaces upon or against which concrete is to be deposited free from running water and no concrete shall be placed until such surfaces are properly drained. Suitable precautions shall be taken to prevent running water from washing out cement or concrete while it is setting or from injuring the Works in any other way.

Notwithstanding the Approval by the Engineer of the Contractor's methods of dealing with water, the Contractor shall be responsible for and accept all the risks and liabilities of dealing with water from whatever source and of all effects thereof.

5. DRAWINGS

- **Tender Drawings**

  Tender Drawings issued with the Tender Documents called Tender Drawings; show scope of the work to be performed by the contractor. The Drawings are generally in sufficient details so as to be used as a basis for construction and fabrication.

- **Construction Drawings, Supplementary Drawings**

  After award of Contract, the Engineer will issue Construction Drawings to the Contractors.

  The Engineer shall have authority to issue the Contractor, from time to time, such supplementary Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and completion of the Works and the remedying of any defect therein. The Contractor shall follow these drawings.

  The Contractor shall give notice to the Engineer regarding the part of the Drawings which is in

his opinion contains discrepancies or are not clear. The Engineer shall issue necessary clarification or supplementary Drawing in greater details as required to execute the works. These supplementary Drawings shall be reviewed by the Engineer for his determination of adjustment of the Contract Price under Clause 51 and 52 of Conditions of Contract.

- **Definition of Term Drawings**

  The term used in the specifications means the Drawings referred in Clause 5.1 and 5.2 hereof.

- **Checking of Drawings**

  The contractor shall check all drawings carefully as soon as practicable after receipt thereof, and shall promptly notify the Engineer of any errors discovered.

- **Copies of Drawings**

  Drawings will be issued to the contractor as described below.

- **Tender Drawings**

  One (1) set of the Tender Drawings will be issued to the Contractor along with Tender Document. Additional sets will be provided at cost of reproduction upon written request of the contractor.

- **Construction Drawings/ Supplementary Drawings**

  One (1) print of each Construction Drawings/ Supplementary drawings will be issued to the contractor free of charge. Additional sets will be provided at cost of reproduction upon written request of the Contractor.

- **Drawings to be furnished by the Contractor/As-Built Drawings**

  The contractor shall submit to the Engineer for review of such drawings as required under the contract sufficient in advance of the work intended to be executed.

  The contractor shall, at all times, keep on site a separate set of prints on which all significant changes between the work shown on the drawings and the which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. The Sub-contractor(s) for plumbing, mechanical and electrical shall at all times, keep in site, a separate set of prints of the drawings (showing their parts of the Works) on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progress. Such drawings shall show the exact physical location and configuration of the works as actually installed.

  The contractor shall within fourteen (14) days of issuance Taking-Over Certificate for whole of the Works furnished to the Engineer for his approval two (2) copies of such marked up drawings. One (1) copy of each of the marked-up drawings approved by the engineer shall be returned to the contractor by the Engineer and these shall be used for the preparation of the AS-BULIT Drawings.

  The contractor shall furnish to the Engineer Six (6) Complete Sets of all AS-BUILT Drawings as well as AutoCAD soft copy within 30 Days of receipt of drawings stated above, from the Engineer.

6. PHYSICAL AND OTHER DATA AVAILBLE TO CONTRACTOR

Drawings and information pertaining to existing project conditions are furnished for reference.

Neither the Employer nor the Engineer warrants the adequacy or correctness of these. The Contractors are encouraged to visit the project site to assess the existing site conditions.

7. LAYOUT OF WORKS AND SURVEY

The Contractor shall establish benchmarks and / or reference line at the Site in accordance with the instructions of the Engineer. The Contractor shall set out its work from these benchmarks and lines. The Contractor shall supply plant, equipment, materials and labor for checking if required of the

survey control by the Engineer. Slope stakes will be set by the Contractor before commencement of excavation and will be re-established as required during progress of work using established bench-marks and reference points.

The Engineer may make checks as the work progress to verify lines and grades established by the Contractor and to determine the conformance of the work as it progresses with the requirements of the Drawings and Specifications. Such checking by the Engineer shall not relieve the Contractor of his responsibility to perform all work in accordance with the Drawings and Specifications and the lines and grades given therein.

Based upon the basic control, the Contractor shall provide his own primary control points, as needed for the Works, and shall preserve and maintain them until otherwise authorized.

The Contractor shall be responsible for maintaining all survey markers/monuments, and property corners. If any markers/monuments are destroyed by the Contractor, the Contractor shall arrange, at his own cost, to retrace and replace them to the entire satisfaction of the Engineer. If a monument cannot be replaced in its original position, the Contractor shall install a witness corner. The Contractor shall complete and file monument reference cards on all monuments as per instructions of the Engineer.

The Contractor shall provide experienced Construction Surveyors with adequate experience in the construction surveys similar in nature as required by this Contract.

Based upon established basic control monuments the Contractor shall establish all lines and grades necessary to control the Works, and shall be responsible for all measurements that may be required for execution of the Works to the tolerance prescribed below.

The Contractor shall perform such surveys and computations as are necessary to determine quantities of work performed or placed during each progress payment period, and shall also perform all surveys necessary for the Engineer to determine final quantities of work in place. The Engineer will determine final quantities based on original ground levels determined by the Contractor and agreed by the Engineer.

The Contractor shall notify the Engineer at least 24 hours before performing a quantity survey and, unless specifically waived, quantity surveys shall be performed in the presence of an authorized representative of the Engineer. Degree of accuracy for the survey works shall satisfy the following specified tolerances:

a) Structure points shall be set within 0.01 foot accuracy from point to point, except where tighter tolerances are required.
b) Cross-section points shall be located within 0.10 foot, horizontally and 0.01 foot vertically.
c) Permissible closing error for a levelling line meant for establishing

Temporary Bench Mark (TBMs) shall not exceed $0.045 \times \sqrt{M}$ foot, where M is in miles. The permissible closing error shall be duly adjusted.

The Contractor shall provide all materials, equipment and labor required for surveying work, including, but not limited to, instruments, stakes, spikes, steel pins, templates, platforms, and tools, and except as required to be incorporated in the work or left in place, all such materials and equipment, shall remain the property of the Contractor. Surveying instruments shall be in perfect working condition and shall be subject to rigid inspection for proper operation at least after every two weeks of use. Defective instruments shall be promptly replaced or repaired and adjusted to the satisfaction of the Engineer.

Survey data shall be recorded in accordance with recognized professional surveying standards. Original field notes, computations, and other surveying data shall be recorded in the Contractor furnished field books. Notes or data not in accordance with standard formats will be rejected. Illegible notes or data, or use of erasures on any page of a field book will be considered sufficient cause for rejection of part or the entire field book. Copied notes or data will not be permitted; therefore, rejection of part or all of a field book may necessitate re-surveying. Corrections by ruling or lining out errors will be satisfactory.

The cost of all materials, equipment, surveyors and labor required for surveys for the Works and quantity surveys required by this clause shall be deemed to be included in the rates and prices of the various items in the Bill of Quantities and no separate measurement and payment in their respect shall be made.

The Contractor shall maintain at the Site the requisite surveying instruments in perfect working conditions to enable the Engineer's Representative to check levels and lines of the work at all times.

8. APPROVAL OF MATERIALS AND EQUIPMENT

- **Quantity of Materials**

  All materials, fixtures, fittings supplies and plant furnished under the contract shall be new and unused, standard first grade quality and of the best workmanship and design. No inferior or low-grade materials, supplies or articles will be either approved or accepted and all work of assembly and construction shall be done in a first class and workmanlike manner. In asking for prices for materials intended for delivery to the site and incorporation in the Works under any portion of these specifications the contractor shall provide the manufacturer or supplier with complete information as may be necessary to secure compliance to this Clause and in every case, he shall quote this Clause in full to each manufacturer or Supplier.

- **Submission of Samples and Data.**

  As soon as practicable after the award of Contract, the Contractor shall submit for the approval of the Engineer drawings, Catalogues diagrams and other descriptive data for all mechanical, electrical, architectural and such other materials and plant designated by the Engineer, which the contractor proposes for use under this Contract. For certain materials and plant, data may be required to be submitted in accordance with a detail form furnished by the Engineer. Samples of materials (2 Sets) shall be submitted by the Contractor to the Engineer at Contractor's Cost for approval sufficiently in advance of the materials intended to be incorporated in the Works.

- **INSPECTION/PRE-SHIPMENT INSPECTION, TESTING, DAMAGES AND MATERIAL ORDERS**

  - **Factory Acceptance Tests (FAT) / Inspection and Testing at Manufacturer's Shop**

  Factory acceptance tests (FAT) of all the major Plant / Equipment / and/or Material to be supplied under this Contract either within or outside the country shall be carried out subject to witnessing of inspection and testing by technical representatives / Engineers as nominated by the Employer, at its point of original manufacture or final shop assembly before its dispatch to site.

  All costs in connection with witnessing of the factory acceptance tests by the Employer's nominated technical personnels shall be borne by the Contractor. These shall include the costs of inland transportation, visa, air travel from Pakistan to place of inspection/ testing and back, hotel accommodation, boarding, lodging (as per actuals), and daily allowance @ Rs. 15,000/- per day person for inspection/ testing to be conducted within Pakistan and @ US Dollars 200 per day per person for inspection/ testing to be conducted outside Pakistan for each visit of every person to witness these tests. The number of days shall be actual days spent in travel calculated from the dates of travel from and to the hometown of the concerned representative nominated for inspection, but not less than five (05) days.

  All costs associated with the factory tests, including testing, inspection, witnessing, travel, accommodation, transportation, documentation, and any other related expenses, shall be deemed to be included in the Contract Price. No additional payment shall be made to the Contractor for such factory tests or associated costs.

  - **Non-Compliance to the Specific Provisions and Penalties**

  If the Contractor fails to provide any facilities, services, or tests required for quality control, supervision, or contract administration as specified in the relevant Clauses of the Specific Provisions, within the period notified by the Employer or the Engineer, the Employer may arrange for such facilities, services, or tests at the Contractor's risk and expense. The costs incurred by

the Employer shall be deducted from the Contractor's payments, along with 10% handling and overhead charges, without the Contractor having any claim in this regard. Such arrangements shall not absolve the Contractor of their obligations under the Contract. In addition, failure to comply with safety and site protection requirements, including proper cordoning off of the worksite, provision of safety equipment, or implementation of protective measures, may result in penalties, suspension of work, or other remedial actions as deemed necessary by the Employer. The Employer reserves the right to conduct inspections at any stage of the project to verify compliance to Health, Safety and Environmental Standards. This Clause shall be binding on the Contractor and all subcontractors engaged in the execution of the Works, without prejudice to any other rights or remedies available to the Employer under the Contract.

- **Payment of Work**

All costs associated with the inspections, Factory Acceptance Tests, witnessing, personnel allowances, travel, logistics, accommodation, documentation, and compliance with this section shall be deemed fully inclusive and covered within the Contract Price/BOQ. No separate or additional payment shall be made to the Contractor under this section unless specifically itemized in the Bill of Quantities.

TEST PROCEDURES & RESULTS

The Contractor shall submit tests procedures and results for approval of Employer. The Contractor shall give at least three (03) weeks' notice to the Employer for approval of such inspections/ tests.

Following imported items would be pre-shipment inspected and tested at manufacturing facility.

a) Busways

b) Transformers

All other equipment's to be supplied under this Contract which has been manufactured or shop assembled outside Pakistan shall be inspected and tested by the manufacturer and certificate of compliance to specified rating, capacities, etc. be issued by the manufacturer.

Whereas, other locally available items will be inspected and tested at manufacturer or supplier facility or as per requirement spelled out in Bidding Documents. All such inspection and testing shall be carried out by Technical Staff/Engineers as nominated by the Employer at Contractor's cost.

The Contractor shall give at least 04 (four) weeks' notice to the Employer and the Engineer of the Consultant for attending all such inspections and tests.

- **Inspection at Site of Works**

All equipment/materials supplied by the Contractor shall be inspected by the Engineer & the Employer after delivery of the same at site to assess any damage or short of quantities and any other requirements of the specifications. The Engineer will issue an inspection certificate if the supplied items of equipment and material are found to be satisfactory.

- **Damages, During Transportation, Storage & Installation**

The Contractor shall be responsible for any damage of the Equipment / material during transportation to site, storage and installation until satisfactory handling over the works to the Employer. The Contractor shall replace any damaged equipment/ materials at his own cost.

- **Material Orders**

Triplicate copies of material or equipment orders and lists of stock required in this Contract shall be furnished to the Engineer. All orders and stock lists shall state the specification designation under which the material is to be furnished and shall bear reference to the drawing and part number, if any, pertinent thereto. Orders shall also state that material is subjected to testing and shall show the required date of delivery of the material to destination.

- **Acceptance of Materials**

The acceptance of any material or equipment prior to shipment shall in no way relieve the Contractor of any of his responsibilities for meeting all of the requirements of the specification's / Contract document and shall not prevent subsequent rejection if such material or equipment is later found to be defective.

- **Testing**

Testing, except as otherwise specified herein shall be performed by a testing agency as proposed by the Contractor and approved by the Engineer at no extra cost to the Employer. The Engineer may require all testing to be carried out under his and employer supervision.

The quality control testing shall be performed by the contractor's competent personnel in accordance with a site testing as approved by the Engineer.

The contractor shall keep a complete record of all quality tests programme performed on site.

- **Testing Laboratory Certificates.**

The Engineer may accept a certificate from a commercial testing laboratory, satisfactory to him, certifying that the product has been tested within a period acceptable to the Engineer and that it conforms to the requirements of these Specifications.

- **Inspection**

All materials and Plant furnished and all work performed under this contract will be subject to inspection by the Engineer at all times and in all states of completion both off-site and on-site. The contractor shall furnish promptly without additional charge, all facilitate, and labor and materials reasonably needed for performing such inspection and testing as may be required by the Engineer.

- **Approved Sample at Site.**

The contractor shall at all times keep on the site approved samples. All such samples shall be made available to the Engineer as and when required.

- **Site laboratory.**

The Laboratory shall be equipped with new unused and latest Equipment to perform tests as per Technical Specifications and General Conditions of Contract. Additional equipment/materials shall be supplied by the Contractor as and when required by the Engineer to perform any specified test, at no additional cost to the Employer.

The laboratory shall also be equipped with new unused furniture, fittings and fixtures. If any equipment, furniture, fitting or fixture becomes unserviceable for any reason what so ever, the Contractor shall promptly replace the same as and when directed by the Engineer.

- **Bar Bending Schedule**

Bar bending (reinforcement bars) schedule of all structural drawings shall be prepared by the Contractor and submitted in triplicate to the Engineer for approval

- **Submissions**

Schedule submission at least sixty days before the dates when reviewed submittals will be needed.

Shop drawings of activities, as deemed necessary by the Engineer, shall be submitted for review and approval by the Engineer as stipulated within the contract terms. Submit Shop Drawings and number of copies of Product Data which the Contractor requires for distribution plus four copies which will be retained by the Engineer.

Submit three samples unless otherwise specified.

Accompany submittals with transmittal letter, in duplicate, containing:
- Data

- Project title and number
- Contractor's name and address
- The number of each Shop Drawing, Product Data and the Sample submitted.
- Notification of deviations from Contract Documents.
- Other pertinent data.

- **Re- Submissions Requirements**

  Shop Drawings:
  - Revise initial drawings as required and resubmit as specified for initial submittal.
  - Indicate on drawings any changes which have been made by the Engineer.
  - Product Data and Samples: Submit new data and samples as required for initial submittal.

9. CONTRACTOT'S QUALITY ASSURANCE PLAN/ SPECIFICATIONS

- **Specification or as specified**

  Specification or as specified refers to the specifications outlined in these Documents and where no specifications are available for any work or where the same are found not applicable then the relevant applicable ASTM or BSS specifications or equivalent standards shall apply in the same order. Any time for which no specifications are outlined but which are identified in drawings shall be completed accordingly to the standards as per ASTM/BSS these include items that may be added in the future. The Employer/ Employer's representative may supplement such specifications during the progress of work. All materials and processes used for these items shall be subject to standard testing and if found below the pertinent ASTM/BSS standards, shall be removed from the site immediately at the contractor's expense.

- **Standards and codes**

  Wherever reference is made in the specifications to the respective standards codes in accordance to the which goods and materials are to be furnished and work is to be performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly set forth in the contract.

- **Material and process**

  All goods and materials to be incorporated in the works shall be new, unused of the most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract.

- **Equivalent Material, Process etc.**

  Where specific materials, processes etc. are specified and the same are not available other alternative material and processes which ensure an equal or higher quality than those specified will be accepted subject to the Employer prior review and written approval. Differences between the specified and the proposed alternatives must be fully described in writing by the contractor and submitted to the Employer's approval who may give such approval after determining that the alternative proposed ensures equal or higher quality.

- **Approved, Directed, Instructed**

  Approved, directed, instructed means the approval etc. of the Employer unless otherwise stated.

- **Alternatives**

  Where alternative materials process etc., are specified the selection will depend on local conditions and discretion rest with the Employer/ Employer's Representative whose decision shall be final and binding.

- **Catalogues/Standards/Manufacturer's Instructions, etc.**

  Wherever the manufacturer's/supplier's instructions, Manuals, guarantees and ASTM/BSS standards are referred to in the specifications and details of BOQ; all such literature shall be

submitted by the contractor to the Employer/ Employer's Representative for due checking, approval and record.

- **Applicability**

  Unless stated or specified else-where to the contrary these General Rules shall apply to all sections of work irrespective of their sequences, location and description.

  Suppliers of local and foreign products and installations specified shall have been regularly engaged in the business of manufacturing, fabricating, installing and / or servicing work required for a period not less than 5 years. In addition, the Engineer may request as appropriate a list of similar installations that describes project, scope and date of completion, complete literature, performance data, and technical data, list of services record within Pakistan and location of service office from which this installation could be maintained.

  For the actual fabrication, installation and testing of the specified work use only thoroughly trained and experienced workmen completely familiar with the items required and with the manufacturers recommended methods of installation. In acceptance or rejection, no allowance will be made for the lack of skill on the part of workmen.

  Use all means necessary to protect materials before, during and after installation and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacement necessary for approval and at no additional cost to the Employer.

  Manufacture's standard schematic drawings shall be modified or deleted to indicate only information which is applicable to the project. Such standard information shall be supplemented to provide all additional applicable information.

  Manufacturer's catalogue sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive literature shall be clearly marked to identify pertinent materials products or models. Dimensions and required clearances shall be indicated. Shop performance characteristics and capacities shall be noted.

  Except as otherwise provided by these Specifications or the Drawings, all materials, equipment and fabrication and testing thereof shall conform to the latest applicable standards and codes referred in the Specifications by use of the abbreviations explained below:

  - ASCE - American Society of Civil Engineers
  - ASA- American Standard Association
  - ACI- American Concrete Institute (USA)
  - AISI- American Iron and Steel Institute (USA)
  - AISC- American Institute of Steel Construction (USA)
  - ANSI - American National Standard Institute (USA)
  - ASTM - American Society for Testing and Materials (USA)
  - AASHTO - American Association of State Highway & Transportation Officials
  - AWS - American Welding Society (USA) BS - British Standards (UK)
  - CP - Codes of Practice (UK)
  - ICAO - International Civil Aviation Organization BSICP - British Standard Institute Code of Practice PS - Pakistan Standards (Pak)
  - PCA - Portland Cement Association PSI - Pakistan Standard Institute
  - SSPC - Steel Structures Painting Council (USA) UBC - Uniform Building Code (USA)
  - USBR - United States Bureau of Reclamation (USA)
  - BCP – Building Code of Pakistan (Pak)

  If the Contractor, at any time and for any reason, wishes to deviate from the above standards or desires to use material or equipment not covered by the above standards, he shall state the exact nature of the changes, the reason for making the change and shall submit complete specifications of the materials and equipment to the Engineer for approval.

10. CONSTRCUTION SCHEDULE

- **Submittal Date**

  The programme of works submitted by the Contractor, in accordance with the contract, in the form of a detailed schedule based on a computerized network analysis covering all construction activities indicating critical activities with critical patch resource scheduling for contractor's equipment material and labor within the period stated in the Appendix A to Tender. All the milestones shall be clearly identified.

- **Requirements**

  The detailed submittal shall consist of schedule, network analysis tabulations and narrative descriptions of the proposed construction programme.

  Each summary or detailed schedule shall consist of a bar chart and time scaled network. The schedule start and finish times for all activities on the bar charts shall agree with those in the network. All inter-relationships and inter-dependencies between structures shall be clearly indicated on the schedules. The network shall show the order and interdependences of activities planned by the contractor and shall be time – scaled accordingly to calendar dates.

- **Monthly Reports.**

  Each month the Contractor shall submit a report consisting of:

  - Copies if the bar charts for the current phase with both actual progress and scheduled progress shown.
  - Network analysis tabulations reflecting actual start date and finish dates where applicable.
  - A narrative report discussing any significant deviations from the schedule and, if necessary, explaining the steps proposed to be taken to maintain the approved schedule.

11. FACILITIES PROVIDED BY THE EMPLOYER

(Not Used)

12. CONSTRUCTION CAMPS AND COLONIES

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labor, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, these facilities shall be handed over to the Employer or if the Employer so desires, the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Engineer.

The Contractor shall erect and maintain at the site in location to be approved by the Engineer 3 Sign Boards 8' x 6' for painting the name of Work name of client, name of consultants, name of Contractor and Project Cost on Both side. The notice board shall comprise of the following; Frame of 3" dia GI pipe properly painted as per direction of the Engineer. 2 Nos. Posts of 3" Dia GI Pipe 4' above ground and 4' below ground embedded in 1:2:4 cc 2'x2'x4' with proper arrangement of anchorage and brasses. 5 Nos. MS / Polyvinyl sheets 9" wide and 1 No. 12" wide, 8' long each fixed with the pipe frame with 3" gap between each strip Background painted in white with synthetic enamel paint on both sides. Alphabets of appropriate size as approve by the Engineer in reflective paint.

Contractor's Site Office & Facilities:

The Contractor shall be solely responsible for allocating, establishing, and maintaining its own temporary site offices, laboratories, material storage yards, workshops, and facilities. Whether within or outside the premises of the building site subject to approval from the Engineer, in any case the responsibility lies solely upon the contractor at his own risk and costs.

The Contractor shall make his own arrangements for providing the necessary space for the storage of plant, equipment and materials and for Contractor's temporary office, in and around the site of works, during the currency of the Contract.

13. OTHER FACILITIES FOR ENGINEER'S AND EMPLOYER'S PERSONNELS

The Contractor shall provide/construct a Site Office as per design and / directions of the Employer on a land to be specified by the Employer. The said office shall be fully furnished / equipped with fittings and fixtures like fans, AC units, furniture, kitchen & washroom facilities, utilities (including backup power i.e Generator and or/Solar Plant), water dispenser, microwave oven etc. The Contractor shall also be responsible for the maintenance of the said office till end of the Defect Liability Period.

Site Offices for the Employer, the Engineer and Their Personnel

The Contractor shall, at its own cost, design, construct, furnish, equip, operate, maintain, secure, service and, upon completion of the Contract, remove separate site office facilities exclusively for the use of the Employer, the Engineer, and their respective personnel.

(a) Location and Space Constraints

The site offices shall be established within the designated Project Site boundaries or space arranged by the Contractor outside the site boundaries as approved by the Engineer/Employer. The exact location, layout, dimensions, and structural configuration shall be subject to the physical availability of space at the Site and shall require the prior written approval of the Engineer before construction or installation. The Contractor shall not relocate, modify, or dismantle any approved office facility without the prior written approval of the Engineer.

(b) Office Facilities and Standard of Accommodation

The site offices shall be weatherproof, secure, structurally sound, fully furnished, adequately illuminated, air-conditioned, and fit for continuous professional use. The facilities shall remain fully operational from the Commencement Date until the expiry of the Defects Notification Period, being three hundred sixty-five (365) days after the issuance of the Taking-Over Certificate, unless otherwise instructed by the Engineer in writing.

The Contractor shall provide, operate, maintain, and replace as necessary all furniture, fixtures, equipment, utilities, information technology infrastructure, communication systems, consumables, cleaning services, maintenance services, security arrangements, and all other facilities specified in **SP-14 of the Conditions of Contract**, ensuring uninterrupted functionality throughout the required period.

(c) Utilities and Operational Services

The Contractor shall provide and bear the cost of all utilities and operational services necessary for the continuous operation of the offices, including but not limited to electricity, standby power, potable water, sewerage, internet connectivity, telephone services, printing facilities, housekeeping, waste disposal, routine maintenance, repairs, and security.

(d) Maintenance Obligation

The Contractor shall maintain the offices, equipment, furniture, utilities, and associated facilities in good working condition throughout the required period. Any damaged, defective, obsolete, or non-functional item shall be repaired or replaced promptly at the Contractor's cost without interruption to the Employer's or Engineer's operations.

(e) Non-Compliance

Failure by the Contractor to provide, maintain, or operate the required site office facilities in accordance with this Sub-Clause shall constitute a failure to comply with the Contractor's contractual obligations. Without prejudice to any other rights or remedies under the Contract, the Engineer may instruct the Contractor to rectify such non-compliance within the specified time. If the Contractor fails to comply, the Employer may arrange the required facilities through others and recover all associated costs, together with applicable administrative overheads, from amounts otherwise due to the Contractor.

The Contractor shall provide following facilities in the site offices of the Employer and the Engineer:

1. Internet connection (landline as approved by the Employer) separately for the Employer & The Engineer at site up-to an average billing of Rs. 20,000/- per month,
2. Three (03) Laptops (latest generation Core I-7, minimum with 500 GB SSD, 16 Gb Ram, etc.), flash drive (at least 8 GB capacity) an A3 size color printer, stationery for exclusive use of Employer.
3. Setup a furnished meeting room, with seating capacity of 15 persons, with multimedia and video conference arrangements.
4. Provide Two (02) Office Boys, or their salary.
5. UPS and Stabilizers,
6. 03 Air conditioners (as required by Employer and the Engineer)
7. Installation of CCTV cameras network at project premises including office areas which must serve following purposes:
   a) Site monitoring
   b) Security of site and offices.
   c) Video Recording and backup

   These cameras must be connected via mobile apps to the Employer. etc.,

The site office shall be connected to the electrical system, potable water supply system and sewage disposal system. The Contractor shall provide replacement of the equipment(s), if any of the above-mentioned equipment(s) is temporarily or permanently rendered unserviceable for any reason(s) or declared to be beyond repair by the Engineer/Engineer’s staff at no additional cost to the Employer.

The said offices shall be provided by the Contractor within twenty-eight (28) days of the receipt by the Contractor of Engineer’s Notice to Commence or twenty-one (21) days of the payment of the first half of the Mobilization Advance, whichever earlier. The site office shall be maintained by the Contractor up to a period of three hundred sixty-five (365) days after the Issuance of Taking Over Certificate (DLP Period) by the Engineer. The site office along with all fittings, fixtures and gadgets shall become property of the Employer after the completion of the project and shall be handed over to the Employer along with list of all items given for the use of Engineer. The site office shall be removed /dismantled if directed by the Engineer/Employer. In such case, the area shall be developed in accordance with the drawings or to its natural state and as per the instructions of the Engineer.

The contractor shall also provide one latest Generation Core I-7 laptop of approved brand/make and 56 inch latest model LED for the exclusive use of the Employer.

The Contractor shall provide within one month to the issuance of Letter to Commence, operate and maintain following vehicles for the Employer and Consultant supervision team:

1. 01 No. Van (1200CC latest model)

2. With A/C (similar to Changan Karvaan or latest model) for the Employer & Consultant's Team at Site with fuel limit of 300 liters/month & leftover fuel will be carried forward to subsequent month with Driver or his salary.

They shall furnish supply and provide, as may be necessary without specific direction of the Employer/Employer's staff, all fuels, lubricants, tyres and other supplies, all maintenance, repairs, comprehensive insurance cover and running costs and suitability qualified drivers at all times for running of vehicles and will provide a substitute vehicle in case of break down exceeding two days.

The Contractor shall provide replacement vehicle if the vehicle is temporarily or permanently rendered unserviceable for any reason(s) or declared to be beyond repair by the Employer/ Employer's representative at no additional cost to the Employer. The Contractor shall maintain the vehicles till the issuance of Defects Liability Certificate, and after the completion of DLP the vehicle(s) will become the property of the employer.

In case above facilities are not provided within stipulated time (within one month from the issuance of Letter to Commence), the Employer / Engineer may have the facilities developed/provisioned on their own and the actual expenditure plus 20% overhead and profit will be deduct from the interim payment certificate submitted by the contractor.

No payment shall be made to the Contractor for the facilities involved under this clause. The cost thereof shall be deemed to have been included in the price quoted by the Contractor for the works.

Engineer's / Employer's Accommodation:

Provide, maintain, and fully furnish a suitable residential facility (min. 4 bedrooms with attached bath) for the Engineer's/Employer's use, including security, continuous power backup, and regular maintenance for the project duration.

Location/Locality: The Contractor shall source and establish this facility off-site within a secure, approved residential sector of Islamabad (preferentially G-11 or nearby). The choice of residential facility, building structure, and location shall be strictly subject to the prior formal written approval of the Employer and the Engineer.

Furnishing & Facilities: the residence shall be fully furnished with all necessary facilities, furniture, fixtures, power supply, kitchen utilities etc. The Contractor shall bear the cost of electricity of up to Rs. 15,000/Month, while electricity bill exceeding Rs. 15,000/Month, the cost of electricity above Rs. 15,000 shall be borne by the users.

WORKING IN EXTENDED HOURS AND OVERTIME DUTY EXPENSES OF PROJECT STAFF

Where the Contractor carries out or extends Works beyond normal working hours specified under Sub-Clause 6.5 [Working Hours] of the Contract Data (Part A), during night shifts, or on gazetted/weekly holidays, the Contractor shall, at its own expense, provide and maintain adequate artificial lighting, mandatory site safety, security, and supervisory personnel across all active work areas pursuant to Sub-Clause 4.8 [Health and Safety Obligations]; furthermore, all overtime duty allowances, supervisory fees, and operational costs incurred by the Employer's Project Management Unit (PMU) / Project Team and the Engineer's site supervisory staff for supervising such extended operations shall be borne entirely by the Contractor, the full cost of which shall be deemed to be included in the unit rates and prices entered in the Bill of Quantities (BOQ).

14. EQUIPMENT FURNISHED BY THE EMPLOYER

(Not Used)

15. COOPERATION WITH OTHER CONTRACTORS

It shall be the responsibility of the Contractor to keep-up good relations with other Contractors employed on site by the Employer. The Contractor shall cooperate and coordinate his work with that of the other Contractors working at the Site, to whatever extent may be necessary to complete the Project in accordance with the approved programme of the Works and in accordance with the Engineer's instructions. Should a disagreement or dispute arise between the Contractor and other contractors, the same shall be referred without delay to the Engineer for his decision. Upon such decision, the Contractor shall proceed with the work in accordance therewith. In case the access to the works of other contractors is through the Site area of the Contractor, the Contractor shall coordinate with and permit all reasonable access to other Contractors.

16. SAFETY AND HEALTH

Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety of his staff and labor at all times throughout the period of the Contract. The Contractor shall further ensure that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements

17. CONSTRUCTION UTILITIES

The Contractor shall search for, find, locate and protect any wiring, cable, duct, pipework, etc., within or immediately adjoining the site area.

The Contractor shall take full responsibly for safety of existing service lines, utilities and utility structures uncovered or encountered during excavation and construction operations. The Contractor shall take full responsibility for damaging any such service lines, utility/utility structure and any cost and/or expense that arises or issues from any such damage shall be borne directly by himself. Should any damage to any such service occur the Contractor shall forthwith take remedial action, initiate safety precautions, install temporary services and carryout repair all at his own cost and expense and inform the Engineer and notify all relevant authorities.

Existing utilities which are to remain in service for or after the works are to be determined by the Contractor. If any existing service lines, utilities and utility structures which are to remain in service are uncovered or encountered during these operations, they shall be safeguarded, protected from damage, and supported. The Contractor shall preserve, maintain and keep in perfect working conditions, any existing facilities required to be preserved by the Employer/the Engineer.

18. TRAFFIC, ROADS, BRIDGES

(Not Used)

19. ROCK QUARRIES

(Not Used)

20. FLOOD WARNING SYSTEM

No work is to be undertaken when, in the opinion of the Engineer, the weather is so unsuitable that proper protection of the work cannot be ensured.

Additionally, the Contractor shall be deemed to have taken all weather, flood, inundation, seismic, traffic, vibrations conditions, arising from any cause whatsoever, into account when preparing his Tender and he shall not be entitled to extra payment by reason of the occurrence or effect of excessive traffic vibrations, rain fall, floods, temperature or humidity, high winds, earthquakes or an, other heavier flood inundation, seismic or environmental conditions.

Without limiting his liabilities under the Contract, the Contractor shall make suitable arrangements to protect the works, Including temporary Works, and Constructional Plant against the effects of weather flood inundation seismic and traffic vibrations conditions.

No work shall be performed when; in the opinion of the Engineer such work is liable to be injuriously affected by the weather, flood, inundation seismic or traffic vibrations conditions. The Contractor shall not be entitled to extra payment on account of loss alleged to have been sustained directly or indirectly by reason of the Engineers declining to permit such work to start or continue or ordering any work damaged by the weather flood inundation seismic or traffic vibrations conditions to be made good or removed and re-executed.

The Contractor shall be responsible for obtaining and acting upon all relevant weather flood inundation and seismic information during the period of the Contract. The Contractor shall promptly supply copies of all-weather flood inundation and seismic forecasts to the Engineer

21. ENVIRONMENTAL PROTECTION

The Contractor shall exercise care to protect the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of works. Except where clearing is required for the Permanent works, approved construction roads and the Temporary Works, and for excavation operations, all trees and native vegetation shall be preserved and shall be protected from damage which may be caused by the Contractor's construction operations and equipment. On completion of the works, all work areas shall be smoothed and graded in a manner to confirm to the natural appearance of the landscape. Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operations, it shall be repaired, replanted, or otherwise

22. STANDARDS OF COUNTRIES OTHER THAN ORIGION

(Not Used)

23. PROGRESS REPORTS AND PHOTOGRAPHS

During the continuance of the Contract, the Contractor shall submit weekly progress on forms as approved by the Engineer. Such weekly reports shall show the actual progress completed as of date of the report plotted against the schedule as given by the Contractor at the start of work and shall be broken down so as to indicate status of all activities associated with mobilization, design, material procurement, manufacture, surveys work, tests with regard to the agreed contract programme.

The Employer and the Engineer reserve the right to coordinate the schedules of this Contractor and other Contractors working at the Site, and to adjust and/or change any and all such schedules as required during the course of construction in order to achieve a coordinated project in harmony with the Employer's completion date.

Commencing after the first week of construction, and continuing every week until completion, the Contractor shall take and submit photographs to the Engineer's Representative, to show progress of his work and completion of each structure or major feature.

During the period of the Contract, the Contractor shall submit to the Engineer not later than the 8th day of the following month, 5 hard copies and soft editable format each of Monthly Progress Reports covering:

- A Construction Schedule indicating the monthly progress in percentage;
- Description of all work carried out since the last report;
- Description of the work planned for the next 56 days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
- Monthly summary of daily job record;
- Photographs to illustrate progress; and
- Information about problems and difficulties encountered, if any, and proposals to overcome the same.

During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be submitted to the Engineer at the end of each day. The daily record shall include particulars of weather conditions, number of men working, deliveries of materials, quantity, location and assignment of Contractor's equipment

As soon as work commences on Site, the Contractor shall provide at least 10 to 12 photographs (along with soft copy) of the works from positions to be selected by the Engineer. Each photographic print shall not be less than 297mm x 210mm and shall bear a printed description, a serial number and the date when taken.

The negatives /soft copy of all photographs shall be held at the Contractor's Site Office, numbered and handed over to the Employer at the completion of the Contract

24. UNIT PRICE BREAKDOWN

The FPS System of Units shall be used throughout the Project.

25. TRANPORT AND HANDLING OF CARGO

If, notwithstanding Sub-Clause 30.1 any damage occurs to any bridge or road communicating with or on the routes to the Site arising from the transport of materials or Plant, the Contractor shall notify the Engineer with a copy to the Employer, as soon as he becomes aware of such damage or as soon as he receives any claim from the authority entitled to make such claim.

The Employer shall not be liable for any costs, charges or expenses in respect of any damage occurs to any bridge or road arising from the transport of Material or Plant by the Contractor. The Contractor shall keep indemnified the Employer against all such claims. The Contractor shall negotiate the settlement of claim with the authority and pay all sums due in respect of all claims, proceeding, damages, costs, charges and expenses.

The Contractor shall notify the Engineer and Employer about the negotiations, in-respect of settlement of claim. In case of failure in payment of claimed amount by the Contractor, the Employer shall recover the amount of claim from the Contractor by making deduction from any monies due or to become due to the Contractor and shall notify the Contractor accordingly

26. DIRECTED AND REQUIRED

The Contractor shall whenever necessary cover up and protect the works from weather and damage by his own or other workmen performing subsequent operation. The Contractor shall provide all necessary dustsheets, barriers and guard rails and clear away the same at completion.

Upon completion of the works the Contractor shall restore all items covered by the Contract to the satisfaction of the Engineer.

The Contractor shall do regular cleaning and clear away all rubbish and excess materials that may accumulate from time to time on completion and before handing over.

Upon completion of the works, he shall obliterate all signs of temporary construction facilities such as work areas, structures, foundations of temporary structures, stock piles of excess or waste materials, or any other vestiges of construction, as directed by the Engineer. All buildings shall be cleaned; floors and paving scrubbed and the works and site shall be left in a clean and satisfactory state for immediate use and occupation. Care shall be taken not to use any cleaning materials, which may cause damage to the surface to be cleaned. The Contractor shall also take all necessary precautions to keep the works and site free from vermin during construction and he shall leave the works vermin free on completion. Application of pest control agents shall not commence until the specific product, name, method and extent of application have been submitted to and approved of by the Engineer.

27. COMMUNICATION TO THE ENGINEER

The Engineer shall be notified daily in writing of the nature and location of the Works the Contractor intends to perform the next day so as to enable necessary inspection and measurement to be carried out. The Engineer may, if necessary, direct that longer notice be given of certain operations.

28. ANY OTHER PROVISION

(Not Used)

29. MEASUREMENTS AND PAYMENTS

Measurement of Works: All Works shall be measured in accordance with the Drawings, Specifications, Bill of Quantities (BOQ), and the actual quantities of permanent Works executed, completed, tested (where applicable), and accepted by the Engineer. Measurements shall be based on the net dimensions of the completed Works, without allowance for waste, laps, cutting losses, temporary works, or construction methods unless expressly stated otherwise in the Contract. Civil, architectural, interior finishing, waterproofing, flooring, wall finishes, ceilings, glazing, doors, windows, partitions, painting, and associated building works shall be measured in the applicable units specified in the BOQ. Electrical and plumbing installations, including conduits, cable trays, cables, pipes, ducts, fixtures, fittings, equipment, panels, pumps, tanks, accessories, testing, commissioning, and all ancillary components, shall be measured in the units prescribed in the BOQ and shall include all supports, hangers, brackets, anchors, fixings, jointing materials, connection accessories, cutting, making good, testing, commissioning, and all incidental works necessary for a complete operational system, unless measured separately under a specific BOQ item. No separate payment shall be made for work or materials required to complete the Works but not specifically identified as a separate pay item in the BOQ, and all such costs shall be deemed included in the respective Contract rates.

Disclaimer:

"In case of any inconsistency in terms of STANDARD BIDDING DOCUMENT and Conditions of the Contract (CoC) as uploaded by the Procuring Agency as an Annexure therein, the terms and conditions as mentioned in Annexure of CoC shall prevail."

SECURITIES & EXCHANGE COMMISSION OF PAKISTAN

HEAD OFFICE BUILDING

PLOT NO. 25, MAUVE AREA G-11/1, ISLAMABAD, PAKISTAN.



Technical Specifications
Electrical Works

September 2026 | Rev. 01

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7,
Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

Table of Contents

ELECTRICAL WORKS

S #	Section	Description
1	E-1	General Electrical Requirements
2	E-2	Electrical Identification
3	E-3	Pre-Commissioning and Commissioning
4	E-4	Conductors and Cables
5	E-5	Conduits and pipes
6	E-6	Cable Tray, Ladder and Trunking
7	E-7	Wiring Devices
8	E-8	MV Switchgear
9	E-9	Static Uninterruptible Power Supply
10	E-10	Automatic Power Factor Improvement Plant
11	E-11	Low Voltage Switchboards Distribution Boards
12	E-12	Dry Type Transformer
13	E-13	Diesel Generator Set
14	E-14	Earthing System
15	E-15	Lightning Protection
16	E-16	Interior Lighting
17	E-17	Self-Contained Emergency Lights
18	E-18	Telecommunication
19	E-19	CCTV System
20	E-20	Access Control System
21	E-21	Fire Alarm and Detection System
22	E-22	Public Address and Voice Alarm System
23	E-23	Central Battery System
24	E-24	Enclosed Bus Assemblies
25	E-25	List of Approved Manufacturer

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-1
GENERAL ELECTRICAL REQUIREMENTS

FOREWORD

This document is to describe the minimum requirements for the equipment and installations and to ensure that the Contractor is fully aware of his duties to perform the required works, in accordance with the terms of the Contract.

1. SCOPE OF WORK

The works related to the electrical system, which are included in the scope of this Contract, are shown on the Drawings, stated in the Particular Specifications, Bill of Quantities and explained in these specifications. The works shall broadly include but not limited to the following:

1	Conductors and Cables	SECTION E-4
2	Conduits and pipes	SECTION E-5
3	Cable Tray, Ladder and Trunking	SECTION E-6
4	Wiring Devices	SECTION E-7
5	MV Switchgear	SECTION E-8
6	Static Uninterruptible Power Supply	SECTION E-9
7	Automatic Power Factor Improvement Plant	SECTION E-10
8	Low Voltage Switchboards Distribution Boards	SECTION E-11
9	Dry Type Transformer	SECTION E-12
10	Diesel Generator Set	SECTION E-13
11	Earthing System	SECTION E-14
12	Lightning Protection	SECTION E-15
13	Interior Lighting	SECTION E-16
14	Self-Contained Emergency Lights	SECTION E-17
15	Telecommunication	SECTION E-18
16	CCTV System	SECTION E-19
17	Access Control System	SECTION E-20
18	Fire Alarm and Detection System	SECTION E-21
19	Public Address and Voice Alarm System	SECTION E-22
20	Central Battery System	SECTION E-23
21	Enclosed Bus Assemblies	SECTION E-24

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

All material and equipment supplied by the Contractor shall be new and in all respects conform to the high standards of Engineering design, workmanship, performance and function as here in specified and fully meet the quality level and rugged requirements of the specifications.

The Contractor shall also be responsible to supply any other equipment not specifically mentioned in these documents but which is necessary for proper operation of the works / system, shall be considered to have been so specified and accordingly shall be provided by the Contractor as part of the Contract.

The Contractor shall be solely responsible for ensuring proper functional requirements of various equipment and shall also be responsible for furnishing any additional piece of equipment and for making modification in the equipment as desired and / or approved by the Owner or his representative, to achieve proper coordination with various equipment offered in the bid and also those installed by others.

Approval of the Contractor's supplied equipment / installation works shall not relieve the Contractor of any of his obligations or liabilities under the Contract, except insofar as provided under the conditions of the Contract.

2. RULES AND REGULATIONS

The entire electrical installation / work shall be carried out by licensed contractor, authorized to undertake such work under the provisions of Electricity Act 1910 and The Electricity Rules 1937 as adopted and modified up to date by the Government of Pakistan.

All works shall be carried out in accordance with the latest edition of the Regulations of the Electrical Equipment of Buildings issued by the Institute of Electrical Engineers - London, the Contract documents, the Electricity Rules 1937 and bye-laws that are in force from time to time. Any discrepancy between these specifications and any other rules and regulations shall be brought to the notice of Owner or his representative, and his decision shall be final and conclusive.

The Contractor shall be responsible for completing all formalities and submitting the test certificates as per prevailing rules and regulations and shall have the installation passed by the Government Electric Inspector of that region. All requirements of the Electric Inspector and the Electric Company shall be complied with.

3. STANDARDS

All works, equipment and materials shall conform to:

On the one hand:

The specification recommended practices, official standards and codes the non - restrictive List of which is given below.

International Electro-technical Commission (IEC)

British Standards (BS)

National Electric Code (NEC)

National Standards

In the event of conflict between standards, the most stringent shall prevail.

Whenever the electrical equipment to be installed, does not hold national standards, the Contractor shall take into account the specific standards chosen by the Owner and make sure that the equipment he has to install, meets these standards.

In addition, even if no mention is stipulated in this specification, it is implied that the equipment be tropicalized, if required, by the conditions of the site of installation.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

In any case, the standards and codes to be taken into consideration are those in force at the date of delivery.

4. INSTALLATION AND SERVICE CONDITIONS

4.1 Site Conditions

All material and equipment supplied and installed shall be designed, manufactured and tested to meet the following ambient conditions unless specifically stated otherwise for any material / equipment:

a. Maximum outdoor ambient temperature : 50 degree C

b. Minimum Indoor ambient temperature : 32 degree C

c. Maximum relative humidity : 75 %

d. Minimum relative humidity : 40 %

4.2 Service Conditions

Equipment shall be designed and built for continuous service with a minimum of supervision and maintenance.

5. MAIN ELECTRICAL CHARACTERISTICS

5.1 Power Supply System

Unless otherwise specified elsewhere, all equipment and material shall be designed to operate and function satisfactorily with the following minimum requirements without any de-rating:

- Voltage 400 ± 10%
- Phase 3, 4 wire system
- Frequency 50 Hz. ±2 Hz.

5.2 Degree of Protection of Enclosures

For indoors, IP31 minimum degree of ingress protection of the enclosures against contact with line or moving parts and against ingress of solid foreign bodies or liquids, shall be selected, in accordance with IEC 60529.

6. GUARANTEE

The Contractor shall furnish written grantee which should clearly state that the works he will carry out as well as the materials he will supply, meet with this specification and that compliance thereto constitutes an official clause, added by implication to the general conditions of his offer when signing the Contract.

Guarantee shall also be for replacement and repair of part or whole of the equipment which may be found defective in material or workmanship. The grantee shall cover the duration of Maintenance Period as defined in the conditions of the Contract. This guarantee shall not relieve the Contractor of his obligations and he will fully be responsible for the repair or replacement of any defective material in time, so as not to cause any undue delay in carrying out the repairs and/ or replacements.

The Contractor shall acquaint himself fully with the existing conditions and limitations at site and all works necessary to complete the project under the Contract, to be carried out by the Contractor.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

7. EXCEPTIONS TO SPECIFICATION

Any exception or deviation from this specification or the codes and standards shall be listed separately in the Contractor's "List of Deviations". Any exception, which shall not be listed, shall not be considered later.

8. AVAILABILITY OF SPECIFICATIONS, DRAWINGS AT SITE

The Contractor shall assume at his own cost the permanent availability of this specification and drawings on site where applicable.

9. DISCREPANCIES IN TENDER DOCUMENTS AND DRAWINGS

The Contractor shall carefully examine the documents and drawings and if he finds any discrepancies or omissions from the specifications, bill of quantities or drawings, or is in doubt as to the meaning, he shall at once notify the Owner or his representative for receiving his instructions before proceeding with the works. If such defective or modified work is carried out by the Contractor on his own, he shall rectify the same at his own cost.

10. MEASUREMENT OF WORKS

The quantities set out in the bill of quantities are the estimated quantities and they shall not be taken as actual and correct quantities of work to be executed by the Contractor. The Contractor shall carry out actual measurement of works at the site.

11. INSTALLATIONS DETAILS

The locations, routings, installation heights, detail etc. for electrical equipment are indicated on the drawings. If any information is not stated on the drawings or wherever modifications are required the Contractor shall obtain prior instructions from the Owner or his representative.

12. DRAWINGS AND DATA

The Contractor shall provide dimensional outline drawings, arrangement drawings and technical data for the equipment offered, for the approval of Owner or his representative.

13. PRIOR APPROVAL OF SHOP DRAWINGS, MATERIALS AND EQUIPMENT

The Contractor shall provide shop drawings for the electrical installations showing the exact routes of all underground cables and ducts, the exact run of all conduits and trunking, draw-in and junction boxes, the number and size of wires in each conduit, the final connection arrangements at distribution boards and the details of ducts for the approval of consultant / Owner's representative before commencing any portion of the works. All such working drawings shall be submitted in suitable number of copies as indicated in the particular conditions and within the periods stipulated below:

13.1 Cable entry ducts into buildings:

a. Working drawings shall be submitted within two weeks of handing over the site.

b. All other working drawings shall be submitted to the Engineer against signed receipt and dated within two months of signing the Contract. Should however the Contractor be obliged to install electrical conduits prior to this period then he shall submit the relevant working drawings at least two weeks prior to the proposed date of commencement of the work. The Contractor shall submit the program indicating the dates on which coordination in different

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

sections will take place, together with the submission of the working drawings. The Engineer shall arrange to return to the Contractor at least one week prior to the commencement of concreting of the section, his comments or approval of the working drawings.

The Contractor shall supply detailed specifications, dimensional drawings, etc., of equipment that he proposes to supply and install.

Where this Contract requires the approval of Engineer to material and goods, the Contractor must seek to obtain this approval within eight weeks after signing of the Contract. No extension of time will be granted for non-availability of material or goods if this clause is not complied with. Approval of the Engineer does not relieve the Contractor of placing his orders in due time for the materials he needs to complete the Contract on time. The approved samples shall be retained on site for comparison with commodities used in works and removed when no longer required.

14. MATERIAL ORIGIN AND QUALITY

The material and equipment shall be purchased from Consultant / Owner's agreed suppliers.

The consultant / owner shall retain the right to at any time demand the indication of origin of the materials, and to eventually refuse products, the origin of manufacturing of which have not been previously agreed to without consideration of quality.

On specific agreement of the Owner, the materials may be delivered progressively to the field, but in such a manner as to allow sufficient time for their reception.

When choice of manufacturer is allowed for any particular commodity the Contractor shall obtain the whole quality required to complete the work from one manufacturer or obtain approval of any change in source of supply. He shall produce written evidence of sources of supply when requested to do so by the Engineer.

15. IDENTIFICATION OF EQUIPMENT

For each piece of equipment, identification label shall be fitted in front of the casing. The label shall have block letter 7mm high, black on white back ground of trifoliate and fixed with screws.

16. MARKINGS

The contractor shall provide “Danger Boards “and” Shock Charts “wherever required to comply with the requirements of local Electricity Rules and according to normal practice.

17. FACTORY TESTS

All equipment supplied by and installed as part of the Contract such as Genset, Transformer, lighting, ELV systems ,distribution boards and like shall be fully tested at the manufacturer's works to the requirements of appropriate standards called for later in the particular specification.

The Contractor shall inform the Engineer in writing about the date and time of test of each equipment at least two weeks in advance. The witnessing of test by the Owner or his representative shall not absolve the Contractor from his responsibility for the proper functioning of the equipment and for furnishing the guarantees

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

referred to in Clause 6.0. All test results in the form of certificate of test / test record certificates, signed by all the witnesses, for each item in the scope of Contractor's supply shall be supplied to the Engineer within seven days of the test date, and in any event before delivery to the site. Especially Transformer, Genset origin factory test are mandatory. Contractor shall bear all expenses on its own. Minimum 2 design engineers, two client representative shall be accompanying in the FAT.

All expenses for carrying out the tests and witness by the Owner or his representative shall be borne by the Contractor and deemed to have been included in the tender bid.

18. STORAGE

The Contractor shall store the equipment in such conditions that it can not be damaged, i.e., in a dry warehouse. As particular concerns; fragile components, these shall be stored on shelves in their original packing, fitted with identification labels so as to avoid unnecessary manipulation or handling.

The Contractor shall handle, store and fix each commodity in accordance with the manufacturer's recommendations. He shall inform the Engineer if these conflicts with any other specified requirement and submit copies of manufacturer's recommendations to the Engineer when requested to do so.

19. LABOR AND STAFF OF CONTRACTOR

The Contractor shall provide / furnish and arrange for:

- Skilled and unskilled labor required for performing the works in accordance with the technical specifications and drawings within the agreed time schedule.
- Supervisory technical staff with appropriate experience and requisite expertise to ensure quality of work performed.
- Supervisory administration and clerical staff to ensure smooth functioning of the activities at site.
- Construction equipment, meggers, tools, etc.

The Contractor shall supply all labor, materials and equipment necessary for the installation of low voltage distribution boards, cables, lighting and power equipment, together with all other apparatus shown on the drawings and as detailed in the Particular specification.

20. SMALL INSTALLATION MATERIAL

The Contractor shall supply all small installation and consumable materials such as nuts, bolts, washers, shims, angles, leveling materials, insulation tape, solder, PVC strap-on or heat shrinkable type cable tags, cable ties, bushes, sealing compound, Avometer, electrical testing and measuring instruments, etc., and all such other material not listed in BOQ, required for complete installation as intended by the specification and scope of works.

21. INSTALLATION INSTRUCTIONS - GENERAL

The Contractor shall set out the works himself as per specifications and drawings and shall properly position the equipment on specified foundation / location. In general, the manufacturer's instructions for installation shall be followed. Any defect or faulty operation of equipment due to Contractor not following the

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

manufacturer's instructions shall be corrected and repaired by the Contractor at his own cost.

22. ASSOCIATED CIVIL WORKS

The expression `Associated Civil Works' shall mean civil work to be carried out by the Contractor under the direction of the Engineer in connection with the Electrical Service.

The Contractor shall prepare accurate drawings giving details of all holes, fixings, bases and other civil work requirements and shall be responsible for their accuracy. The cost of preparing shop drawings shall be considered to have been so specified in the tender price.

The following is a summary of the work to be carried out by the Contractor:

a. The cutting and forming of holes for conduits or pipes, or conduit or pipe fixings through walls, floors, ceilings, partitions, roofs, etc., and making good after the work is sufficiently advanced.
b. The building of concrete and / or brick ducts in floors, walls, etc.
c. The formation of concrete bases, etc., for equipment
d. Excavation forming for underground services of ducts and courses and then covers it.
e. The cutting or forming of chases, recesses, etc., in floors, walls, etc., for conduits and fittings in and making good.
f. Excavation for and laying of cable carrying pipes.
g. The building in of brackets and supporting bars or other form of conduit or pipe suspensions.
h. The painting of all pipes, tube and conduits etc. after fixing unless specified to the contrary.
i. The providing and building in of sleeves through slabs and walls.

In general all required holes through walls, floors and beams for pipes and ducts will be left out by the Contractor during the process of building.

Where conduits, pipes or fittings are fixed to concrete or woodwork by means of saddles or clips, the Contractor shall himself execute the work necessary and the cost of such work shall be considered to have been so specified in the price.

Cutting, fitting, repairing, patching or plastering and finishing of carpentry work shall be done by craftsmen skilled in their respective trades, when cutting is required it shall be done in such a manner as not to weaken structure, partitions or floors. The holes required to be cut must be directed without breaking out around the holes. Where patching is necessary in finished areas of building, the Engineer shall determine the extent of such patching or refinishing.

23. TESTING - GENERAL

Upon completion of installation, at least seven days notice is to be given of intention to perform any test. The Contractor shall perform all static, semi-dynamic (by simulation), and dynamic field testing on all the equipment and systems.

All tests shall be conducted in the presence of the Engineer for the purpose of demonstrating equipment or system compliance with specifications. The

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Contractor shall submit for Engineer's approval complete details of tests to be performed describing the test procedure, test observations and expected results. The Contractor shall furnish all tools, instruments, test equipment, materials, etc., and all qualified personnel required for the testing, setting and adjustment of all electrical equipment and material including putting the same into operation.

All tests shall be made with proper regard for the protection of the personnel and equipment and the Contractor shall be responsible for adequate protection of all personnel and equipment during such tests. The cost of any damages or rectification work due to any accident during the tests shall be the sole responsibility of Contractor.

The Contractor shall record all test values of the tests made by him on all equipment. Four copies of all test data and results certified by the Engineer shall be given to the Engineer for record purposes. These shall also include details of testing method, testing equipment, diagrams, etc.

The witnessing of any tests by the Engineer does not relieve the Contractor of his guarantees for materials, equipment and workmanship, or as any obligations of Contract.

In addition to installation testing, the Contractor is to carry out operation testing of all sections and is to clean, set, calibrate and fully commission, demonstrate and hand over to the Owner the entire Contract works in a thoroughly complete and operational state to the satisfaction of the Engineer.

The acceptance - provisional or final- shall be made by the Owner. This reserves him the right to be represented or assisted by a representative or an organization (whether official or not) of his choice, which may decide on his behalf any repairs deemed necessary resulting from lack of observations of this specification, or of the rules and standards. In addition, he may judge the quality of the works and the materials supplied.

This remains in force in case of sub-contracting.

The Contractor shall formally engage his direct responsibilities to the Owner or his representative, and likewise, shall assume all responsibility for work performed by sub-contractors and materials he has supplied and installed.

23.1 Insulation Resistance Test

Insulation resistance test shall be made on electrical equipment by using a megger of 1000 volts for circuits between 250 and 500 volts. The insulation resistance of distribution boards, cables, etc., shall be as per IEC, IEEE, BSS and Pakistan Electricity Rules.

The distribution boards shall be given an insulation resistance measurement test after installation, but before any wiring is connected. Insulation tests shall be made between open contacts of circuit breakers, switches and between each phase and earth.

If the insulation resistance of the circuit under test is less than specified value, the cause of the low reading shall be determined and removed. Corrective measures shall include dry-out procedure by means of heaters, if equipment is found to contain moisture. Where corrective measures are carried out, the insulation resistance readings shall be taken after the correction has been made and repeated twice at 12 hours interval. The maximum range for each reading in the three successive tests shall not exceed 20% of the average value. After all tests have been made, the equipment shall be reconnected as required.

23.2 Earth Resistance Test

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Earth resistance tests shall be made by contractor on the earthing system, separating and reconnecting each earth connection as may be required by the Engineer. If it is indicated that soil treatment or other corrective measures are required to lower the ground resistance values, the Engineer will determine the extent of such corrective measures.

The electrical resistance of the E.C.C. together with the resistance of the earthing lead measured from the connection with earth electrode to any other position in the completed installation shall not exceed one ohm.

Earth resistance test shall be performed as per Electrical Inspector's requirements. Where more than one earthing sets are installed, the earth resistance test between two sets shall be measured by means of Resistance Bridge Instrument. The earth resistance between two sets shall not exceed one ohm.

23.3 Switchgear

Each circuit breaker shall be operated electrically and mechanically. All interlocks and control circuits shall be checked for proper connections in accordance with the wiring diagrams given by the manufacturer.

The Contractor shall properly identify the phases of all switchgear and cables for connections to give proper phase sequence.

Trip circuits shall be checked for correct operation and rating of equipment served. The correct size and function of fuses, disconnect switches, number of interlocks, indicating lights and alarms shall be in accordance with approved manufacturer drawings. Nameplates shall be checked for proper designation of equipment served. Protective relays shall be tested and set at site prior to commissioning of the equipment.

23.4 Special Systems Tests

The special systems such as telephone, intercom, etc., shall be tested according to the procedures laid down in the respective sections of the technical specifications. However, any specific tests recommended by the manufacturer shall also be carried out as approved by the Engineer.

23.5 Complete Tests

After any equipment has been tested, checked for operation, etc., and is accepted by the Engineer, the Contractor shall be responsible for the proper protection of that equipment so that subsequent testing of other equipment do not cause any damage to the already tested equipment.

24. ELECTRICAL CONNECTION

Electrical connection for each building shall be supplied by other but necessary arrangement coordination to be done by this Contractor.

25. AS BUILT DRAWINGS AND SERVICE MANUALS

A record shall be kept as the work proceeds of any work not in accordance with the working drawings, and upon completion of the work, the Contractor shall prepare the following drawings and forward them to the Engineer for approval:

a. Duplicate prints of as built single line diagram of the main and sub main distribution network, indicating all cables, their size and type, and the rating of all protection devices such as circuit breakers, fuses, etc.
b. Duplicate prints of as built drawings of lighting, power, telephone, fire alarm, as applicable.
c. Duplicate prints of as fixed control and wiring diagrams for the equipment installed as part of the Electrical Contractor works.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

After these drawings have been approved, the Contractor shall supply two prints on paper of each and insert these in the operating and maintenance manual specified below.

The Contractor shall submit to Engineer for approval a sample of manufacturer instructions for installation, testing, commissioning, operation and maintenance manuals including manuals of spare parts and tools of the equipment. Upon acceptance, the Contractor shall supply three copies to the Engineer for forwarding to the Owner. These manuals should be in properly bound form. At least two copies of the documents shall be submitted in original. The installation instruction shall be submitted two weeks prior to commencement of installation of each equipment, and operation and maintenance instruction at the time of commissioning. If the Contractor fails to provide the documents, the Engineer shall withhold issuance of requisite certificates and deduct suitable amount from the payments to the Contractor.

26. WORK COMPLETION

The Contractor shall further make good, repair, replace all defective works and clear away on completion and leave all installations in perfect working order and to the satisfaction of the Owner or his representative.

27. PAYMENT

No separate payment shall be made for work involved within the scope of this section unless specifically stated in the Bill of Quantities or herein.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-2
ELECTRICAL IDENTIFICATION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Nameplates and Labelling
B. Wire markers
C. Raceway colour coding
D. Cable Identification tags
E. Cable Warning Tapes
F. Cable markers
G. Equipment Warning / Danger Charts
H. Circuit Identification Charts (DB Directories)
I. Exposed Metal Work
J. Concealed Metal Work
K. Colour Schemes and Language

1.02 SUBMITTALS

A. Submit shop drawings
B. Include data sheets for identification materials furnished
C. Include schedule for nameplates and labels
D. Include sample engraved nameplate of each type and size

PART 2 – PRODUCTS

2.01 NAMEPLATES AND LABELLING

A. All plant and equipment provided under this contract shall be labelled in English and other languages as selected by the Engineer. All warning signs shall be English and one more languages as to duty or services, all such labeling to correspond to schedules, diagrams, etc. shall be provided as part of the as-built drawings. Labels shall be of white Traffolyte with black engraved lettering not less than 20mm high or as otherwise required and approved.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Manufacturers' nameplates shall be provided for all plant and equipment and shall show serial and model numbers and date of manufacture.

C. Label shall be provided for all sub-board, distribution boards, Circuit Breaker of Switchboard, Termination Board, etc. as required or directed on site

D. Every indicating light, switch, terminal and breaker in the control and electrical board shall be labelled so as to provide ready identification of each and all circuits and operational light and switch. A schedule of circuits shall be mounted in a metal frame complete with plastic protective cover and hung in the vicinity of the switchboard. For smaller distribution boards, the schedule can be kept inside the board when agreed by the Engineer. The designation of the boards shall be labelled.

E. Labels shall be screwed or riveted to sheet metal. Adhesive fixing is not acceptable.

F. Details of exact lettering shall be agreed with the Engineer prior to manufacture.

2.02 WIRE MARKERS

A. Wire markers shall be split sleeve or tubing type.

B. Wire markers shall be required for each conductor at panel board gutters, pull boxes, outlets, junction boxes and each load connection.

C. All power and lighting circuits, branch or feeder circuits and control circuits shall require wire markers.

2.03 RACEWAY COLOUR CODING

A. All expose pass through public area shall be finishes with colour matching surrounding with colour band identification as in Table 1.

TABLE 1

Painting, Labelling and Finishing

Equipment colours and codes

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Item	Colour
Switchboards	Grey
Control Panels	Grey
Electrical Motors	In accordance with equipment colour and as per Engineer's approval.
Electrical Conduits	Light Orange
Electrical Installation (Power and Lighting Points)	Orange (Tango)
Automatic Control / BAS installation	Yellow (Canary Yellow)
Fire Protection System	Dark Red (Matador)
Telecommunication System	White
White	Light Green (Linden)
MATV, PA	Light Blue (Lobelia)
Security, CCTV	Light Blue with Red band

B. Colour scheme proposed by the contractor shall be made reference to a recognised international standard acceptable to the Engineer.

C. All colour identification shall comply with Local Authority and Civil Defence's code requirement

2.04 CABLE IDENTIFICATION TAGS

A. All cables which exit from manholes, vaults, hand-holes, and transformer or switch enclosures shall be properly tagged or labelled. Tags shall be permanent, non-corrodible and clearly readable. Tags shall include the information listed below for the various circuit categories:
   1. Primary Cable - 13.8 kV or LV Cable – 400 Volts.
   2. Feeder Name.
   3. Voltage.
   4. Phase (for single conductor cables).

B. Cable identification tags for wire and cable circuits shall be of an opaque nylon material arranged to include a marker plate, non-releasing nylon ties, and cable fastening tail. One side shall be roughened to hold black nylon permanent ink. Identification shall be permanent and waterproof. The holding device shall be

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

designed to allow the fastening tail to pass around the cable through the holding device and shall prevent removal of the tail without cutting it loose from the marker. Cable identification shall be inscribed in English.

2.05 CABLE WARNING TAPES

A. For buried LV and MV cables use warning tapes according to the standard practice of the electricity supply authority and applicable international standards.

B. Cable warning tapes shall be of polythene, not less than 150 mm wide and at least 0.25 mm thick. They shall be yellow in colour for LV and MV cables and shall bear the continuously repeated legend – "CAUTION ELECTRIC CABLE BELOW" or similar in English, in black letters not less than 30 mm high.

C. For buried low current/communication cables or duct banks, use warning tapes in accordance with the requirements and standards of local authorities having jurisdiction and applicable international standards.

2.06 CABLE MARKERS

A. Buried cables shall be permanently identified by concrete markers. Markers shall be 600 mm square x 100 mm thick with impressed characters and shall be made of grade 20 concrete, with 10 mm aggregate. The impressed characters shall be in English and worded "HV CABLE" or "LV CABLE" as appropriate together with circuit details as required for proper identification. In addition, the word "JOINT" shall be added to above words, where applicable.

B. Except where cables are buried, located in switch rooms, in ducts and spaces designated solely for electrical services or have orange over-sheaths, they shall be identified by adhesive bands coloured orange, complying with standards and codes of practice mentioned elsewhere in the Specification. The bands shall be not less than 100 mm long, located at least once within each separate compartment through which cables pass and at intervals not exceeding 12 m.

C. Except where cables are buried or enclosed in conduit, trunking or ducting; they shall be permanently identified by discs. Discs shall be of laminated plastic

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

material with black characters on white. Character shall be not less than 3 mm high. The inscription shall indicate the nominal voltage, the designation of the load, the number and cross sectional area of cores and the rated voltage of the cable.

D. Cable identification discs shall be attached to the cables with ties. Discs shall be located within 500 mm of terminations and joints, at least once within each separate compartment through which the cable passes, and at intervals not exceeding 24 m. Locations of discs shall coincide with the colour bands.

2.07 EQUIPMENT WARNING / DANGER CHARTS

A. For external use, pressure sensitive danger signs shall be used. Dimensions shall be as approved by the Engineer. The signs shall be heavy duty vinyl with a self-adhesive backing which can be applied to curved or irregular surfaces. Danger signs shall be weather-resistant and shall not discolour or deteriorate with age.

B. Danger signs shall be inscribed with the equipment voltage level along with an internationally recognized danger sign.

C. Warning/danger signs made of red plastic (vinyl) with white letters at least 25 mm high reading "DANGER High Voltage" shall be fixed to the entrance doors of all 13.8 kV switchgear and transformer rooms.

D. Warning/danger signs made of red plastic (vinyl) with white letters at least 15 mm high reading "DANGER 400V"or “DANGER 230V” as appropriate, shall be fixed to the lids, covers or doors of any equipment which contains terminals or conductors connected to more than one phase of a low voltage supply.

E. All signs shall be in English and Local language as approved by the Engineer.

2.08 CIRCUIT IDENTIFICATION CHARTS (DB DIRECTORIES)

A. Individual circuit identification charts shall be provided for all MV switchgear, LV power distribution boards, panel boards, control panels, etc. indicating the following information as a minimum and as applicable:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Circuit numbers.
2. Phase.
3. Load names with location.
4. Connected load
5. Outgoing terminal numbers.
6. Sizes and types of protective devices.
7. Sizes and types of incoming and outgoing cables.
8. Contacts location references of relays and other control devices (if any).

B. Charts shall be printed on A4 size sheets. They shall be enclosed in a clear plastic envelope and shall be securely fixed to the inside cover of the unit. Additional copies of the charts shall be included in the operation and maintenance manuals.

2.09 EXPOSED METALWORK

A. All exposed metalwork (including those inside plant room) shall be wire-brushed and cleaned from rust, scale, dirt and grease, and shall then be given one priming coat, one undercoat and one finishing coat of full gloss enamel.

B. The priming coat for exposed galvanised iron shall be an approved galvanized iron primer.

C. The priming coat for exposed non-ferrous metalwork shall be approved as suitable for the metal to which it will be applied.

2.010 CONCEALED METALWORK

A. All galvanized iron surface concealed in roof spaces, false ceilings, building ducts etc. need not be painted.

B. All black iron and steel surface shall be wire brushed and given one coat of zinc chromate or red lead.

C. Colour banding for identification shall be provided as described elsewhere in this Specification.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. Colour–paint finish for concealed services, if required by Local Authorities, shall however be provided.

2.011 COLOUR SCHEMES AND LANGUAGE

A. The whole of the installation shall be painted in accordance with the requirements indicated in Table 1, unless otherwise agreed by the Engineer.

B. The language used for all Labelling and Identification shall be English and Local language as approved by the Engineer.

PART 3 – EXECUTION

3.01 APPLICATION OF PAINTING

A. All paints shall be prepared and applied in accordance with the manufacturer's recommendations.

B. All galvanized metal surfaces shall be properly etch-primed to ensure correct adhesion of the paint to the surface. Materials for etch-priming shall be as recommended by the paint manufacturers. Subsequent painting of galvanized surfaces shall comply with this Specification.

C. Prior to painting, all metallic surfaces except galvanized surfaces shall be thoroughly scraped and wire brushed as necessary to remove scale, rust and swarf. Surfaces shall then be solvent cleaned to remove all oil, grease and dirt.

D. When the surfaces to be painted are clean and dry, one coat of an approved primer shall be evenly applied over the entire area. When the priming coat is completely dry, one coat of an approved paint flat undercoat shall be applied. Before applying

E. the finishing coats, the Sub-contractor shall ensure that the undercoated surface is rubbed flat and smooth. Finally, an approved high gloss finishing paint shall be applied when all dust has been removed.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

F. Each successive coating shall be completely dry prior to the application of the next coat. The minimum thickness of each layer of paint shall be 50 microns.
   1. All expose series pass through public access area shall be finishes with colour matching surrounding with colour Band Identification as above.
   2. All Colour Identification shall comply with Local Authority and Civil Defence.

END OF SECTION

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION- E-3
PRE-COMMISSIONING AND COMMISSIONING

1.0 1.01 GENERAL

Conform to General Requirements for Electrical Services of Division 16.

2.0 1.02 DESCRIPTION OF WORK

Prior to acceptance, inspect, operate and test all electrical equipment, materials and components, whether such tests are detailed in this specification or not. Tests will be witnessed by THE CONSULTANT/PROJECT MANAGER, to ensure that the operation of the systems and components satisfies the requirements of the Contract Documents.

Include any specific testing required by the Authorities, or any other body having jurisdiction over the installation, and as directed by THE CONSULTANT/PROJECT MANAGER.

Provide all tools, equipment, labour and materials required to perform the electrical testing. Provide three copies of the test reports to THE CONSULTANT/PROJECT MANAGER.

3.0 TESTING AND COMMISSIONING

4.0 2.01 GENERAL

The testing and commissioning shall be carried out in accordance with contract requirements, by a firm specializing in this work, under no circumstances shall the Contractor be allowed to use his own staff or affiliated companies for the Capital plant such as switchboards, power factor correction equipment, fire alarm system, lighting control and dimming system, central emergency lighting system and lifts.

The contractor shall submit for approval, a detailed method statement for each testing and commissioning activity.

The contractor shall maintain written records of all tests.

Successful test records shall be counter signed by the consultant and bound into the operation and maintenance manual. upon completion of the testing and commissioning the contractor shall demonstrate to the consultant the following:

A. Voltage within correct tolerances in accordance with the contract documents.
B. Power factor and harmonics in accordance with the Contract Documents.
C. Earthing in accordance with the contract Documents.
D. Illumination levels in accordance with the Contract Documents.
E. Correct control of all plant.
F. Structured cabling of telephone and data communication system

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Fire alarm system.

H. Correct functioning of the following specialist systems and their integration:

- An audit inspection at factory before dispatch and at site after receipt of the switchgear for any manufacturing / transit defects.

5.0 2.02 PRECOMMISSIONING AND COMMISSIONING CHECKS

Pre-commissioning/Commissioning check sheets for the following shall be submitted for the CONSULTANT review:

A. DB / Final Light & Power Points
B. Specified Lighting Controls
C. Power And Control Cables
D. Fire Alarm System
E. Emergency Lighting System
F. Programmable lighting control system

6.0

Once the procedures are agreed up on, the Inspection and testing reports for the above systems shall be submitted for CONSULTANT review/approval.

The following inspections have to be carried out for any manufacturing defects/transit damages and inform the supplier immediately if found any defects

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-4

CONDUCTORS AND CABLES

1.0 SCOPE OF WORK

The work under this scope consists of supplying, installation, testing, connecting and commissioning of all material and services of low voltage cables and wires and the accessories as specified herein or shown on the Tender Drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at site with others for exact route, location and positions of electrical lines and equipment.

The LV cables and wires with accessories shall also comply with the General Specifications for Electrical Works, Section E- I and with other relevant provisions of the Tender document.

2.0 GENERAL

All multicore and single core wires for light circuits, socket outlets and circuits operating upto 250 volts shall be 300 / 500 volts grade. All single core sheathed cables shall be of 450 / 750 volt grade and upto 50sqmm and above shall be of 600/1000V. Power cables for main feeders, main to sub main feeders, power equipment, etc., armoured or unarmoured shall be of 600 / 1000 volts grade.
Armouring of cables shall be done with appropriate size galvanized steel wire as per codes.

The conductors shall be stranded or solid, high conductivity, soft annealed copper. Conductor of single core cables shall be circular, whereas of multicore cables may be circular or shaped according to standard practices and codes. The PVC insulation shall be extruded with a PVC compound having good flexibility, resistance to aging and ability to withstand the ambient temperatures as given in General Specifications for Electrical Works, Section E-1 of these specifications. Cable should be capable of running 125% of full load current without any damage.

3.0 STANDARDS

LV Cables and Wires shall comply with Section – E -1, Clause 3.

Particular reference shall be made to:

BS 6004 / 6346	PVC insulated cables for lighting and power.
BS 6746	PVC insulation for electrical cables.
BS 6360	Copper conductors
BS 6500	Insulated flexible cords.

Any other standard referred to in above standards or these specifications.

4.0 MATERIAL

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.1 General

The power, lighting and control cables shall be furnished and installed in accordance with the routes and requirements shown on the drawings.

All cables shall have phase identification colours on insulation of each core. The colour code for three phase circuits shall be red, yellow and blue for phase conductors and black for neutral conductor. Where insulated earth conductor is installed, it shall have green colour insulation.

Single phase circuits shall have insulation of red colour for phase / line, black colour for neutral and green colour for earth conductor.

All DC circuits shall have insulation of red colour for positive, black colour for negative and green for earth conductor.

The ends of each length of multicore armoured or unarmoured cables shall be properly marked for clock-wise and anti clock-wise sequence of core colors.

4.2 Cables for Conduit Wiring

All cables / wiring in concealed or surface mounted PVC or steel conduits shall be single core PVC insulated of specified grade and size, unless specifically shown on the drawings or given in BOQ.

4.3 Cables on Surface / Concrete Trenches

Cables for distribution system to be installed on surface, in cable ducts, in concrete trenches or on trays shall be single or multicore PVC insulated and PVC sheathed of specified voltage grade and size, unless specifically shown on the drawings or given in BOQ.

4.4 Underground Installation

Cables for laying directly underground shall be PVC insulated, PVC sheathed and armoured with galvanized steel wire. Cables fully installed in underground ducts / pipes and mechanically protected from end to end shall be PVC insulated and PVC sheathed unless specifically shown on the drawings or given in BOQ.

4.5 Cable Accessories

All cable accessories shall be provided for the complete cabling and wiring system without any additional cost unless specifically mentioned in BOQ. These shall include but not limited to the items such as saddles, clamps, fixing channels, connectors, cable joints (where necessary and approved by the Engineer), clips, lugs, tapes, solder, identification tags, bushes, glands, etc.

5.0 INSTALLATION

5.1 General

When the laying is effectuated by others, the contractor shall test the cable characteristics insulation and continuity, at all phases of these and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

communicate them in a report to the Engineer, as per recommendations of the standards according to which the cable is manufactured.

The cables shall be spaced by categories along their entire length as well as upon penetration into buildings and in their interiors, according to their following rated voltages:

- 30 cm at least between a cable carrying I KV - 30KV and other cables.
- 20 cm at least between a cable carrying voltages between 50V - 500V, and any power or control 10 cm at least between a cable carrying voltages lower than 50V and telephone or these possible being grouped.

All installation material, labour, tools and accessories for cable installation shall be furnished by the Contractor. The cable and accessories shall be installed as described in accordance with these specifications, drawings and manufacturer's instructions.

5.2 Conduit Wiring

The wiring through conduit shall be started only after the conduit system is completely installed and all outlet boxes, junction boxes, etc., are fixed in position. The filling rate inside the conduits shall not exceed 50 %. Cables directly embedded in the masonry are not accepted.

The wires shall be pulled in conduit with care, preferably without the use of any lubricant. Where necessary and if approved by the Engineer, the cable manufacturer's recommended lubricant may be used. Where several wires are to be installed in the same conduit, they shall be pulled together along with the earth conductor. All wires of same circuit shall be run in one conduit.

The wires shall not be bent to a radius less than 10 times the overall diameter of the wire, or more if otherwise recommended by the manufacturer.

The wiring shall be continuous between terminations and looping-in system shall be followed throughout. Any joint in wires shall not be allowed. The use of connectors shall only be allowed at locations where looping-in is rendered difficult. The consent of the Engineer shall be required for using connectors. The connector shall be of suitable rating having porcelain body with sunk-in screw terminals. The connector shall be wrapped with PVC insulation tape after its installation. A minimum of 150 mm extra length of cable / wire shall be provided at each termination to facilitate repairs in future.

5.3 Cables on Surface / Trenches

All cables for installation on surface of wall, column, ceiling, trenches, etc., shall be fixed to the surface by means of galvanized steel clips, secured to a steel channel using suitable stud plate, nuts and washers.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

The erection of cables and position of support shall be agreed by the Engineer on site, having taken into consideration the accessibility of all such routes. These shall be so arranged that cable crossing one another be minimized if cannot be avoided.

Cables shall be fixed throughout their length by means of approved saddles, clips, etc., at every 600 mm vertically and 900 mm horizontally.

Cables and equipment fixed to a building fabric, i.e., brickwork, concrete, etc., shall be fixed by means of appropriate fixing devices, i.e., Raw bolts, Hilti fixing devices, etc., or alternatively by means of suitable fixing devices cast at site, e.g., concrete inserts.
Contractor shall be responsible for all drilling of steel work, brick work and masonry where necessary for fixing clamps and brackets for supports.

Cables shall not be pulled into conduit until the conduit system has been completed, cleared and free from obstruction and sharp edges.

It shall be ensured that conduit system is clear before cable is drawn in. cables shall be put into conduits in such a manner that there will be no cuts or abrasions in the cable insulation, protective braid and jackets. There shall be no link in the conductors.

Distance of saddles shall be used for installation of cables in defined condition of the surface of wall etc.

Grease or other injurious lubricants shall not be used in pulling cables. The use of talc or non injurious lubricants is permissible, if desirable.

The number of wires installed in any conduit shall be such that the resulting space factor does not exceed 50 %. Spliced wires shall not be pulled through conduits.

All conduit wiring shall be carried out in the loop - in principle from outlet box to outlet box and in no circumstances shall joints be used except in fixed base connection blocks housed in outlet boxes.
The vertical clearance between two adjacent cables at any point is 50 mm minimum. Common mounting, channels are to be furnished for cable along the same route. The Contractor can offer alternate cable fixing arrangement, which shall be approved by the Engineer before commencement of installation.

The wall crossings where the outdoor cables penetrate in the building shall be carefully obstructed by means of polyurethane foam. The Contractor shall be fully responsible for the perfect tightness of these cable penetrations.

5.4 Underground Cables

The Contractor shall plan and take special care to prevent any damage to existing under ground facilities such as under ground piping, cables, foundations, etc. The Contractor shall notify the Engineer of any

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

obstruction encountered and shall provide protective support or removal of such obstructions as instructed by the Engineer. Excavation adjacent to existing facilities, such as foundations manholes, ducts, under ground pipelines and paving shall be braced and / or shored properly to protect those facilities during excavation and construction.

Sufficient slack shall be left in cables for this purpose that cut lengths of cables shall allow about 3% more in the measured lengths between terminations.

Cables, whether installed under ground or in concrete trenches, shall not be bent to a radius less than 10 times the diameter of the cable or as recommended by the cable manufacturer, whichever is higher.

All cables shall be marked at least at each end, switch gear and equipment termination, where cable enter or leave under ground cable trenches or channels, where cable rises from one level to another, at 30M intervals with predetermined identification numbers, by means of proprietary non-deteriorating type, PVC, heat shrinkable, strap-on type or equivalent, for the identification of cable and circuit. These shall be indelibly marked with cable number and securely fixed to the cable. Where conductors are left to be terminated by another party or left to be connected later, they shall be identified. The earth continuity conductor shall be laid in the trench with the cables.

Cables entering the buildings shall also be laid in protective pipes. The protective pipe ends, after installation of cables, shall be plugged water tight by means of polyurethane foam / bituminized Hessian or equivalent method as approved by the Engineer.

5.5 Cable Termination and Joints

Cables shall be terminated in a safe, neat and approved manner at the associated equipment, included that erected by others.

Compression type connectors (lugs) shall be of the correct size and approved type for the conductors concerned. Compression tools shall be supplied for specific use and shall be maintained in good order. After compression the conductor and terminal shall form a solid mass ensuring good conducting properties and mechanical strength. The compression jointing system used throughout the installation must be approved by the Owner or his representative before use.

The Contractor shall be responsible for all drilling and if necessary, tapping entries where these have not been provided by others.

When preparing cables prior to fitting glands, the gland manufacturer's instructions for cable preparation shall be observed. In all cases where armoured cables are used, care shall be taken to ensure that the lay of the armour is maintained after the gland is completely fitted.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Termination and joints shall be suitably insulated for the voltage of the circuits in which they are used.
Every compression joint shall be of a type, which has been the subject of a test certificate as described in BS 4579.

Cable ends, which are not terminated immediately after cutting, shall be sealed effectively to prevent ingress of moisture and shall be protected from damage until termination.

For all cables above 6 sq. mm in section, if a substantial mechanical clamp is not provided a compression type lug or socket shall be provided. At all equipment, cable shall be installed and terminated so that no strain is imposed on the cable or gland and due allowance made to counter the effect of vibration. At all termination an ample length of 'tail' shall be left.

Where joints in cable conductors and bare conductors are required, they shall be mechanically and electrically sound and they shall be accessible for inspection. Joints in non-flexible cables shall be made either by soldering or by means of mechanical clamps or compression type socket, which shall securely retain all the wires of the conductors.

Any joint in flexible cable shall be effected by means of cable coupler. Cable couplers and connectors shall be mechanically and electrically sound and shrouded in metal, which can be earthed. Where the apparatus to be connected require earthing every cable coupler shall have adequate provision for maintaining earth continuity.

Cables of AC circuits, installed in PVC or steel conduit shall always be so bunched that the cables of all phases and the neutral conductor (if any) are contained in the same circuit. The outdoor apparatus shall normally be connected by means of cables with conduit termination down to about 30 cm below ground level or concrete foundation. The conduit shall be firmly secured down to their penetration into the trench or channel.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-5
CONDUITS AND PIPES

1.0 SCOPE OF WORK

The work under this scope consists of supplying, installation and commissioning of all material and services of the complete Conduits and Pipes as specified herein and / or shown on the Tender Drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at site with others for exact route, location and positions of electrical lines and equipment.

The Conduit and Pipes with accessories shall also comply with the General Specifications for Electrical Works, Section E- I and with other relevant provisions of the Tender document.

2.0 GENERAL

The extent of works shown on the drawing does not indicate the exact position of conduit and pipes. The Contractor shall ensure exact location and route of conduit and pipes in coordination with other services drawings, as per site requirements and as directed by the Engineer.

The quality and material for the accessories of conduits and pipes such as sockets, elbows, bushings, bends, inspection / pull boxes, round boxes, etc., necessary for the completion shall be similar to that of conduit or pipes. All the accessories shall be supplied by the Contractor without any extra cost and deemed to have been included in the price of conduits / pipes.

3.0 STANDARDS

Pipes and Conduits shall comply with Section - E-1, Clause 3.
Particular reference shall be made to:

BS 31	Steel Conduit and accessories
BS 1378	Galvanized Iron Pipes and accessories.
BS 3595	PVC Pipes and accessories.
BS 4607	PVC Conduits and accessories.

Any other standard referred to in above standards or these specifications.

4.0 MATERIAL

4.1 PVC Conduits, Pipes and Accessories

The PVC conduits and accessories for lighting and power circuits shall be furnished by the Contractor as shown in the drawings or given in BOQ. The PVC bends shall have enlarged ends to receive conduit without any reduction in the internal diameter at joint. Manufactured smooth bends shall be used where conduit changes direction. Bending of conduits by heating or otherwise will be allowed in special situations only, for which the consent of the Engineer shall be required. The use of sharp 90 degree bends and tees will not be allowed for concealed wiring.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

The round PVC junction boxes for ceiling light or fan points shall have minimum dimensions of 64 mm diameter and 64 mm depth. The junction boxes for wall light points shall have minimum dimensions of 57 mm diameter and 40 mm depth. Round junction boxes shall be provided with one piece bakelite cover plate fixed to the box by means of galvanized screws.

The PVC pipe shall be rigid and shall be minimum D-Class (working pressure - 12 Kg / cm), unless otherwise stated on Drawings or Bill of Quantities. Where pipe changes direction, manufactured smooth bends shall be used. For jointing of pipe, all precautions and procedures recommended by manufacturer shall be followed.

4.2 Steel Conduit and Accessories

All conduits shall be of heavy gauge 16 SWG steel, manufactured and tested in accordance with latest relevant standards.

The conduit shall be protected by two base coats of red oxide anti-rust paint and finished in first quality black enamel paint. The coating shall be of heavy enamel, which shall not flake or crack during installation and handling. Each conduit length shall be furnished with threaded ends and a threaded coupling at one end. Soft metal bushes shall be provided at conduit termination to prevent damage to cable during pulling operation.

Junction boxes shall be 100 mm square, having minimum depths of 38 mm or 65 mm as required for accommodating the number of wires. The junction box shall be 16 SWG sheet steel provided with anti-rust paint and finished in heavy black enamel paint. The cast Iron outlet boxes for light points shall be round having 50 mm diameter and 63 mm depth. The above dimensions are given as minimum only, and the exact size shall be determined by the Contractor keeping in view the ease of Installation and maintenance. All outlet boxes and junction boxes shall be provided with one piece bakelite cover plate of suitable design.

4.3 Galvanized Iron Pipes and Accessories

The G.I. pipes shall be galvanized from inside and outside by hot dip galvanizing method. The pipes shall be free from stains, burrs or any other defect. The accessories for G.I. pipes shall be galvanized from inside and outside. The conduit shall be NPT threaded, with at least 5 complete threads and assembled with TEFLON tape.

4.4 Inspection Boxes / Pull Boxes

The rectangular inspection boxes or pull boxes shall be of 16 SWG heavy gauge, sheet steel having nipples welded to box at entry holes to receive PVC conduit with force fit. The box shall be painted inside and outside with black enamel paint over a base coat of red oxide primer paint. The minimum length of inspection box shall not be less than six times the cable manufacturer's recommended bending radius of the cable. All concealed type pull boxes shall have a white plastic sheet of appropriate size fixed to the box by means of galvanized screws.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.5 Adaptable Boxes

Adaptable boxes shall be made of 16 SWG sheet steel box, painted and finished to the same quality as the light Distribution Board. The boxes shall be 50 mm in depth for conduits up to 25 mm diameter, 63 mm in depth for conduits up to 40 mm diameter and 87 mm in depth for conduits up to 50 mm in diameter. For conduits more than 50 mm in diameter, the minimum depth shall be two times the diameter.

4.6 Conduit / Pipe Accessories

Bushes, plugs, glands, etc., shall be of brass and all male bushes shall be of long thread pattern. Covers for boxes shall be screw fixed and finished as the boxes. Gaskets shall be fitted only when finish is galvanized unless otherwise specified.

4.7 Cable Trunking

Where required, wiring shall be run in hot-dipped galvanized (after fabrication) sheet steel cable trunking of the specified gauge complete with all fittings and accessories, manufactured and installed in accordance with BS 4678/NEMA. The trunking shall be constructed with return flanges. Trunking covers shall be secured by anchored turn-buttons and locking bars and minimum length of individual sections shall be 2.44-m. The trunking shall be suspended/supported from the structure at maximum 2-m intervals with straps and hangers fabricated from minimum 6-mm dia HDGF bars, or supported by angle-iron brackets.

Conduit drips from the trunking shall also be supported with hangers. Factory made connectors shall be used at joints.

Junctions (tee and 4-way) in multi-compartment trunking shall be double depth to avoid reduction in cabling space. Cable in vertical runs shall be supported by pin racks, prongs or bridging pieces. Fire barriers shall be provided at each floor level. Allowance for expansion shall be incorporated.

Bonding links shall be provided at each joint and secured by screws, nuts an shockproof washers. The bonding links shall make contact with the metal of the trunking of fitting, and continuity shall not depend on contact through the screws, nor on removal on site paint finish from ferrous metal.

5.0 INSTALLATION

5.1 PVC Conduits - Concealed

The conduit shall be installed concealed in roof, wall, column, etc.
At all joints and bends, PVC jointing solution as manufactured by Pakistan PVC Limited or approved equivalent must be used to strengthen and to seal the joint.

Manufactured smooth bends shall be used. Bending of conduits by heating or otherwise will be allowed in special situations only, for which the consent of the Engineer shall be required. The use of 90 degree bends and tees will not be allowed.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

The conduit shall have a minimum of 38 mm cover of concrete. In the reinforced cement concrete (RCC) work, the conduit shall be laid before pouring of concrete. Under no circumstances shall chases be made in the RCC structure for concealing conduit and accessories, after pouring of concrete. The concrete shall be supported on top of bottom reinforcement of slab and shall be firmly secured by tieing to the reinforcing steel in order to avoid being disturbed during pouring of concrete.

All outlet boxes to be firmly supported and installed such that they finish flush with the soffit of slab of beam.

Where conduits have to be concealed in cement concrete (CC) work after concreting, or in block masonry, chases shall be made with appropriate tools and shall not be made deeper than required. The conduit shall than be fixed firmly in the recess and covered with cement concrete mixture to have to at least 32 mm cover before plastering. The work of curing in the cement concrete work or block masonry work shall be coordinated with the civil work. The Contractor shall obtain approval from Engineer for the route, to suit the site conditions before starting chasing and cutting.

The termination of conduits at or near the Switchboard / Distribution Board is shown diagrammatically on the drawing. The exact final locations of the termination shall be coordinated with the Switchboard / Distribution Board to be installed. Any extension of conduit near the Switchboard / Distribution Board to suit the site condition shall be made without any extra cost. Conduit ends pointing upwards or downwards shall be properly plugged in order to prevent the entry of foreign materials. All openings through which concrete may leak shall be carefully plugged and boxes shall be suitably protected against filling with concrete. At all termination of concrete, soft bushes shall be fixed to prevent sharp edges of conduit ends from cutting or damaging the wires or cables to be pulled through them.

The entire conduit system shall be installed and tested before wiring is carried out. Any obstruction found shall be cleared by use of cutting mandrel or other approved device and the conduit shall be cleaned out before the installation of cable.

Pull boxes / Adaptable boxes shall be provided in conduit runs wherever required to facilitate pulling operation. The drawings are diagrammatic and do not indicate the position and spacing of pull boxes or adaptable boxes. However, these shall meet the following requirements:

- Pull boxes.
  For straight runs the spacing shall not be more than 30 meters.
  For runs with one 90 degree bend, the spacing shall not be more than 15 meters.

- Adaptable boxes.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

For conduits up to 25 mm diameter, the boxes shall be 50 mm in depth.
For conduits up to 40 mm diameter, the boxes shall be 63 mm in depth.
For conduits up to 50 mm diameter, the boxes shall be 87 mm in depth.

Wherever the conduit lengths cross the expansion joint either along the column or slab, suitable arrangement shall be provided so that when the conduit lengths in the expansion joint are stressed, the conduit neither develops any cracks nor breaks down.

Bending, off setting and similar operations shall be performed through the help of proper bending tool to give a perfect bend of required angle without Desha ping of conduit to the least.

5.2 Steel and G.I/MS Conduit

The minimum size of conduit shall be 20 mm.

The use of solid or inspection elbows, bends or tees will not be permitted and 120 degree bends shall be limited to one between any two drawn-in boxes.
Conduit coupling joint shall not be used where conduit enter spout entry boxes. Conduit running, joints shall not be used where conduit enter conduit boxes or spout entry boxes.

Equipment that is required to be removed for maintenance shall be provided with conduit unions in all conduits that enter such equipment. The use of conduit nipples shall be avoided as far as practicable.

All conduits shall be cut square and reamed at the end. All conduit ends and the inside of conduits shall be clean and free from burrs.
Where bushed spouts or tapped holes are not provided at conduit termination, the conduit shall be terminated in a flanged socket and a smooth bore brass hexagon bush, with a lead washer fitted between the flanged socket and the equipment or box.

All exposed threads and parts where the galvanizing has become damaged shall be thoroughly cleaned and painted with galvanized paint. the exposed conduit ends shall be capped to protect threads from being damaged before installing cables.

Repair painting shall take place before any making good on site or buildings is carried out. The entire conduit system shall be checked for continuity. Any observation found shall be removed without damaging the installation.

The conduit system shall be installed empty with an 16 SWG steel wire drawn through the conduits for pulling of cables. Joints in underground conduits shall be avoided or reduced to the absolute minimum.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Where adjustable dies are used they shall be so adjusted that threads cut with them shall be the same depths as machine made threads.

The use of manufactured bends shall be avoided and instead smooth bends shall be provided by using approved type of bending tools.

Flexible steel conduits shall be installed at all points locations where flexible connection is required, as directed by the Engineer. The flexible conduits when used, shall be protected by external PVC sheath, resistant to oil damages.

G.I. pipes for under ground installation shall be given bituminous paint coating and wrapped with suitable paper or cloth before installation.

5.3 Fixing of Conduits and Fittings

Conduits in process units and on steel work with "U" bolt type fixings.

Conduits in buildings shall be fixed with galvanized distance saddles. Where a number of conduits follow a single route they may be fixed to mild steel brackets.

Conduits shall be supported on both vertical and horizontal runs as follows:

- Conduits size 20 mm and 25 mm maximum spacing of fixing 1000 mm.
- Conduit sizes larger than 25 mm spacing of fixing 1500 mm.

All conduit boxes that support fittings shall be securely fixed. All conduits shall be fixed 150 mm before and after every right angle or off set. All conduit fittings and equipment shall be fixed true and line able.
All conduit bends shall be made with an approved conduit bending machine or hickory. The radius of curvature of the inner edge of any bend shall not be less than the following table:

Conduit size	Radius
20 mm (3/4")	Not less than 130 mm.
25 mm(1")	Not less than 150 mm.
32 mm (1-1/4")	Not less than 200 mm.
38 mm (1-1/2")	Not less than 255 mm.
50 mm (2")	Not less than 305 mm.
70 mm (2-1/2")	Not less than 380 mm.
82 mm (3")	Not less than 460 mm.
100 mm (4")	Not less than 610 mm.

Under ground conduit stud-up or kick pipe through concrete envelope shall be extended a minimum of 150 mm above grade and adequately braced to prevent shifting during concrete pouring work. The concrete envelope shall extend at least 76 mm above grade.
Under floor conduit installation shall be at a minimum depth of 120 mm from finished floor level. The G.I. pipes / conduits shall be installed at a minimum depth of 1000 mm measured from the top of size to the finished road level.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5.4 Location of Conduits and Fittings

Before conduits are installed, confirmation shall be obtained that the conduit may be installed in that position.

Particular attention shall be given to the location of conduits to prevent the infringement of headroom and access ways.

Conduits shall be located to avoid obstructions, furnaces, hot lines and other places of high temperature.

Conduit shall not be located than 150 mm (6") where it runs parallel to or crosses hot surfaces. Under ground conduit runs shall be kept to minimum in both number and length. Conduits shall not be recessed in fair brick work.

Draw boxes shall be so positioned to enable the cables to be drawn in easily. The boxes shall not be located in the comers or other such locations and shall be positioned to avoid tight bends, bending and cable kinks.

Conduits shall not generally be installed having a greater length 12,000 mm (40 feet) between draw-in boxes.

Conduit entries shall wherever possible be located in the bottom of boxes and equipment etc.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-6
CABLE TRAY, LADDER AND TRUNKING

1.0 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

2.0 SUBMITTALS

General: Submit the following according to the Division 1 Specification Sections.
Product data for each component. Show tray types, dimensions, and finishes.
Determine the sizes of the cable trays based on the number and size of cables laid on the cable trays plus 20% space for future growth. Cables laid on cable trays shall be spaced twice their overall diameter (consider the largest cable as reference). In case of discrepancy with the contract documents this clause shall prevail, unless approved by the Engineer otherwise.

Shop drawings detailing fabrication and installation of cable tray, including plans, elevations, sections, details of components, and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice plate's connectors, expansion joint assemblies, straight lengths, and fittings.

Co-ordination drawings, including floor plans and sections drawn to accurate scale. Show accurately scaled cable tray layout and relationships between components and adjacent structural and mechanical elements.

3.0 QUALITY ASSURANCE

Manufacturer Qualifications: Select a firm experienced in manufacturing cable trays which has a record of successful in-service performance.
Comply with the relevant standards of BS, NEMA and NEC.
Single-Source Responsibility: All cable tray components shall be the product of a single manufacturer.

4.0 SEQUENCING AND SCHEDULING

Co-ordination: Co-ordinate layout and installation of cable tray with other installations.

Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Engineer.

5.0 CABLE TRAYS

The cable tray system shall be of one manufacturer and shall include factory made trays, tray fittings, connections and necessary accessories and supports to form a complete tray support system.

The cable tray system shall include the following factory made tray elements. Straight trays and ladders, fittings and horizontal and vertical bends of various

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

angle crosses, tees, wyes, reducers, vertical riser elements, connectors and all necessary fixing accessories.

Cable trays shall be constructed from mild steel of minimum thickness 16 gauge (1.5 mm). Trays in excess of 300 mm width shall be of minimum thickness 14 gauge (2.0mm).

Insert elements, bolts, screws, pins etc., shall be mild steel cadmium plated.

a. Tray work shall have oval perforations. Ladder type trays shall be used as required and/or approved by the Engineer.
b. All trays (straight and fittings) to be heavy duty returned flanged type unless specified otherwise.
c. Tray component are to be accurately rolled or formed to close tolerance and all edges rounded. Flanges are to have full round smooth edges.
d. Ladder racks of widths up to and including 300mm shall be constructed from rolled steel sections of minimum thickness 16 gauge (1.5 mm). Ladders in excess of 300 mm width shall be C Section construction with a minimum thickness of 14 gauge (2.0mm). the rungs shall be spaced at a maximum 300 mm.
e. Unless indicated otherwise on drawings, cable trays shall be used in the range 150 mm to 900 mm wide, in fire preferred standard sizes: 150, 300, 450, 600 and 900 mm.
f. Other sizes shall be used where specified or previously agreed with the Engineer.
g. Flanges shall be a minimum of 50 mm deep.
h. Minimum radius at side rails, horizontal and vertical tees and crosses shall be in accordance with the Manufacturer's standard.

Perforated, heavy duty, return flange type, in 2.5m nominal lengths Hot dip galvanized after completion of bending and drilling, complete with all necessary purpose made bends, tees, supports and the like. Width shall be such as to permit adequate access for installation and maintenance of cables and per the requirements of KESC regulations.

6.0 CABLE TRUNKING

Where required, wiring shall be run in hot-dipped galvanized (after fabrication) sheet steel cable trunking of the specified gauge complete with all fittings and accessories, manufactured and installed in accordance with BS 4678/NEMA. The trunking shall be constructed with return flanges. Trunking covers shall be secured by anchored turn-buttons and locking bars and minimum length of individual sections shall be 2.44-m. The trunking shall be suspended/supported from the structure at maximum 2-m intervals with straps and hangers fabricated from minimum 6-mm dia HDGF bars, or supported by angle-iron brackets.

Conduit drips from the trunking shall also be supported with hangers. Factory made connectors shall be used at joints.

Junctions (tee and 4-way) in multi-compartment trunking shall be double depth to avoid reduction in cabling space. Cable in vertical runs shall be supported by pin racks, prongs or bridging pieces. Fire barriers shall be provided at each floor level. Allowance for expansion shall be incorporated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Bonding links shall be provided at each joint and secured by screws, nuts an shockproof washers. The bonding links shall make contact with the metal of the trunking of fitting, and continuity shall not depend on contact through the screws, nor on removal on site paint finish from ferrous metal.

7.0 EXAMINATION

Examine surfaces to receive cable tray, cable trunking and cable ladder for compliance with installation tolerances and other required conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

8.0 WIRING METHODS

Use cable tray of complete with manufacturer's recommended covers, barrier strips, dropouts, fittings, conduit adapters, hold-down devices, grommets, and blind ends.

9.0 INSTALLATION

a. Install cable tray, cable trunking and cable ladder level and plumb according to manufacturer's written instructions, rough-in drawings, the original design, and referenced standards.
b. Remove burrs and sharp edges of cable trays.
c. Make changes in direction and elevation using standard fittings.
d. Make cable tray connections using standard fittings.
e. Locate cable tray above piping except as required for tray accessibility and as otherwise indicated.
f. Fire stop penetrations through fire and smoke barriers, including walls, partitions, floors, and ceilings, after cables are installed.
g. Working Space: Install cable trays with sufficient space to permit access for installing cables.

10.0 GROUNDING

Connect cable trays, cable trunking and cable ladder to ground as instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors.

11.0 CLEANING

Upon completion of installation of system, including fittings, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes, including chips, scratches, and abrasions.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-7
WIRING DEVICES

1. SCOPE OF WORK

The work under this scope consists of supplying, installation and commissioning of all material and services of the complete switches, switch sockets, etc., and miscellaneous items as specified herein and / or shown on the Drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordi- nate at site with others for exact route, location and positions of electrical lines and equipment.

The wiring accessories shall also comply with the General Specifications for Electrical Works, Section – E - I and with other relevant provisions of the Tender document.

2. GENERAL

The locations of the wiring accessories such as sockets, switches etc. are tentatively shown on the drawings. The Contractor shall ensure exact positions and locations of wiring accessories in coordination with other services drawings, as per site requirements and as directed by the Engineer. The Contractor shall be responsible for proper functioning of wiring accessories after installation and Commissioning.

3. STANDARDS
Wiring accessories and miscellaneous items shall comply with Section - E-1, Clause 3.
Particular reference shall be made to:
- BS 67 Ceiling roses.
- BS 1363:1984 13A fused plugs and unswitched socket outlets
- BS 116 Two and three terminal ceiling roses.
- BS 2135 Capacitors for radio interference suppression
- BS 3676 Switch for domestic and similar purposes.
- BS 4934 Safety requirements for electric fans and regulators.
- BS 5060 Performance of circulating fans and their regulators.

Any other standard referred to in above standards or these specifications.

3. MATERIAL

3.1. Switches

Switches for controlling light and fan points shall be single pole, rated for 10 Amp, 250 VAC. The body of switches shall be made of poly carbonate
/ urea with white face plate suitable for flush mounting on sheet steel out- let box. The switches shall be gang type having silver tipped contacts and operate with snap action.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

For locations where switches and fan speed regulators are installed to- gether, single switches shall be grouped and fixed on 3 mm thick plastic sheet screwed to a sheet steel box of appropriate dimensions. The fixing of plates on outlet boxes shall be means of flat head counter sunk galva- nized screws with the head of the screw finish flush with the surface of the plate. Except for switches controlling light points, all single switches for fans, sockets, etc., shall have identification symbols on the operating lev- ers.

Two way switches shall be used to control lights from two different loca- tions as shown on the drawings.

3.2. Switch Socket Outlets

Switch socket units shall be of flat pin type and conform to BS 1363, 13A for fused plugs and socket outlets. 2 and 3 Pin rated for 15 Amps. or 2 Pin rat- ed for 10 Amps. Supply as specified in the bill of quantities.

3 Pin 15 Amps. Sockets shall be moulded type having white plastic face plate, suitable for mounting on a sheet steel box of appropriate dimen- sions. Switch sockets shall have shrouded live contacts such that the earth pin is engaged to socket earth before making with the live contacts. Where specified, the switch socket unit shall have spring loaded dust tight cover for mechanical protection.

3.3. Sheet Steel Boxes

The outlet boxes for installation of switches, fan speed regulators and socket outlets shall be 16 SWG sheet steel having appropriate dimensions. The boxes shall have suitable knockouts or welded nipples for receiving the conduits. An earth terminal shall be provided for connecting at least three earth wires of 4 sq. mm. The outlet boxes shall be given two coats of anti-rust red oxide and one coat of enamel before installation. The boxes shall be suitable for mounting flush with the surface of wall or on the sur- face of wall as may be required. The boxes shall not be less than 75 mm x 75 mm (3" x 3"). All boxes shall be water tight where installed in the vicinity of liquids.

3.4. Ceiling Rose

The ceiling rose shall be suitable for 5 Amps. 250V AC. It shall have white plastic moulded base plate, copper or brass terminals for connecting at least two wires of 2.5 sq. mm size. The ceiling rose shall have a cover with cable inlet hole for multicore PVC insulated and PVC sheathed cable.

3.5. Fans

3.5.1. Bracket Type

The bracket type fans shall be suitable for mounting on the wall and suitable for operation sami-horzontally. These shall operate sat-

isfactorily on 250 volts, single phase, 50 Hz, A.C. supply with + 10 % tolerance.

The sweep of the fan shall be as given in BOQ/drawings.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.5.2. Exhaust Fan

The exhaust fans shall be three blade types, mounted on the steel/plastic structure of its own, which will be fixed to the structure by means of suitable grouted foundation bolts. The fan shall be suitable for operation on 250 VAC with + 10 % tolerance.

The sweep of the fan shall be as given in Schedule of Quanti- ties/drawings. Fans shall be direct driven and supplied complete with electric motor, back draft dampers and anti-vermin screen. The bearings shall be ball, roller or sleeve type of permanently lu- bricated and sealed type.
Wheels shall be heavily and rigidly constructed and accurately balanced both statically and dynamically and free from objec- tionable vibration or noises.

The fans shall comply with BS 380 as far as constructional require- ments, range of fan speed, speed regulator starting, radio interfer- ence silent operation and temperature rise is concerned. For test- ing BS 848 as amended 1 960 shall be complied with.

3.5.3. Ceiling Fan

The ceiling fans shall be consist of three blade types with 56" and suitable for operation on 250 VAC with +10% tolerance. The Fan shall be mounted directly on ceiling; the lowest point of the fan blade is approximately 300mm (1 foot) below the ceiling. Make sure that the chosen location of the fan will not allow the rotating fan blades to come into contact with any object.

Ensure ceiling joists are sound and of adequate size to support a 35Kg (77lb) load. To reduce the risk of fire, electrical shock or per- sonal injury, ensure that the fan mounting bracket is supported di- rectly from the building structure. Do not mount to an outlet box. The mounting bracket must be firmly screwed to a load bearing structure e.g. a concrete ceiling, steel structure or timber frame. If a timber frame is to be added it must b securely nailed or screwed between two beams.

3.5.4. Wiring & Circuit Accessories

All final circuit wiring shall comprise suitably sized copper conductors, including earth continuity conductors, installed in approved PVC conduits with all necessary junction boxes, connectors, terminals, lugs and other accessories required for a complete installation. Lighting circuits shall be wired from the distribution board to the first lighting point and interconnected between successive light points, while socket outlets, industrial sockets, isolators and other dedicated power outlets shall be provided with suitably sized wiring based on the connected load and equipment rating. All wiring and accessories shall be properly terminated, supported and installed in accordance with the approved design, applicable codes and manufacturer's recommendations.

End of Section

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-8
MV SWITCHGEAR

-PART 1 – SCOPE

The work under this section consists of supplying, installing, testing, connecting, commissioning of all material and services of the complete MV switchboard and Earthing system as specified herein and shown on the Bid Drawings.

The Contractor shall discuss the electrical layout with the Engineer and co-ordinate at site with other services for exact location and position of the MV Switchboard and Earthing system.

The MV switchboard and Earthing system with accessories shall also comply with the General Specifications for Electrical Works and with other relevant provisions of the Bid Document.

-PART 2 - GENERAL

- 2.01 MV SWITCHBOARD

The MV switchboard shall be sheet steel fabricated, floor mounting cubicle type, indoor, totally enclosed, dust tight MV and vermin proof, and shall have protection class IP-42. It shall be complete in all respect with material and accessories, factory assembled, tested and finished according to the specifications and to the normal requirements.

The switchboard shall be suitable for front operation only and shall:

- be suitable for addition of units, on either side, in future.
- be provided with adequate clearance from live parts so that flashovers cannot be caused by switching surges, vermin, pests, etc.
- be designed for flush mounting of all instruments on the front side.
- have all incoming and outgoing connections from the bottom.
- have the components mounted so as to facilitate ease of maintenance from the front.
- have provision for lamp test, alarm test, alarm accept and reset facility.
- be mounted on cable trenches having their own supporting structure of angular or U steel profiles.
- be provided with anti-condensate heater, in each individual compartment of cubicle controlled automatically through adjustable humidistat for maintaining required safe operating condition inside the panel and also avoid condensation. The heater shall also be manually operable and provided with protective miniature circuit breaker and ON indication lamp.
- have stainless steel name plat.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- have bus bar chamber and instrument chamber.

- have pocket for wiring diagram in suitable location/door of instruments chamber.

All pertinent details and drawings shall be provided to the Engineer for approval prior to manufacturing.

-PART 3 - APPLICABLE STANDARDS/CODES

The latest editions of the following standards and codes shall be applicable for the materials within the scope of this section:

IEC 62271-100	High voltage AC circuit breakers
IEC 62271-102	High voltage AC disconnectors and earthing switches
IEC 62271-103	High voltage switches for rated voltage above 1 kV and less than 52 kV
IEC 62271-200	Metal enclosed switchgear and control gear for rated voltage up to and including 38 kV
IEC 60694	Common specifications for high voltage switchgear and control gear standards
IEC 60044-1	Instrument transformers – Current transformers
IEC 60044-2	Instrument transformers – Inductive voltage transformers
IEC 60051-1, 2, 3, 5 & 8	Direct acting indicating analogue electrical measuring instruments and their accessories.
IEC 60099-4	Surge arresters: Metal oxide surge arresters without gaps for ac system

-PART 4 - MATERIAL

- 4.01 MV SWITCHBOARD

The switchboard shall be fabricated with angle-iron framework, welded, grinded, finished and cladded with 12 SWG sheet steel. It shall be suitably divided into panels and compartments for accommodating the required number of circuit components, instruments and accessories.

Each cubicle shall be divided in four (04) compartments:

- Breaker compartment
- busbar compartment
- MV cable connection compartment

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- low voltage compartment to accommodate instruments

All instruments, relays, control and selector switches, indicating lamp, push buttons and trip levers shall be flush mounted and located at convenient height on the front doors of switchgear in logical and clear manner. Means shall be provided to limit the opening angle of doors to about 100°.

The switchboard shall be supplied complete with foundation bolts and other installation materials as recommended by the manufacturer. Proper size cable clamping channels shall be provided for fixing required size of 15 kV XLPE cable. Adequate number of eye bolts shall be provided to facilitate handling.

An earth bar of appropriate cross section to safely carry the fault current shall be provided on full length of MV switchboard and connected to the body of all sections of the switchboard. The external earth terminal shall be provided for main earth connection. The doors shall be grounded by flexible strap of copper braids.

The control cabling inside the switchboard shall be suitably numbered and harnessed by means of straps or cords. All indicating, selecting and control equipment shall be suitably arranged and clearly labelled with flameproof material using indelible ink/marking, indicating the rating and designation of fuses, switches etc. The nameplates shall be provided on the front of panel for each circuit and component, which is accessible from outside. The nameplates shall be of stainless steel with engraved equipment designation having minimum width of 5mm. Other labeling on the switchboard such as danger signs, voltages, switchboard/panel identification shall be of sufficient size to be legible from a distance of 5 metres.

All metal work of the switchboard shall be cleaned down to bare shining metal phosphate and the surfaces chemically prepared for powder coating. Then these shall be coated with powder of colour RAL 7032 and then baked in oven. The thickness of powder coating shall not be less than 120 microns.

A. <u>Capacity and Basic Data</u>

The switchboard shall be designed to conform but not limited to the following requirements:

Rated Current : 630A or as shown on drawings.

Rated Nominal Voltage : 12 kV

Rated Maximum Voltage : 12 kV

Rated Power Frequency Withstand Voltage (r.m.s.) : 28 kV for 1 minute

Rated Short Circuit Capacity : 350 MVA at 12 kV for one second.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Rated Breaking Current (1 second rating)	:	
Symmetrical		18.4 kA
Asymmetrial		22.4 kA
Rated Peak withstand Current	:	2.55 times rated symmetrical breaking current.
Operating Duty	:	B-0.3"-MB-3' -MB
Rated Basic Impulse Level (BIL)	:	75 kV
Control Voltage	:	
a) Indication/Metering	:	110 Volt AC from secondary of P.T.
b) Tripping	:	Series tripping or 110 volt D.C. from capacitor trip unit
Heaters and audible alarm	:	220 V AC from substation LT switchboard.
Auxiliary Contacts	:	Provision for remote indication and/or as required.

B. Interlocking

Any interlocking if required inside the MV switchboard and between MV switchboard and other equipment shall be provided as stated on the drawings.

C. Interfacing with BMS system

Monitoring Meters in all MV switchgears shall be compatible to interface with the BMS system. Interfacing card/port, BACnet Compliant/compatible and software for interfacing and programming with BMS system shall be provided with Switchgears.

- **4.02 BUS BARS**

The bus bars shall be made of 99.9% pure high conductivity electrolytic tinned copper conductors, suitably protected against corrosion, and shall be completely insulated by heat shrink coloured sleeves of specified voltage and mechanically braced to safely withstand the stresses due to short-time

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

momentary current under the fault conditions. The phase identification of bus bars shall be red, yellow and blue by providing colour sleeves at the bus bars ends. The clearances shall not be reduced on account of the bus bar insulation or the phase barriers. The temperature rise shall not exceed 30º C at rated current.

- 4.03 CIRCUIT BREAKER

The circuit breakers shall be triple pole, with drawable type, with arc interruption in vacuum. The operating characteristics and technical data shall be as given in art. 4.1.1 of this section. The bidder shall submit with his offer the type and details of equipment proposed.

The circuit breaker shall have trip free, direct acting and manually operated drive mechanism. For manual operation a handle shall be provided. The unit shall have rollout trucks and channels for horizontal withdrawal. Interlocking device shall be provided such that the breaker can be closed only when it is in fully plugged-in or fully withdrawn position, and withdrawal of circuit breaker is only possible in the open or isolated position. Safety shutters shall be provided which will automatically cover the live contact as the circuit breaker is withdrawn. Other interlocks as essentially required for safe and proper operation of circuit breaker shall be provided. The circuit breaker phases shall be separated by barriers of approved heat resisting, non-tracking insulating material.

Each circuit breaker shall have a device to register the number of closing operation.

A triple pole grounding switch shall be provided on outgoing panels of H. T Switch Board for cable and bus bars earthing, complete with mechanism for interlocking it with the circuit breaker and the roll-out truck, and mechanical indication to show the position of grounding switch. The grounding switch shall be rated to safely carry the fault current due to inadvertent closing of supply circuit breaker and also for making duty on the fault.

The circuit breaker shall have automatic, mechanically operated `ON' and `OFF' position indications. The circuit breakers shall be provided with electrical and mechanical ON-OFF push buttons.

Luminous indications shall be provided on all incoming and outgoing panels, which shall include but not limited to following:

- Circuit Breaker ON
- Circuit Breaker OFF
- Circuit Breaker TRIPPED
- Heater ON

Additional push buttons and indication lamps shall also be provided as shown on drawings and as per requirements

The following instruments and meters shall be installed on the panels as required:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. One voltmeter with phase selector switch.
2. One ammeter phase selector switch.
3. One kWH meter with M.D.I.
4. One kVARH meter.
5. Power factor meter
6. One IDMT Protection Relay.
7. Hooter
8. Cable termination pad.
9. Signaling lamps.

Each circuit breaker shall be provided with at least three normally closed and three normally open potential free auxiliary contacts rated for 10 Amp, 230V AC as spares. Provision shall be made for remote indication of the circuit breakers position/status.

A test position shall also be provided to facilitate testing operation of circuit breaker manually and by protective relays. Test socket with lug shall be provided for testing the relays.

The circuit breaker shall be complete with necessary secondary wiring with ferrules to indicate the circuit. Protection shall also be provided for all control circuits.

- **4.04 CURRENT TRANSFORMERS**

Each circuit breaker shall be provided with current transformers having following ratings and characteristics:

- Type : Cast resin
- Number : Three single phase units
- Burden and : Suitable for load of protection instrumentation circuits.
- Accuracy : 5P 20 for protection and 0.5 for measuring with security factor 5.
- Duty : For operating relays/meters and instruments.
- CT ratio : As shown on the Bid Drawings.
- No. of cores : 1 or 2 as required and as shown on Bid drawings.
- Rating and Insulation requirement : As shown on drawings and/or specification in Article 4.1.1

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Rated dynamic current : 2.55 times rated symmetrical short circuit current.

- **4.05 POTENTIAL TRANSFORMERS**

Potential transformers (PT) shall be provided as shown on the Bid Drawings and having the following ratings and characteristics:

- Type : Cast resin

- Number : Three single phase units.

- Burden : Suitable for load of protection and instrumentation circuits min 100 VA.

- Accuracy : Class 0.5 for metering & protection

- Duty : For operating relays/meters and instruments.

PT's shall be designed to have either two independent secondary windings of specified ratio for connection in star or open delta or with a single secondary windings as required and as shown on single line diagram.

- Voltage ratio : 12 kV/110 V/110 V for double secondary
  Sqrt 3 Sqrt 3 Sqrt 3 winding
  : 12 kV/110 V for single secondary winding
  Sqrt 3 Sqrt 3

- Rated voltage factor : 1.2 continuous and 1.5 for 30 seconds.

- Rating & insulation requirements : As shown on drawings and/or specification in Article 4.1.1

- **4.06 PROTECTIVE RELAYS**

The circuit breakers shall be provided with inverse definite minimum time directional or non-directional over-current relays for phase and earth fault protection as shown on drawings. The relays shall have the following common characteristics, unless otherwise specifically mentioned:

- Phase fault over current setting range

  Inverse : 50-200% of CT secondary rating

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Instantaneous : 200-800% of CT secondary rating.

The instantaneous elements shall also have infinity setting to block their operation, if necessary.

- Ground-fault : 20-80% of CT secondary rating with instantaneous element as for phase fault unit.
- Time setting range : 0-1 second
- Connection : 5 Amp secondary of CT

Tripping : 110 Volts DC from capacitor trip unit in each breaker panel or series tripping.

- Indications/Control : 110 V AC from secondary of P.T.

The relay shall preferably be triple pole type and have positive action without chatter.

- **4.07 SURGE PROTECTION**

Surge Arresters shall be provided in incoming panels of MV switchboard The 11 kV surge arrester shall have the following characteristics:

- Voltage Class (highest system voltage) : 12 kV rms
- Service (rated voltage) : 11 / 1.732 kV rms

This equipment will be tested in accordance with the relevant IEC Standard.

- **4.08 CAPACITOR SHUNT TRIP UNIT**

In case series tripping is not provided, then each circuit breaker in the MV switchboard shall be provided with 110 volts direct current trip coils, which will be supplied power through the capacitor trip units. The trip coils shall be fed through the relay contacts and the 'OFF' push buttons.

The capacitor trip unit will be fed from 110 volts secondary of potential transformer. The capacitor trip unit shall be suitable for performing two successive tripping operations carried out within five minutes. Every circuit breaker shall be provided with a separate capacitor trip unit.

- **4.09 METERS & SELECTOR SWITCHES**

The meters to be provided on MV switchboard are shown on drawings and shall be as specified below:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. Ammeter and Voltmeter

The ammeter and voltmeter shall be moving iron spring controlled having front dimensions of 96 x 96 mm. Voltmeters shall have measuring range of 0-15 kV and ammeters measuring range shall be as shown on the drawings. Ammeters and voltmeters shall conform to B.S.S. accuracy class 1.5 and suitable for connection to the secondary of PTs and CTs installed on the switchboard.

B. Selector Switches

Ammeter selector switch shall be R-Y-B-OFF and voltmeter selector switch RY-YB-BR-OFF. The selector switches shall be complete with front plate and operating lever.

C. kWh and kVArh Meters

Kilowatt-hour (kWh) and reactive Kilovolt ampere-hour (kVArh) meters shall be suitable for 3 phase, 3 wire, 50 cycles balanced and unbalanced loads. The kWh meter shall also be provided with maximum demand indicator and built in switch for operation at an interval of 30 minutes.

D. Alarm Indication

On occurrence of any fault in the system and subsequent tripping of circuit breakers, audio alarm shall be provided on the MV Switchboard. Push buttons shall be provided on MV Panel for independent resetting of the audio alarm and fault-indicating lamp. At least two potential free contacts rated 10 Amp AC or DC shall be available for remote connection.

E. Push Buttons

The push buttons shall be illuminated, momentary make/break contact type or latch type (push-on/push-off) as required and approved by the Engineer and suitable for flush mounting. The push button for ON and OFF switching shall be red and green respectively. They shall be provided as shown on the drawing.

F. Indicating Lamps

Indicating lamps shall be LED type having long life suitable for flush mounting, complete with base. They shall be suitable for operation on single phase AC and shall have rosettes of suitable colours as approved by the Engineer.

- **4.10INSULATION MAT**

Insulation mat shall be placed in front of the MV panels all along the length. They shall be one meter wide and 6 mm thick and suitable for providing insulation for 15 kV working.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- **4.11 DANGER BOARDS WITH SIGNS & DESIGNATION AND SHOCK/FIRST AID CHARTS**

As per requirements of Pakistan Electricity Rules/Electric Inspector, Danger Boards having signs and designation of the room shall be installed on the external door of each room of the Substation.

Shock/First Aid Charts shall be installed in MV, L.T, Generator and Transformer Rooms.

- **PART 5 – TESTING**

All type of routine tests on MV Switch board, shall be performed at the manufacturer's works in the presence of the Engineer.

The Contractor shall inform the Engineer about the date and time of test of each equipment at least two weeks in advance. This shall, however, be done after the Contractor has got the test procedures duly approved by the Engineer. The witnessing of the test by the Engineer and the Employer shall not absolve the Contractor from his responsibility for the proper functioning of the equipment, and for furnishing the guarantees. All test results shall be supplied in quadruplicate. All expenses for carrying out the tests as incurred by the Engineer and the Employer to witness is shall be borne by the Contractor.

Upon completion of the installation, the Contractor shall perform field tests on all equipment, materials and systems. All tests shall be conducted in the presence of the Engineer for the purpose of demonstrating equipment or system compliance with Specifications. The Contractor shall submit for Engineer's approval complete details of tests to be performed describing the procedure, test observations and expected results.

- **PART 6 - INSTALLATION**

The MV switchboard shall be installed at location shown on the drawing. The cable trenches shall be constructed as part of civil works. The Contractor shall co-ordinate with the civil works for providing any openings, holes, etc., in time to avoid any breakage/damage to completed works. In case such provisions in civil works for installation of electrical equipment are not made or made incorrect, the same shall be rectified by the electrical Contractor at his own cost and to the satisfaction and approval of Engineer.

The Contractor shall provide foundation bolts and grout them in cement concrete floor using non-shrinkable material approved by the Engineer. All installation materials for physically erecting the switchboard, such as bolts, nuts, washers, supporting steel, etc. shall be provided and installed by the Contractor. The switchboard shall be installed upright MV and in level and shall be firmly and rigidly bolted on the floor and concrete supports. All wiring external from MV Switchboard to alarm indication control unit protection interlock circuits and for auxiliary power supply for heaters, etc., will be furnished and installed by the Contractor in consultation with the Engineer.

The switchboard shall be erected as per manufacturer's instructions and as

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

approved by the Engineer. Loose parts dispatched by the manufacturer shall be installed and connected as per assembly drawing provided by the manufacturer. Any safety locking of meters, relays, etc., provided by the manufacturer for safe transport shall be released only after the switchboard is erected in position.

Necessary provision shall be made in the MV switchboard for incoming/outgoing cables, and installation of cable termination kits, keeping in view both cable and switchboard manufacturer's recommendations.

The switchboard body shall be connected to earth as per instructions given by the Engineer. The switchboard shall be tested and commissioned in the presence of the Engineer. The tests to be carried out shall be as recommended by the International standard to which the switchboard is manufactured.

END OF SECTIONS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-9
STATIC UNINTERRUPTIBLE POWER SUPPLY

PART 1- GENERAL

1.1 SUMMARY

A. This Section includes 400V, 50 Hz, three-phase in, three-phase out, on-line, double-conversion, static-type, UPS installations complete with transient voltage surge suppression, input harmonics reduction, rectifier-charger, battery, battery disconnect device, inverter, static bypass transfer switch, output isolation transformer, battery monitoring.

1.2 SUBMITTALS

A. Product Data: For each UPS component indicated. Only exclusive dealer for stated Brand shall be considered.

B. Shop Drawings: Detail assemblies of equipment indicating dimensions, weights, components, and location and identification of each field connection. Show access, workspace, and clearance requirements; details of control panels; and battery arrangement.

1. Include wiring diagrams.

C. Factory test reports.

D. Field quality-control test reports.

E. Operation and maintenance data.

F. Warranties.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use and for compliance with the following:

1. UL 1778.
2. Suitable for installation in computer rooms according to NFPA 75.

1.4 WARRANTY

A. Special Battery Warranties: Specified form in which manufacturer and Installer agree to repair or replace UPS system storage batteries that fail in materials or workmanship within specified warranty period.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Warranted Cycle Life for Valve-Regulated, Lead-Acid Batteries: Equal to or greater than that represented in manufacturer's published table, including figures corresponding to the following, based on annual average battery temperature of 35 deg. C:

Discharge Rate	Discharge Duration	Discharge End Voltage	Cycle Life
8 hours	8 hours	1.67	6 cycles
30 minutes	30 minutes	1.67	20 cycles
15 minutes	45 seconds	1.67	120 cycles

B. Special UPS Warranties: Specified form in which manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within special warranty period.

1. Special Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PERFORMANCE DESCRIPTION

A. Automatic operation includes the following:

1. Normal Conditions: Supply the load with ac power flowing from the normal ac power input terminals, through the rectifier-charger and inverter, with the battery connected in parallel with the rectifier-charger output.
2. Abnormal Supply Conditions: If normal ac supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, the battery supplies energy to maintain constant, regulated inverter ac power output to the load without switching or disturbance.
3. If normal power fails, energy supplied by the battery through the inverter continues supply-regulated ac power to the load without switching or disturbance.
4. When power is restored at the normal supply terminals of the system, controls automatically synchronize the inverter with the external source

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

before transferring the load. The rectifier-charger then supplies power to the load through the inverter and simultaneously recharges the battery.

5. If the battery becomes discharged and normal supply is available, the rectifier-charger charges the battery. On reaching full charge, the rectifier-charger automatically shifts to float-charge mode.
6. If any element of the UPS system fails and power is available at the normal supply terminals of the system, the static bypass transfer switch switches the load to the normal ac supply circuit without disturbance or interruption.
7. If a fault occurs in the system supplied by the UPS, and current flows in excess of the overload rating of the UPS system, the static bypass transfer switch operates to bypass the fault current to the normal ac supply circuit for fault clearing.
8. When the fault has cleared, the static bypass transfer switch returns the load to the UPS system.
9. If the battery is disconnected, the UPS continues to supply power to the load with no degradation of its regulation of voltage and frequency of the output bus.
10. Battery backup time shall be 15 minutes at full load.

B. Manual operation includes the following:

1. Turning the inverter off causes the static bypass transfer switch to transfer the load directly to the normal ac supply circuit without disturbance or interruption.
2. Turning the inverter on causes the static bypass transfer switch to transfer the load to the inverter.

2.3 SERVICE CONDITIONS

A. Environmental Conditions: The UPS shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability, except battery performance.

1. Ambient Temperature for Electronic Components: 0 to 40 deg. C.
2. Ambient Temperature for Battery: 0 to 35 deg. C.
3. Relative Humidity: 0 to 95 percent, no condensing.

2.4 PERFORMANCE REQUIREMENTS

A. The UPS shall perform as specified in this Article while supplying rated full-load current, composed of any combination of linear and nonlinear load, up to 100 percent nonlinear load with a load crest factor of 3.0, under the following conditions or combinations of the following conditions:

B.

1. Inverter is switched to battery source.
2. Steady-state ac input voltage deviates up to plus or minus 10 percent from nominal voltage.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Steady-state input frequency deviates up to plus or minus 5 percent from nominal frequency.
4. THD of input voltage is 15 percent or more with a minimum crest factor of 3.0, and the largest single harmonic component is a minimum of 5 percent of the fundamental value.

C. Minimum Duration of Supply: If battery is sole energy source supplying rated full UPS load current at 80 percent power factor for a period of 15 minutes.

D. Input Voltage Tolerance: System steady-state and transient output performance remains within specified tolerances when steady-state ac input voltage varies plus 10, minus 15 percent from nominal voltage.

E. Maximum Energizing Inrush Current: Six to Eight times the full-load current.

F. Maximum AC Output-Voltage Regulation for Loads up to 50 Percent Unbalanced: Plus or minus 2 percent over the full range of battery voltage.

G. Output Frequency: 50 Hz, plus or minus 0.5 percent over the full range of input voltage, load, and battery voltage.

H. Limitation of harmonic distortion of input current to the UPS shall be as follows:

1. Description: Either a tuned harmonic filter or an arrangement of rectifier-charger circuits shall limit THD to 5 percent, maximum, at rated full UPS load current, for power sources with X/R ratio between 2 and 30.

I. Maximum Harmonic Content of Output-Voltage Waveform: 5 percent RMS total and 3 percent RMS for any single harmonic, for rated full load with THD up to 50 percent, with a load crest factor of 3.0.

J. Minimum Overload Capacity of UPS at Rated Voltage: 125 percent of rated full load for 10 minutes, and 150 percent for 30 seconds in all operating modes.

K. Maximum Output-Voltage Transient Excursions from Rated Value: For the following instantaneous load changes, stated as percentages of rated full UPS load, voltage shall remain within stated percentages of rated value and recover to, and remain within, plus or minus 2 percent of that value within 100 ms:

1. 50 Percent: Plus or minus 5 percent.
2. 100 Percent: Plus or minus 5 percent.
3. Loss of AC Input Power: Plus or minus 1 percent.
4. Restoration of AC Input Power: Plus or minus 1 percent.

L. Input Power Factor: A minimum of 0.95 lagging when supply voltage and current are at nominal rated values and the UPS is supplying rated full-load current.

M. EMI Emissions: Comply with FCC Rules and Regulations, and with 47 CFR 15 for Class A equipment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.5 UPS SYSTEMS

A. Electronic Equipment: Solid-state devices using hermetically sealed, semiconductor elements. Devices include rectifier-charger, inverter, static bypass transfer switch, and system controls.

B. Enclosures: Comply with NEMA 250, Type 1, unless otherwise indicated.

C. Control Assemblies: Mount on modular plug-ins, readily accessible for maintenance.

D. Surge Suppression: Protect internal UPS components from surges that enter at each ac power input connection including main disconnect switch and static bypass transfer switch. Protect rectifier-charger, inverter, controls, and output components.

1. Use factory-installed surge suppressors tested according to IEEE C62.41

E. Output Circuit Neutral Bus, Conductor, and Terminal Ampacity: Rated phase current times a multiple of 1.73, minimum.

2.6 RECTIFIER-CHARGER

A. Capacity: Adequate to supply the inverter during rated full output load conditions and simultaneously recharge the battery from fully discharged condition to 95 percent of full charge within 10 times the rated discharge time for duration of supply under battery power at full load.

B. Output Ripple: Limited by output filtration to less than 0.5 percent of rated current, peak to peak.

C. Rectifier-Charger Control Circuits: Immune to frequency variations within rated frequency ranges of normal and emergency power sources.

1. Response Time: Field adjustable for maximum compatibility with local generator-set power source.

D. Battery Float-Charging Conditions: Comply with battery manufacturer's written instructions for battery terminal voltage and charging current required for maximum battery life.

2.7 INVERTER

A. Description: Pulse-width modulated, with sinusoidal output.

2.8 STATIC BYPASS TRANSFER SWITCH

A. Description: Solid-state switching device providing uninterrupted transfer. A contactor or electrically operated circuit breaker automatically provides electrical isolation for the switch.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Switch Rating: Continuous duty at the rated full UPS load current, minimum.

2.9 BATTERY

A. Description: Lithium ion .

2.10 CONTROLS AND INDICATIONS

A. Description: Group displays, indications, and basic system controls on a common control panel on front of UPS enclosure.

B. Minimum displays, indicating devices, and controls include those in lists below. Provide sensors, transducers, terminals, relays, and wiring required to support listed items. Alarms include audible signals and visual displays.

C. Indications:

1. Quantitative indications shall include the following:

   a. Input voltage, each phase, line to line.
   b. Input current, each phase, line to line.
   c. Bypass input voltage, each phase, line to line.
   d. Bypass input frequency.
   e. System output voltage, each phase, line to line.
   f. System output current, each phase.
   g. System output frequency.
   h. DC bus voltage.
   i. Battery current and direction (charge/discharge).
   j. Elapsed time discharging battery.

2. Basic status condition indications shall include the following:

   a. Normal operation.
   b. Load-on bypass.
   c. Load-on battery.
   d. Inverter off.
   e. Alarm condition.

3. Alarm indications shall include the following:

   a. Bypass ac input overvoltage or under voltage.
   b. Bypass ac input over frequency or under frequency.
   c. Bypass ac input and inverter out of synchronization.
   d. Bypass ac input wrong-phase rotation.
   e. Bypass ac input single-phase condition.
   f. Bypass ac input filter fuse blown.
   g. Internal frequency standard in use.
   h. Battery system alarm.
   i. Control power failure.
   j. Fan failure.
   k. UPS overload.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

l. Battery-charging control faulty.
m. Input overvoltage or undervoltage.
n. Input transformer overtemperature.
o. Input circuit breaker tripped.
p. Input wrong-phase rotation.
q. Input single-phase condition.
r. Approaching end of battery operation.
s. Battery under voltage shutdown.
t. Maximum battery voltage.
u. Inverter fuse blown.
v. Inverter transformer over temperature.
w. Inverter over temperature.
x. Static bypass transfer switch over temperature.
y. Inverter power supply fault.
z. Inverter transistors out of saturation.
aa. Identification of faulty inverter section/leg.
bb. Inverter output overvoltage or under voltage.
cc. UPS overload shutdown.
dd. Inverter current sensor fault.
ee. Inverter output contactor open.
ff. Inverter current limit.

4. Controls shall include the following:

a. Inverter on-off.
b. UPS start.
c. Battery test.
d. Alarm silence/reset.
e. Output-voltage adjustment.

D. Emergency Power off Switch: Capable of local operation and operation by means of activation by external dry contacts.

2.11 OUTPUT ISOLATION TRANSFORMER

A. Description: Unit with low forward transfer impedance up to 3 kHz, minimum. Include the following features:

1. Comply with applicable portions of UL 1561, including requirements for nonlinear load current-handling capability for a suitable K-factor.
2. Output Impedance at Fundamental Frequency: Between 3 and 4 percent.
3. Regulation: 5 percent, maximum, at rated nonlinear load current.
4. Full-Load Efficiency at Rated Nonlinear Load Current: 96 percent, minimum.
5. Electrostatic Shielding of Windings: Independent for each winding.
6. Coil Leads: Physically arranged for minimum inter lead capacitance.
7. Shield Grounding Terminal: Separately mounted; labeled "Shield Ground."
8. Capacitive Coupling between Primary and Secondary: 33 Pico farads, maximum, over a frequency range of 20 Hz to 1 MHz

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.12 BASIC BATTERY MONITORING

A. Battery Ground-Fault Detector: Initiates alarm when resistance to ground of positive or negative bus of battery is less than 5000 ohms.

B. Annunciation of Alarms: At UPS control panel.

2.13 BATTERY-CYCLE WARRANTY MONITORING

A. Description: Electronic device, acceptable to battery manufacturer as a basis for warranty action, for monitoring of charge-discharge cycle history of batteries covered by cycle-life warranties.

B. Performance: Automatically measures and records each discharge event, classifies it according to duration category, and totals discharges according to warranty criteria, displaying remaining warranted battery life on front panel display.

2.14 SOURCE QUALITY CONTROL

A. Factory test complete UPS system before shipment. Use simulated battery testing. Include the following:

1. Test and demonstration of all functions, controls, indicators, sensors, and protective devices.
2. Full-load test.
3. Transient-load response test.
4. Overload test.
5. Power failure test.

B. Report test results.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install system components on 100mm high concrete bases.

B. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

C. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams, unless otherwise indicated.

D. Separately Derived Systems: If not part of a listed power supply for a data-processing room, comply with NFPA 70 requirements for connecting to grounding electrodes and for bonding to metallic piping near isolation transformer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Identify components and wiring according to relevant section of this specifications

F. Equalize charging of battery cells according to manufacturer's written instructions. Record individual-cell voltages.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust equipment installation including connections and to assist in field testing. Report results in writing.

B. Electrical Tests and Inspections: Perform tests and inspections according to manufacturer's written instructions and as listed below to demonstrate condition and performance of each UPS component:

1. Inspect interiors of enclosures, including the following:

   a. Integrity of mechanical and electrical connections.
   b. Component type and labeling verification.
   c. Ratings of installed components.

2. Test manual and automatic operational features and system protective and alarm functions.

C. Retest: Correct deficiencies and retest until specified requirements are met.

D. Record of Tests and Inspections: Maintain and submit documentation of tests and inspections, including references to manufacturers' written instructions and other test and inspection criteria. Include results of tests, inspections, and retests.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the UPS. Refer to Division 1 Section

End of Section

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-10
AUTOMATIC POWER FACTOR IMPROVEMENT PLANT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Nameplates and Labelling
B. Wire markers
C. Raceway colour coding
D. Cable Identification tags
E. Cable Warning Tapes
F. Cable markers
G. Equipment Warning / Danger Charts
H. Circuit Identification Charts (DB Directories)
I. Exposed Metal Work
J. Concealed Metal Work
K. Colour Schemes and Language

1.02 SUBMITTALS

A. Submit shop drawings
B. Include data sheets for identification materials furnished
C. Include schedule for nameplates and labels
D. Include sample engraved nameplate of each type and size

PART 2 – PRODUCTS

2.01 NAMEPLATES AND LABELLING

A. All plant and equipment provided under this contract shall be labelled in English and other languages as selected by the Engineer. All warning signs shall be English and one more languages as to duty or services, all such labeling to correspond to schedules, diagrams, etc. shall be provided as part of the as-built drawings. Labels shall be of white Traffolyte with black engraved lettering not less than 20mm high or as otherwise required and approved.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Manufacturers' nameplates shall be provided for all plant and equipment and shall show serial and model numbers and date of manufacture.

C. Label shall be provided for all sub-board, distribution boards, Circuit Breaker of Switchboard, Termination Board, etc. as required or directed on site

D. Every indicating light, switch, terminal and breaker in the control and electrical board shall be labelled so as to provide ready identification of each and all circuits and operational light and switch. A schedule of circuits shall be mounted in a metal frame complete with plastic protective cover and hung in the vicinity of the switchboard. For smaller distribution boards, the schedule can be kept inside the board when agreed by the Engineer. The designation of the boards shall be labelled.

E. Labels shall be screwed or riveted to sheet metal. Adhesive fixing is not acceptable.

F. Details of exact lettering shall be agreed with the Engineer prior to manufacture.

2.02 WIRE MARKERS

A. Wire markers shall be split sleeve or tubing type.

B. Wire markers shall be required for each conductor at panel board gutters, pull boxes, outlets, junction boxes and each load connection.

C. All power and lighting circuits, branch or feeder circuits and control circuits shall require wire markers.

2.03 RACEWAY COLOUR CODING

A. All expose pass through public area shall be finishes with colour matching surrounding with colour band identification as in Table 1.

TABLE 1

Painting, Labelling and Finishing

Equipment colours and codes

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Item	Colour
Switchboards	Grey
Control Panels	Grey
Electrical Motors	In accordance with equipment colour and as per Engineer's approval.
Electrical Conduits	Light Orange
Electrical Installation (Power and Lighting Points)	Orange (Tango)
Automatic Control / BAS installation	Yellow (Canary Yellow)
Fire Protection System	Dark Red (Matador)
Telecommunication System	White
White	Light Green (Linden)
MATV, PA	Light Blue (Lobelia)
Security, CCTV	Light Blue with Red band

B. Colour scheme proposed by the contractor shall be made reference to a recognised international standard acceptable to the Engineer.

C. All colour identification shall comply with Local Authority and Civil Defence's code requirement

2.04 CABLE IDENTIFICATION TAGS

A. All cables which exit from manholes, vaults, hand-holes, and transformer or switch enclosures shall be properly tagged or labelled. Tags shall be permanent, non-corrodible and clearly readable. Tags shall include the information listed below for the various circuit categories:
   1. Primary Cable - 13.8 kV or LV Cable – 400 Volts.
   2. Feeder Name.
   3. Voltage.
   4. Phase (for single conductor cables).

B. Cable identification tags for wire and cable circuits shall be of an opaque nylon material arranged to include a marker plate, non-releasing nylon ties, and cable fastening tail. One side shall be roughened to hold black nylon permanent ink. Identification shall be permanent and waterproof. The holding device shall be

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

designed to allow the fastening tail to pass around the cable through the holding device and shall prevent removal of the tail without cutting it loose from the marker. Cable identification shall be inscribed in English.

2.05 CABLE WARNING TAPES

A. For buried LV and MV cables use warning tapes according to the standard practice of the electricity supply authority and applicable international standards.

B. Cable warning tapes shall be of polythene, not less than 150 mm wide and at least 0.25 mm thick. They shall be yellow in colour for LV and MV cables and shall bear the continuously repeated legend – "CAUTION ELECTRIC CABLE BEL

C. OW" or similar in English, in black letters not less than 30 mm high.

D. For buried low current/communication cables or duct banks, use warning tapes in accordance with the requirements and standards of local authorities having jurisdiction and applicable international standards.

2.06 CABLE MARKERS

A. Buried cables shall be permanently identified by concrete markers. Markers shall be 600 mm square x 100 mm thick with impressed characters and shall be made of grade 20 concrete, with 10 mm aggregate. The impressed characters shall be in English and worded "HV CABLE" or "LV CABLE" as appropriate together with circuit details as required for proper identification. In addition, the word "JOINT" shall be added to above words, where applicable.

B. Except where cables are buried, located in switch rooms, in ducts and spaces designated solely for electrical services or have orange over-sheaths, they shall be identified by adhesive bands coloured orange, complying with standards and codes of practice mentioned elsewhere in the Specification. The bands shall be not less than 100 mm long, located at least once within each separate compartment through which cables pass and at intervals not exceeding 12 m.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Except where cables are buried or enclosed in conduit, trunking or ducting; they shall be permanently identified by discs. Discs shall be of laminated plastic material with black characters on white. Character shall be not less than 3 mm high. The inscription shall indicate the nominal voltage, the designation of the load, the number and cross sectional area of cores and the rated voltage of the cable.

D. Cable identification discs shall be attached to the cables with ties. Discs shall be located within 500 mm of terminations and joints, at least once within each separate compartment through which the cable passes, and at intervals not exceeding 24 m. Locations of discs shall coincide with the colour bands.

2.07 EQUIPMENT WARNING / DANGER CHARTS

A. For external use, pressure sensitive danger signs shall be used. Dimensions shall be as approved by the Engineer. The signs shall be heavy duty vinyl with a self-adhesive backing which can be applied to curved or irregular surfaces. Danger signs shall be weather-resistant and shall not discolour or deteriorate with age.

B. Danger signs shall be inscribed with the equipment voltage level along with an internationally recognized danger sign.

C. Warning/danger signs made of red plastic (vinyl) with white letters at least 25 mm high reading "DANGER High Voltage" shall be fixed to the entrance doors of all 13.8 kV switchgear and transformer rooms.

D. Warning/danger signs made of red plastic (vinyl) with white letters at least 15 mm high reading "DANGER 400V"or “DANGER 230V” as appropriate, shall be fixed to the lids, covers or doors of any equipment which contains terminals or conductors connected to more than one phase of a low voltage supply.

E. All signs shall be in English and Local language as approved by the Engineer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.08 CIRCUIT IDENTIFICATION CHARTS (DB DIRECTORIES)

A. Individual circuit identification charts shall be provided for all MV switchgear, LV power distribution boards, panel boards, control panels, etc. indicating the following information as a minimum and as applicable:
   1. Circuit numbers.
   2. Phase.
   3. Load names with location.
   4. Connected load
   5. Outgoing terminal numbers.
   6. Sizes and types of protective devices.
   7. Sizes and types of incoming and outgoing cables.
   8. Contacts location references of relays and other control devices (if any).

B. Charts shall be printed on A4 size sheets. They shall be enclosed in a clear plastic envelope and shall be securely fixed to the inside cover of the unit. Additional copies of the charts shall be included in the operation and maintenance manuals.

2.09 EXPOSED METALWORK

A. All exposed metalwork (including those inside plant room) shall be wire-brushed and cleaned from rust, scale, dirt and grease, and shall then be given one priming coat, one undercoat and one finishing coat of full gloss enamel.

B. The priming coat for exposed galvanised iron shall be an approved galvanized iron primer.

C. The priming coat for exposed non-ferrous metalwork shall be approved as suitable for the metal to which it will be applied.

2.010 CONCEALED METALWORK

A. All galvanized iron surface concealed in roof spaces, false ceilings, building ducts etc. need not be painted.

B. All black iron and steel surface shall be wire brushed and given one coat of zinc chromate or red lead.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Colour banding for identification shall be provided as described elsewhere in this Specification.

D. Colour–paint finish for concealed services, if required by Local Authorities, shall however be provided.

2.011 COLOUR SCHEMES AND LANGUAGE

A. The whole of the installation shall be painted in accordance with the requirements indicated in Table 1, unless otherwise agreed by the Engineer.

B. The language used for all Labelling and Identification shall be English and Local language as approved by the Engineer.

PART 3 – EXECUTION

3.01 APPLICATION OF PAINTING

A. All paints shall be prepared and applied in accordance with the manufacturer's recommendations.

B. All galvanized metal surfaces shall be properly etch-primed to ensure correct adhesion of the paint to the surface. Materials for etch-priming shall be as recommended by the paint manufacturers. Subsequent painting of galvanized surfaces shall comply with this Specification.

C. Prior to painting, all metallic surfaces except galvanized surfaces shall be thoroughly scraped and wire brushed as necessary to remove scale, rust and swarf. Surfaces shall then be solvent cleaned to remove all oil, grease and dirt.

D. When the surfaces to be painted are clean and dry, one coat of an approved primer shall be evenly applied over the entire area. When the priming coat is completely dry, one coat of an approved paint flat undercoat shall be applied. Before applying

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. the finishing coats, the Sub-contractor shall ensure that the undercoated surface is rubbed flat and smooth. Finally, an approved high gloss finishing paint shall be applied when all dust has been removed.

F. Each successive coating shall be completely dry prior to the application of the next coat. The minimum thickness of each layer of paint shall be 50 microns.
   1. All expose series pass through public access area shall be finishes with colour matching surrounding with colour Band Identification as above.
   2. All Colour Identification shall comply with Local Authority and Civil Defence.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-11
LOW VOLTAGE SWITCHBOARDS / DISTRIBUTION BOARDS

PART 1 - GENERAL

1.01 REFERENCE

Conform to General Requirements for Electrical Services of Division 16.

1.02 DESCRIPTION OF WORK

Supply and installation of main low voltage switch boards (MDB), sub main distribution boards (SMDB), final distribution boards (DB) and related accessories.

This specification section covers the design and fabrication of low voltage switch gear including all items of equipment and materials necessary to complete the assembly and the information, documents and data required to be supplied by the supplier.

Any separate panels shall be as detailed hereafter. Separate panels shall comply with the requirements of this specification section.

1.03 QUALITY ASSURANCE

Design, manufacture, testing and method of installation of all apparatus and materials furnished under requirement of these specifications shall conform to latest publications and standard codes.

Product selection for restricted space: Drawings indicate maximum dimensions for the equipment, including clearance between the equipment and adjacent surfaces and items. Switchgears having equal performance characteristics and complying with indicated maximum dimensions may be considered.

1.04 CODES AND STANDARDS

The assemblies and the associated equipment shall conform to the requirements of the latest edition of the following standards and codes where applicable:

Low Voltage switchgear control Gear assemblies	:	IEC 61439-1,2
Circuit breakers	:	IEC 947-1,BSEN60947-2,BSEN 60898
Isolators/switch disconnectors	:	IEC 60947-1, IEC 60947-3
Current transformers	:	IEC 60185
Voltage transformers	:	IEC 60186
Measuring instruments	:	IEC 51, IEC 414
Contactors	:	IEC 60947-1, IEC 60947-4
Overload relays	:	IEC 60947-1, IEC 60947-4
Control relays	:	IEC 337-1, IEC 60947-1, IEC 60947-5
Indication lamps, Push buttons, Switches	:	IEC 60947-5-1, IEC 337-1, IEC-60536
Tropicalisation	:	IEC 68-2-30, IEC 68-2-1 & 2, IEC 68-2-11

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Automatic transfer switching : IEC 947-6-1

BSEN60051/IEC 51	Direct acting indicating analogue electrical-measuring instruments and their accessories.
BSEN60079/IEC 79	Electrical apparatus for explosive gas atmospheres.
IEC 112	Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions.
BS5992/IEC 255	BS5992/IEC 255
BS88/IEC 269	Low voltage fuses.
BS5685/IEC 521	Class 0.5,1 and 2 alternating current watt-hour meters.
IEC 664	Insulation coordination for equipment within low-voltage systems, including clearances and creepage distances for equipment.
IEC 688	Electrical measuring transducers for converting AC electrical quantities to analogue or digital signals.
BSEN60947/IEC 947-3	Low-voltage switchgear and control gear. Part 3: Switches, Disconnectors, Switch-Disconnectors and Fuse-Combination units.
BSEN60947/IEC-947-4	Low-voltage switchgear and control gear. Part 4: Contactors and Motor-Starters.
BS 6231/IEC 502	PVC Insulated cables for switchgear and control gear wiring
BSEN 61008	Earth leakage circuit breakers
BSEN 61009	Earth leakage circuit breakers

Applicable local laws and regulations.

All panel boards shall be partially Type tested against short circuit as a minimum as per the latest IEC61439 and manufactured only by manufacturer having ISO 9001 Certificates. The Contractor shall also submit test certificates such as ASTA or as issued by any other independent testing authority confirming the declared short circuit ratings of Switch Boards and circuit breakers.

All mains and submain panel boards shall undergo the following test before dispatching and a test certificate shall be forwarded for the same.

A. Primary injection test for all circuit breakers and meters.
B. Secondary test for all protective relays.
C. Millivolt droptest
D. Insulation test
E. Function test

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

All such tests shall be witnessed by the Engineer or it shall be carried out by an independent testing authorities.

The contractor is responsible for complying with all codes, which apply to the equipment. Any special certification requirements or inspection by other authorities arising from the above shall be arranged by the contractor and the costs for the same included in this quotation.
The equipment to be provided by vendor must be in complete compliance with this specification and reference codes. Exceptions or deviations "if any" shall be listed separately, with the quotation for THE CONSULTANT's approval. Any exception, which is not listed, shall not be considered.

Project Conditions:

A. Verify dimensions by field measurements.
B. Determine suitable path for moving switchgear into place considering project conditions.
C. Verify clearance requirements. Locate switchgear to meet installation tolerances.
D. Revise locations and elevations from those indicated as required to suit project conditions.

1.05 Submittals

A. Manufacturers Technical Data

During the time of the contract and before substantial completion of the electrical installation, submit to the consultant three(3) copies of descriptive literature, technical data, maintenance recommendations(from the equipment manufacturer), catalogues etc

B. Test Reports

Provide test reports prepared in accordance with WAPDA/IESCO requirements to the consultant. Provide other tests reports necessary to establish the adequacy, quality, safety, completed status, and suitable operation of each system.

C. Installation Instructions

Submit the complete manufacturers installation instructions of all the products used.

D. Calculations

Forward the following calculations and data:

Calculations and charts proving that discrimination in the breaker characteristics is achieved. Detailed short circuit level calculation to select the short circuit rating of the various switchboards. Bus bar sizing calculation for each switchboard. Calculation for Temperature rise inside switchboards

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Shop drawings

The contractor shall furnish the following drawings and documents along this submittal for approval:

a. Dimensioned drawing showing outline of the switch boards arrangement and position of important external features. These drawings shall show masses, crane lift necessary for untanking and size of lifting lugs or eyes.
b. Single line diagram showing all auxiliary devices.
c. Original catalogues for various proposed components.
d. Drawings of nameplate and all termination arrangements.
e. Drawing giving typical mechanical and electrical details of the voltage control apparatus.
f. Details of cable terminations and fittings.
g. Foundation plan, including foundation loading.
h. Schematic and connection diagrams covering all equipment pertaining to the switch board.
i. Type and special test certificates as applicable
j. Approved test certificate / test report
k. Schedule of Accessories and Fittings
l. Technical Manual giving installation, operation and maintenance instructions
m. Schedule of recommended spare parts.

PART 2 - PRODUCTS

2.01 MAIN LOW VOLTAGE SWITCH BOARD (MDB)

The specification hereunder shall be applied to all panel boards referred on the drawings (power layout, single line diagrams as MDB.

A. The switchboards shall be partially Type Tested against short circuit as a minimum and comply with IEC 61439, Multicubicle type FBA, Form 4 Type 6, Construction.

B. The switchboards shall be rated 400V three phase and neutral 4 wire 50HZ with neutral solidly grounded. The equipment shall be suitable for operating on a system having a fault level of 50 KA rms symmetrical.

The minimum short circuit rating of MDBs shall be 50KA for 1 second.

C. The Contractor shall submit valid test certificate foer short circuit protection such as ASTA or as issued by any other independent testing Authority to the consultant for approval.

D. Refer to the single line diagram for rating and type of feeder required.

E. Provide meters and CTs as shown in the single line diagram.

F. Provide permanent lifting means on top of shipping sections.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Include an integral roll-along lifting device for any switchgear equipped with draw out devices. Mount lifting device on top of switchgear.

H. Electrical characteristics

Rated operating voltage	: 690V
Rated insulation voltage	: 1000V
Rated current	: 4000 A or 6300 A as per tender documents
Rated short circuit withstand current	: 50 KA, 1 Sec
Rated peak withstand current	: 105 KA

I. Special Tools

The contractor shall provide a complete set of all special tools and devices necessary for the operation and maintenance of the complete assembly.

The contractor shall provide a wall mounted panel to accommodate these tools and devices.

J. The switchgear assembler should have a valid ISO 9001 certification.

K. In case of local assembly the authorized / approved assembler shall strictly follow the guidelines and standards laid down by the manufacturer.

L. The contractor shall provide fault level calculations to substantiate proper selection of all devices.

M. The contractor shall carry out routine tests at their works with the valid testing equipment calibrated by reputed laboratory.

N. The assemblies shall be of the dead – front, multi – cubicle type forming an enclosed F.B.A with air insulated switching devices. Each incoming or outgoing circuit-switching device shall be housed in its own enclosure. The switchgear shall be completely compartmentalized and metal enclosed in accordance with Form 4b separation described in IEC 61439. Assemblies shall be freestanding. All switchboards and MCC shall be single fronted and not double – front.

O. All air circuit breakers shall be with drawable type. The incoming air circuit breakers shall have manually and electrically operated spring charge mechanism while the outgoing air circuit breakers shall be manually operated.

P. All equipment and materials shall be new.

Q. The assembly, including the framework, wiring, earth bar, etc., shall be suitable in all respects for extension at both ends such that only the minimum of work will be required to make such extensions.

R. The switchgear shall be painted inside and out. Unpainted galvanized coating of internal metal work will not be acceptable.

S. A space of 100mm shall be provided at the bottom of each panel.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

T. The panel shall be of uniform height of not more than 2200 mm.

U. Energy analyzers/EMU in MDBs & Generator synchronization panel shall be compatible to interface with BMS system. Interfacing card, BACnet/MODBUS compliant/compatible and software for interfacing and programming with BMS system shall be provided by the contractor.

2.02 CONSTRUCTION

A. The degree of protection shall be IP-42 for indoor units.

B. The switchboard shall be fabricated, welded; grinded, finished with angle iron framework and cladded with 14 SWG MS sheet, to form a rigid, free standing, flush mounting fronted assembly. The sheet metal shall be coated with a thermosetting powder of any epoxy resin base modified by polyester resin, which provide perfect finish and excellent protection against corrosion (standard "all climate" protection). The thickness of powder coating shall not be less than 120 microns. The color shall be to RAL 7032 /9002 and to Consultant approval.

The switchboard shall be:

a. Provided with a metal sill frame made of structural steel channels section properly drilled for mounting the switchgear along with necessary mounting hardware. Hardware shall be zinc plated and passivated.

b. Provided with labels on the front and rear indicating the switchgear designation.

c. Provided with cable entry facilities at bottom with 3mm thick removable gland plates and necessary cable glands. For 1 core cable these plates shall be nonmagnetic.

d. Provided with gaskets all round the perimeter of adjacent panels, panel and base frame, removable covers art doors.

e. Provided with bus-bar running at the top all along the Switchgear in a separate sheet steel enclosure.

C. Operating devices shall be incorporated only in the front of the switchgear with a hinged door.

Only the handles of control and selector switches, push buttons, knobs and cutouts for lamps and meters shall be arranged on the front doors of the respective compartments to permit operation without opening the door. Protective relays shall be mounted on the front door of the compartment. All cutouts shall be provided with gaskets for the purpose of dust proofing.

D. Current transformers shall not be directly mounted on the buses. Current transformers shall be mounted on the fixed portion of the compartment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Suitable barriers shall be placed between circuit breakers and all control, protective and indication circuit equipment including instrument transformers. External cable connections shall be carried in separate cable compartments for power and control cables.

F. After isolation of the power and control connections of a circuit, it shall be possible to safely carry out maintenance in a compartment with the bus bars and adjacent circuits live.

G. The switchgear shall be divided into distinct vertical sections each comprising:

a. A completely metal enclosed bus bar compartment running horizontally.

b. Individual feeder modules arranged in multi-tier formation. It is essential that the modules are integral multiples of the basic unit size to provide for flexibility in changes, if any, at site.

c. Enclosed vertical bus-bars serving all modules in the vertical section for safety isolation of the vertical bus-bars, insulating barrier with cut outs shall be provided to allow the power stab contacts to engage with vertical bus-bars.

d. A horizontal separate enclosure for all auxiliary power and control buses, as required, shall be located so as to enable easy identification, maintenance and segregation from the main power buses. Tap off connections from these buses shall be arranged separately for each vertical section.

H. Each vertical section shall be equipped with thermostatically controlled space heaters.

I. Open metal sheet shall be provided between two adjacent vertical sections running to the full height of the switchgear except for the horizontal bus-bar compartment. However, each shipping section shall have metal sheets at both ends.

J. All equipment associated with a single circuit shall be housed in a separate module compartment of the vertical section. The compartment shall be sheet steel enclosed at the sides and the rear with the withdrawable units in the position or removed. However, for front cable entry type switchboards, a plate cover with a slot to permit wiring connections shall be provided on the side corresponding to the cable alley

K. All doors shall be provided with concealed type hinges and captive screws.

L. All out-going breakers shall be fitted on prefabricated appropriate mounting plates and access to their operating toggles shall be provided through an appropriate front cover, fixed to the front frame.

M. The cable connection shall be made in a separate compartment. The access shall be possible through hinged covers.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

N. The cubicle shall be divided into modules with a minimum of 15% of empty modules for extension.

O. Cables entries/outgoings shall be as per site requirements.

P. ACBs shall be draw-out with ratings, breaking capacity etc. as mentioned elsewhere in this specification and contract drawings.

Q. Out-going MCCBs shall be Fixed type, operated by door interlocked rotary handles with ratings breaking capacity etc. as given elsewhere in this specification.

R. The draw out contact shall be only between copper/copper alloy faces, which are silver-plated.

S. All live parts shall be provided with suitable automatic shutter to cover all live parts when the section is in withdrawn position.

T. No cast iron or cast aluminium shall be used in any part of the assembly which is subjected to mechanical stress.

U. All incoming and outgoing switching devices shall have provision for locking in the 'off position.'

V. Where the F.B.A is required to bridge one or more civil work expansion joints in the substation construction, this requirement shall be detailed on the civil drawings.

W. Degree of Protection.

IP 20 minimum shall apply within an isolated compartment or cubicle while the remainder of the assembly is live. Metallic barriers shall provide this protection. Unless otherwise approved this requirement shall apply to bus-bar shutters and to devices energized from external supplies, such as motor heater auxiliary switches.

X. Incoming and sectionalizing units

Incoming and sectionalizing units shall be air circuit breakers and shall be mounted in separate panels.

Air circuit breakers shall be four-pole or three-pole type as indicated in the single line diagram for three phase and neutral systems. They shall be provided with "In Service/Out of Service/Test Point" positions and suitable locking devices shall be provided for the "Out of Service" and "Test Point" positions.

A dedicated compartment shall be included for metering on the incomers.

Supplier shall supply details for incoming units and bus-bar standard earthing arrangements.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Y. Outgoers

They shall be ACB or MCCB with type and ratings as indicated in the contract drawings and as specified in the relevant section of this specification.

Suppliers shall provide a minimum 160mm space between the base of the switchgear and the underside of the lowest outgoers.

All incoming and outgoing circuit breakers shall be provided with a release to trip the breaker, instantaneously if closed onto a fault.

All compartments shall occupy the full cubicle width; a semi module compartment or vertical division between compartments is not acceptable.

Supplier shall ensure that the number of outgoing feeders in any vertical section of switchboard shall be such that there is adequate space in the cable alley for all power, and all control cables entering the panel. The number of feeders shall not exceed 8 numbers for each vertical panel.

Z. Cable and Wire Terminations and Terminals

All internal control and auxiliary wiring shall terminate in suitable spring loaded, clamp type terminals and shall be provided with a permanent, easily read numbering system at both ends in accordance with the wiring diagram. Wires shall be identified by means of numbered and or lettered sleeves.

Formal blocks shall be arranged and positioned to afford easy access for carrying out external cabling, testing, inspection and maintenance.

Cable Glands shall be of the double sealed compression type with position armor bond suitable for XLPE and PVC insulated cables.

AA. Mechanical Indications

All main circuit devices other than contactors shall be provided with mechanically operated “on” and “off” indicators which shall be positively driven in both directions and shall be visible from the front of the assembly.

BB. Safety Shutters

Where shutters are provided to maintain IP 20(minimum), they shall automatically cover all bus bar and cable spouts or isolating contacts whenever removable or withdrawable units are removed.

The safety shutters shall be automatically opened and closed by action of the removable or withdrawable unit movement. A positive drive to the shutters shall be provided in both directions.

They shall be capable of being padlocked in the closed position.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

CC. Interlocks

All units shall be provided with a complete set of electrical and mechanical interlocks to prevent incorrect operation and to provide safety for personnel in addition to any external interlocks specified for operational reasons.

On removal of withdrawable units, mechanical interlocks shall be provided to prevent the following operations and any other operations which could cause danger or damage:-

a. The unit being closed unless it is correctly located in the service, isolated or earthed positions or unless it is removed from the fixed part of the assembly.
b. The unit being withdrawn from or inserted into the feeder spouts or isolating device when it is in the closed position.
c. The unit being moved to any position other than that selected by means of the mechanical selector.
d. The unit being withdrawn or inserted into the fixed part unless it is in the correct state for withdrawal or insertion.
e. The unit being closed in the service position unless all auxiliary circuits between fixed and removable parts have been completed.
f. Means shall be provided to prevent opening of cubicle doors or covers before disconnection of supply to exposed live parts within.

DD. Interlocks and Transfer Functions

The general philosophy of the required inter-trips and interlocks shall generally be as indicated hereunder. The vendor shall submit all logic diagram and interlocking line diagram to THE CONSULTANT for approval.

The main switch board incoming transformer feeders, and the bus section circuit breaker shall be provided with the required electromechanical interlock for auto transfer incase of failure of an incoming supply facilities shall be provided for manual transfer.

The various interlocking schemes shall generally as indicated on the drawings and to THE CONSULTANT approval.

EE. Nameplates shall be engraved on traffolite/ PVC sheet, with Black letters on white background. Nameplates for main breaker, tie breaker, section and outgoers modules identification and for the entire switchboard shall have letters not smaller than 13 mm high. Nameplates for branch breakers, switches, push buttons, control devices, pilot lights and metering shall have letters not less than 3 mm high. All Main nameplates shall be mechanically fixed with non-ferrous metal screws.

FF. Warning signs on doors and access panels shall be engraved traffolite with white letters on red background.

GG. Control contacts, auxiliary contacts, relays and small or light mechanisms shall be enclosed and protected, and shall be accessible for repair or adjustment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

HH. Engraved trifoliate /aluminum mimic of the SLD shall be provided on the front face of the switchboard. The same shall be mechanically fixed with non-ferrous metal screws.

II. Anti condensation heaters shall be provided within the assembly.

2.03 BUSBARS

A. The bus-bars shall be TPN+E (full neutral and half earth). Earth bar shall run through the entire length of the switchboard. The metal frames and all components shall be connected to the earth bar.

B. The bus-bar shall be of uniform cross section throughout the length of the switchgear and shall be of hard drawn high conductivity tinned copper.

C. Bus-bars shall be provided with at least the minimum clearances in air as per applicable standards for a 500V, 3 phase system.

D. The complete bus-bar system shall be certified for a fault level as indicated on the drawings, certificate for a typical bus-bar system assembled by the switchgear assembler shall be submitted to THE CONSULTANT for approval.

E. Bus-bars shall be totally enclosed within sheet steel compartments to provide optimum safety against accidental contact. The bus-bar compartments shall be properly marked with danger signs.

F. Horizontal and predrilled vertical bus-bar, make modification and extension very easy in addition to the above characteristics.

G. The vertical bus-bars shall be accessible through hinged doors.

H. The bus-bars shall be PVC sleeved with high die electric strength (450 V/mm). The maximum operating temperature at a design temperature of 55 deg. C shall not exceed 90 deg. C for normal operating and 200 deg. C for short circuit conditions. The bus-bar dropper shall be rated at 120 % of the current carried by the bus-bar with a minimum of 800 A rating.

I. MDB manufacturer to provide bus bars extension all the way up to flanged end of busway inside MDB.

2.04 SUBMAIN DISTRIBUTION BOARD (SMDB-FREE STANDING)

A. Description

a. The distribution panel(s) shall be of the free standing cubicle multitier type incorporating 3 phase, neutral and earth insulated tinned copper busbars, all necessary CTs, and the like as required.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Each cubicle shall be equipped with thermostatically controlled heaters which shall be 'on' all the time and ventilation means wherever shown in the SLD.

c. Switchboard shall be designed to operate on a 400/230V 3 phase and neutral 50HZ supply and shall have a short circuit rating as noted in drawing for 1 second, for the SMDB's, switchboards shall be constructed in accordance with IEC 61439-2 multicubicle type FBA FORM 3 Type 2.

d. Sub Main Distribution panel(s) shall be equipped with all necessary circuit breakers and components with enough spare outgoing for any future use.

B. Busbars

a. The busbars shall be made of hard drawn high conductivity tinned copper and rated for continuous operation. The main bus bar rating shall be the same throughout the entire length of the switchboard and a provision shall be made in the busbars system to allow for expansion and contraction caused by temperature variation.

b. The busbar shall be sized taking into consideration the ambient temperature and the specified temperature rise.

c. The neutral busbar shall have the same size as the phase busbars while the earth bar shall have a minimum size of half the phase busbar.

C. Breakers

a. All breakers shall be fixed type and all circuit breakers of the same type and rating shall be entirely interchangeable.

b. The cubicle shall be front operated with a mechanical ON/OFF position indicator and shall be designed and tested in accordance with relevant standards.

c. The main incoming supply shall be complete with a flush mounted ammeter for each phase, CTs, phase to phase voltmeter. Each meter shall have a phase selector switch and indication lamps.

D. Enclosure

a. The switchboard shall be constructed of minimum 2mm thick electro-galvanized steel coated with high solid enamel polyester electrostatic spray and oven baked 16SWG. There shall be adequate channel frames, drilled or slotted for ease of assembly, to support cable tails, clamps and terminations within the cubicles.

The busbars shall run in a separate compartment with the partition shall be made of Aluzinc or of similar material as the enclosure of at least 1mm thickness. All entries and openings shall be vermin-proof. All live conductive

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

parts either on the incoming or outgoing side shall be shielded in such a manner that they cannot be accidentally touched when the doors are open.

b. The degree of protection of the Switch Board enclosure should be IP-42

c. The contractor shall provide all necessary means of ventilation and forward the necessary calculation in order to ensure that maximum temperature rise within the panel will not exceed 35 deg at the operating ambient temperature of 55 deg C.

2.05 SUB MAIN DISTRIBUTION BOARDS (SMDB-WALL MOUNTED).

A. General

MCCB distribution boards shall comply with IEC 61439-2 Form 2, type 2
Enclosures:

a. MCCB distribution boards must be totally enclosed.
b. The degree of protection according to IEC 439.1 shall be IP 42 minimum for indoor installation and IP 55 for outdoor installation.
c. The enclosure shall be manufactured from minimum 1.5 mm thick 16SWG electro-zinc coated sheet steel with Epoxy polyester powder finish and color to COMPANY approval.
d. A hinged door fitted with lock and key has to be opened for operating the switchgear. Access to the cabling space and to the switchgear shall be obtained by removing a front cover bolted fastener.
e. Ample-wiring space shall be provided. Detachable blank gland plates shall be provided at the top and bottom.
f. Anti condensation heater shall be provided wherever shown in the SLD.

B. Breakers:

a. Incoming breakers shall be isolator and out-going breakers shall be MCCBs of fixed type. Breaking capacity of the MCCBs shall be in line with the prospective fault level of the installation but shall not be less than fault level calculation. Ratings and capacity shall be as given elsewhere in this specification.
b. Short circuit calculations shall be submitted to the engineer for approval.
c. Breaker selection shall be made to achieve maximum discrimination between the upstream and downstream breakers.

C. Electrical Characteristics:

a. Rated insulation voltage : 600V (AC)
b. Maximum rated current of bus-bars : up to 800 A or as mentioned on drawings.
c. Rated short time withstand current of bus-bars shall be as shown on the single line diagram.
d. The short circuit capacity of the distribution boards shall be 25 kA minimum and shall be rated to withstand the short-circuit level of the position it is installed. A short circuit level calculation shall be submitted and the short circuit level of the distribution board shall be upgraded accordingly.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.06 DISTRIBUTION BOARDS

A. Description

a. The specification hereunder shall be applied to all panel boards referenced on the drawings/load schedules as DBs. The distribution board shall be flush / surface mounted split busbar type and shall be provided with standard extension box to allow cable glanding if required. The distribution board shall be surface mounted when installed within the electrical room/service rooms.

Distribution boards shall be provided with an isolator incomer with common ELCBs for group of lighting circuits and common ELCBs for group of power circuits for each section of MCBs for each power circuit as shown on schedules.

b. As a standard item, all MCB boards shall be provided with permanent circuit identification charts to the approval of the engineer.

c. MCBs shall comply with IEC – 898 and RCBOs shall comply with BSEN 61009. ELCBs shall comply with BSEN 61008.

d. DBs inside electrical rooms shall be surface mounted type fixed onto a U channel support.

B. Enclosures

a. The MCB Distribution Boards shall be surface/flush mounted type. The enclosures within Electrical rooms must be surface mounting type. Powder coated rustproof sheet steel units 16SWG, complete with circuit breakers providing thermal overload and magnetic short-circuit and earth fault protection as shown on the drawings. The enclosure protection shall be IP 31, while the complete assembly shall comply with IEC – 439-1.

b. Surface wall mounted DBs shall be fixed on U channel support and not direct to the wall.

C. Busbar

a. The MCBs shall be mounted on either 3 phase or single phase or split busbars as appropriate. All spaces which are not provided with breakers shall be covered with blank plates.

b. A final sub-circuit neutral assembly and an earthing bar assembly shall be available to facilitate the connection of neutral conductors and protective conductors respectively.

D. Breakers

a. Miniature circuit breakers and earth leakage circuit breaker and shall be provided as indicated on the load schedules.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. The short circuit rating for the MCBs shall be 6KA for DB's.

c. All circuit breakers shall be factory calibrated to ambient temperature of 40 deg. C.

2.07 DISCONNECT SWITCH

A. Disconnect switches (isolators) shall be manufactured to IEC and British standards.
B. Disconnect switches shall be heavy duty (AC23) with operating handle interlocked with the switch cover, in general purpose rust proof aluminium enclosure and to IP44 finished in gray stove finish.

C. Switches shall be quick make, quick break action. Provision shall be made for padlocking in either the "On" or "Off" position.

D. Switch blades shall be fully visible when in the "Off" position.

E. Operating handles shall be interlocked to prevent doors from being opened when switch is closed. Provision shall be made to defeat this interlock with a screwdriver.

F. Fuse clips shall be designed for HRC BS 88/IEC 269 fuses without adapters and shall reject standard code fuses.

G. Switches mounted outside, in damp or dusty locations and unconditioned areas shall be supplied in weather resistant enclosures IP 65 made of aluminium with double wall construction.

H. Sample and catalogues with installation details shall be submitted for approval by THE CONSULTANT prior to ordering.

I. Provide a disconnect switch ahead of all motors, starters and electrical equipment where shown on the drawings and where required to meet Code regulations and jurisdictional authorities, whether the equipment is supplied or installed under the Electrical Division or any other division.

J. All disconnect switches shall be provided with tag to THE CONSULTANT approval to indicate equipment connected to the switch. The feeding circuit reference and the related distribution board number.

2.08 AIR CIRCUIT BREAKERS

A. General

a. The circuit breakers shall comply with IEC947-2, 3pole or 4pole as mentioned in the single line diagram. However the incomer and bus coupler ACBs shall be of 4 poles.
b. The breaking capacity performance certificates shall be available for category B to the above mentioned standards. The test shall be carried out with a breaking performance during operation (Ics) equal to the ultimate breaking capacity (Icu).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

c. All circuit breakers can be reverse fed without reduction in performance.

d. Breaker shall be equipped with a grounding device to solidly ground the framework before the main disconnecting contacts are engaged and to maintain the grounding until after the contacts have separated.

e. Breaker trips shall be completely self-powered with no external control power source required. If external control power is required, 125V D.C. batteries and charger shall be provided. Batteries to be Sealed Maintenance Free type.

f. Breakers shall be provided with overload, short circuit and earth fault protection and have the following functions:

g. Adjustable long time delay trip.

h. Adjustable short time delay trip.

i. Instantaneous trip,

j. Ground fault trip. For incomer ACB only.

k. .Breakers shall be suitable for operating at 55 deg. C ambient temperature and shall be tropicalised.

B. Construction

a. The air circuit breaker ratings shall be as shown on the single line diagram.

b. All air circuit breakers main contact shall be encased in a reinforced polyester casing and offer double insulation from the operators on the breaker front face. The circuit breaker also shall offer total insulation between the control part and the power part.

C. Operating Mechanism

a. The operating mechanism shall be the O-C-O stored energy spring type motor/manually operated with a closing time of less than or equal 80 ms.

b. Each breaker shall be provided with 3 nos. normally open and 3 nos. normally closed potential free spare auxiliary contacts rated 10A at 240 V AC.

D. Arc Chutes

Arc chutes shall be common on the whole range and removable on site to allow inspection of arc chutes and main contacts.

E. Auxiliaries

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

All electrical auxiliaries including the motor spring charging mechanism shall be field adaptable without adjustment or the necessity for any tool (except a screwdriver).

F. Trip Units

The trip units shall be micro-processor based type and use digital programming technique for highest protection accuracy against overload, short circuit and earth fault. They shall be integrated as part of the circuit breaker. The trip unit shall have a wide adjustment range to allow flexibility of the setting on site. The trip unit shall measure the true RMS value of any waveform of current. The trip unit shall be equipped with a push to reset mechanical indicator, for anti-pumping function.

G. Control Unit

The control unit shall be microprocessor based type and shall make it possible to display the electrical quantities relevant to the protected line, and the control of electrical devices through power relays housed in the release case.

The control unit shall also provide the following :

Maintenance indications providing the wear and tear of the main power contacts of the breaker etc.

H. Dialogue Unit

The dialogue unit shall be microprocessor based type and shall give information on electrical quantities, alarms and the circuit breaker condition. Besides it shall receive the operational commands for the circuit breaker sent by centralized system.

I. Auxiliaries and Accessories

a. 1 ammeter and volt meter with selector switch.
b. Operation counter
c. ON/OFF/Fault/Control Circuit fault indication light with lamp test facilities.

2.09 MOULDED CASE CIRCUIT BREAKERS (MCCB)

Moulded case circuit breakers shall conform to the latest editions of BSEN 60947-2.

The MCCB's shall have a minimum service short circuit capacity similar to the panel board where the same is installed.

Three pole breakers shall have a common trip with a single operating handle and designed so that any overload in one pole automatically causes all poles to open. Breakers shall be trip free and each shall have a trip indication independent of ON or OFF positions.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Wherever shown on the drawings MCCBs shall be provided with earth leakage alarm relay or earth leakage relay of fixed/adjustable sensitivity.

A. MCCB From 100 To 800 A or as mentioned on drawings

a. The moulded-case circuit breakers shall be designed for both vertical and horizontal mounting, without any adverse effect on electrical performance. It shall be possible to supply power either from the upstream or downstream side.
b. The moulded-case circuit breakers shall provide class II insulation (according to IEC 664 standard) between the front and internal power circuits.

B. Construction

a. For maximum safety, the power contacts shall be insulated in an enclosure made of a thermosetting material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries.

b. The operating mechanism of the moulded-case circuit breakers shall be of the quick make, quick-break type with fault tripping over ridding manual operation. All poles shall operate simultaneously for circuit breaker opening, closing and tripping.

c. The moulded-case circuit breakers shall be front operated by a toggle or handle that clearly indicates the three positions: ON, OFF and TRIPPED.
d. The moulded-case circuit breakers shall be equipped with a "push to trip" button in front to test operation and the opening of the poles.

e. Where required, motor operated mechanism, shunt trip, under voltage release, auxiliary switches up to four changes over contacts and a tripped signal contact shall be provided. Each of these units shall incorporate a pre-wired terminal strip, which is accessible from the front of the breaker without removing the cover.

C. Current Limiting

The moulded case circuit breakers shall be capable of greatly limiting currents. For short circuits, the maximum thermal stress it shall be limited to

10^6 A^2 s for ratings up to 250A.
5 x 10^6 A^2 s for ratings between 400A and 630A.

A : Amps and S : Seconds

These characteristics will allow high cascading performance with moulded-case or miniature circuit-breakers.

D. Auxiliaries and Accessories

a. The addition of motor mechanism or a rotory handle shall in no way affect circuit breaker characteristics:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Only three stable tripping mechanism positions (ON, OFF and TRIPPED) shall be possible with the motor mechanism.
c. Suitability for isolation shall be provided by positive contact indication (ON and OFF) in front of the motor mechanism module.

d. The moulded case circuit breakers shall be designed to enable safe on-site installation of auxiliaries such as voltage releases (shunt and under voltage releases) and indication switches.

e. The addition of a motor mechanism, module or a rotory handle, etc., shall not mask or block devise setting.

f. It shall be possible to equip the moulded case circuit breakers with devices indicating faults without tripping the circuit breaker.

E. Protection Function General Recommendations

a. Moulded case circuit breakers with ratings up to 250A shall be equipped with inter changable Thermal-magnetic trip units.
b. Moulded case circuit breakers with ratings over 250A shall be equipped with electronic trip units. The trip units shall not augment overall circuit breaker volume.
c. Electronic trip units shall comply with appendix F of IEC 947-2 standard (measurement of RMS current values, electromagnetic compatibility, etc.,)
d. Electronic and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorized access to the settings.
e. Protection settings shall apply to all circuit breaker poles.

2.10 MINIATURE CIRCUIT BREAKERS

A. MCBs shall comply with BS EN 60898.
B. MCBs shall be 35mm symmetrical rail mounted type and available n one, two, three or four poles version.
C. MCBs can be reverse fed without reduction in performance.

D. Construction
a. The operating mechanism shall be mechanically trip free from the operating handle so as to prevent the contacts from being held closed against short circuit conditions. It shall be of the "automatic resetting type".
b. The individual operating mechanism of each pole of a multi-pole MCB shall be directly linked within the MCB casing and not by the operating handles.
c. The operating handle shall be of the toggle type.
d. Each pole shall be provided with bi-metallic thermal element for overload protection and magnetic element for short circuit protection.
e. Terminals shall be of the tunnel type (IP20) in order to minimize the risk of direct contact.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.11 METERING

A. Meters (indicating instruments) shall be provided as shown in the schematic diagram.

B. All meters shall be moving iron type, minimum of 72 sq. mm square shape and 90 deg. scale.

C. All meters (indicating instruments) shall be of class 1.5.

D. Instruments shall temperature compensated to operate between -25 deg. C and + 55 deg. C and shall be trophical version.

E. All meters shall comply with IEC 51.

2.12 CURRENT TRANSFORMERS

A. Current transformers shall comply with IEC 185.
B. The conditional ratings of current transformers shall correspond with the switchboard rating and shall be such as to maintain the overall metering accuracy as is necessary to operate relays within the tolerances specified by the manufacturer.
C. Current transformers secondary ratings shall be:

1. for protection 1A
2. for metering 5A

D. Current transformers shall have the following accuracy as a minimum, for protection Class 5P (Except for REF Protection which will have PS class CT)
E. for indication Class 1
F. for metering Class 1
G. The manufacturer shall ensure that the current transformers are such that the relays will operate correctly when set at any point within their ranges.
H. Current transformers secondary wiring shall be earthed on one side through a removable link. Where current transformers are connected in star, the star point shall be earthed through a removable link.
I. Shorting links shall be provided for each current transformer.
J. Current transformers shall be cast resin insulated.

2.13 VOLTAGE TRANSFORMERS

A. Voltage transformers shall comply with IEC 186.
B. Voltage transformers shall be suitable in rating and accuracy for their functions, loads and duties.
As a minimum they shall have following accuracy,
Protection applications Class 5P
Indication and metering applications Class 1
C. The primary and secondary circuits of the voltage transformers shall be protected by fuses and the secondary winding shall be earthed at one point through a removable link.
D. Voltage transformers shall be cast resin insulated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. The manufacturer shall provide MCBs with auxiliary contacts or alternatively 4-pole MCBs on the secondary side of the voltage transformers.

2.14 CONTACTORS

A. All contactors shall comply with IEC 947-1, IEC 947-4.
B. Duty category for lighting contactors shall be AC1 and for inductive load shall be AC3.
C. Contactors shall be protected against direct finger contact, mechanical life shall be 15 to 20 million operating cycles. Shall be suitable for 1200 operating cycles per hour.
D. The contactors shall be of 3 pole construction capable of handling high rush currents and suitable for operating up to 55 deg. C ambient temperature without any derating.
E. Coils shall operate between 85% to 100% of the nominal voltage.

2.15 EARTH LEAKAGE CIRCUIT BREAKERS (ELCBS)

Current operated earth leakage circuit breakers shall be in accordance with BSEN 61008 providing the functions of isolation, switching and earth leakage protection of electrical circuits.

The ELCB's shall have a residual current operated electro mechanical release.

The ELCB's shall incorporate a filtering device to eliminate unwanted tripping due transient voltage.

A test push button is to prove operation.

A trip free mechanism is required to ensure that the unit cannot be held closed against an earth fault.

The tripping device is connected directly to the secondary of the current balance transformer.

No amplifiers or rectifiers are to be used.

The breaker shall be double pole when used for single phase and 4 poles when used for three phase circuit protection.

The ELCB's sh all have 30mA or 100mA sensitivity as indicated in the drawings.

2.16 OVERLOAD RELAYS

These are to be used in conjunction with motor starters to provide protection against overloads, phase sequence, phase failure (single phasing) and under voltage conditions.

The relays shall be selected such that the full load current of the equipment protected falls at the centre of the relays adjustment range.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Incase of Star Delta starter, the overload relays shall be placed on the main's contactor.

2.17 CONTROL RELAYS

Shall be of the encapsulated plug-in type and incorporate visual indication that the operating coil is energized.

Bases for relays shall be mounted horizontally, to ensure relay is vertical above the base when the control cabinet is in its intended location, with screw type terminals, suitable for receipt of spade type crimped/soldered lugs.

Adjustable timer delay relays used for the star delta starter shall ensure precise reproducibility of the timing function. The relay shall have a linear setting scale over a 350 deg. rotation by means of knurled knob with timing guide marks. The relay shall be equipped with two electrically separated time delayed contact one normally open and one normally close.

2.18 INDICATION LAMP

These are generally used to indicate main's presence, run, trip, fault and to give fault alarm or indicate any other function.

Indicator lamps shall be of the low voltage 24 volt transformer with twin LED lamp type and accord with the signaling colours laid down in BS. 4099. Minimum lens diameter shall be 12.5mm and all lenses on a panel shall be of a matching size and appearance and removable from the front for lamp replacement.

Terminations shall be screw grip to receive spade typing crimpled/soldered lugs.

2.19 SELECTOR SWITCH

They shall be of the complete rotary cam type rated to suit item controlled and fitted with pointer type switching knob. Terminations shall be screw grip to receive spade type crimped/soldered lugs.

Hand off auto selection switch shall have three positions with centre position off and shall be key operated wherever necessary.

Selector switch when used along with the voltmeter it shall have 8 positions, i.e phase to phase, 3 phase and 2 off position.

2.20 ACCESSORIES

A. Furnish the following accessories,
B. Set of extension rails, if required
C. Hoisting device for removing breakers
D. Set of test plugs
E. Levering out device, if required
F. Manual maintenance closing lever, for electrically operated breakers

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Set of special tools and hardware

2.20 VARIABLE FREQUENCY DRIVES

A. General Description

This Specification describes the requirements for the 400V Variable Frequency Drive Controllers (VFD). The 400V Variable Frequency Drive Controllers shall be designed and provided in accordance with this Specification and the attached data sheets. The proposed Manufacturers installation requirements should be complied by the Manufacturers as part of the Contract including shielded power cables (if required), enclosure for VFD's, earthing requirements, etc. to achieve EMC Compatible installation. All details shall be furnished as part of the submittal.

B. Scope of Supply

The scope of supply includes the design, manufacture, testing and delivery of the 400V VFDs as described above. The VFDs shall comply with EMC directives and provide with filters. All VFDs shall be communicating type using LON / Modbus.

C. Supplied By Contractor

Equipment unloading and storage at the Job Site.

D. Codes and Standards

a. All equipment shall be designed, manufactured and tested in accordance with the latest edition of the applicable:

NFPA 70

IEC 146

EN Standard/CE marked for EMC directives:

Emissions	Immunity
EN 50081-1	EN 50082-1
EN 50081-2	EN 50082-2
EN 55011 Class A	IEC 801-1, 2, 3, 4, 5, 6, 8
EN 55011 Class B	EN 50178

b. EN 60204-1

c. The manufacturer shall furnish the product as listed and classified by underwriter's laboratories as suitable for the purpose specified and indicated.

E. Environmental Conditions

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. The VFD product line shall be capable of operating normally in an environment with an ambient temperature range of 0 °C to 50 °C with a relative humidity of up to 95% (non-condensing). The enclosed current rating shall be derated by 10% for each 5 °C above 50 °C not exceeding 60 °C.

b. The product line shall be capable of being shipped and stored in an environment with an ambient temperature range of 0 °C to 65 °C.

c. The nominal operating altitude shall be less than 1000 m above sea level.

F. Product Delivery and Handling

a. Ship controllers in convenient sections crated and protected, bearing in mind the hazards of transportation.

b. All necessary bus connections, wire jumpers, bolts, nuts, etc. shall be suitably packed and identified to facilitate field assembly.

G. Products

a. General

b. The variable speed drive controllers' technical requirements shall be in accordance with the data sheets. Seller shall be responsible for ensuring that under all operating conditions:

- The controllers and their characteristics shall be compatible with their respective driven production motor and the plant control system. Seller shall obtain speed (frequency) range required and maximum frequency permitted for each type of controller from the load equipment supplier.

- The VFD shall be suitable for use with high efficiency Design B, 400 V motors.

- The total harmonic distortion (THD) voltage in the plant electrical and local systems shall not exceed 5% and no individual harmonic shall exceed 3% during normal plant operation.

- Computerised harmonic analysis studies to IEEE Standard 519; copies of the studies shall be provided with the proposal.

- The VFD shall be fully digital pulse width modulated type (PWM) using latest generation IGBTs with isolating contactors and line reactors.

c. Design Requirements

I. The VFD controllers shall be suitable for operation on 400 Volt ±15%, 3 phase, 50 Hz input power supply and 0-400 Volt, 3 phase, 0.5 to 400 Hz output. No transformer shall be used on either the input or output of the VFD.

II. Each controller shall comprise:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Enclosure with filters and gaskets construction, mounted on steel sills.
- Incoming supply terminals complete with cable lugs.
- Padlockable line disconnect switch with bolt on HRC fuses in each phase.
- 110% overload capacity above motor service factor demand (115%) for 30 minutes.
- Short circuit and current limit protection.
- Surge (TVSS) protection wherever shown in the SLD.
- Stop / Start contactor to ensure when the motor is not running, no voltage is present on the motor power terminals wherever shown in the SLD.
- Wireways with removable gland plates.
- Incoming power system isolation transformer, if required, with thermal sensing in each phase, and filters to limit on the plant 400V bus THD to 5%; no single harmonic to be more than 3%.
- Drive operation man machine interface (MMI) keyboard.
- Stepless non reversing minimum and maximum motor speed adjustments, adjustable ramp up rates, minimum/maximum speed limits for pump motors. Adjustments to be password protected.
- Man / Auto select switch via keypad, with locking via password in both positions (see Note).
- Local/Remote selector switch via keypad with locking via password in both positions (see Note).
- “Drive Ready” with remote signal.
- Stop and start pushbuttons via keypad, in remote mode.
- Speed control: Local / Remote / Automatic via keypad.
- Motor speed indication via LED display.
- Motor On / Off indication via LED display.
- Emergency stop pushbutton, local at controller and local to plant provision.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Drive status and failure diagnostic feature via LED display. Feature to log, time and date the last 30 fault conditions.

- Indication of output to drive current on each phase.

- Isolated I/O control signals.

- Motor multi-function protection, providing short circuit (51), overvoltage (59), undervoltage (27), thermal (49), stalling (49S) and phase unbalance (46) protections, complete with ground fault (51G) protection device to trip the incoming supply.

- Bolted and shrouded bolted type terminals for terminating load cables.

- Weidmuller or Wieland type terminal blocks shall be provided to connection of external wiring and cables.

- Interposing relays as required.

- 110V AC control voltage or manufacturers standard.

- Microprocessor based electronic self-diagnostics and fault detection system.

- Each cubicle shall be provided with an earthing bus, complete with two connectors for connecting to the plant earthing system. Drilled holes shall be provided for connecting cable earth conductor.

- VFD controllers shall be provided with a lamacoid engraved nameplate, minimum size 150mm x 75mm, engraving details to be provided by Purchaser.

In "Man" mode, two modes shall be functional: Local or Remote. In "Local" mode, motor shall be started from Start/Stop pushbuttons via controller's keypad. In "Remote" mode, motor shall be started from pushbutton station located near motor (if required).

III. Performance

The VFD shall have the following features as a minimum:

- Minimum efficiency of 97% at maximum load and speed.

- Minimum line side displacement power factor of 0.95 to 1.0 logging at all speeds and loads.

- Adjustable motor frequency of 0 to 400 Hz.

- Separately adjustable acceleration and deceleration ramps from 0 to 999 seconds.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Rotating motor restart feature.
- Capable of running without a motor connected for set-up and testing.
- Skip frequency reject point to prevent operating of the equipment at a resonant speed.
- Ride through for power outage of at least 2 seconds duration
- Load loss detection
- Overload protection
- Auto economizer
- The flying start feature operable with or without encoder feedback

IV. Discrete Operation

Inputs

- Start
- Stop

Outputs

- Ready to start
- Running
- VFD general fault alarm status
- VFD Auto and Man/Local/Remote operation status

V. Analog Operation

Inputs

- Speed control signal

Outputs

- Speed signal feedback
- Phase currents (percent)
- Frequency (percent)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

VI. Verification of Interface

Vendor shall demonstrate functional testing and operational verification of the control interface with the Building Management System via Modbus, Bacnet, LON, or equal as required.

d. Inspections and Factory Test

I. Controllers shall be inspected at all stage of manufacture in accordance with the Seller's Quality Assurance Program and shall be completely assembled in the works. Seller shall provide a production schedule, which shall give details of the production processes. Seller shall provide a QA

II. Manual, which shall detail the inspections, testing to referenced standards, and burn in at full load at an ambient of 50 °C, for a minimum of 8 hours. All deficiencies shall be corrected before shipment.

H. Painting

All metal surfaces that are to be painted or coated shall be cleaned to an equal of a commercial finish as defined in the Steel Structures Painting Council's manual - SSPC-SP6-63, modified to exclude wet sandblasting and painted to manufacturer's standard finish. Internal surfaces shall be painted white.

I. Nameplates

Nameplates shall be provided for each VFD controller.

2.21 MOTOR STARTERS

A. Description

Starters shall be manufactured and type tested in accordance with IEC 947-4 and IEC 947-4-1

All motors shall be provided with heavy duty contactor type motor fuseless starters selected for coordination type 1 in accordance with IEC 947-4 generally complying with the following and protected through circuit breaker.

a) 4KW direct on line starting
b) 5.5KW to 25KW Star Delta starting
c) 25KW and above reduced voltage electronic soft or VFD as appropriate as indicated.

Each starter panel shall be provided with a main incoming Non Auto MCCB / isolator capable of carrying the full load current.

Each starter shall comprise as a minimum:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. On load triple pole MCCB with two normally open and one normally closed auxiliary switches wherever shown in the SLD. The MCCB to be mechanically interlocked with the starter component door and capable of breaking the motor starting current and of making onto a fault at the motor terminals.

Provision to be made for padlocking the MCCB in the 'OFF' position.

b. Three pole contactors to be fitted with required normally open and required normally closed auxiliary contacts to obtain the specified starter type.

All the auxiliary contacts to be wired down to the starter terminal block.

c. One triple pole thermal over current relay incorporating over current, phase sequence and single phase protection with adjustable trip settings.

External mechanical hand reset to be provided.

d. One control circuit MCB or fuse and one copper link.

e. Each starter shall be fitted with one set of local start/stop push buttons and a local/remote/auto selector switch or hand/off/auto switch as required. Each starter control wiring terminal block shall include control terminals for connection of remote push buttons, auto circuits and local and remote emergency stop push buttons.

f. Where more than one motor with a duty/standby or duty/backup functions used, the starter control wiring shall be arranged to automatically change duty upon the fault tripping of the selected motor. A duty/standby or sequence selector switch shall be provided.

g. Each starter shall be fitted with twin led indication lamps indicating:

1. Motor running (green)
2. Motor Overload Tripped (red)

h. Each starter shall be fitted with an ammeter and selector switch for motors 30 KW and above.

i. Each starter to be equipped with labels giving drive designation, plant number and control operation.

j. Each starter control wiring shall include control terminal and control relays as necessary to achieve any interlocking specified elsewhere or to achieve any control or monitoring through the BMS where specified.

k. Adjustable time delay devices for Star Delta Starters.

l. Earth leak relays/ Breakers as required.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Starter units for manual operation shall have push buttons for starting and stopping, together with auxiliary contacts for remote indicator lights where specified. Starter units arranged for automatic operation shall have hand/off/auto controls and remote push buttons.

All Star Delta starters shall be provided with mechanical and electrical interlocks for star delta contactor assembled to prevent short circuiting.

B. Enclosure

Panels shall be constructed of a minimum 1.6mm thick electro galvanized steel coated with high solid enamel polyester electrostatic spray and oven baked and protected to IP 54.

Front access shall be arranged for all panels with hinged lift off doors. Dust and damp proof gasket around the edge and fitted with lockable cam type chromium plated handle mechanically interlocked with the starting MCCB.

The enclosure for the motor starters are divided into two types as follows:

a. Single starter panel.
b. Motor control centre.

Single starter panel

a. This specification shall be applied for starter panels used for starting single equipment with a maximum of two motors.

b. All equipment shall be mounted on sheet steel mounting plate with screws into tapped holes and all live parts shall be shrouded to a minimum IP54.

c. The minimum short circuit rating for the different components shall be 25kA. However, the contractor shall forward a short circuit calculation and upgrade the same if found necessary.

Compensated Equipment

Any motorized valve or damper controlled via a compensated system, shall be arranged such that a manual selector switch is provided to override compensated selection and enable manual opening/closing or on/off control, as appropriate. Any compensator unit mounted within the control cabinet shall remain in the manufacturer's purpose made enclosure and be installed strictly in accordance with the manufacturer's recommendations.

The panels shall contain devices for automatic restart of units after power failure where required.

2.22 MOTOR CONTROL CENTERS (MCC)

A. Motor control centers shall be of similar construction to the main low voltage switchboard in addition shall comply with the following specification:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Motor control centers shall be in accordance with IEC 947-4-1 with type 1 coordination.
b. All power and control devices shall be mounted in separate compartments. All power and control wiring shall be segregated. Separate color-coded wires shall be used for power and control wiring; the same shall be properly ferruled.
c. Control wires shall be of flexible copper not less than 1.5 sq. mm.
d. Chiller sequence controller shall be provided.
e. Automatic controls for pump duty stand/by, duty selection, interlocking with chillers shall be provided.
f. All motors shall be provided with phase failure, under voltage, phase sequence over current and earth fault protection wherever shown in the SLD.
g. Run/Trip indication shall be provided for all pumps with lamp test facility.
h. On/Off switch for chiller's control panel shall be provided.
i. Hand/Off/Auto selector switches and On/Off push buttons shall be provided for all motors.
j. The degree of protection of the switchboard enclosure shall be IP 54 (minimum).

B. Outgoers

Motor starters and contactors shall have a utilization category of AC-3 (starting of squirrel-cage motors, switching off motors during running) and AC-4 for motors with inching or reversing duties.

Motor starter components i.e. breakers, contactors, relays etc. shall be selected in accordance with IEC 947 947-4-1 type 1 coordination.

Ammeters shall be fitted to all starters for motors greater than 30.0kW. On-off fault indication of contractors shall be fitted on the front of the starter compartment with a red light for "ON", green light for "OFF" and an amber light to indicate motor overload or fault conditions.

Suppliers shall provide a minimum 160mm space between the base of the switchgear and the underside of the lowest outgoers.

All incoming and outgoing circuit breakers shall be provided with a release to trip the breaker, instantaneously if closed onto a fault.

All compartments shall occupy the full cubicle width; a semi module compartment or vertical division between compartments is not acceptable.

Supplier shall ensure that the number of outgoing feeders in any vertical section of switchboard shall be such that there is adequate space in the cable alley for all power, and all control cables entering the panel. The number of feeders shall not exceed 8 numbers for each vertical panel.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 3 - EXECUTION

3.01 INSTALLATION

A. After installation and leveling, render the entire switchboard rodent proof by any means of steel plates,

B. Provide full length rubber mat in front of switchboard

C. Installation of switchboard shall be fully in accordance with THE CONSULTANT requirements.

Switchgear and distribution boards shall be surface mounted/free standing type and shall be mounted on the building structure by means of suitable mild steel straps or angle iron frames. Where distribution boards or switchgear are required to be directly attached to brickwork etc., the fixing shall be by means of grouted in bolts, or bolts of the expansion type.

Any live metal in the distribution board shall be screened with insulation material, so that circuit breakers can be replaced without any danger to the operator.

D. The circuit breakers shall be situated to allow wiring to be carried out with sufficient slack to enable them to be removed for inspection without disconnecting any circuit wiring.

E. All main, submain and final distribution boards shall have a spare capacity and shall also be provided with enough spare breaker as shown on the drawings.

F. All panel board and distribution boards shall consist of adequately rated circuit breakers. Circuit breakers shall be temperature compensated at the manufacturer's works to give the design current rating at 50 deg. C. Non-compensated breakers will not be approved and a formal certificate will be required from the manufacturer confirming that the breakers have b0een suitably temperature compensated.

The contractor shall supply and install all panel board with the related voltmeters, ammeters and energy meters of a type that meets consultant's approval.

Where single core cables enter or leave any item of metal clad switchgear, distribution gear, etc., the cable cores shall all pass through the same aperture in the enclosure or case of the unit concerned, to avoid the setting up of eddy currents. Where separate holes are provided by the manufacturer for the cables, the holes shall either be cut out to form a continuous slot, or alternatively the holes shall all be joined together with saw cuts through the solid metal separating the holes. In all cases end plates shall be of non-ferrous metal.

A special termination arrangement shall be provided to consultant's approval at the submain and main panel boards wherever the cable size exceeds the breaker terminal capacity.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.02 TESTS AT WORK

A. Routine tests to standards shall be carried out. Evidence that type test have been carried out provided they are relatively to the configuration of the equipment offered, may be acceptable to THE CONSULTANT and shall be made available.

B. A full visual check and electrical functional test shall be carried out on all apparatus and every circuit. All wiring shall be inspected. It shall be verified that the FBA is fully in accord with the requisition. Circuit breakers shall be closed and tripped at their rated minimum and maximum trip and close supply voltage. Primary and secondary injection tests shall be done on protection relays and CT circuits and indicating and metering instruments. All labels shall be checked.

C. The test procedure shall be as follows:

a. Visual inspection to verify degree of protection creepage and clearance distances.

b. All conductors and cables are checked for proper routing and all devices for proper mounting.

c. Check effectiveness of all mechanical devices, e.g. handles, locks, interlocks, operating devices, etc.

d. Check panel conformity to drawing requirements.

e. Megger test all main circuit through to final terminals. Insulation resistance shall exceed 10 meghoms. Record all measurements.

f. Flash test all main circuit at 2.5 KV for one minute. Record leakage current.

g. Repeat megger test to verify insulation resistance has not been affected by the dielectric test.

h. Continuity tests of each circuit.

i. Function test of all circuit breakers switches, contacts, etc. and every circuit to verify correct operation.

j. Primary and secondary injection tests of all relays, CT's and indicating and metering instruments.

D. Prior to energizing the switchboards, perform the following checks on site:

a. Operate the equipment through all design functions, including remote operation, actuation of alarm and indicating devices, mechanical and electrical tripping and closing and operation of the protective devices.

b. Insulation resistance measurements on the buses, phase to phase and phase to ground, with all breakers in the fully connected position and contacts open.

c. Control circuit insulation resistance to ground.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

d. Inspect all relays and protective devices, and verify settings in accordance with the manufacturer's instructions or the information in the Coordination study.

e. Inspect current transformers and relays for correct polarity of connections and the installation of jumpers on unused current transformer circuits.

f. Simulate the operations and check the logic of interlocks.

g. Manually close and trip each breaker checking and adjusting the main contact alignment and wiring action in accordance with the manufacturer's instructions.

h. Check the phasing on each side tie breaker, before closing.

i. Test protective relay operation for incomer air circuit breakers.

E. Routine Tests

a. Following routine tests are to be carried out by the switchgear assembler,
b. Inspection of assembly including inspection of wiring and electrical operation
c. Dielectric test:
Checking of protective measures and of the electrical continuity of the protective circuits.
d. Verification of insulation resistance.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-12
DRY TYPE TRANSFORMER

1.0 SCOPE OF WORK

The works related to the electrical system, which are included in the scope of this Contract, are shown on the Drawings, stated in these specifications. The works shall broadly include but not limited to the following:

- 11/0.4 kV, 3-Phase transformer

2.0 SHOP DRAWINGS

The Contractor shall submit the shop drawings to the Engineer showing the detailed scheme of installation, explaining the method of installation, proposed position of termination etc., for approved before commencement of installation.

3.0 TRANSFORMER

3.1. SPECIFICATIONS

DRY-TYPE DISTRIBUTION TRANSFORMERS
The capacity of the transformers shall be as shown on the drawings and mentioned in the BOQ. The transformers shall be Dry Type, naturally cooled 3-phase indoor type.

The transformers shall include the following features

. Rating : As mentioned in BOQ.
- Type : Dry Type, Forced Fan.
- Voltage ratio at no-load : 11000 / 400 volts.
- Frequency : 50 Hz
- Vector Group : DYn 11
- Off load tap changer (HT) : +/- 2.5%, +/- 5%,
- HT connection : 11 KV Delta
- LT connection : 415 V with grounded star point.
- Neutral on LT side : Solidly earthed
- Impedance voltage: 4.5% to 6%
- Rated Voltage HT/LT : 12 KV/ 1.1 KV
- Voltage regulation for rated : Not to exceed 2.5% of no-load operating condition secondary voltage at 0.85 P.F.

The transformers shall be provided with the following accessories.

- Lifting Jugs
- Bi-directional rollers.
- Earth terminal
- Thermometer with maximum temperature indicator pointer and tripping facility.
- Diagram and rating plate

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Off-load tap changer fitted with position indicator and pad-locking arrangement.

a. Description: Three phase transformers dry type, 2-winding transformers, complying with IEC 60076-11 and BS EN 50541-1

3.2. INSTALLATION

Transformers shall be installed at location shown on the drawings. It is responsibility of the Contractor to check the provisions in civil works, related to transformer installation.

The installation of the transformer shall be carried out in accordance with specifications and the manufacturer's recommendations. The accessories shall be assembled, installed and connected in place so as to form a complete transformer assembly. The transformers roller wheels shall be locked after placing it in position so that the wheels do not move on the channel due to vibrations. The HV cable connections shall be made on the HV terminal, provided on the transformer, by the Contractor as per manufacturer's recommendations. The jointing / termination materials shall be provided by the Contractor without any additional cost. The neutral on the LV side shall be effectively connected to earth.

3.3. ROUTINE TESTS

Following routine tests as per IEC 60076-11 and IEC 60076-1 to 60076-3 shall be carried out on each transformer

- Measurement of windings resistance
- Measurement of transformation ratio and vector group
- Measurement of impedence voltage and load loss
- Measurement of no load loss and no load current
- Applied voltage dielectric test
- Induced voltage dielectric test
- Measurement of partial discharge level

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-13
DIESEL GENERATOR SET

1.0 SCOPE OF WORK

To continue feeding electrical energy to specified main distribution board during main failure hours, emergency diesel generating sets shall be provided and installed in Generator Room as shown on the drawing. The installation shall be complete with all necessary auxiliary equipments, control and protective gears, fuel oil tank and related piping, critical silencer, exhaust piping, ducting and control cabling to provide a complete operational system of emergency power supply.

2.0 RATING

The prime power diesel engine driven generating set shall have the following rating and electrical characteristics:

a. Generating Capacity (Prime Power Rating) As indicated in the BOQ
b. Voltage 400 Volts, + 5%
c. System 3 Phase 4 wire
d. Frequency 50 Hz, + 2%
e. Number of revolutions 1500 RPM

3.0 CLIMATE CONDITIONS

The diesel generating set shall be designed to withstand the climatic conditions prevailing in Lahore throughout the year and to meet the following ambient conditions:

a. Maximum outdoor ambient temperature : 45 degree C
b. Minimum indoor ambient temperature : 0 degree C
c. Maximum relative humidity: 90 %
d. Minimum relative humidity : 26 %
e. Altitude : 500m above sea level

The tenderer shall quote in his offer the above climatic parameters he has considered for the design of his equipment.

4.0 SPECIAL REQUIREMENTS

The generating set shall strictly comply with IEC60034-1. It shall be prime power rated (PRP) in accordance with ISO 8528. It shall be capable of providing 10% overload for one hour in any period of twelve hours operation in accordance with ISO 3046, AS 2789, BS 5514.

5.0 OPERATION DESCRIPTION

The A.C. diesel engine driven electric generating set shall be arranged for electric starting by battery power, the set shall stay in stand-by position.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

The generator shall have auto mains failure (AMF) system. It shall automatically start and supply power to the load within approximately 0 to 5 seconds of the complete cessation of mains supply failure on one or more phases, or when the voltage is reduced by 20% of nominal, and automatically shut down the plant and re-transfer the load back to the mains supply to stabilize before retransfer of the load takes place, and shall be adjustable over the 1-10 minute range.

6.0 ALTERNATOR SPECIFICATIONS

a. The alternator shall be prime power rated and be of steel construction. It shall be A.C. Brushless type. The bearings shall be grease lubricated or roller bearings.
b. The rotor shall consist of dynamically balanced salient pole revolving field. The poles shall be equipped with damper windings. The field coils shall be to withstand high centrifugal stresses without developing any damage. Rotor insulation shall conform to Class-H.
c. The stator core shall be made from high grade laminated silicon steel and carefully tightened to prevent occurrence of magnetic vibrations. The stator windings shall be provided insulation conforming to Class-F. All windings shall be fully impregnated for tropical climates with high quality oil resistant varnish.
d. The A.C. exciter shall have permanent magnets in its field ensuring positive voltage build-up. The rectification shall be affected by a suitably rated silicon diode assembly over-hung to the shaft. The rotating rectifier assembly shall be built to withstand vibration and centrifugal forces.
e. The inherent characteristics of the alternator shall be such to maintain the output voltage under all conditions of load, power factor and temperature, within the limits of +5% of nominal.
f. The alternator shall have self-contained excitation system with transistorized automatic voltage regulator. The automatic voltage regulator and control gear shall be mounted in a component box on the side of the machine using antivibration mounting. Electrical connections to the voltage regulator shall be taken through a multi-way plug and socket.
g. The alternator shall be screen protected and drip proof. It shall have efficient cooling system using centrifugal fans. It shall be provided with a large terminal box for outgoing cable connections.
h. The alternator shall be able to suppress radio or television interference in accordance with EN61000-6. Line voltage waveform shall contain not more than approximately 2% total harmonic contents.
i. The telephone influence factor (TIF) shall be <50 as per NEMA MG1. The total harmonic factor (THF) shall be <2%
j. The temperature rise and performance shall comply with BSS 2613/1957.

7.0 ALTERNATOR PROTECTION

Alternator protection shall be incorporated to shut down automatically the set with a visual cum-audio alarm of the following conditions:

a. Over load / Short circuit current
b. Over and under voltage.
c. Over and under frequency

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

d. Reverse power
e. Rotor ground fault protection
f. Excitation protection
g. Phase balance protection
h. Negative Sequence protection

8.0 DIESEL ENGINE SPECIFICATIONS

a. The engine shall be prime rated 16 cylinder/ v type, 4 stroke, turbocharged air and charged air cooled induction, water cooled industrial diesel engine.
b. The engine shall withstand a 10% overload for a period of 1 hour (in 12 hours) in accordance with BS 5514, ISO 3046, and AS2789).
c. The engine speed should be rpm at 50 Hz.
d. An engine driven pump shall circulate the lubricating oil under pressure and spin-on full flow filters with replaceable elements shall be fitted.
e. The air filter type should be dry replaceable element with restriction indicator.
f. Governing shall conform to ISO 8528 G2 and an electronic Governor shall be provided.

9.0 ENGINE PROTECTION EQUIPMENTS

Engine protection equipment shall be incorporated to shut down automatically the set with a visual cum-audio alarm of the following conditions:

a. Low lubricating oil pressure (Below a safe working value).
b. High cooling water temperature
c. Low coolant level
d. Engine Over speed
e. With fuel oil level low engine protection system shall develop visual cum- audio alarm.
f. Intake air temperature rise alarm only.

10.0 GENSET CONTROL PANEL

The control panel shall be electronic solid state type. Automatic start Engine management and instrumentation system module in cubical is installed on individual bracket with anti-vibration isolator, with instruments and graphical icon in LCD display as follows.

a. Generator running indicator.
b. Voltage adjuster.
c. Emergency stop button
d. Selector Switch with key (STOP / RESET, AUTO, MANUAL).
e. Manual start button.
f. Battery voltage monitoring, protection and testing
g. Common alarm indicator
h. Data logging
i. Scroll button for the display on LCD.
j. Value display on LCD.
   - Frequency / RPM.
   - AC voltage Line-Neutral.
   - AC voltage Line-Line.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- AC line current.
- Oil pressure.
- Coolant temperature.
- Engine hours run.
- DC battery voltage.
- Kilowatt-hours (kWhr).
- Kilowatt (kW)
- Maximum demand meter

k. Alarm indication with graphical symbol on LCD with audio and visual flashes.

l. Status indicator.

m. Remote communication via RS 232 or RS 485 "modbus/BacNet/LON" output. However, communication shall interface with rest of the BMS network should be ensured.

11.0 MECHANICAL COUPLING

a. The Diesel Engine and A.C. brushless Generator shall be coupled with each other by means of flexible coupling complete with all necessary control equipment mounted on a substantially fabricated type steel base.

b. The generator end shield and the engine flywheel housing faces shall be fully machined with spigots concentric to their shafts. A fabricated steel coupling ring with both faces machined shall be flange mounted to the flywheel housing and generator end shield by steel bolts.

c. A flexible coupling shall be fitted between the engine and generator to provide the drive and shall be suitable to absorb the transmissions of shock loads.

d. The distortional flexibility shall be designed to match the distortional characteristics of the system to prevent resonant conditions.

12.0 MOUNTING DESCRIPTION

The combined engine-generator unit shall be bolted to a separate sub-frame which shall be attached to the main frame through 'Resilient Mountings including vibration isolator so providing complete protection from the engine vibration to the control gear, and other set mounted components.

13.0 GENERATOR ROOM

The generator room shall be completely treated with sound proofing material. The maximum allowable noise level shall not exceed 75 dB at 1 meter maximum from the generator room boundary. The material for sound proofing shall be fire resistant.

14.0 COOLING SYSTEM

a. The diesel engine shall be radiator cooled.

b. A thermostat shall pass the coolant, until a pre-determined operating temperature is reached.

c. An immersion heater shall be incorporated in the cooling system.

d. In order to provide sufficient air flow along the radiator a canvas / G.I air duct with 1" insulation shall be made from the radiator to the outside wall without any extra cost of the owner.

e. The Contractor shall provide all material and labour that is necessary to achieve purpose.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

15.0 STARTING SYSTEM

a. The starting system shall consist of a heavy duty starter motor and starter switch, a set of 24 volt heavy duty lead acid starting maintenance free batteries of adequate capacity, all arranged for automatic electric starting.
b. The starter motor shall automatically disengage when the engine shall fire. There shall be three automatic starting attempts before the starting batteries are, should the engine fail to start due to shortage of fuel, etc.
c. Battery charging shall be automatic provided from a suitable single-phase full wave rectification static charger. Charger shall be complete with all necessary relays, cutouts, controls, switches and instruments for automatic charging of batteries.
d. The batteries shall be housed in a cradle on the main base frame.

16.0 GENSET GROUNDING

The genset frame shall be grounded at two points by two independent earth protected conductor and it is necessary to bond to a grounding electrode. The genset neutral earthing shall be done with PVC insulated cables and connect to grounding electrode.
Earthing resistance shall be less than one ohm.

17.0 EXHAUST

A large and efficient critical acoustic type silencer to reduce noise level to a maximum of 75 dB at 1m outside generator room, with a suitable length of flanged flexible exhaust pipe shall be installed. The pipe shall be of suitable dimensions to fit direct in the exhaust manifold to allow for the free movement of the engine alternator and to give some isolation from vibration to the surrounding fabric. The exhaust pipe shall be thermal insulated and brought outside the building to a suitable height and have a rain cap at the other end.

18.0 FINISH

a. All sheet steel used shall be zinc coated.
b. The set shall be painted with good quality primer and finished with high gloss paint.

19.0 ACCESSORIES

The AC diesel engine driven electric generating set shall be supplied with the following accessories and manuals.

- One - Kit of engine tools.
- One - Set of holding down bolts.
- Three - sets of installation drawings.
- Three - sets of circuit diagram.
- Three - sets of engine maintenance book.
- Three - sets of spare parts manual.
- Three - sets of generating set instruction manual.

20.0 FUEL STORAGE TANK

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. A fuel storage tank with a capacity as specified in the BOQ shall be provided inside the building. The tank shall be complete with fill pipe with flange connection and vent pipe with cap. The fuel storage tank shall comply with NFPA 30 and NFPA 37.
b. The tank shall be provided with fuel level gauge and float switches.
c. 25 mm diameter schedule 40 pipe with socket, elbow and SS valve etc. for fuel filling from outside the building to fuel storage tank and fuel storage tank to genset skid base tank.
d. The fuel storage tank shall be sheet steel of 5mm thickness.
e. Filling pipe with valve and flange shall be provided. Automatic fuel filling system with auto start/off and local monitoring shall be provided. Fuel pump as specified in drawing and BOQ shall be provided. Level switches to be provided in fuel tanks.

The overflow pipe going back from fuel tank to the Genset Skid tank shall be of 50mm diameter.

21.0 GENERATOR TESTS

A manufacturer's standard test report/certificate shall be submitted for factory tests at the manufacturing facility.

a. Operation of automatic starting, control sequence and all protection circuit/sensor.
b. Prior to acceptance of installation, the equipment shall be subjected to an on-site test with full load for a minimum period of 8 hours, plus one hour at 110% load at manufacturer's facility.

The performance test which shall be carried out on site shall include the following as a minimum:

a. Load test temperature rise
- 25 % load ½ hour
- 50 % load ½ hour
- 75% load ½ hour
- 100 % load 1hour
- 110 % load 1hour

All operating fluids (including fuel, oil, lubricants, coolant etc.) and load banks for the testing shall be provided by the contractor, who shall commission the genset, making all initial adjustment and setting required and test all the control and protection function and circuit. Three copies of the witnessed test report shall be submitted to the Employer.
The contractor shall have the kWh meters sealed and the installation approved by the electrical inspector.

22.0 MAINTENANCE AND WARRANTY

The contractor, as a representative of the manufacture, shall warranty the set and system to be free from all defects for a period of one year or 1000 hours (whichever is less) from the date of commissioning. All defective parts shall be replaced by the

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

contractor free of charge during warranty period. The contractor shall train the Employer's staff in the proper operation and maintenance of the set.

23.0 SPARES

The contractor shall submit, in the format given below, a detailed itemized price list of manufacturer' recommended spares for the generator, engine and control panel for 1000 hours in the environmental condition.

a. Required Spare Parts

Type No.	Description	Qty Set	Rate (Rs)	Amount (Rs)
	Engine:			
	Fuel filter	4 sets		
	Oil filter	4 sets		
	Air filter	1 set		
	Water filter	4 sets		
	Fan belt	1 set		
	Water-pump belt	1 set		
	Alternator belt	1 set		
	Rocker cover gasket	2 sets		
	Gasket	2 sets		
	Alternator & Panel:			
	AVR	1 set		
	Forward diodes	3 set		
	Reverse diodes	3 set		
	Fuses 2 amp	5 Nos		
	Fuses 6/8 amp	5 Nos		
	Fuses 10 amp	5 Nos		

Total = ----------

Required Spare Parts

Type No.	Description	Qty Set	Rate (Rs)	Amount (Rs)

Total = ----------

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-15
LIGHTNING PROTECTION

PART 1 – GENERAL

1.01 WORK DESCRIPTION

A. This section specifies the engineering, supply, installation, testing, commissioning and setting to work of the complete earthing network for individual earthing systems, circuit protective conductors and bonding conductors. A complete earthing network comprising cables, copper tapes, electrodes and earth bondings of all relevant necessary non-current carrying metal shall be supplied, erected and connected as required.

B. The system shall be a common earthing system as described in the Specification and as shown on the Drawings. Individual earthing systems shall be provided as follows prior to any according to drawing. Earth main MV/LV/Generator Electrical Earthing shall have 2 connections to the earthing system:

1. MV Electrical Earthing
2. LV Electrical Earthing;
3. Generator Earthing;
4. ELV Earthing;
5. Data Earthing;
6. Local Authority's Earthing

C. Sufficient numbers of electrodes interconnect by stainless tape to form earthing mat so that the overall earth resistance shall be less than 1 ohm for each individual earthing mat.

D. The number of earth electrodes of the earthing mat are indicated on the drawings as minimum. The Contractor shall test the resistivity of soil at site. Exact number of earth electrodes shall be determined by the Contractor to achieve the earth resistance value subject to Engineer approval. The complete earthing installation include earth plate, earth mat detail to achieve the earth resistance value shall be included in the Contract.

E. The Contractor shall inform the Engineer or his representative before

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

driving stainless steel earthing rods into the ground so that he may supervise the operation. Driving shall be carried out only in the presence of the Engineer or the representative and all rods shall be submitted for the examination before use.

1.02 REFERENCE STANDARDS

A. Complete earthing system shall be engineering and constructed in accordance with the latest revision of the following standards and the appropriate BS/IEC:

1. BS 2784 & BS 970 : BS for earthing material, solid copper rods and accessories.
2. BS 7671 : Electrical Installation
3. BS 7430 : Earthing
4. BS 6651 : Lightning Protection System
5. BS 7430 : Earthing
6. CP 1013 : BS Code of Practice - Earthing
7. IEC 61024-1-2 : Lightning Protection System

B. The detail of the Earthing System shall also conform to the requirements of all relevant local codes, as applicable, together with the additional requirements referred to in this Specification and Drawings, whichever is the more stringent and acceptable to the Engineer.

C. In the adoption of standards and requirements, the Contractor shall take the following precedence:

1. Engineer's decision;
2. Local codes of practice;
3. Drawings;
4. Specification
5. International standards and requirements.

1.03 SUBMISSION

A. All technical submissions shall be approved by the Engineer prior to the respective stages of construction.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. As minimum requirement, the submission shall include the following:

1. Equipment Schedule, including all manufacturer's data;
2. Shop Drawings;
3. Sample Submission;
4. Builder's work requirements;
5. Testing procedures and report format for testing of the earth electrodes and/or earth strips;
6. Soil resistivity test report with calculation report for the details of the earthing system detail including quantity and layout of earth electrodes and/or earth strips to achieve the required earth resistance. The report shall be endorsed by the Contractor's Installation Engineer who supervise and endorse the installation upon completion;
7. Proposed details of earthing system including quantity and layout of the earth electrodes and/or earth strips according to the calculation result.

PART 2 – PRODUCT

2.01 GENERAL

A. Common earth mats of resistivity of less than one (1) ohm shall be constructed below the lowest floor structure prior to any ground work construction. The stainless steel earth mats shall comprise the complete earth electrodes, earth strips/grids, earth inspection chambers, earth leads, main earth terminals, earth test link boxes at ground level, etc. Under these circumstances, each individual earthing system shall have earth leads connecting its main earth terminal directly to an earth electrode underground as specified.

B. In the case where drilling is required to take the earth rods or stainless steel tapes below ground level, a specified earth resistance enhancement compound shall be added into the bored holes and a mixture at 60% bentonite and 40% of gypsum to 125% of water mixed to give a thick slurry. It shall be grouted into the holes prior to inserting of rods or tapes, and be allowed to solidify. The hiring of machine drilling equipment and the grouting as described above shall be provided by the Contractor.

C. The earthing system shall be formed from stainless steel tapes.

D. All stainless steel tape clips, holdfasts, clamps, earth rod clamps, etc. shall be

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

supplied by the same manufacturer of the stainless steel tapes and rods. All stainless steel material used shall be type 316 or better.

E. All earthing products/accessories shall be of Local Authority's approved type.

F. The mating surface of all tapes at joints etc. shall be cleaned before clamping and all joints shall be rivetted, joint with proper connector or exothermic welded. All connectors to electrical apparatus shall be made by a bolted connection in a visible and accessible position

G. Stainless Steel tapes shall be secured with appropriate size stainless saddles at intervals not exceeding 600 mm and the tapes shall be supplied in long unbroken lengths to avoid unnecessary jointing.

2.02 EARTH ELECTRODES

Various types of earth electrodes shall be utilized as specified:

a) 3m length 16 mm dia copper rod 99% purity.
b) Tinned copper plate, 600mm×600mm×3.2mm, 99% purity buried at least 300mm below permanent water level at 8.0mm below ground level, whichever is less. A mixture of charcoal and salt (3:1) shall be used as packing 300mm around the earth plate.
c) Chemically activated grounding electrodes, commercially known as
d) CEE (Chemically Enhanced Earthing).

1) Earth Electrode Rods

A. Earth electrode rods shall be 16 mm diameter extensible stainless steel type with internal screw and socket joints, driving head and connection clamp.

B. Stainless steel rods shall have tensile strength of approximately 600 N/m^2.

C. Couplings for each section of the rod shall be of same material of the rod, threaded to fit the rod sections. Driving studs shall be used when driving the electrode into the ground. Earth values shall be measured and recorded before coupling and driving in the next section. Additional earth rods shall be driven in if necessary to attain the required effective

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

earth values.

D. Clamping of the earth leads to the earth rod shall be made by earth clamp. The clamps shall be capable of providing a high pressure contact between the earth rod and the earth leads to achieve a low contact resistance.

E. When two or more electrodes are driven to form a group, the heads of the electrodes in the group shall be bonded to each other by means of a 25 mm x 3mm stainless steel tape, laid at a depth of at least 600 mm in soil.

2) Earth Electrode Tinned copper plate

Tinned copper plate, 600mm×600mm×3.2mm, 99% purity buried at least 300mm below permanent water level at 8.0mm below ground level, which ever is less A mixture of charcoal and salt (3:1) shall be used as packing 300mm around the earth plate.

3) Chemically Enhanced Earthing

A. Chemically Enhanced Earth is an electro-chemical grounding electrode that automatically conditions the soil/rod interface. This is accomplished by absorbing local moisture to facilitate the electrolytic process. The installation must be accomplished in such a manner as to encourage this process.

B. To install the CEE, first bore a hole in the selected location to a diameter of not less than six (6) inches to accommodate the Earth Conductivity Enhancement Compound (ECEC) and a depth equal to the length of the selected rod plus one foot.

C. Remove all of the tapes covering the absorption and electrolyte holes.

D. Insert the electrode in the bored hole to its full length. It is preferable to leave the top exposed and protected by the special wall assembly, as illustrated. Pour 2 to 4 liters of water in the hole as it is being back filled.

E. Tamp the earth in place, leaving space to reach the connections and to install the well access assembly.

F. Make the connection to the ECC copper electrode.

G. Do not install in a place where watershed or downspout carry-off will flood the unit. Provide for carry-off when you install. The unit may be cemented or paved around, providing above instructions is followed and may be installed indoors.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. Upon completion of installation of the earthing system, resistance-to-ground (earthing connection) shall be tested with a resistance tester. Where tests indicate resistance-to-ground is over 5 ohms, appropriate action shall be taken to reduce resistance to 5 ohms or less, by installing additional, properly spaced, ground electrode and treating soils in proximity to ground electrode. A retest shall be performed to demonstrate compliance.

I. All earth electrode penetrations through basement water proofing membranes shall be provided with manufacturer's recommended water seal insert sleeve approved by Engineer. The installation of the water seal insert sleeve shall be under the supervision and endorsed by the manufacturer's representative to ensure the installation comply with the manufacturer installation detail.

2.03 EARTH INSPECTION CHAMBER

A. Earth electrode shall be fitted with a heavy-duty precast concrete inspection chamber/pit complete with heavy-duty cover as specified on drawings.

B. For earth electrodes located outside or on the apron of the building, earth inspection chambers shall extend to a depth of not less than 300 mm below finished ground level and kept free of soil. For earth electrodes located inside building, earth electrodes shall be buried not less than 100 mm below the floor slab structure. Each earth electrode shall be clearly marked 'SAFETY ELECTRICAL EARTH CONNECTION – DO NOT REMOVE'.

C. The chamber and cover shall be heavy duty detail to consider the traffic load at the location of installation. The cover shall be recessed cover to receive the Architectural floor finish at the location of installation.

2.04 EARTH LEAD

A. Earth leads, also commonly known as earth conductors, shall be used for the final connection between the earth electrodes and the main earth terminals.

B. Unless otherwise specified, earth leads shall be of 25mm x 3mm stainless steel tape.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.05 EARTH STRIP

A. Earth strips/grids shall be of bare stainless steel tapes of 25 mm x 3 mm as specified. `

B. Earth strips shall be rivetted or joint with proper connector to earth electrodes underground below the floor slab structure, and shall be buried not less than 300 mm below the floor slab structure.

C. In order to minimise the mutual inductance between strips, earth strips shall be positioned at a distance not less than 6m apart unless otherwise specified.

2.06 MAIN EARTH TERMINAL

A. Main earth terminals shall be provided for the termination of each earthing system. 50mm x 6 mm tinned HDHC copper earth bars of not less than 1000 mm in length shall be installed in the respective plant rooms / switch rooms at a height of 300 mm above finished floor level. The insulators shall be the approved type. Interconnection between plant rooms / switch rooms and connection to earth electrodes shall be minimum 2 direct connection and as per the Drawings and/or as required to complete the installation.

B. Suitable earthing terminals shall be provided in all the equipment housings, switchgear enclosures, relayed and instrument casings and all other electrical metalwork for bonding to earth.

C. The earth connections for all sections of the installation shall be electrically continuous throughout back to the corresponding main earth terminals.

2.07 CONNECTIONS

A. Joints in the earth bars, copper tapes and earth mats shall be exothermic or butt weld or brazed such that the resistance of the section containing the joint shall not exceed that of an equivalent length at unjointed conductor. Any joint so made may be required to be tested to prove compliance with the requirement.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. The contact faces of all protect conductors shall be cleaned and tinned before connections are made.

C. No drilling of the earth bar shall be permitted except in terminations.

PART 3 – EARTH BONDING

3.01 CIRCUIT PROTECTIVE CONDUCTOR

A. Circuit protective conductor (CPC) is a system of conductors joining together all exposed conductive parts and connecting them to the main earth terminal.

B. The purpose of circuit protective conductor is to provide a path for earth fault circuit so that the protective device will operate to remove dangerous potential differences during a fault condition.

C. The circuit protective conductors shall take the form of separate cable with a sheath in green/yellow colour or copper tape of minimum size 25mm x 3mm.

D. All exposed non-current carrying metal parts of light fittings, switchgears, motors, enclosures, etc. shall be effectively earthed by circuit protective conductors for earth continuity protection.

E. For equipment where an earth terminal is provided, the earth continuity wire shall be firmly clamped. Where no earth terminal is provided, the exposed metal part shall be cleaned of paint and surface rust before welding the earth continuity lead.

F. The sizing of principal protective conductors shall be in accordance with to the current edition of BS7671 and BS7430.

G. The external earth terminal on the outside of the end panel of any switchboard shall be connected to the main earth bar provided in two independent points.

H. Circuit protective conductors shall be provided in electrical and mechanical rooms and along the routes for the bonding of all exposed conductive parts and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

extraneous conductive parts. A suitably sized earth terminal shall be provided at each zone of the building for this purpose.

I. All exposed conductive parts shall be effectively connected in an approved manner to the principal protective conductors. The circuit protective conductors shall be single core copper cables or high conductivity annealed copper tapes specified. Unless otherwise specified, the minimum cross-sectional area of the circuit protective conductors shall be selected in accordance with BS7671.

J. Neutral earthing (N.E) shall be done with PVC insulated cables connecting the neutral bar of the LT panel to the substation earth bar.

3.02 MAIN EQUIPOTENTIAL BONDING CONDUCTOR

A. This is referred to the conductor for the equipotential earth bondings of the metalwork of other services such as gas and water to the earthing system. This bonding of service pipes shall be made as close as possible to their point of entry to a building.

B. All extraneous conductive parts of the following services shall be connected to the main earth terminal by means of main equipotential bonding conductors:
   1. Main water pipes;
   2. Main gas pipes;
   3. Other service pipes and ducting;
   4. Risers of central heating and air conditioning system;
   5. Exposed metallic parts of the building structure and as required by the Engineer;
   6. Breeching inlets
   7. Fuel inlets.

C. The earthing system shall be bonded to the rebars of the building foundation and UG water tank, with approved rebar clamps/welding of already laid steel reinforcement bars within the structural concrete around the entire periphery of the basement retaining wall to form a continuous loop with clamps to vertical rebar at column positions

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. The metalwork of public gas and water service shall not be used as a sole protective earth electrode.

E. Main equipotential bonding conductors shall have cross-sectional areas not less than half of the cross-sectional area of the earth conductor of the installation, subject to a minimum of 6 mm^2 for copper cables. A conductor size beyond 25mm^2 for copper cables, theoretically, is considered not necessary.

F. Location of all incoming pipes and ducting shown on the Drawings are indicative only and are to be coordinated on site.

3.03 SUPPLEMENTARY EQUIPOTENTIAL BONDING CONDUCTOR

A. This is referred to the conductor for the equipotential earth bonding of the metalwork which is not associated with the electrical installation but which may provide a conducting path giving rise to shock.

B. All extraneous conductive parts of the following shall be connected to the earthing system by means of supplementary equipotential bonding conductors:
   1. Metal tanks;
   2. All metallic cat-walks, platforms, handrails, staircases, ladders within 2m reach of pipes, tanks, cable trays cable ladders, trunking etc. which have equipotential bonding.
   3. Any metallic cat-walks, platforms, handrails, staircases, ladders etc. with attached electrical cabling or fittings;
   4. Metallic door frames/doors controlled by electromechanical locking mechanism with an operating voltage or supply voltage exceeding 50V.
   5. Metallic support to electrically operated equipment without direct electrical contact with the equipment;
   6. Electrically operated roller shutters;
   7. Metallic wall cladding containing, or immediately adjacent to, electrical socket outlet or other sources of electricity;
   8. Cable ladder, tray and trunking
   9. Raised floor system;
   10. Electrical facilities in toilets and shower rooms;
   11. Exposed metallic parts of building structure, including roof trusses. (If roof trusses connect to lightning conductor earth, no further equipotential

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

bonding is required).

C. The requirement does not apply in the following instances:
   1. Steel reinforced concrete poles in which the steel reinforcement is not accessible;
   2. Exposed conductor parts which owing to their reduced dimensions or their disposition cannot gripped or cannot be contacted by a major surface of the human body, provided that connection of these parts to the protective conductor cannot readily be made or cannot be reliably maintained. This item applies to small isolated metal parts such as bolts, rivets, nameplates and cable clips. A major surface of the human body is considered to be 50mm x 50mm.
   3. Fixing screws for non-metallic accessories provided that there is no appreciable risk of the screws coming into contact with live parts.
   4. Short lengths of metal conduit for mechanical protection of cables having a nonmetallic sheath.

D. Local supplementary bonding conductors shall be provided between simultaneously accessible (i.e. within 2m) exposed conductive parts of equipment, between exposed conductive parts and simultaneously accessible extraneous conductive parts, and between simultaneously accessible extraneous conductive parts. The bonding conductors shall be single core copper cables with oversheath in green/yellow colour.

E. Supplementary bonding, conductors shall be sized in accordance with BS7671 which can be summarized as follows:
   1. For conductors connecting two exposed conductive parts, the conductor sizes shall not be less than the smaller protective conductor connected to the exposed conductive parts, subject to a minimum of 4 mm^2 if the cables are not mechanically protected.
   2. For conductors connecting exposed conductive parts to extraneous conductive parts, the conductor sizes shall not be less than half that of the protective conductor connected to the exposed conductor parts, subject to a minimum of 4 mm^2 of the cables are not mechanically protected.
   3. For conductors connecting two extraneous conductive parts, the conductor sizes shall not be less than 4 mm^2, or even 2.5 mm^2 if mechanically protected, for copper conductors.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

F. All equipment equipotential bondings in area other than plant rooms and within false ceiling shall be concealed. Any remedial work required due to bad connection, open circuit, etc. shall be borne by the Contractor.

G. All earth conductors and earth terminals shall be manufactured to carry the maximum short circuit current at the point of the installation.

3.04 CLEAN EARTHING SYSTEM

Clean earthing system must be provided for Telecommunication System, Data Communication etc. as per system's requirements and connected to a separate earth pit. The low current panels shall be connected to separate dedicated clean earthing system.

PART 4 – EXECUTION

4.01 INSTALLATION

1. The whole of the earthing and bonding shall be installed and tested in accordance with the requirements of the IEE Wiring Regulations, K-ELECTRIC requirement and this specification.

2. Attention is drawn to the use of circuit protective conductors in addition to metallic conduit/trunking.

3. All enclosures, equipment, exposed conductive parts, extraneous conductive parts, and metallic trunking, metallic conduits, metallic cable trays and other metalwork other than any live part, forming protection to or part of the electrical installation, Including apparatus and appliances, shall be effectively bonded to earth.

4. Protective conductors shall be provided in the form of copper tape to all vertical electrical rising busbars. The size of this tape shall be in accordance with the IEE Wiring Regulations.

5. All bonding and protective conductors, where fixed to bolted connections, shall

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

be terminated on compression type lugs made with an automatic purpose made machine.

6. Provide an earth bar 450mm long on 10mm spacers on the wall of each electrical room, and connect to the enclosure and ground buses of all equipment in the room.

7. Run a No. 120mm2 sheathed copper cables from the main 600V switchboard ground bus to the main water pipe and connect to the upstream side of the water meter.

8. Bond water main with proprietary purpose made bonding clamps. Scrape and sand the water main to remove all rust, paint or scale at the location where the connection is to be made.

9. Remove non-conductive coatings from threads or other contact surfaces to ensure good electrical continuity.

10. Provide a separate insulated ground conductor in every conduit, in every system, to all, devices and fixtures.

11. Protect all exposed earthing conductors from mechanical damage.

12. Soldered joints are not permitted.

4.02 TESTING AND COMMISSIONING

4.02.1 GENERAL

i) The complete installation shall be tested and inspected to ensure that it complies with the requirements of this Specification, the IEE Wiring Regulations, and British Standards. The tests shall be carried out in accordance with the IEE Wiring Regulations.

ii) The inspection and tests shall be carried out in the same sequence as set out in the IEE Wiring Regulations and in such time as to allow any remedial work to be completed prior to Practical Completion. Tests shall also Include any part of the existing installation related to the new work.

iii) Tests shall be carried out strictly in accordance with a programme to be

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

agreed prior to commencement of such tests. Facilities shall be provided for witnessing of such tests.

iv) All instruments necessary for inspection and testing shall be supplied and shall be properly calibrated and operated by personnel skilled in their use.

v) Allowance shall be made for disconnection or similar operations to satisfy the requirements for testing, etc. and the reinstatement of the installation.

4.02.2 CERTIFICATES AND SCHEDULES

All values called for under the IEE Wiring Regulations shall be recorded and three copies of the Inspection Certificate described in the IEE Wiring Regulations shall be submitted. The installation shall not be considered as completed unless inspection Certificates have been submitted.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-15
LIGHTNING PROTECTION

1.0 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Sup- plementary Conditions and Division 1 Specification Sections, apply to this Sec- tion.

2.0 SUMMARY

This Section includes lightning protection for buildings and associated structures and requirements for lightning protection system components.

3.0 SYSTEM DESCRIPTION

Protect relevant buildings from lightning by means of a system of conductor run- ning on the roof top and effectively grounded, in accordance with relevant codes.

The Direct Lightning strike protection system should be based on Controlled Early Streamer Emission technology, designed to intercept the lightning by initiating an upward streamer precisely at the time of an impending lightning strike and safely convey the lightning current to earth through a known and preferred route.

The direct lightning protection system shall include components like Controlled Early Streamer Emission enabled Air terminal (CESEAT), Mechanical support, down conductor(s), Air Terminal maintenance/function test meter, LCD based Transient Event Counter, and maintenance free earthing system based on chem- ical earth enhancing compound to reduce the earth resistance.

Optimum lightning protection for the site shall be determined using a Risk As- sessment software, strictly adhering to international guidelines laid by NFC 17-102 and IEC 62305. A certified representative/engineer from the manufacturing company shall be present at all times during the Design and Installation process.

4.0 SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Specification Sections-E-01.
Product Data for each component specified. Include the following:
Shop Drawings detailing lightning protection system, include air terminal loca- tions, conductor routing and connections, and bonding and grounding provi- sions. Include indications for use of raceway and information on how conceal- ment requirements will be met.
Field inspection reports indicating compliance with specified requirements.

5.0 QUALITY ASSURANCE

Manufacturer and Installer Qualifications: Engage an experienced manufactur- er who produces system components made of high quality materials as listed herein. Engage an installer who is listed or who is certified by the Lightning Pro- tection Institute as a Master Installer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Life service of the materials used shall not be less than 30 years. Lightning protection system shall conform to BS-6651 current edition.

6.0 SEQUENCING AND SCHEDULING

Coordinate installation of lightning protection with installation of other building systems and components, including supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and build- ing finishes.

7.0 LIGHTNING PROTECTION SYSTEM COMPONENTS:

A. Essential Requirements for Air Terminals

a. The CESEAT shall be UL Listed, to be supported with the duly verified UL- certification online access submitted against demand.

b. The protection area of the air-terminal shall be determined using Rolling Sphere Method as indicated in the following standards, IEC 62-305 and NFC 17-102

c. Components used in the LPS shall be in accordance with IEC 62305 and IEC 62651(Part 1 – 7)

d. The CESEAT shall be supported with independent third party certification by the manufacturer, certifying the compliance to the Annex C of the NFC 17-102 ver- sion 2011 along with test reports for the following tests:
- Mechanical Tests
- Environmental Tests (salt mist treatment and humid sulphurous atmosphere)
- Electrical Tests (High-Voltage laboratory test with a standardized waveform 10/350µs
- Performance Assessment (ΔT Test in High-Voltage laboratory)
- EMC Tests

e. The CESEAT Advanced Triggering performances must be >10µs and <60µs. Any CESEAT with a rating >60µs, shall be deemed unfit for operation.

f. The CESEAT must be CE marked (EMC compliance to NF EN 61000-6-2 / NF EN 61000-6-3 / NF EN 55016-2-3 / NF EN 61000-4-3 / NF EN 61000-4-2)

g. The CESEAT shall have been tested in a High-Voltage laboratory with a standard- ized waveform 10/350µs. The CESEAT standard variations σESEAT measured in the High Voltage Laboratory vs a Single Rod (σSRAT) must be ≤0.8.

h. The air-terminal shall be tested to support a 250kA current or more. Test to be performed in accordance to NFC 17 102 (France)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

i. The CESEAT shall be tested in real lightning conditions.

j. The CESEAT shall be made of Stainless Steel 316 grade non-corrosive metallic components. It shall be equipped with a central rod made of copper, copper al- loy or stainless steel.

k. The rod and the CESEAT tip shall have a conductive cross-sectional area larger than 120mm²

l. The CESEAT shall guarantee a full electrical continuity between the tip and the down-conductor.

m. No external power supply shall be required for the effective working of the sys- tem

n. The CESEAT shall be active only during a storm

o. The CESEAT shall ensure the emission of a streamer when a lightning strike is oc- curring in the claimed protection area.

p. The CESEAT shall ensure the neutralization of the space charges surrounding its tip prior to the triggering of the upward streamer.

q. Performances of the CESEAT shall not be affected by extreme climatic conditions

r. The CESEAT shall be designed to ensure its maintenance during its lifetime: Modu- lar design enabling to repair/replace defective components

s. Plug and Play module, Testable on site, using hand-held smart remote monitoring system. Designed to be upgradable on site to integrate a self-sustainable, solar powered "distant testing module" to facilitate distant testing on site up to 100m from the air terminal

t. Lightning strike counter and battery status information to be displayed on the hand-held device

u. Single remote programmed to monitor multiple Air terminals within the range of 100m

v. CESEAT manufacturer warranty shall be for a minimum of 5 years (60 months)

8.0 Air Terminal (FOR TERMINAL BUILDING)

a) Type : Controlled Early Streamer Emission (CESE) Air Terminal.

b) Protection levels : Level I - 20m, Level II - 30m, Level III - 45m and Level IV - 60m (Rolling sphere method)

b) Detection of downward
Streamer : Continuous measuring of Electric field gradient (ΔE/Δt)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

c) Material used : Stainless Steel Water Proof Enclosure, central rod made of Nickel plated copper

d) Advanced Triggering time : Greater than 10µs and less than or equal to 60µs.

e) Radius of Protection : Min. 79 Meters with Level-I protection for ΔT of 60µs (When installed at a height of 5m above the finished roof level)

f) Type of fixing arrangement : 5-meter-high fixed on GI base plate with sound mechanical fittings & guying to take care of wind velocity suitable.

g) Constructional details : Triggering device housed in a stainless steel weather proof and non-corroding Housing. Central rod shall be surrounded by smaller electrodes to assist development of an effective early streamer

h) Internal circuits : 6 independent and synchronized modules

i) Triggering devices- type : Electronic triggering device, external power sup- ply not required

j) Sensors – type : Lower and upper series sensors arranged around the central pick-up rod internally connected with the triggering device for the fast sensing of atmospheric charge buildup.

k) Approvals/Standards : Tested in a High voltage laboratory confirm- ing to NFC 17-102 Appendix–C and IEC 62 305

l) Reduction in standard deviation : 60% compared to standard deviation of Sin- gle rod

m) Testing facility : Plug and play module. Testable on site, using hand- held smart remote control. Also, Upgradable on site to integrate a "distant test- ing solar module" (distant testing on site up to 100m from the air terminal)

1.1. Air Terminal Support

- The installation materials used should be non-corrosive and long lasting.
- The installation of the tower should be at a height of min. 2 meters from the fin- ished roof level or the highest point on the structure
- The support shall be securely bolted to other mast materials with where neces- sary to enable the air termination and mast system to withstand maximum locally recorded wind velocities
- Elevation pole made of Class 'B' GI- material having ISI-marking. Consists of the following (for a typical 5m mast):
    a. 3mtr x 60mm dia GI pipe
    b. 2.5mtr x 50mm dia GI pipe
    c. Reducer, M20 thread

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a) Base plate(200x200x10mm), mounting bracket, clamps and all required fixing accessories supplied in compliance with IEC 62305

1.2. Down Conductors

70sqmm bare Copper down conductor is embedded in structural columns as indicated on the drawings. It is connected to the mesh of horizontal protective conductors on roof. The down conductor is connected via test link located at the lowest level to foundation reinforcement steel for earthing the system as indicated on the drawings. Each down conductor is to be effectively Cad welded to the foundation steel using recommended method as per codes to form an earth termination network.

The whole of the earth termination network should have a combined resistance to earth not exceeding 10 Ohms without taking into account any bonding to other services. Provide additional rods, as required to achieve the required resistance without any additional cost.

9.0 EXECUTION EXAMINATION

Examine surfaces, areas, and conditions, with Installer present, for compliance with installation tolerances and other conditions affecting performance of light- ning protection. Do not proceed with installation until unsatisfactory conditions have been corrected.

10.0 INSTALLATION

Install lightning protection as indicated, according to manufacturer's written instructions.
Install conductors with direct paths from air terminal to ground connections. Avoid sharp bends and narrow loops.

Cable Connections: Use approved exothermic-welded connections for all con- ductor splices and connections between conductors and other components, except those above single-ply membrane roofing.

Bond extremities of vertical metal bodies exceeding 60 feet (18m) in length to lightning protection components.

11.0 CORROSION PROTECTION

Do not combine materials that can form an electrolytic couple that will acceler- ate corrosion in the presence of moisture, unless moisture is permanently exclud- ed from the junction of such materials.

Use conductors with protective coatings where conditions would cause deterio- ration or corrosion of conductors.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-16
INTERIOR LIGHTING

1.0 SCOPE OF WORK

The work under this scope consists of supplying, installation and commissioning of all material and services of the complete light fixtures as specified herein and / or shown on the Tender Drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at site with other services for exact route, location and positions of light fixtures.

The light fixtures with accessories shall also comply with the General Specifications for Electrical Works, Section - E-1 and with other relevant provisions of the Tender document.

2.0 GENERAL

The description of light fixtures in given Bill of Quantities, and stated on the drawings, and relevant material are described in this section. The determination of quality is based on certified photo-metric data covering the coefficient of utilization, light distribution curves, construction material, shape, finish, operation, etc.

The Contractor shall submit two samples of each and every light fixture specified and obtain approval of the Owner before purchasing. The quality and finishes of local make light fixtures (if mentioned in BOQ) shall be same as that of standard manufacturer. The accessories such as ballast, lamp / starter holders, starters, lamps, ignitors, etc., for all type of light fixtures shall be of Philips make.

All fixtures shall be finished in standard colour schemes as mentioned in the manufacturer's catalogue for respective fixtures, unless specifically stated in the Specifications, Drawings or Bill of Quantities or directed by the Engineer.

3.0 STANDARDS

Lighting fixtures shall comply with Section E-1, Clause 3.
Particular reference shall be made to:

- IEC 81 Tubular LED lamps.
- IEC 82 Ballast for tubular LED lamps.
- IEC 155 Starters for LED lamps.
- IEC 400 Lamp holders and starters holders for LED lamps.
- IEC 566 Capacitors for use in TL, HP Mercury and LP sodium vapour.
- IEC 598 Luminaries.
- BS 3677 Discharge lamp circuits.

Any other standard referred to in above standards or these specifications.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.0 MATERIAL

4.1 LED Light Fixtures

The LED light fixtures shall have lamps and ballast of proper rating as shown on the drawings. Each lamp shall be provided with independent ballast.

The body of the LED light fixtures shall be minimum 22 SWG sheet steel, derusted, degreased, finished in heat resistant paint, stove enameled. Appropriate size bushed wire entry holes, fixing holes and earth terminals shall be provided. Connectors suitable for connecting 2.5 sq. mm cable connectors shall be provided for supply connections. An earth terminal for connection to 14 SWG copper conductor shall be provided.

The light fixtures shall be furnished with perpex diffusing panels " 040 opal acrylic" (minimum sheet thickness 3 mm), polystyrene louvers or metal grid louvers or mirror optic reflectors, etc. as specified on the drawings or in BOQ. The louvers shall be secured firmly and in level. The polystyrene louvers shall be white Egg Crate or as approved. The louvers shall be in one section and not in pieces.

The design of light fixture for recess mounting shall be coordinated with the design of false ceiling prior to commencement of manufacture. Shop drawings shall be submitted for approval of Engineer.

4.2 LED Light Fixtures

The light fixture shall be as stated on drawings and bill of quantities. The light fixture shall be finished in standard colors unless otherwise stated on drawings or directed by Engineer. All LED light fixtures shall be of international standard and quality. The type of fixtures with manufacturer catalogue reference is given on the fixture schedule and in Bill of Quantities. Equivalent fixture may be acceptable provided that the Contractor submits for review all necessary data indicating photo-metric curves to show that the fixture proposed are of the same type, construction and quality. Minimum life span of each light shall be 50000 Hrs. LME 80, 70, CCT, PF and CB test are mandatory.

The lamps for light fixtures shall be Light Emitting Diodes with driver and shall be supplied and installed according to the wattage as indicated on drawings.

Weather proof light fixture shall comprise of cast aluminum body and gasketed clear glass cover secured to the body by means of galvanized nuts / screws to give a weather proof and water tight fit. The gasket shall be weather resistance type.
The LED light fixtures shall be supplied complete with driver and all accessories as per light fixture schedule and shall be installed in accordance with manufacturer's recommendations and sound engineering practice.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5.0 INSTALLATION

5.1 General

The mounting heights of light fixtures are indicated on the drawings, and position of fixtures according to the mentioned scale.

The Contractor must ensure that the light fixtures are installed uniformly with respect to the dimensions of the area. Any modifications due to site conditions may be made with the approval of Engineer. All fixtures shall be carefully aligned before fixing in position. All fixing accessories such as ceiling rose, flexible cord, lamp holder, suspension rod; pipe or chain with suitable canopy, etc., shall be provided and installed.

The wiring between terminal box and the fixture shall be carried out with 3 core 0.75 sq. mm and l sq. mm copper conductor, PVC / PVC cable respectively for circuits protected by 10 amps and 15 / 20 amps MCBs. The wiring inside light fixture body shall be done with heat resistant cables or PVC insulated cable in heat resistant sleeves as approved by the Engineer.

Glasses, shades, reflectors, diffuses, etc., must be in a clear condition after installation.

All light fixtures shall be earthed by an earth wire connected to the earth terminal in the fitting.

5.2 LED Light Fixtures

The LED light fixtures on the surface of ceiling shall be installed with the back of the body flush with the ceiling surface, and in a manner so as to facilitate wiring. Nylon plugs and galvanized steel bolts or screws shall be used for fixing the light fixture to the ceiling. For light fixtures on installation on false ceiling, the installation method detail shall be coordinated with ceiling design and submitted for approval of Engineer. Care shall be taken to prevent the weight of the fixture from being transferred to the false ceiling.

Pendent light fixtures shall have two holes in the top of each casing by a 1/4" diameter galvanized pipe or any other standard method as approved by the Engineer. Wiring from ceiling rose to the fixture shall be installed through the pipe. Proper arrangements such as long threads with check nuts, etc. for minor adjustment in the mounting heights of the fixtures shall also be provided.

5.3 LED/CFL Light Fixtures

The LED light fixture shall be installed on the surface of ceiling or wall by means of nylon plugs and galvanized steel screws, such that their back finish flush with the surface for exposed conduits and flush with outlet box for concealed conduit system. Wherever convenient, screws for fixing light fixtures shall be screwed into the holes of the outlet box. The light on false ceiling shall be installed in accordance with manufacturer's recommendations and in coordination with ceiling installation.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5.4 Outdoor Lighting

For illumination around buildings during dark hours, light fittings in various arrangements shall be provided in accordance with these specifications. The items not shown on drawings or called for, but which are necessary for a complete working system as required, these shall also be provided and deemed to have been considered as such. IP 65 class lights are required.

The Contractor shall essentially use the standard products of a manufacturer, regularly engaged in the manufacturer of the product and shall meet the requirement of the specifications.

END OF SECTION

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-17
Self-Contained Emergency Lights

1.0 SCOPE OF WORK

The work under this scope consists of supplying, installation and commissioning of all material and services of the complete light fixtures as specified herein and / or shown on the Tender Drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at site with other services for exact route, location and positions of light fixtures.

The light fixtures with accessories shall also comply with the General Specifications for Electrical Works, Section - E-1 and with other relevant provisions of the Tender document.

2.0 GENERAL

The description of light fixtures in given Bill of Quantities, and stated on the drawings, and relevant material are described in this section. The determination of quality is based on certified photo-metric data covering the coefficient of utilization, light distribution curves, construction material, shape, finish, operation, etc.

The Contractor shall submit two samples of each and every light fixture specified and obtain approval of the Owner before purchasing. The quality and finishes of local make light fixtures (if mentioned in BOQ) shall be same as that of standard manufacturer.

All fixtures shall be finished in standard color schemes as mentioned in the manufacturer's catalogue for respective fixtures, unless specifically stated in the Specifications, Drawings or Bill of Quantities or directed by the Engineer.

3.0 STANDARDS

Lighting fixtures shall comply with Section E-1, Clause 3.

- BSEN 1838 Emergency Lighting

4. EMERGENCY LIGHTS

The emergency indoor lighting shall be operative during power breakdown and emergency situation, light fitting in several areas shall be provided according to specifications.

All emergency lighting equipment utilized shall comply the standards as listed above. Emergency lighting shall be provided using self-contained LED type maintained for 1 hours duration battery inverter packs fitter to selected luminaries.

Along with emergency lighting ‘Exit’ signs shall be managed from the same lighting control modules as normal luminaries.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.0 EXIT & SAFETY Luminaire

All Exit luminaires shall have pictogram legends as per DIN 4844/CEN TC 169, EN50171 or markings as per local civil defense requirements with viewing distance of 24 meters. The luminaire shall be built according to UL 924 EN 60598. It's rating shall be 1 hours battery backup and IP 65 ingress protection.

Working Voltage: 220 – 240V AC/ 50/60 Hz Viewing distance: 24 meters
Installation: It can be mounted on Wall/Side/ Ceiling
Accessories: It shall have over charge and discharge protection with charging LED and test button.

5.0 EMERGENCY LUMINAIRE

Luminaire shall be of fluorescent type

All luminaries shall meet following requirements: Battery backup: 1 hr
Power rating: 7W
Exit luminaire 8Watt.
Supply voltage: 230V AC Ingress Protection: IP 65
The luminaire shall comply with the requirements of UL924 & EN60598 Electronic ballast shall comply with the requirements of EN60298/60294 EMC or EMI protection to EN55015
Ambient Temperature – 40 ºC.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-18
TELECOMMUNICATION

1.0 GENERAL

The scope shall cover the complete Gigabit capable Passive Optical Network (GPON) system including all kind of components and accessories for the satisfactory installation, operation and maintenance of the ICT Communications system required for the complete project on site. The system shall adhere to the standard ITU G.984.1. It describes a flexible optical fiber access network capable of supporting the bandwidth requirements of infrastructure services and covers systems.

2.0 STANDARDS

Following ITU standards shall be used as recommendation for the system:

[ITU-T G.652] Recommendation ITU-T G.652 (2003), Characteristics of a single mode optical fiber cable.

[ITU-T G.808.1] Recommendation ITU-T G.808.1 (2006), Generic protection switching – Linear trail and subnetwork protection.

[ITU-T G.902] Recommendation ITU-T G.902 (1995), Framework Recommendation on functional access networks (AN) – Architecture and functions, access types, management and service node aspects.

[ITU-T G.982] Recommendation ITU-T G.982 (1996), Optical access networks to support services up to the ISDN primary rate or equivalent bit rates.

[ITU-T G.983.1] Recommendation ITU-T G.983.1 (1998), Broadband optical access systems based on Passive Optical Networks (PON).

[ITU-T G.983.2] Recommendation ITU-T G.983.2 (2002), ONT management and control interface specification for B-PON.

[ITU-T G.983.3] Recommendation ITU-T G.983.3 (2001), a broadband optical access system with increased service capability by wavelength allocation.

[ITU-T G.984.2] Recommendation ITU-T G.984.2 (2003), Gigabit-capable Passive Optical Networks (GPON): Physical Media Dependent (PMD) layer specification.

[ITU-T G.984.3] Recommendation ITU-T G.984.3 (2008), Gigabit-capable Passive Optical Networks (GPON): Transmission convergence layer specification.

[ITU-T G.984.4] Recommendation ITU-T G.984.4 (2008), Gigabit-capable Passive Optical Networks (GPON): ONT management and control interface specification.

[ITU-T G.984.5] Recommendation ITU-T G.984.5 (2007), Gigabit-capable Passive Optical Networks (GPON): Enhancement band.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

[ITU-T I.112] Recommendation ITU-T I.112 (1993), Vocabulary of terms for ISDNs

DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. **Differential fiber distance**: An OLT is connected to several ONU/ONTs. The differential fiber distance is the difference in the distance between the nearest and farthest ONU/ONT from the OLT.

B. **Optical line termination (OLT)**: A device that terminates the common (root) endpoint of an ODN, implements a PON protocol, such as that defined by [ITU-T G.984], and adapts PON PDUs for uplink communications over the provider service interface. The OLT provides management and maintenance functions for the subtended ODN and ONUs.

C. **Optical network termination (ONT)**: A single subscriber device that terminates any one of the distributed (leaf) endpoints of an ODN, implements a PON protocol, and adapts PON PDUs to subscriber service interfaces. An ONT is a special case of an ONU.

D. **Optical network unit (ONU)**: A generic term denoting a device that terminates any one of the distributed (leaf) endpoints of an ODN, implements a PON protocol, and adapts PON PDUs to subscriber service interfaces. In some contexts, an ONU implies a multiple-subscriber device.

E. **Physical reach**: Physical reach is defined as the maximum physical distance that can be achieved for a particular transmission system.

F. **Service**: Service is defined as a network service required by operators. Service is described by a name that is clearly recognized by everyone, regardless of whether it is a frame structure name or a general name.

G. **Configuration:** The interface at reference points S/R and R/S is defined as IFPON. This is a PON-specific interface that supports all the protocol elements necessary to allow transmission between OLT and ONUs.

H. **Logical Reach:** Logical reach is the maximum distance between ONU/ONT and OLT except for the limitation of the physical layer. In GPON, the maximum logical reach is defined as TCC area.

I. **Physical Reach:** Physical reach is the maximum physical distance between the ONU/ONT and the OLT. In GPON, two options are defined for the physical reach: area define for TCC. It is assumed that maximum distance over which FP-LD can be used in the ONU for high bit rates such as 1.25 Gbit/s or above.

J. **Differential Fiber Distance:** In GPON, the maximum differential fiber distance is 20 km. This affects the size of the ranging window and provides compliance with [ITU-T G.983.1].

K. **Split Ratio:** the larger the split ratio is for GPON, the more attractive it is for operators. However, a larger split ratio implies greater optical splitting which creates the need for an increased power budget to support the physical reach. Split ratios of up to 1:64 are realistic for the physical layer, given current technology. However, anticipating the continued evolution of optical modules, the TC layer must consider split ratios up to 1:128.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

L. **Service Overlay:** An overlay wavelength may be used to provide enhanced services to the subscriber. Accordingly, GPON must vacate the Enhancement Band defined in [ITU-T G.983.3].

M. **Abbreviations and Acronyms**

BRI	Basic Rate Interface
DSL	Digital Subscriber line
FTTB	Fiber to the Building
FTTH	Fiber to the Home
FTTC	Fiber to the Curb
FTTCab	Fiber to the Cabinet
ONT	Optical Network Termination
OLT	Optical Line Termination
ONU	Optical Network Unit
OpS	Operation Systems
PDH	Plesiochronous Digital Hierarchy
PRI	Primary Rate Interface
PON	Passive Optical Network

3.0 NETWORK ARCHITECTURE

The optical section of a local access network system can be either active or passive and its architecture can be either point-to-point or point-to-multipoint. The optical access network (OAN) is common to all architectures; hence the commonality of this system has the potential to generate large worldwide volumes.

4.0 FTTB SCHEME

The FTTB scheme can be divided into two scenarios, one for multi floor IT rack (RACKS) and the other for businesses. Each scenario may have the service categories as defined under FTTH below.

5.0 COPPER & FIBRE OPTIC CABLE AND CONNECTORS

Unshielded twisted-pair copper & fiber optic cables shall be approved & recommended by component manufacturer. This is to enable the component manufacturer to give the necessary product and application warranties for the system.

Provide unshielded twisted-pair copper cable, fiber optic cable and connectors, in sizes and types as recommended by the active equipment manufacturer for indicated applications. Mate and match connector materials to factory-installed equipment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Computer cabling System Accessories: Provide computer accessories, including modular wall and floor jacks, junction boxes, connecting blocks and pre-wired boxes.

The selection and type of material required for the Services shall conform to the specifications given herein and items or matters not specified herein shall conform to ISO/IEC 11801, EN 50173 and TIA / EIA 568B Category 6 Standards as applicable. The Contractor shall also ensure that the materials utilized to complete the Cabling System installation are capable of supporting the minimum expected performance requirements for emerging applications such as ATM services (1.2 GPS), including 10 Gbps Ethernet. The complete system shall guarantee a minimum of 250 MHz & 100 MHz bandwidth performance and the products shall be from an internationally reputable manufacturer. The selection of materials shall be subject to approval by The Company.

The cables that are used to complete the installation shall be Category 6 UTP, capable of carrying high bit rate signals for extended distances in building distribution systems over frequency ranges up to and potentially beyond 250 or 600MHz, designed to work on an ISO 11801 Class "E" link.

The cable shall be composed of 23 or 24 AWG bare, solid-copper conductors. The insulated conductors shall be twisted into individual pairs and four such pairs twisted together.

The cables shall be fully color coded as provided hereunder, colour contrast being such that each pair in the cable is easily distinguishable from every other pair.

Conductor Identification	Colour Code	Abbreviation
Pair 1	White – Blue Blue – (White)	WT – BL BL
Pair 2	White – Orange Orange – (White)	WT – OR OR
Pair 3	White – Green Green – (White)	WT – GN GN
Pair 4	White – Brown Brown – (White)	WT – BR BR

5.1 SPECIFICATIONS OF UTP CABLES:

Cable Type	Category 6 UTP
Conductor Size(mm)	23 or 24 AWG
Number of Pairs	4
Nominal Outer Diameter (mm)	6.0
Impedance (Ohm)	100+/-15
Velocity of propagation (% speed of light)	69
Frequency (MHz)	250

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Max. Attenuation @ 250 MHz (dB)	32.1
Worst case NEXT @ 250 MHz (dB)	38.3

5.2 HORIZONTAL CABLING DISTANCES

The maximum horizontal portion of a cabling system from work area information outlet to a mechanical termination at the patch-panel in the wiring closets must not be more than 90 meters. The cable run must be free of bridges, taps and splices.

Both ends of the cable shall be labeled for identification, i.e., at the patch panel and work area information outlet according to EIA/TIA 606 administration standards for the Data cabling of commercial buildings.

The horizontal cabling system shall be correctly designed and the work area outlets in each shown or required location shall be correctly mapped to an appropriate wiring closet. The star topology shall be applicable to every individual unit of the transmission media.

5.3 FIBRE OPTIC & UTP CABLING

The backbone cabling interconnecting distribution cabinets to the main Central distribution cabinet shall be of multimode OM3 fiber cable 50/125 microns; 8-core cable with color-coded fibers. All fiber optic cables shall be laid in straight run without intermediate splices and all fibers shall be terminated at either end using suitable fiber cable patch panels mounted on the wiring closets.

All fiber optic backbone links between the main cross connect and the Telecommunication rooms have a backup link using a different route from the main fiber optic link. Each of these links shall be 6-core fiber optic cable as described in this document.

The Contractor shall be responsible for the supply, installation, testing and commissioning of the complete fiber cable backbone interconnection/cross connection requirements of the "building/complex" LAN Cabling System.

The Contractor shall install suitable fiber optic pigtails/connectors needed to complete the entire fiber cable installation as per the manufacturer's recommendation and shall ensure that the backbone is capable to handle the traffic and provide error- free universal data transport for the foreseeable future.

All of the fibers in the backbone shall be terminated with LC type connectors at the time of the installation. The Contractor shall ensure proper testing of the fibers and make them available whenever they are needed. No fibers shall leave unterminated; all fibers must be terminated. A document with fiber cable test results for every fiber cable link shall be provided by the Contractor.

The Contractor shall observe the manufacturer's specifications for maximum tension and minimum bend radius for each fiber optic cable. The contractor shall provide a copy of the manufacturer's specifications to company prior to the commencement of the work.

Care must be taken when mechanical pulling devices are used, that maximum

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

tension limits are not exceeded. Minimum bend radius specification shall not be violated when the cables are routed through walls or around corners. The contractor shall ensure that all installation personnel are aware of these limitations.

The Contractor shall follow an intelligent numbering system based upon the destination and channel number. The numbering system shall have a prefix 'F' to indicate it is a fiber optic cable, followed by the destination IDF, then a hyphen and the channel within the cable.

4 Pair, CAT 6A, 250 MHz UTP cable shall be installed as redundant backbone between the main patch panel (Server Rack) to Each building patch panel (IDF) at each floor/location as indicated in the drawings.

Logical labeling should be as per ANSI/TIA/EIA-606. Labels should be ring and printed type. No labels should be written by hand.

5.4 OPTICAL FIBRE CABLE TECHNICAL SPECIFICATION

Fiber optic cables within the premises shall use multimode, graded-index.

Fibers must comply with TIA/EIA 492 specifications and OM3 or OM2 fiber specification as in ISO 11801 standard.
Fibers will have dual wavelength capability; transmitting at 850 and 1300nm ranges.
All fibers shall be colour coded to facilitate individual fiber identification. The coating shall be mechanically strippable.

Core	50 μm ± 3 μm
Core Non-Circularity:	<6%
Core/Cladding Concentricity Error:	<3.0 μm
Numerical Aperture:	0.200 ± 0.015
Cladding diameter:	125 μm ± 1 μm
Cladding Non-Circularity:	<2.0%
Coloured Fiber Diameter:	250 μm ± 15 μm
Buffering Diameter:	890 mm ± 50 mm
Minimum Tensile Strength:	100,000 psi
Fiber Minimum Bending Radius:	.75 in. (1.91 cm)
Cable Minimum Bending Radius: During Installation: After Installation:	 20 times cable diameter 10 times cable diameter
Operating Temp. Range:	32°F to 122°F (0°C to 50°C)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Storage Temp. Range:	-40°F to 149°F (-40°C to 65°C)
Maximum Fiber Loss:	3.5 dB/km at 850 NM 1.5 dB/km at 1300 NM
Minimum Bandwidth:	1500 MHz. km at 850 nm (OFL) 500 MHz .km at 1300 nm (OFL) 2000 MHz. km at 850 nm (DMD, laser) 500 MHz. km at 1300 nm (DMD, laser)

6.0 FTTH

Within this scenario, the following service categories may be considered:

1. Asymmetric broadband services (e.g., digital broadcast services, VOD, file download, etc.).
2. Symmetric broadband services (e.g., content broadcast, e-mail, file exchange, distance learning, telemedicine, online-gaming, etc.).
3. POTS and ISDN. The access network must be able to provide, in a flexible way, narrow-band telephone services with the appropriate timing for the introduction.

7.0 SERVICES, USER NETWORK INTERFACE AND SERVICE NODE INTERFACE

7.1 Services:

GPON is required to support all currently known services and new services being discussed for TCC subscribers and business customers, because of such a broadband capability.

What specific services should be provided is clearer to some operators than to others and depends heavily on the particular regulatory conditions of each operator's markets, as well as on the market's own potential. How these services are delivered in a cost-effective way is a function not only of legal conditions, but also of factors including existing telecommunication infrastructure, dwelling distribution and business customer's mix.

7.2 User Network Interface and Service Node Interface:

ONU/ONT has UNI, as well as OLT, has an SNI. UNI/SNI depends on which services are provided by the service operator.

8.0 BIT RATE

Basically, GPON aims at transmission speeds greater than or equal to 1.2 Gbit/s. Accordingly, GPON identifies two transmission speed combinations as follows:

- 1.2 Gbit/s up, 2.4 Gbit/s down;
- 2.4 Gbit/s up, 2.4 Gbit/s down.

The most important bit rate is 1.2 Gbit/s up, 2.4 Gbit/s down, constituting nearly all of the deployed and planned deployment of the GPON systems.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

9.0 MAXIMUM MEAN SIGNAL TRANSFER DELAY

GPON must accommodate services that require a maximum mean signal transfer delay of 1.5 ms.

Specifically, GPON system must have a maximum mean signal transfer delay time of less than 1.5 ms between T-V (or (a)-V, depending on the operator's preference). See clause 12 of [ITU-T G.982]. Delays introduced by the adaptation functions such as circuit emulation are not included in this value.

Although a section of the delay measurement is T-V for FTTH system, or (a)-V for the other application in [ITU-T G.982], in a GPON system the reference points are not restricted by the system configuration.

10.0 PROTECTION ON THE PON SECTION

From the viewpoint of administration of the access network, the protection architecture of GPON is considered to enhance the reliability of the access networks. However, protection shall be considered as an optional mechanism because its implementation depends on the realization of economical systems. Further information on protection switching can be found in [ITU-T G.808.1].

10.1 Possible Protection Switching Types

There are two types of protection switching, both of which are analogous to those of SDH systems:

i) Automatic switching.

ii) Forced switching.

The first type is triggered by fault detection, such as loss of signal, loss of frame, signal degrade (BER becomes worse than the predetermined threshold), and so on. The second type is activated by administrative events, such as fiber rerouting, fiber replacement, etc. Both types should be possible in a GPON system, if required, even though they are optional functions. The switching mechanism is generally realized by the OAM function; therefore, the required OAM information field should be reserved in the OAM frame.

The relevant part of the protection in the GPON system in this scheme should be a part of the protection between the ODN interface in the OLT and the ODN interface in the ONU via the ODN, excluding the SNI redundancy in the OLT. The relevant part of the protection in the GPON system should be a part of the protection between the ODN interface in the ONU and each ODN interface in the two OLTs via the ODN, plus the signaling required to implement protection functions upstream from the SNI.

10.2 Possible Duplex GPON Configuration Examples

The control protocols for each configuration should be specified independently from one another. No switching protocol is required since the switching is carried out only in the OLT. The possible configuration examples are detailed below:

Type A: A deprecated configuration that duplicated only the optical fibers.

Type B: The second configuration doubles the OLTs and the optical fibers between the OLTs and the optical splitter, and the splitter has two

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

input/output ports on the OLT side. This configuration reduces the cost of duplexing the ONUs, although only the OLT side can be recovered.

Type C: The third configuration doubles not only the OLT side facilities but also the ONU side. In this configuration, recovery from failure at any point is possible by switching to the standby facilities. Therefore, the full duplex cost enables high reliability.

Type D: A deprecated configuration that allowed the mixing of duplicated and non-duplicated ONUs, essentially providing a combination of types B and C protection.

It shall be noted that in both of these types of protection schemes, the PON line terminations do not need to reside in a single OLT equipment. In fact, they may be located in physically diverse locations (dual parenting).

10.3 Possible Duplex GPON Characteristics

Type B: This configuration requires cold standby of the spare circuit in the OLT side. In this case, signal loss or even frame loss is, in general, inevitable in the switching period. However, all the connections supported between the service node and the terminal equipment should be held after this switching.

Type C: In this case, the hot standby of the spare receiver circuits is possible in both ONU and OLT sides. In addition, hitless switching (without frame loss) is also possible in this configuration.

10.4 Requirements

1. The protection switching function should be optional.
2. Both automatic protections switching and forced switching are possible in the GPON system, if required, even though they are optional functions.
3. All the configuration examples of clause 14.2 will be possible, even though they are optional functions.
4. The switching mechanism is generally realized by the OAM function; therefore, the required OAM information field must be reserved in the OAM frame.
5. All the connections supported between the service node and the terminal equipment should be held after switching.

Regarding the last requirement, one implementation of the POTS service node (exchange) requires the frame loss period to be less than 120 ms. if the frame loss period becomes longer than that, the service node disconnects the call, and the call set-up is required again after the protection switching. Since GPON supports the emulation of conventional services, such as POTS and ISDN, this value should be taken into consideration.

T1 and E1 services require 50 ms protection times, so for these services to be provided as protected, the GPON should support 50 ms protection times.

10.5 Required Information Fields for OAM Frame

Protection switching requires less than ten codes to be used for both upstream and downstream, which will be realized by the field of the OAM

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

frame. The field mapping of the OAM frame for the protection will be required to be defined.

11.0 SECURITY

Due to the multicast nature of the PON, GPON needs a security mechanism adapting the following requirements:

1. To prevent other users from easily decoding the downstream data.
2. To prevent other users from masquerading as another ONU/ONT or user.
3. To allow cost-effective implementation.

12.0 QUALITY ASSURANCE

Manufacturer's Qualifications: Firms regularly engaged in manufacture of signal transmission media and accessories of types required, whose products have been in satisfactory use in similar service for not less than 25 years.

Installer's Qualifications: Firms with at least 25 years of successful installation experience with projects utilizing systems and equipment similar to that required for this project.

Co-ordinate with other electrical work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of data system with other work.

Sequence installation of system with other work to minimize possibility of damage and soiling during remainder of construction.

13.0 SUBMITTALS

Product Data: Submit manufacturer's data on signal transmission media and components.

Shop Drawings: Submit layout drawings of telephone cable distribution system and accessories.

Wiring Diagrams: Submit data transmission wiring diagrams for overall system.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-19
CCTV SYSTEM

1.0 GENERAL

A. All equipment and materials used shall be standard components that are regularly manufactured and used in the manufacturer's system.

B. All systems and components shall have been thoroughly tested and proven in actual use.

C. All systems and components shall be provided with the availability of a toll-free, 24-hour technical assistance program (TAP) from the manufacturer. The TAP shall allow for immediate technical assistance for either the dealer/installer or the end user at no charge for as long as the product is installed.

D. All systems and components shall be provided with a one-day turnaround repair express and 24-hour parts replacement. The repair and parts express shall be guaranteed by the manufacturer on warranty and non warranty items.

2.0 GENERAL SPECIFICATIONS

IP MEGAPIXEL CAMERA (INDOORWALL TYPE):

The camera shall be compact rugged, IR, 4Mega pixel 1/3 image sensor format digital color having the horizontal resolution of 1280x720 TVL or above with outstanding picture quality. The camera shall provide easy installation, digital signal processing, on screen displays, superior picture quality reliability. The camera shall accept AC or DC POE type. The camera shall provide auto-detection of lens type with lens wizard. The camera shall provide night sense feature to extend the excellent sensitivity in low light conditions.

The camera shall provide automatic sensing for tracking white balance. The camera shall support bidirectional communication technology using standard video cable. The camera shall be line locked to the power line zero crossing to ensure roll free vertical interval video switching and recording.

The rated voltage shall be 12VDC, 24 VAC 50 Hz and POE option. The operating temperature shall be -20 to 50 degree Celsius. Humidity shall be 5 to 93% non condensing. Shock resistance shall be minimum 50 gm.

Signal to Noise Ratio	:	50 dB
Electronic shutter	:	AES or 1/77000 sec.
White Balance	:	Automatic sensing, (2500 – 9000K)
Video output	:	Composite video 1.0 Vp-p, 75 ohms.
Aperture correction	:	Horizontal and vertical, symmetrical.
BLC	:	Center window weighting
Synchronization	:	Line Lock

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

		(When powered by AC only) Synchronizes the camera to the power line zero crossing for roll-free vertical interval switching. (When DC supply) Internal crystal.
Video Compression	:	H. 264, multicast streaming.
Networking	:	10/100/1000 Mbps gigabit Ethernet, RJ-45
Viewing Requirement	:	ONVIF
Field Of View	:	31 to 87, 25 to 880, 35 to 105 (Horizontal, Vertical & Diagonal)
Image Resolution	:	Main stream 1280 x 720 @ 25/30 fps. Feature: Extra stream shall be provided.
Audio Compression	:	Built-in
Support Protocol	:	TCP/IP, UDP, SMTP, UPNP, FTP, HTTP or etc.
Data Storage	:	Video or Snapshot. Built-in (Micro SD).
Low light Capabilities	:	0.0013 Lux. Additional feature should be removable IR cut filter mechanism for increased sensitivity.
Lens	:	DC Iris.
Security	:	Password protection, IP address filtering, user access log.
Users	:	10 Simultaneous users.
Video Analytic	:	Adaptive motion analytic to intelligently detect motion within the field of vision and trigger an alarm. Also detects vehicles near sensitive areas longer than the users define time. Also count the objects that enter in a define zone. Also any object placed in a define zone and then trigger alarm. Cameras shall have maximum feature which shall meet clients requirements.
Imaging Device	:	16:9 Aspect Ratio 1/3 inch, effect 4:3 Aspect ratio 1280 x 720 @ 1.3 MP x1.
Cabling type	:	Cat-6
Alarm Pan Input	:	22 to 34 VAC 24 VAC nominal or POE.
Alarm I/P	:	10 VDC max, 75 mA max
Alarm O/P	:	0 to 15 VDC max, 75 mA.
Service Port	:	External 3 Connection 2.5 m pwds.
Certification	:	FCC, CE, UL/UL Listed.

3.0 INDOOR TYPE IP CAMERA (DOME TYPE):

The camera shall be compact rugged, 4 Mega pixel 1/3 (3 to 12mm) varifocal lens & image sensor format digital color having the horizontal resolution of 1280x720 TVL or above with outstanding picture quality. The camera shall provide easy installation, digital signal processing, on screen displays, superior picture quality reliability. The camera shall accept AC or DC POE type. The camera shall

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

provide auto-detection of lens type with lens wizard. The camera shall provide night sense feature to extend the excellent sensitivity by a factor 3 in low light conditions.

The camera shall provide automatic sensing for tracking white balance. The camera shall support bidirectional communication technology using standard video cable. The camera shall be line locked to the power line zero crossing to ensure roll free vertical interval video switching and recording.

The rated voltage shall be 12VDC, 24 VAC 50 Hz and POE option. The operating temperature shall be -20 to 50 degree Celsius. Humidity shall be 5 to 93% non condensing. Shock resistance shall be minimum 50 gm.

Signal to Noise Ratio	:	50 dB
Electronic shutter	:	Automatic, 1/5 to 1 /132,000 sec. CCIR, 1/60 to 1/150000 sec. (EIA)
White Balance	:	Automatic sensing, (2500 – 9000K)
Video output	:	Composite video 1.0 Vp-p, 75 ohms.
Aperture correction	:	Horizontal and vertical, symmetrical.
BLC	:	Center window weighting
Synchronization	:	Line Lock (When powered by AC only) Synchronizes the camera to the power line zero crossing for roll-free vertical interval switching. (When DC supply) Internal crystal.
Video Compression	:	H. 264, multicast streaming.
Networking	:	10/100/1000 Mbps gigabit Ethernet, RJ-45
Viewing Requirement	:	ONVIF
Field Of View	:	24 to 65, 15 to 37, 28 to 75 (Horizontal, Vertical & Diagonal)
Image Resolution	:	Main stream 1280 x 720 @ 25/30 fps. Feature: Extra stream shall be provided.
Audio Compression	:	Built-in
Support Protocol	:	TCP/IP, UDP, SMTP, UPNP, FTP, HTTP or etc.
Data Storage	:	Video or Snapshot. Built-in (Micro SD).
Low light Capabilities	:	0.0013 Lux. Additional feature should be removable IR cut filter mechanism for increased sensitivity.
Lens	:	DC Iris.
Security	:	Password protection, IP address filtering, user access log.
Users	:	10 Simultaneous users.
Video Analytic	:	Adaptive motion analytic to intelligently detect motion within the field of vision and trigger an alarm. Also detects vehicles near sensitive areas longer than the users define time. Also count the objects that enter in a define zone. Also any object placed in a define zone and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

		then trigger alarm. Cameras shall have maximum feature which shall meet clients requirements.
Imaging Device	:	16:9 Aspect Ratio 1/3 inch, effect 4:3 Aspect ratio 1280 x 720 @ 1.3 MP x1.
Cabling type	:	Cat-6
Pan I/P	:	22 to 34 VAC 24 VAC nominal or POE.
Alarm I/P	:	10 VDC max, 75 mA max
Alarm O/P	:	0 to 15 VDC max, 75 mA.
Service Port	:	External 3 Connection 2.5 m pwds.
Certification	:	FCC, CE, UL/UL Listed.

4.0 OUTDOOR TYPE IP SPEED CAMERA:

The camera shall be compact weather proof, IP Speed Dome 36 x optical zoom format digital color having the horizontal resolution of 12 x DIGITAL ZOOM (530) TVL or above with outstanding picture quality. The camera shall provide easy installation, digital signal processing, on screen displays, superior picture quality reliability. The camera shall accept AC or DC POE type. The camera shall provide auto-detection of lens type with lens wizard. The camera shall provide night sense feature to extend the excellent sensitivity by a factor 3 in low light conditions.
The camera shall provide automatic sensing for tracking white balance. The camera shall support bidirectional communication technology using Cat-6. The Cameras shall high speed pan up to 260°/sec and tilt up to 120°/sec. built-in web browsing.

The rated voltage shall be 12VDC, 24 VAC 50 Hz and POE option. The operating temperature shall be -20 to 50 degree Celsius. Humidity shall be 5 to 93% non condensing. Shock resistance shall be minimum 50 gm.

Image Sensor	:	¼" CCD
Signal to Noise Ratio	:	50 dB
Electronic shutter	:	Automatic, 1/5 to 1 /132,000 sec. CCIR, 1/60 to 1/150000 sec. (EIA)
White Balance	:	Automatic sensing, (2500 – 9000K)
Video output	:	Composite video 1.0 Vp-p, 75 ohms.
Aperture correction	:	Horizontal and vertical, symmetrical.
BLC	:	Center window weighting
Synchronization	:	Line Lock (When powered by AC only) Synchronizes the camera to the power line zero crossing for roll-free vertical interval switching. (When DC supply) Internal crystal.
Video Compression	:	H. 264, multicast streaming.
Networking	:	10/100/1000 Mbps gigabit Ethernet, RJ-45
Viewing Requirement	:	ONVIF

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Field Of View	:	24 to 65, 15 to 37, 28 to 75 (Horizontal, Vertical & Diagonal)
Resolution	:	530 TVL
Sensor Element	:	PAL 752 (H) x 582 (V)
Lens Type	:	36 x optical zoom, 12 x digital zoom.
Focal Length	:	F1.6 ≈r 3.8 f=3.4≈122.4mm.
Illumination	:	1.4 lux /0.01 lux.
Pan Range	:	On 360° Continuous, Speed 0.5 or 260°/sec.
Preset Point/ Tour	:	32 Preset, 16 Camera tour.
Focus	:	Auto/manual.
Video Capture	:	H.264,4CIF/CIF/QCIF
MJPEG	:	4CIF/CIF/QCIF
Image Frame rate	:	30 fps (N), 25 fps (P) for all resolution.
2 way audio	:	Simplex/Duplex 2 way audio.
Lan port	:	RJ45 Connector, 10/100 M auto.
Alarm/out	:	Dry contact or relay output standard.
RS 485	:	For external keyboard.
Audio In/Out	:	Microphone in/out.
Video Out	:	1.0 Vp-p/75Ω Bnc optional.
Motion Detection	:	1.5 Zone.
OS	:	Windows based.
Security	:	Password protection.
Certification	:	FCC, CE, UL

5.0 MANUFACTURER'S WARRANTY

Repair or replacement of defective parts for a period of two years from the date of shipment, installation.

6.0 IP Video Management Systems (VMS):

A. IP VMS shall support minimum 300 channel and the direct analog cameras.

B. IP VMS shall provide 6 to 10 Mbps for recording of analog and IP video stream, play back and export.

C. IP VMS shall support recording of H.264, JPEG, and MPEG-4 IP Stream.

D. IP VMS shall support third party H.264 Megapixel video stream up to 10Mps resolution with total system throughout recording of all IP & analog streams, playback and export.

E. The IP VMS shall have fully open architecture with support for both IP Specific Cameras and as well as ONVIF Compliance.

F. The VMS shall support 0.264 compression, CIF 4CIF resolution at maximum 100 IPS, 16audio input and RS422/485 PT2 Control with supplied system/ third party compatible protocol.

G. VMS shall support unlimited no's of system connected over network. Each system shall contain 5 16GB min network ports, one for IP Camera/Encoder data, 1 for client computer access.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. VMS shall view, managed, & playback through single user interface simultaneously with other compatible VMS through supplied PC Server & PC Client Software.

7.0 HARDWARE:

A. The VMS server shall operate on 2nd generation Intel® Core i9 processor and 32 GB of Ram or approved equivalent to support 300 cameras bandwidth.
B. VMS server shall utilize latest windows ultimate or windows based equivalent operating system.
C. VMS server shall have expansions of IP video channel capacity through a licensing without any modification in hardware.
D. VMS server shall support multiple make/models of IP Camera and encoders including third party manufacturer.
E. VMS server shall also support audio recording in addition to third party manufacturer's audio recording.
F. VMS server shall support recording the internal storage (Built-in)server with additional storage utilize SCS1 attached HDD1 storage.
G. VMS server shall capable of continuous scheduled alarm/event and motion recording, pre and post alarm recording also be available and full programmable on per channel basis.
H. The VMS system shall allow archival of video data to computers or SAN storage devices over a network connection with optional compatible archive utility. The archival schedule shall be either automatic at user defined intervals or manual and shall be configurable per connected per connected camera.
I. VMS shall indicate system performance.
J. RAIDS or NAS storage media built in an external shall be used. Minimum 48 TB built in shall be required. Manufacture should submit the data storage calculation prior to bidding.
K. System shall have 6, 3.5 inch drive and optical DVR ± RW.
L. System shall have PC1-E slots x 16 and PC1-E x 4.
M. Auxiliary interfaces shall be USB 2.0 and USB 3.0 ports.
N. 100 to 240 VAC 50/60 Hz, Auto ranging.
O. The maximum frame per second for recording or storage shall be 15 fps. Supplier shall be responsible for better resolution and good result.
P. The resolution or frame size is not less than 1280 x 720.
Q. System should have recording capacity for 90 days recording of all cameras at 24 hours a day.

8.0 CLIENT SOFTWARE

A. The IP VMS shall be capable running client application.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. The minimum client hardware configuration shall be Intel core I7 with required graphic cards.
C. The memory shall be in tera bites for 90 days or high.
D. The system shall have optical drive like DVR +.
E. The optical system shall be windows based XP professional or as engineer approved.
F. The system shall have required accessories like connecting cables, programming, hardware for rack mounting recovery disc etc.
G. The client software shall include all licenses for any additional third party cameras. No additional license cost shall be barred by client.
H. The client software shall have capable for interface the multiple DVR or NVR platforms.
I. The client system & software shall support minimum 20 to 25 cameras matrix on required fps resolution. It is the suppliers' responsibility to provide the better resolution and performance.
J. The client system & software shall provide live video review and record video view with at least 1, 5, 15, 30, 60 or 90 minutes.
K. The client system & software shall capable to selectable in-video PT2 control or dashboard style control.
L. The system & software shall capable for video export to any accessible media like HDD, DVD or network storage.
M. The system shall have alarm pop-up featured and playback active alarm. It shall have on motion detection.
N. The system & software shall have capable for matrix functionality whereby cameras sequences creating on monitor.

ELECTRICAL:
Input Voltage 100-240 VAC, 50Hz, auto ranging

Note:

The active switches POE type is the responsibility of Client IT personal.
Passive equipments CAT 6 cable and Patch panel has been covered in Telecom BOQ.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-20
ACCESS CONTROL SYSTEM

1.1 STANDARDS

A. Materials and workmanship shall conform to the latest issue of all industry standards, publications, or regulations referenced in this section and with the following references as applicable.

NFPA 70 – National Electrical Code
UL294 – Standard for Access Control Systems
NFPA 72 – National Fire Alarm Code
NFPA 101 - Life Safety Code.

1.2 SYSTEM DESCRIPTION

A. The System shall be a modular and network capable access control system. The System shall have following systems controlled access with various reader technologies supported simultaneously, Enterprise level Time attendance ,alarm monitoring with text and graphics based annunciation. The system control at the central computer location shall be under a single software program control, shall provide full integration of all components, and shall be alterable at any time, depending upon the facility requirements. Reconfiguration shall be accomplished on-line through system programming, without hardware changes. This shall be integrated with BMS.

B. The system shall support both manual and automatic responses to alarms entering the system. Each alarm shall be capable of initiating a number of different actions, activation of remote devices and door control.

C.

D. Access control functions shall include, validation based on time of day, day of week, holiday scheduling, automatic or manual retrieval of cardholder photographs, and access validation based on positive verification of card, card/PIN, and PIN.

E. The system programming shall be user-friendly Windows environment (use conventional “Title Bar”, “Menu Bar”, “Tool Bar” and “Status Bar”) and allow mouse control of key functions. The programming shall be MENU driven and include on-line “Documentation”, “Help” or “Tutorial” information. The software shall utilize combo boxes for previously entered system-required data where applicable.

F.

G. The method of communication from remote locations to the central components shall be transparent to the user.

H. After installation, the OWNER shall be able to perform hardware configuration changes as desired without the services of the MANUFACTURER.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Equipment repair shall be able to be accomplished on site, by module replacement, utilizing spare components.

J. All controller components shall utilize "Distributed-Processing" concepts. The distributed processing shall include the ability to down-load operating parameters to any field panel, thus allowing the field panel to provide full operating functions independent of any other system component.

K. The system shall be capable of utilizing the existing LAN / WAN connecting the buildings or a dedicated security Ethernet network for Controller and Client communications.

L. Manufacturer: The access control system shall be from a single-source manufacturer that specializes in access control and intrusion detection systems with a minimum of 20 years experience.

M. Installer: Company specializing in access control and intrusion detection systems with a minimum of three years experience on systems of similar size and scope. Technicians working on project must have been certified on the hardware and software used for this project.

1.3 SUBMITTALS

A. Manufacturer's Data:

1. Submit three (3) copies of:

a. Product Data Sheets
b. Installation Instructions

2. Authorized Dealer Certificate and Certified Training Certificates of installers who will be working on this project.

B. Shop Drawings

Submit three (3) copies and digitally in AutoCad or later format on a CD (3 copies), shop drawings, including:

a. Layout of equipment on supplied AutoCAD drawings.
b. Security Console elevation drawings.
c. Field Controller equipment location wall layouts, including size requirements.
d. Detailed wiring diagrams of Field Controllers, Door Details, and head-end devices.
e. Load calculations of all security equipment for proper sizing of electrical provided by the customer and standby emergency generator circuits.

C. As-Built Drawings

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Update Shop Drawings to create final As-Built Drawings. Submit 3 copies and digitally in AutoCad 14 or later format on a CD (3 copies).

D. OPERATION AND MAINTENANCE MANUALS

Operation Data: Include three (3) copies of the software Administrator and Operator Manuals.

E. Control Panel Specifications

The control panel shall incorporate microprocessor-based, digital technology, using high speed processing for maximum reliability.

F. Distributed Intelligence

1. Time Attendance software enterpeise level series to accommodates total occupancy of the building and also interlink with centralized hub of clients requirement.
2. The system shall use distributed intelligence architecture, with controllers operating independently of one another.

3. Regionalized functions for all controllers connected to an XBox communications loop shall include: Use Count, Absentee Limit, Temporary Days, Passback, and Input/Output linking and shall not require the host to be online for processing and control.

G. Stand Alone Operation

1. All database information required for stand-alone operation shall be stored at the control panel level. All decision-making shall be performed at the control panel, eliminating the need for degraded mode operation.

2. Proprietary software programs and control logic information used to coordinate and drive system hardware shall be stored in Flash Downloadable Read Only Memory.

1.4 **HARDWARE REQUIREMENTS**

A. Controllers

There controllers shall be : access control 8 door type ; alarm monitoring (16 supervised inputs); and relay control with the addition of REB8 relay expansion boards and. Each controller shall have the following common features.

B. Controller Board

The controller board shall be microprocessor based, incorporating Flash ROM (firmware) downloadable from the Host Computer, RAM (User Information,

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

System Setups, Event Transaction Buffer) and a Clock/Calendar. The ROM shall be modularly upgradeable in the field for enhancements to system features. All powered connections to the controller board shall be protected by fuses. All wiring connections to the controller board shall be to "Phoenix" type screw terminals. Each door connection shall consist of terminals for two readers, one 10 Amp rated Form C dry output relay for lock control, and one input for monitoring a status switch, a request-to-exit device, and a tamper switch. There shall be status indicator lights for active relays, as well as diagnostic indicator lights to aid in system troubleshooting. There shall be dedicated alarm output relay/s for external reporting of the following conditions: Alarm; Duress; Tamper; and Trouble.

C. Enclosure

The controller enclosure shall be a NEMA style metal cabinet designed for surface mounting. It shall have a tampered, removable hinged door with a high security key lock. It shall have conduit knockouts to allow from 25mm conduit to be used for wire entry into the cabinet.

D. Internal Power Supply

The controller shall have an internal power supply that will accept 50 Hz/ 220 - 240 VAC. The primary side of the power supply shall be protected with a fuse. The power supply shall provide 28 VDC power to the controller board, internal battery charger, selected card readers, and reader interface boards.

E. Standby Battery

The controller shall have an internal standby battery that is capable of running the system during AC power interruptions. It shall be recharged by a charging circuit incorporated into the controller board.

F. Alarm Inputs

The controller shall be capable of accepting up to 32 additional supervised alarm inputs, in increments of eight (8). The sensitivity of the line supervision shall be 2% AA Standard. The alarm expansion boards shall be mounted in the controller cabinet and connect to the controller board via an expansion bus cable. This option shall be limited to 16 additional supervised alarm inputs for the 16 zone alarm input controller (Model M16N) and none for the Model M1N. The alarm expansion board shall be Hirsch Model AEB8.

G. Intelligent Reader Interface

The control panels shall utilize an intelligent reader interface to communicate with card readers of various types. The interface shall be microprocessor based and allow data formats including ABA magnetic stripe, Proximity, Bar Code, Touch Memory, RF and Biometric. The interface shall utilize a digitizing algorithm, which will convert the card data to a unique number,

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

thus, eliminating the need for facility codes. A single interface shall support both entrance and exit readers with keypads associated with each door. The interface shall be U.L. Listed to U.L.294. The reader interface shall be included as standard in all Scramble Pads.

1.5 CONTROLLER FIRMWARE

A. General Features

1. The software for the controller shall reside in Flash ROM (firmware) and be located on a plug removable module on the controller board to facilitate easy field upgradability of the features. All of the necessary software for a fully functional System is located in the controller. The controller firmware shall include the following general features at a minimum and be fully supported by the VELOCITY head-end.

   a. 3 - 15 digit keypad Code's
   b. Duress digit for keypad Code's
   c. 150 Time Zones for access restriction and automatic event control
   d. 128 Access Zones for access management
   e. 256 Control Zones for alarm and relay management
   f. Assigned to 1 – 4 Holiday Schedules.
   g. Automatic daylight savings time clock adjustment
   h. 27 different functions for Code's and cards, e.g. access, unlock, re-lock, alarm mask,
   i. relay control
   j. Add user records
   k. Tag users for annunciation at host computer
   l. 4,000 Users
   m. 1500 event, 1500 alarm transaction buffer

B. Access Control Features

1. The controller shall include the following access control features at a minimum.

   a. Restrict access by: time of day; day of week; door; holiday
   b. Momentary Access of door up to 8100 seconds
   c. Extended Access for User Definable Momentary Access duration (requires ScramblePad). ScramblePad will display time remaining on the minute, and annunciate at the defined "Warning Time"
   d. Special Needs Time Extension to provide additional time for Momentary Access and Door Open Too Long for selected people.
   e. Unlock/Re-lock of door by CODE, card or Time Zone
   f. Door status monitoring shall allow for: door forced monitoring; door-open-too-long monitoring; door-open-too-long while door is

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

unlocked; auto-re-lock of door when opened or closed

g. Request-to-exit masks alarm and/or unlocks door

2. 2 person requirement by door. A user can be defined as Normal, A/B Rule A, A/B Rule B, Executive Override. Can be disabled by Time Zone.

3. 63 Pass back Zones. Can be disabled by Time Zone. A User can be designated with Pass back Executive Override.

4. Use Count limits on users

a. Absentee Rule limits on users
b. Temporary Day limits on users
c. Occupancy Counting / Minimum & Maximum limits per Passback Zone
d. Deadman CODE / Timer
e. Threat Levels – 99 Levels may be defined. Based on the Level in effect for the facility, selected readers may be disabled, dual readers in Card/Code Only during Time Zone can require dual, and selected User's Credentials can be disabled.

C. Alarm Management Features

1. The controller shall include the following alarm management features at a minimum.

a. Momentarily mask alarm by CODE and/or card
b. Mask/unmask alarm by CODE and/or card or by Time Zone
c. Alarm device supervised while masked
d. Tamper switch on alarm device monitored while masked
e. Tamper Input may be configured to operate as a "Latch Monitor" with the appropriate door locks hardware.
f. Entry/Exit delay per alarm input
g. Alarm input triggers relay/s

6. CARD READER/KEYPAD SPECIFICATIONS

A. Readers

1. The controllers shall accept all of the following reader technologies concurrently: Scrambling Keypad; Mag Stripe; Wiegand; Proximity; Bar Code; Biometrics - Retinal Scan, Hand Geometry, Fingerprint; Radio Frequency. The readers can be used for access control, alarm management, and/or relay control and shall be capable of being used alone (keypad only, card only) or a scrambling keypad and any other reader technology may be combined to operate as a dual technology reader where two valid IDs (PIN and card) are required.

B. Scramble Pad

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. The controller shall be capable of using scrambling keypad readers. The keypad shall incorporate the following features: Scrambling display of numbers 0 - 9 (numbers appear in different location every time it is used); +/- 4 degree horizontal and +/- 26 degree vertical viewing restriction; accept 3 - 15 digit CODEs simultaneously; be disabled for 1 minute and report CODE Tamper violation (guessing CODEs); be disabled and report Physical Tamper violation (attempt to remove keypad from mounting box); silent CODE duress; status LEDs for reporting granted, denied, and overridden transactions, AC Fail, Programming Mode active, responses to Status Request of Alarm Inputs and Relay Outputs; weather resistant; supervised by controller; and built-in diagnostics. The ScramblePad shall include the MATCH Reader Interface functionality for connection of up to two (2) card readers.

   A version of the scrambling keypad shall be available for use in high ambient lighting conditions or where the front is subject to direct sunlight. This version shall have a +/- 26 degree horizontal and +/- 40 degree vertical viewing restriction.

   A version of the scrambling keypad shall be available with an integrated proximity card reader. Presentation of the card shall automatically auto-start the scrambling display. The scrambling keypad with integrated proximity card reader shall be the Hirsch ScrambleProx Model DS47L-SPX.

   A version of the scrambling keypad with high intensity display shall be available with an integrated proximity card reader. Presentation of the card shall automatically auto-start the scrambling display.

C. Proximity Card Readers

1. The controller shall be capable of using proximity readers that output a standard 26-55 Bit data format. The readers can have a short or long read range and be unidirectional or bi-directional.

PART 1 - EXECUTION

3.1 INSTALLATION

A. Install system in accordance with manufacturer's instructions.
B. Install wiring for detection and signal circuit conductors in conduit. Use 22 AWG minimum size conductors.
C. Make conduit and wiring connections to existing door hardware devices as required.

3.2 TRAINING

A. The two designated System Administrators shall attend the 3 Day Factory Velocity User Class.
B. The Dealer shall coordinate with the System Administrators for two 8 hour Operator training sessions on the Operational System to be conducted on-site on the actual running system.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.3 Field Quality Control

A. Test in accordance with Hirsch Electronics testing procedures for the "Velocity for Windows 2000".

END OF SECTION

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-21
FIRE ALARM AND DETECTION SYSTEM

1.0 SCOPE OF WORK

The work under this scope consists of supplying, installation and commissioning of all material and services of the complete Addressable Fire Alarm system as specified herein and / or shown on the Tender Drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at site with other services for exact route, location and positions of the system.

The Fire Alarm system with accessories shall also comply with the General Specifications for Electrical Works, Section E- I and with other relevant provisions of the Tender document.

2.0 STANDARDS

The latest editions of the following standards / codes shall be applicable for the materials covered within the scope of this specification:

BS 5839, EN approved
EN 54-16

Any other standard referred to in above standards or these specifications.

3.0 OPERATION

The Fire Alarm System shall be analogue addressable type complete with battery standby power.

At locations indicated in the drawings the break glass type fire alarm Control Panel, Repeater Panel and automatic detectors shall be installed. In case of any Fire, the manual station shall be operated by pulling down the handle or breaking glass. The actuation of this station shall cause an audio as well as visual alarm at the fire alarm control and indication unit, duly indicating the location of the respective station/zone.

An authorized person shall immediately visit the effected area and if after investigating, it is deemed necessary, alarm in the whole building shall be initiated from either the alarm switch located beside the fire alarm control panel by inserting a special key or the actuation of any indication at the Fire Alarm Control Panel. The general alarm shall be initiated by an authorized person after inspecting the affected location.

Circuit shall be so arranged that an open circuit in an initiating or indicating loop shall cause the individual zone and common trouble indication at the fire alarm control panel.

4.0 MATERIAL

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.1 Conduit and Conduit Accessories

The specifications for conduit and conduit accessories shall be same as given for electrical conduit in Section E - 5 of these specifications.

4.2 Fire Alarm Cable

Fire Alarm Cable shall be 2 core 1.5mm shielded twisted pair, fire resistant, PVC insulated, 250/440 volts grade cable to be laid in concealed PVC conduit.

4.3 Power Supply

The supply and operating voltages shall be 220 volts, 50 c/s and 24 volts D.C. respectively. The control stations shall be provided with sufficient capacity nickel cadmium battery with charger to operate the complete system for the least 3 hours in case of mains failure.

4.4 Fire Alarm Control and Indication Unit

The fire alarm control and indication unit shall be a Solid State Modular Unit consisting of the following Modules; suitable number of modules shall be used to provide facility for 6 loops. It shall not be possible to remove the key without turning the key to its normal position, thus resetting the alarm contacts.

i. Loop Module

Loop Module shall have multiple of supervised initiating circuit with a trouble and an Alarm Lamp for each loop. Detection circuit wiring shall be two wire Class `A' and shall power all Detectors (Relay outputs and) voltage output for each zone alarm and voltage output for each zone trouble shall be provided.

ii. Audible Expander Modules

Audible Expander Modules shall provide for supervised control circuit for polarized alarm signaling devices.loop activated lamp shall be provided for each loop to aid on system testing and trouble- shooting provide (1) (2) (3) indicating circuits.

iii. Power Module

Power Module shall supply the necessary power for the loop module and all Detectors (and shall contain a Battery Charger to charge the batteries) An AC power to Lamp shall be provided to indicate the normal condition of the panel. Individual supervisory lamps shall be provided for AC power failure indication, ground fault detection, and low battery. All controls shall be behind a key-locked door to prevent unauthorized operation. Two supervised control circuits for audible signaling shall be provided as part of this module. Common trouble and common alarm relay and logic outputs shall be provided. The panel cover shall be key-locked to prevent unauthorized access.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.5 Addressable Manual Break Glass Station

The break-glass manual station shall be operated by pulling down on the handle. When operated, the handle shall remain down with the pre-signal alarm contacts closed until the station is reset. The general alarm contacts shall remain open until after investigation. The general alarm switch shall be operated by an authorized person with a special key.

4.6 Addressable Audible Signal Unit

Fire alarm sounder with strobe shall be red color surface mounted installed where indicated on the drawings. Sound intensity shall be such that an audible signal will be heard clearly throughout the structure when the entire bells ring. The bell shall be connected in multiple cross loop conductors.

4.7 Addressable Smoke Detector:

The Smoke Detector is optical type and shall be connected to the specific loop. Base shall be provided with detector.

4.8 Addressable Heat Detector:

The Heat Detector is connected to the specific loop. Base shall be provided with detector.

4.9 Annunciator if required

The remote visual annunciator shall have the capacity for indicating 6 distinct alarm loop and one common trouble condition. The annunciator shall be back lighted type to increase visibility and to deter tampering with the lamps. The descriptions of each zone shall be approved by the Engineer Incharge. In the normal condition the annunciator shall have a blank appearance. Alarm and trouble condition shall be annunciated both visually and audibly. Lamp shall be 24 V DC, and replacement shall be readily available. Lamp replacements shall be accomplished without tools.

A test switch shall be provided for periodic testing of all lamps in the annunciator. To reduce tampering the annunciator shall have a key operated silence switch and a key locked cover. For aesthetic reasons the unit shall be compact, have a brushed metallic trim ring and be surface mounted.

4.10 Function of Addressable Fire Alarm Control Panel (FACP)

i. Design

The FACP shall be solid state, modular design with integral static protection. All indicating lamps shall be long-life, low maintenance solid state light emitting diodes (LED).

ii. Enclosure

The FACP enclosure shall be semi-flush mounted. The enclosure shall be hinged from the left and the cover shall have clear windows and locking mechanism to keep the system operating and status switches from being tampered keys shall be made available to fire

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

department and other authorized operating personnel. Finish shall be "FIRE ALARM RED" and "BLACK".

iii. Loops & Identification

All controls shall be labeled, all loop locations shall be identified, and the FACP shall be provided with a set of permanently mounted operating instructions, to avoid confusion. Loop location identification shall be as approved by the Engineer Incharge and contain up to three lines of text with 1/8" minimum character heights.

iv. Components of Fire Alarm Control Panel

The FACP shall include as minimum following:

a. All hardware and software to allow the panel configuration and operation to be changed at the panel. System that require off-site programming are not acceptable.

The memory data for panel configuration and operation shall reside in non-volatile, memory provided by battery-backed RAM. Removal of the board shall not cause loss of memory contents.

Switches for panel setup, set reset, manual, evacuation alarm, silence and acknowledge. Individual supervisory LEDs shall be provided for power, run, alarm, trouble, disconnect, low battery and ground fault.

b. Indicating zones: As indicated on the drawings, each zone containing smoke detectors shall provide power and monitoring for up to only 50% detectors. (All hardware and software shall be provided to facilitate selection of circuit performance to provide alarm verification for smoke detector circuits with field false alarms. When a detector signals an alarm, the panel shall automatically reset the detector, wait and their double checks to verify the alarm. Each zone shall have a red LED to indicate alarm and yellow or amber LED to indicate a trouble condition.

c. Indicating Loops: 1 or 2 indicating circuits shall be provided. Each circuit shall provide power for polarized alarm signaling devices. A red LED to indicate the energized state of the circuit and a yellow LED to indicate a trouble condition shall be provided for each circuit. A disconnect switch for each circuit shall be provided to allow the FACP to be tested with sounding alarm signals. When disconnected, the FACP shall indicate both trouble condition and disconnect.

v. Manual Functions

At any time, even without an alarm condition on an indicating circuit, the operator shall provide the following manual capabilities

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

in the FACP by means of switches located behind a key-locked cover:

a. In case of fire if a general evacuation is needed all bells shall sound. These signals can be initiated from the main panel and secondary switch at manual fire alarm initiating device (break glass unit).

b. Silence the local audible signal. This shall also cause the LED(s) to cease flashing and to be continuously `ON'.

c. Silence the alarm signals.

d. Reset the FACP, after all initiating devices have been restored to normal.

e. Disconnect any individual initiating or indicating circuit from the alarm sequence. This action shall light a disconnect LED and cause a trouble condition.

f. Perform a complete operational test of the system microprocessor with a visual indication of satisfactory communication with each board.

g. Test all panel LEDs for proper operation without causing a change in the condition on any zone.

vi. System Supervision

a. Upon application of primary power, or reapplication following power failure, the FACP shall automatically be in a normal supervisory condition.

b. In the normal supervisory condition, a green "POWER" LED shall be illuminated, indicating the presence of primary power.

c. A green "RUN" LED shall be illuminated indicating that the microprocessor is communicating with the system and the memory contents are satisfactory.

d. The following shall be electrically supervised:

All initiating and indicating device circuits.

All plug-in circuit board shall have proper board type in the position. System that use electrical continuity to supervise the presence of plug boards, but that do not assure that board position have been exchanged, shall provide equivalent means for specified supervision, beyond that provided by the locked cover.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4.11 Shop Drawings / Technical Specifications

Prior to installation of any equipment, the Contractor shall submit for approval, shop drawings including riser and terminal wiring diagrams and specifications data sheets. Submittals indicating typical one line riser and typical specification data sheets only will not be acceptable.

The Contractor shall review the total system point to point wiring layout to assure that the correct number and type of wire and conduit sizes are installed.

Upon completion, the Contractor shall provide detailed written operation instructions and three sets of "as built" drawings including plan, layout, conduit runs and wiring diagrams as finally installed.

4.12 Test

Upon completion and at such time as the Engineer incharge may direct, the Contractor shall conduct a total system test where line supervision and each device shall be tested. All the tests shall demonstrate that the system meets the tests shall operating requirements of this specification, that individual conductors of all circuits are free of grounds, shorts and breaks, and that no grounds exist between any piece of equipment in the control unit and the cabinet. All final connections, testing, adjusting and calibrating shall be made under the direct supervision of a factory trained technician of the system supplier.

4.13 System

The fire alarm control panel (FACP) shall be installed at the Security room at lower ground floor by at a position and height as shown on drawing and as approved at site. The FACP shall match with the wall finish and shall be of neat finish, installed flush or semi-flush with the wall.

The fire alarm riser shall travel in one conduit for straight runs, separate conduit shall be used at branch office through junction boxes.

4.14 Fire Alarm Installation

The Fire alarm system shall be installed as mentioned in the drawings. The system shall be connected, tested and commissioned as per manufacturer's instructions and in the presence of Engineer Incharge. The wall recessed mounting Fire alarm manual stations shall be installed at a height of 4.5' feet above finished floor level. The connections of the appropriate Contactors of the Fire alarm system shall be made as per manufacturer's instructions.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

The mounting height of the sounder shall be above the false ceiling or 7' from F.F. level when false ceiling is not comes. The conduit and wiring of the Fire alarm system shall be as per installation instructions for conduits and wirings given in the relevant section of these specifications. The Fire alarm system conduit shall be laid 15 cms (6") from the electrical conduits and cross the electrical conduit at 90 degree only. The Fire alarm system conduit shall be marked with red colour at terminations in order to distinguish it from other conduit system.

END OF SECTION

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-22
PUBLIC ADDRESS AND VOICE ALARM SYSTEM

1.0 SUMMARY

This Section includes equipment for amplifying, distributing, and reproducing sound signals.

2.0 DEFINITIONS

Retain abbreviation and terms that remain after this Section has been edited.
Channels: Separate parallel signal paths, from sources to speakers or loudspeaker zones, with separate amplification and switching that permit selection between paths for speaker alternative program signals.

PA/VA Zone: Separate group of speakers and associated supply wiring that may be arranged for selective switching between different channels.
VU: Volume unit.

3.0 SUBMITTALS

Product Data: For the following: Adjust list below to suit Project.
System manager with built in amplifiers (Matrix type) EN 54 Power Supply Manager EN 54-16
Microphone. EN 54 Equipment rack.
Speakers (Wall, ceiling etc) EN 54
Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
Field quality-control test reports. Operation and maintenance data.

4.0 QUALITY ASSURANCE

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
Comply with NFPA 70.
System must comply with EN 60849 and EN 54-16 Standards as PA/VA.

5.0 COORDINATION

Coordinate layout and installation of system components and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

6.0 FUNCTIONAL DESCRIPTION OF SYSTEM

Descriptions below are offered as examples only. Revise this Article to convey design intent to Contractor and Installer. PA system has built in emergency voice evacuation system so that in case of emergency it shall override the announcement and allow prerecorded emergency message.

System Functions: Include the following:

- Emergency voice announcement shall be announced in the event of fire and the system manager shall interfaced with Fire alarm panel.
- Delete functions in subparagraphs below that are not required and edit remaining descriptions to suit Project; add other functions as required.
- Selectively connecting separate zones to different signal channels.
- Selectively amplifying sound among various microphone outlets and other inputs.
- Communicating simultaneously to all zones regardless of zone or channel switch settings.
- Paging, by dialing an extension from any local telephone instrument and speaking into the telephone.

Producing a program-signal tone that is amplified and sounded over all speakers, overriding signals currently being distributed. Reproducing high-quality sound that is free of noise and distortion at all speakers at all times during equipment operation including standby mode with inputs off; and output free of non-uniform coverage of amplified sound. In case of emergency built in Emergency Voice Evacuation system shall enable and announce through speakers.

7.0 EQUIPMENT AND MATERIALS

Coordinate features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
Modular equipment type using solid-state components, fully rated for continuous duty, unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 100 to 240 V, 50 Hz.

8.0 SYSTEM MANAGER:

It shall be located at LT Small Faculty Building at PA Room in PA/VA Rack
Comply with EN 54
Power Source: 31V DC, removable terminal blocks (4 pins) Zones: minimum 16 zones with 512 matrix zones
Speaker line: 4 channels (with AB speaker line output)
Audio Input: 4 inputs (Line: -20 dBV / Mic: -60 dBV / ANC sensor, phantom power selectable)
DSP: Feedback suppression, Equalizer/Filter, Compressor, Delay and Ambient Noise Control (ANC)
Control Input: 16 inputs, no-voltage make contact input, open voltage: 24 V DC, short- circuit current: 2 mA

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Fault Detection System: Short circuit, Open circuit, Method: Voltage detect ; Connector: RJ45 connector ; Connection Cable: CAT5-STP Power Amplifiers: Built in 4 modules type
Dimensions (W x H x D): 482 x 132.6 x 345 mm (19", 3U)
Standby Amplifier: Input: 1, Output: 1; Max. Voltage/Current: 100 Vrms, 5 Arms ; Connector: Removable terminal block (2 pins) x 2

LAN A,B: No. of Connectors: 2 (LAN A, LAN B) ; Network I/F: 100BASE-TX ; Network Protocol: TCP, UDP, ARP, ICMP, RTP, IGMP, FTP, HTTP; Spanning tree Protocol: RSTP; Audio Transmission System: TOA Packet Audio; Audio Encoding Method: PCM; Audio Sampling Frequency: 48 kHz, 16 bits Connector: RJ45 connector; Connection Cable: CAT5; Max. Cable Distance: 100 m

9.0 DIGITAL POWER AMPLIFIER MODULES

Comply with EN 54
Power Source: 31V DC (operating range: 20 to 33 V DC) Amplification System: Class D
Rated Output: 300W (at 100V line), 210W (at 70V line), 150W (at 50V line) Output Voltage: 100V(70V,50V selectable)
Frequency Response: 40 Hz to 20 kHz: - 5 to +1 dB Max Capacitive Load: 0.5 uF
Distortion: 1 % or less (at 100 V line, A-weighted)
Min Resistive Load: 67Ω (100 V), 47Ω (70 V), 33Ω (50 V)

10.0 POWER SUPPLY MANAGER

Comply with EN 54
Power Source: 220 – 230 V AC, 50/60 Hz
Power Consumption: 2800 W max in total (at rated output with charging), 650 W max in total, 350 W max each (EN 60065)
Charging Method: Temperature compensated trickle charging
Battery Connection: One each positive and negative terminal, applicable cable diameter: AWG 6 – AWG 0 (AWG 1/0) (16 mm2 – 50 mm2) Line resistance within 4 mΩ/ total
Control Connector: RJ45 female connector for connecting the system and cascade
connection, Shielded Twisted-pair straight cable (TIA/EIA-568A standard) Type of control signal: Battery check, AC power status,
DC power status, charging circuit failure, battery failure, and communication
DC Power Output: 8 x 31 V (19 – 33 V) 25 A max. each, M4 screw terminal, distance between barriers: 11 mm 3 x 31 V (19 – 33 V) 5 A max. each,
removable terminal block (3 x 2 pins) 1 x 24 V (16 – 25 V) 0.3 A

max., removable terminal block (1 x 2 pins)
DC Power (AC Mode): Rated output: 2300 W (total DC power output), Peak output: 2780 W (total DC power output)

. DIGITAL POWER AMPLIFIER MODULES

Comply with EN 54

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Power Source: 31V DC (operating range: 20 to 33 V DC) Amplification System: Class D
Rated Output: 300W (at 100V line), 210W (at 70V line), 150W (at 50V line) Output Voltage: 100V(70V,50V selectable)
Frequency Response: 40 Hz to 20 kHz: - 5 to +1 dB Max Capacitive Load: 0.5 uF
Distortion: 1 % or less (at 100 V line, A-weighted)
Min Resistive Load: 67Ω (100 V), 47Ω (70 V), 33Ω (50 V)

11.0 POWER SUPPLY MANAGER

Comply with EN 54
Power Source: 220 – 230 V AC, 50/60 Hz
Power Consumption: 2800 W max in total (at rated output with charging), 650 W max in total, 350 W max each (EN 60065)
Charging Method: Temperature compensated trickle charging
Battery Connection: One each positive and negative terminal, applicable cable diameter: AWG 6 – AWG 0 (AWG 1/0) (16 mm2 – 50 mm2) Line resistance within 4 mΩ/ total
Control Connector: RJ45 female connector for connecting the system and cascade
connection, Shielded Twisted-pair straight cable (TIA/EIA-568A standard) Type of control signal: Battery check, AC power status,
DC power status, charging circuit failure, battery failure, and communication
DC Power Output: 8 x 31 V (19 – 33 V) 25 A max. each, M4 screw terminal, distance between barriers: 11 mm 3 x 31 V (19 – 33 V) 5 A max. each,
removable terminal block (3 x 2 pins) 1 x 24 V (16 – 25 V) 0.3 A

max., removable terminal block (1 x 2 pins)
DC Power (AC Mode): Rated output: 2300 W (total DC power output), Peak output: 2780 W (total DC power output)

12.0 GOOSENECK MICROPHONE FOR AZAN SYSTEM

Microphone :

Comply with TIA/EIA SE-105.
Type : minimum 3 zone pattern
Phantom supply : 9 to 52V DC
Output Connector : XLR – 3- 12 equivalent
Cable : C25J
Mounting : Desk stand with push to talk application, press to talk switch. It shall be mounted on base stand.

12. UHF WIRELESS TUNER AND UHF WIRELESS HAND HELD MICROPHONE

Microphone : Electret condenser microphone

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Frequency Range : 794 – 865 MHz Channel Selectable
: 64 channel
Battery : AA alkaline dry cell battery
Antenna: Built-in type

Power source : AC mains with 12V DC adapter Power Consumption
: 250 mA
Receiving Frequency : 576 – 865 MHz

13. COMPONENTS:
Parameters listed in this Article are typical values. Performance and product characteristics vary among manufacturers. Revise to suit Project.

Microphone : Comply with TIA/EIA SE-105.
Type : Dynamic, with cardioids polar or unidirectional characteristic
Impedance : 120 ohms.
Frequency Response : Uniform, 60 to 20,000 Hz. Output Level : Minus 58 dB minimum.
Finish : Satin chrome and as required.
Cable : C25J.
Mounting : Desk stand with integral-locking, press-to- talk switch.
Equipment Rack : Comply with TIA/EIA-310-D. House amplifiers and auxiliary equipment in standard TIA/EIA 19-inch (483-mm) racks.

Group items of same function together, either vertically or side by side, and arrange controls symmetrically.

Power-Supply Connections: Approved plugs and receptacles.

Arrange all inputs, outputs, interconnections, and test points so they are accessible at rear of rack for maintenance and testing, with each item removable from rack without disturbing other items or connections.

Blank Panels : Cover empty space in equipment racks so entire front of rack is occupied by panels.

Enclosure Panels : Ventilated rear and sides and solid top. Use louvers in panels to ensure adequate ventilation.

Finish : Uniform, baked-enamel factory finish over rust-inhibiting primer or as required.

Power-Control Panel : On front of equipment housing, with master power on/off switch and pilot light; and with socket for 5-A cartridge fuse for rack equipment power.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Service Light : At top rear of rack with an adjacent control switch.

Vertical Plug Strip : Grounded receptacles, 12 inches (300 mm) o.c. the full height of rack, to supply rack-mounted equipment.

Maintenance Receptacles: Duplex convenience outlets supplied independent of vertical plug strip and located in front and bottom rear of rack.

Spare Capacity : 20 percent spare space capacity in rack for future equipment. Coordinate paragraph and subparagraphs below with Drawings.
Insulation for Wire in
Conduit : Thermoplastic, not less than 1/32 inch (0.8 mm) thick.
Microphone Cables : Neoprene jacketed, not less than 2/64 inch (0.8 mm) thick, over shield with filled interstices. Shield No. 34 AWG tinned, soft-copper strands formed into a braid

or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent. Plenum Cable: Listed and labeled for plenum installation.

13.0 CEILING SPEAKERS:

It shall be compliant with EN 54

Rated power : 6/3/1.5/0.75W
SPL : 96 dB
Frequency : 100 Hz to 16 kHz

14.0 WALL MOUNTED SPEAKERS:

It shall be compliant with EN 54

Rated power : 30W SPL : 90 dB
Frequency : 80 Hz to 20 kHz
Speaker Component : 12cm dynamic cone type + dome type Accessory : Mounting Bracket

15.0 EXECUTION INSTALLATION Wiring Method

Install wiring in raceways except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum-board partitions where cable wiring method may be used. Use plenum cable in environmental air spaces including plenum ceilings. Conceal cables and raceways except in unfinished spaces.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings so designed and installed to avoid damage to cables. Secure cable at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, or fittings.

Wiring within Enclosures
Bundle, lace, and train conductors to terminal points with no excess use lacing bars in cabinets.

Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.

Separation of Wires
Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

Splices, Taps, and Terminations
Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

Identification of Conductors and Cables
Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.

Wall-Mounting Outlets: Flush mounted.
Floor-Mounting Outlets: Conceal in floor and install cable nozzles through outlet covers. Secure outlet covers in place. Trim with carpet in carpeted areas.

Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than No. 18 AWG and conductors from microphone receptacles to amplifiers not smaller than No. 22 AWG.
Speaker-Line Matching
Transformer Connections: Make initial connections using tap settings indicated on Drawings.

Connect wiring according to Division 16 Section "Conductors and Cables."

16.0 GROUNDING

Revise this Article to suit system requirements. Include grounding electrodes for special applications only.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
Install grounding electrodes as specified in Division 16 Section "Grounding and Bonding."

17.0 FIELD QUALITY CONTROL

Perform the following field tests and inspections and prepare test reports: Schedule tests with at least seven days' advance notice of test performance. After installing public address and music equipment and after electrical circuitry has been energized, test for compliance with requirements.

18.0 Operational Test

Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.

Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:

Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.
Repeat test for each separately controlled zone of loudspeakers. Minimum acceptance ratio is 50 dBs.

Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.

Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dbs. In addition, the levels between locations in the same zone and between locations in adjacent zones must not vary more than plus or minus 3 dbs.

Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

Signal Ground Test: Measure and report ground resistance at pubic address equipment signal ground. Comply with testing requirements specified in Division 16 Section "Grounding and Bonding."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Retesting: Correct deficiencies, revising tap settings of speaker-line matching transformers where necessary to optimize volume and uniformity of sound levels, and retest. Prepare a written record of tests.

Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

19.0 ADJUSTING

On-Site engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.

20.0 DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain public address and music equipment. Refer to Section 01.

21.0 EXECUTION INSTALLATION Wiring Method

Install wiring in raceways except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum-board partitions where cable wiring method may be used. Use plenum cable in environmental air spaces including plenum ceilings. Conceal cables and raceways except in unfinished spaces.

Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings so designed and installed to avoid damage to cables. Secure cable at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, or fittings.

2 core 2.5 sqmm flexible PVC cable shall be used for wiring.

Wiring within Enclosures
Bundle, lace, and train conductors to terminal points with no excess use lacing bars in cabinets.

Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.

Separation of Wires
Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) for speaker microphones and adjacent

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

Splices, Taps, and Terminations

Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

Identification of Conductors and Cables
Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.

Wall-Mounting Outlets: Flush mounted.

Floor-Mounting Outlets: Conceal in floor and install cable nozzles through outlet covers. Secure outlet covers in place. Trim with carpet in carpeted areas.

Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than No. 18 AWG and conductors from microphone receptacles to amplifiers not smaller than No. 22 AWG.

Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.
Connect wiring according to Division 16 Section "Conductors and Cables."

22.0 GROUNDING

Revise this Article to suit system requirements. Include grounding electrodes for special applications only.

Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.

Install grounding electrodes as specified in Division 16 Section "Grounding and Bonding."

23.0 FIELD QUALITY CONTROL

Perform the following field tests and inspections and prepare test reports: Schedule tests with at least seven days' advance notice of test performance. After installing public address and music equipment and after electrical circuitry has been energized, test for compliance with requirements.

Operational Test

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.
Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at

normal gain settings as follows:

Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.

Repeat test for each separately controlled zone of loudspeakers. Minimum acceptance ratio is 50 dB.

Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.
Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in the same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.
Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

Signal Ground Test: Measure and report ground resistance at pubic address equipment signal ground. Comply with testing requirements specified in Division 16 Section "Grounding and Bonding."
Retesting: Correct deficiencies, revising tap settings of speaker-line matching transformers where necessary to optimize volume and uniformity of sound levels, and retest. Prepare a written record of tests.
Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

24.0 ADJUSTING

On-Site engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.

25.0 DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain public address and music equipment. Refer to Division 1 Section.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-23
CENTRAL BATTERY SYSTEM

A. PART 1 - GENERAL

The Emergency lighting system and all its components shall be designed & installed to meet the local civil defense requirements & the respective EN50171 & BS standards and regulations applicable on the project. The product shall bear CE certification for electromagnetic compatibility. Also Exit/Emergency lights are to be SGS FI or TUV SUD approved.

Emergency lighting shall fulfill the following functions:

Illuminate the escape routes.

Indicate the escape route direction clearly

Provide EXIT signs on escape doors and routes to such doors.

Ensure fire alarm call points, firefighting equipment and other lifesaving equipment on the premises are illuminated.

Permit operations concerned with safety measures & to shut down all hazardous process

Each emergency supply panels shall be used for supply, automatic testing & monitoring of maximum 16 Nos. Escape route, EXIT & Safety on each circuit. Panels should be distributed on the building based on Security Zone or Typical Areas etc., to minimize wiring. The product shall have local civil defense authority approvals. Exit lights and EL shall be connected in same circuit using latest smart technology.

Input Voltage: 230V – 400V AC

Output Mains: 230V AC

Output Emergency: 230V DC

Battery back up required for Duration of 1 Hours under emergency operation, with minimum of 75% light output on connected fittings.

B. 1.01 MECHANICAL CONSTRUCTION

The battery housing shall be sheet steel, powder coated housing IP32 with removable screwed front, rear & top doors to provide complete access to the batteries. The electronics section shall have IP54 sheet steel enclosure with transparent polycarbonate window for all central systems & IP54 sheet steel enclosure with full metal door for all substations.

The electronic compartment shall have large cabling compartments with cable entries from top via four or more undrilled removable metal flange plates. All incoming cables & looping circuits shall be connected on protected & fused

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

terminals as per ENVDE0100. All outgoing luminaire circuits shall be connected direct to relevant components via plug-in type terminals 2.5 sq. mm. The electronic components shall have 19" slide in technology for installation and maintenance.

C. 1.02 ELECTRICAL CONSTRUCTION

D. Changeover Modules / Inverters / Converters

The system shall be built up in a modular format with all units being plug-in-type changeover modules or inverters. The outgoing circuits shall be fed through programmable changeover modules or DIN rail mounted MCBs. Emergency & Exit lights will be connected to each circuit, thereby allowing connection of luminaries of all switching modes, namely Maintained, Non-maintained and Switched Maintained in the same circuit. All outgoing circuits shall be no load and short circuit protected with independent fuses /MCB for mains and battery supply and will have LED status indication for operation & failure.

Each panel shall have a spare fuse carrier with at least three spare fuses for each size used in the panel.

E. Sub Station Panels

The substations shall be installed in areas with a maximum room temperature of 30 deg. C. The substations shall be located based on the requirements of the lighting loads and optimizing the field wiring. All substations shall be connected to the Central panel using fire proof power cables.

F. 1.03 BATTERY

Central Battery panel will have maintenance free sealed lead acid batteries at 25 °C and capable of supporting the connected load for 90 minutes. The room shall be without any special battery room ventilation requirement. Where the space required for the batteries does not permit the installation of same in standard enclosure, the batteries shall be installed in a fire rated room, on purpose built support stand / enclosure.

Battery catalogues and calculation details should be submitted as part of Submittal.

G. 1.04 CHARGER

Charger module shall be plug-in type boost charge type, microprocessor controlled module with temperature controlled voltage charging to IU characteristics. It shall have charging & supervising method via battery monitoring for failure indication of battery circuit as well as battery charger. The charger shall be designed for an 80% recharge of a fully discharged battery set within 12 hours of commencement of recharge.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. 1.05 CONTROL MODULE

Each panel will have modular plug in type freely programmable control module liquid crystal display; touch pad keys for programming and monitoring of the panel & constant memory back up with logbook facility.

The control module should have the following features:

Monitor & control all test cycles & functions
Conduct automatic / manual Function and Battery Duration test
Indicate every status of the system & the connected luminaries
Conduct an Earth Leakage test on each circuit.
Luminaries' failure will be displayed with text location

It also displays battery voltage level, withdrawn battery current, interrupted battery charge circuit, luminiare failure with address with text location. The control module has three LED's for status indication of mains supply ON/OFF, luminaire or unit failure & battery supply.

A. Automatic & Cyclic Function Monitoring & Logging Facility

An automatic monitoring and testing facility shall be installed with permanent cyclic charger and battery monitor at intervals of five minutes or less with daily/weekly function test of the complete load supplied from the battery, charger, wiring, luminaires, registration and logging of tests and results. The panel should also have the facility to conduct automatic battery duration test once in a year.

B. Changeover Module

Each changeover module shall be plug-in type, freely programmable to suit type of luminaires connected on outgoing circuits i.e. maintained, non maintained or switch maintained. The individual lamp monitoring circuits shall be included in the changeover module. Each changeover module shall have LED indications for Circuit On & Lamp failure & shall be fit to monitor upto 20 luminaires maximum as required by DIN / VDE0108 / pr EN50171. All outgoing circuit terminals shall be provided to monitor the sub distribution boards.

C. Light Switch and Sensing Module

For mains operation common switching of general lighting & safety lighting by means of existing light switches a compact fully encapsulated module shall be provided.

I. PART 2 - SUB CIRCUIT MONITORING

Final non maintained / switched Individual lighting circuits shall be monitored for operation & when failure is detected in supply voltage. The circuit shall be automatically be transferred from normal supply to emergency supply with 75% light output on the luminiares.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

J. PART 3 - HIGH FREQUENCY ELECTRONIC CONTROL GEAR

All safety and exit luminaires shall be built according to EN 60598; electronic ballast to EN 60298/60294 and EN 60924/60925, EMC protection to EN 55015. The electronic ballast with monitoring facility and easy accessible address module shall have an automatic cut-out fuse for failures within the lamp circuit.

All electronic ballasts for the safety luminaries supplied by others, but connected to Central battery system must comply with above clauses.

K. PART 4 - EXIT & SAFETY LUMINAIRE

Unless otherwise stated all EXIT luminaires shall be operated via a CENTRAL EMERGENCY BATTERY SYSTEM (ECBS).

All Exit luminaires shall have pictogram legends as per DIN 4844/CEN TC 169, EN50171 or markings as per local civil defense requirements with viewing distance of 32 meters. The luminaire shall be built according to EN 60598.

L. 4.01 SLAVE EMERGENCY LUMINAIRE

All luminaries shall meet following requirements:

Supply voltage 230V DC
The luminaire shall comply with the requirements of EN60598
Electronic ballast shall comply with the requirements of EN60298/60294
EMC or EMI protection to EN55015
Ambient Temperature – 40 ºC.

A. Electrical Rooms, Plant Rooms, Stores, etc

It shall be non maintained type, slave luminaire with 8 watt fluorescent lamp with addressable module and low loss electronic ballast which can communicate with central control module. Luminaire housing shall be Polycarbonate. Luminaire shall be suitable for wall / surface mounting, with rectangular shape and rated to IP65.

B. Car Park and Staircase & External Area
Same as above (4.1.1) but IP-65 with different lux level to meet local Civil Defense requirements.

C. False Ceiling areas

1 x 7W fully IP 20 ceiling recessed Emergency luminaire to ID acceptance. Housing polycarbonate white with electronic ballast and addressable communication module.

The luminaire shall comply the requirements of EN60598
Electronic ballast shall comply the requirements of EN60298/60294
EMC or EMI protection to EN55015

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

M. PART 5 - WIRING

Wiring, both power and control wiring between the central battery, substation panels and luminaires shall be carried out in fire retardant Pirelli FP200 or equivalent cable of suitable size as per the local civil defense requirements.

All emergency & exit lights should be located on a single cable. A single 2 core + E fire rated cable with 2.5/ 2.5 sq mm thickness should be used. Separate cable for data will not be allowed.

EL and EXIT lights shall be connected in same circuit as shown on drawings. Cross zoning shall be considered as required by Authority.

N. PART 6 - INTEGRATION

Volt free contact shall be provided within the Central Battery panel for interfacing with Central Monitoring for status monitoring and also with BMS.

O. PART 7 - EQUIPMENT WARRANTY

PGuarantee equipment furnished under these specifications against defective parts and workmanship under terms of the manufacturer's and dealer's standard warranties for a period of not less than one year from date of testing and commissioning or 18 months from date of delivery.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION E-24
ENCLOSED BUS ASSEMBLIES

PART 1 - GENERAL

Conform to General Requirements for Electrical Services of Division 16.

1.01 QUALITY ASSURANCE

Design, manufacture, testing and method of installation of all apparatus and materials
Furnished under requirements of these specifications shall conform to latest Publications or standard rules of the following:

The quality Control/Quality Assurance duties shall be performed by the Contractor.
The system of quality control verification shall be in accordance with ISO 9000 Standards of quality assurance.

1.02 CODES AND STANDARDS

The following Codes and Standards to the extent specified herein, form a part of this Specification. When an edition date is not indicated for a Code or Standard the latest edition enforce at the time of proposal submitted shall apply.
BS EN 60439-2 Low Voltage switchgear and control gear assemblies
BS EN 60439-1 Low voltage switchgear and control gear assemblies requirements for type tested and partially type-tested assemblies.

In addition to the above, bus bar trunking systems and associated equipment take account of the criteria set out in the relevant paragraphs of the following National, International and Harmonized European Standards:

BS 7671 : 1992 (IEC 364) Requirements for Electrical Installations (IEE Wiring Regulations 17th Edition)
BS 6423 : 1983 Code of practice for Maintenance of Electrical Switchgear and Control gear up to including 1000V
BS EN 60529 : 1992 Specification for Degree of Protection provided by Enclosures
(IP Code) PD 6499 : 1981 (IEC 664:1980) Guide to Insulation Co-ordination within Low Voltage Systems including Clearance and Cree page Distance for Equipment.
BS 1432 : 1987 Specification for Copper for Electrical Purposes, High Conductivity Copper Rectangular Conductors with Drawn or Rolled Edges.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

BS 1433 : 1970 Specification for Copper for Electrical Purposes, Rod and Bar.
BS 5622 Part 1 : 1979 (IEC71-1:1976) Guide for Insulation Co-ordination; terms, Definitions, Principles and Rules
BS 5622 Part 2 : 1979 (IEC71-2:1976) Guide for Insulation Co-ordination; Application Guide.
BS EN 60947-1 : 1992 (IEC 947-1: 1991) Specification for Low Voltage Switchgear and Controlgear ; General Rules
BS EN 60947-2 : 1992 (IEC 947-1: 1989) Specification for Low Voltage Switchgear and Controlgear; Circuit Breakers.
BS EN 60947-3 : 1992 (IEC 947-3: 1990) Specification for Low Voltage Switchgear and Controlgear; Switches, Disconnectors, Switch Disconnectors and Fuse Combination Units.

1.03 SUBMITTALS

The CONTRACTOR shall submit the following drawings and documents related with each electrical system for approval:

Original catalogues for various proposed components.

Schedule of Accessories and Fittings.

Test Certificates.

Shop drawings.

PART 2 - PRODUCTS

2.01 BUS BAR TRUNKING

Bus bar trunking shall be installed so that it is inaccessible to unauthorized persons and totally enclosed in an earthed trunking enclosure. The conductors shall be rectangular manufactured from HD HC tinned copper of 99.9% purity and shall comply with BS 159. Current ratings at the specified site condition shall be as shown on drawings.

The Bus Bar trunking system shall be of sandwich type construction and designed to operate on 415/230v 5 wire (3 Phase+N+E) with full section neutral and half section earth bar, 50 HZ supply. The complete system shall comply with the requirements of BS. 159, BS. 5486 Part 1 and Part 2 and IEC 60439-1/2.

The continuous-rated current shall be according to the designed load of each system and temperature-compensated to the high ambient temperature at 50 deg. C. The minimum short circuit withstanding capacity for one second shall be 80 KA.

The conductors shall be of high conductivity tin plated copper bars insulated with class B 130 deg. C insulating material. They shall be colour coded and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

insulated over the entire length. Neutral bars shall have the same cross section area as phase conductors. An earth bar of half the phase bar size shall be provided as an integral part of the bus bar trunking. The bus bars shall be totally enclosed to provide protection against mechanical damage and dust accumulation.

Fire barriers shall be included as an integral part of each feeder bus bar trunking length and fitting, and shall also be positioned when it passes through fire insulating ceilings and walls. These fire barriers shall be effective not only within the interior of the bus duct, but also in the space between the bus duct and the protective sleeve of the ceiling.

Fire barrier, when it is installed shall prevent fire, smoke and hot gases passing into the next storey. Bus bar duct shall be provided for feeding the LV switchgear from the transformers. Housing of bus bar shall be of joint less single piece extruded aluminum and shall be ensured for IP 55 rating over the entire length.

The bus bar system shall be rated for minimum IP 55 throughout the length. The contractor shall provide manufactures certificate after the installation for conformity of IP rating. The bus bar trunking system shall be of the compact design, with low impedance and voltage drop. The conductor shall be cast resin insulated suitable for outdoor installation.

The electrical connections in the bus bar system shall be such that the overlap between conductors shall be more than 60 % of the width of the conductors and irrespective of thickness with optimum distribution of contact pressure. The bus bar shall have overload capacity of minimum 50% for continuous 2 hours operation End terminations shall be provided such that the bus bar system shall form an integral part of the whole system.

The bus bar system, rated for 1000V, shall be KEMA/ASTA certified to EN 60439-1 &2: 1994 and IEC 60439-1 Edition 4.1 2000-054 and IEC 60439-2 Edition 3.1 2005-10 for a minimum short circuit withstand of 65 KA for 1 second. Bus bar should be proven thermal with standability test with 190 deg. C for 3 hrs and witnessed by ASTA/KEMA.

The conductors to be colour coded using high quality heat sinkable sleeves and special feeder element aligning tool will be provided for ensuring fool-proof erection at site. Insulation should be tested in minimum 1 KV and accordance with IEC 439-2 and BS 5486. The conductor shall be of minimum 99.95% purity. Fire Test on bubar has to be conducted according to IEC 60439 -1&2; ISO 834.

Bus duct shall carry full rated current at an ambient temperature of 50 deg. C. The temperature rise at any point in the bus duct shall not exceed 50 deg. C above the ambient temperature. Contractor shall submit test certificate by KEMA/ASTA as proof of compliance.

The bus bar system shall be supported throughout the entire length as per manufacturer's requirements to withstand its own weight and abnormal

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

forces created on short-circuit conditions. Bus bar expansion fittings shall be provided at all building expansion joints and for long lengths as recommended by the manufacturer. Spring type hangers shall be used for fixing of bus bars when they run vertically. Purpose made fittings, supports and accessories should be used throughout the installation. The bus plug tap off unit shall be of the current limiting 50kA MCCB, type of the sizes and ratings shown on the plans and shall be safety type so interlocked with the bus way that they cannot be added or removed unless the switching mechanism is off. Plugs shall be equipped with red/green indicator flag clearly visible to indicate the 'ON or OFF" position of the switching mechanism.

2.02 PLUG-IN DEVICES

Fusible Switches: NEMA KS 1, heavy duty; with rejection-type fuse clips to accommodate specified fuses; hook stick-operated handle, lockable with two padlocks, and interlocked with cover in closed position.

Molded-Case Circuit Breakers: NEMA AB 1; hook stick-operated handle, lockable with two padlocks, and interlocked with cover in closed position interrupting-capacity rating to withstand available fault current 50kA.

Motor Controllers: NEMA ICS 2, Class A, full voltage, non reversing, across the line, unless otherwise indicated.

Control Circuit: Obtained from integral control power transformer with a control power transformer of enough capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

Combination Controller: Factory-assembled, combination controller and disconnect switch with or without over current protection as indicated.

Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a nationally recognized testing laboratory (NRTL) acceptable to authorities having jurisdiction. See Division 16 Section "Fuses" for fuses and fuse installation requirements.

Non fusible Disconnecting Means: NEMA KS 1, heavy-duty, non fusible switch.

Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2. Overload relays shall have heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.

Adjustable Overload Relay: Dip-switch selected for motor running overload protection with NEMA ICS 2 and selected to protect motor against voltage and current unbalance and single phasing. Adjustable overload relays shall have Class II ground-fault protection with start and run delays to prevent nuisance trip on starting.

PART 3 - EXECUTION

3.01 INSTALLATION

Support bus assemblies independent of supports for other elements such as equipment enclosures at connections to panel boards and switchboards, pipes, conduits, ceilings, and ducts.

Design each fastener and support to carry load indicated by seismic requirements and to comply with seismic-restraint details according to Division 16 Section "Seismic Controls for Electrical Work Electrical Supports and Seismic Restraints."

Design each fastener and support to carry 200 lb (90 kg) or 4 times the weight of bus assembly, whichever is greater.

Support bus assembly to prevent twisting from eccentric loading.

Support bus assembly with not less than 3/8-inch (10-mm) steel rods. Install side bracing to prevent swaying or movement of bus assembly. Modify supports after completion to eliminate strains and stresses on bus bars and housings.

Fasten supports securely to building structure according to Division 16 Section "Basic Electrical Materials and Methods Electrical Supports and Seismic Restraints."

Install expansion fittings at locations where bus assemblies cross building expansion joints. Install at other locations so distance between expansion fittings does not exceed 90 percent of manufacturer's recommended distance between fittings.

Install fire stop fittings where bus assemblies penetrate fire-rated elements such as

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

walls, floors, and ceilings. Seal around penetrations according to Division 7 Section "Through-Penetration Fire-Stop Systems," and as directed by authorities having jurisdiction.

Install appropriate weather seal fittings and flanges where bus assemblies penetrate exterior elements such as walls or roofs. Seal around openings to make weather tight. See Division 7 Section "Joint Sealants" for materials and application.

Coordinate floor penetrations with structural Drawings.

Coordinate bus-assembly terminations to equipment enclosures to ensure proper phasing, connection, and closure.

Tighten bus-assembly joints with torque wrench or similar tool recommended by bus-assembly manufacturer. Tighten joints again after bus assemblies have been energized for 30 days.

Install bus-assembly plug-in units. Support connecting conduit independent of plug-in unit.

3.02 CONNECTIONS

Ground equipment according to Division 16 Section "Grounding and Bonding."

Connect wiring according to Division 16 Section "Conductors and Cables."

3.03 FIELD QUALITY CONTROL

Perform the following field tests and inspections and prepare test reports:

After installing enclosed bus assemblies and after electrical circuitry has been energized, test for compliance with requirements.

Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.4. Certify compliance with test parameters.

Remove and replace units that do not pass tests or inspections and retest as specified above.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

LIST OF APPROVED MANUFACTURER

*** All Equipment shall be procured from Principal Authorized agents / distributors / resellers.**

The Bidder shall fill name of only one manufacturer for each equipment/material on which the tender is based. He shall be bound to supply the equipment from the same manufacturer. In case, the Bidder gives names of more than one manufacturer against any equipment, the Engineer / Owner can ask the Bidder supply the equipment from any one of them.

At the evaluation stage if it is noted that any material offered by the bidder does not meet the specification requirements, the Engineer / Owner reserves the right to ask the bidder to replace his choice of equipment supplier meeting the required quality and specification requirement.

During the execution stage if the material from any supplier is found defective / substandard the Engineer / Owner reserves the right to ask the successful bidder to replace his choice of manufacturer / supplier for that particular equipment.

Any change in manufacturer / supplier shall only be entertained if there is sufficient reason that adhering to the original choice of manufacturer / supplier shall be detrimental to either the project quality or project timeline. Proper approval shall have to be sought for change in the choiced manufacturer / supplier at least 1 month before the equipment is to be procured.

Samples of all equipments shall have to be got approved prior to their procurement. Any deviation from the BoQ / Specification shall be listed in a separate sheet to be labeled as Annexure-1 containing the details of the deviation including the deviating BoQ item number.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

S. No.	Equipment/ Material	Manufacturer/Supplier
NOTE: The Bidder should note that only Equipment/materials from the following recommended manufacturers or approved equivalent shall be allowed to be used on this Project provided their products meet the specified requirements. All equipment shall be supplied from Manufacturer's own Plant/Facility. Equipment and materials specified with brand names have been provided in order to establish a standard of performance and do not necessarily indicate a preference for a particular manufacturer or material. The names of manufacturers given below are to indicate the level of quality and performance anticipated by the Engineer/ Employer. Other makes may be accepted provided that the quality and performance of such equipment in the sole opinion of the Engineer, are at least equal to or better than the equipment offered by the recommended manufacturer. The acceptance of equipment/ materials offered by these manufacturers will be subject to compliance of offered models/materials with the specifications, capacity and/or performance requirements. Onus lies with the Contractor for establishing the genuineness of any material/product for its make and origin.		
LOW VOLTAGE (LV) PRODUCTS		
1	***Dry Type Transformers***	a. Schneider b. ABB c. Siemens d. TRAFFO Electro SRL
2	***LV Switchboards / Distribution***	a. Schneider b. ABB c. Siemens d. Pak Electron Limited (PEL)
3	***Circuit Breakers***	a. Schneider Electric b. Terasaki c. ABB d. Siemens
4	***Load Break Switches***	a. Gewiss b. Kraus & Naimer c. Legrand d. Breter e. Clipsal
5	***Power Factor Improvement (PFI)***	a. Nokian b. Schneider Electric c. ABB d. Siemens
6	***Contactors***	a. Telemecanique (Schneider) b. Legrand c. ABB
7	***Push Buttons, Switches, etc.***	a. Schneider Electric b. Maruyasa
8	***LV Cables & Wires***	a. Pakistan Cables b. Newage Cables

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

		c. Fast Cables d. Pioneer Cables
9	***Cable Glands, Lugs, Terminals***	a. Cembre b. Hubbell / Hawke c. Hensel
10	***PVC / UPVC Conduits & Accessories***	a. SHAVYL b. Dadex c. Adamjee DuraBuilt d. Beta e. Polo
11	***GI Conduit & Accessories***	a. IIL b. Steelex
12	***Back Boxes / Pull Boxes / Enclosures***	a. Hussain & Co. b. Hensel c. Clipsal (Schneider) d. Power Engineers e. Davis
13	***Switch & Socket Outlets***	a. Schneider b. Legrand c. ABB d. ORANGE
14	***Fans & Accessories***	a. Lahore Fans b. GFC Fans c. Pak Fan b. Royal Fans
15	***Lighting Fixtures***	a. Philips (Signify) (Professional Series only) b. Osram (Professional Series only) c. Opple (Professional Series only) d. Ledos (Professional Series only)
16	***Lightning Protection & Earthing***	a. Dehn b. Furse c. Wallis d. Forend
17	***Cable Tray / Trunking***	a. JEI b. NIBS Engineering c. Suntech d. Techman e. PowerTech
18	***Uninterruptible Power Supply (UPS)***	a. APC (by Schneider) b. Centiel c. Eaton d. ABB e. Emerson (Vertiv)
19	***Busways***	a. Schneider Electric b. Siemens

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

		c. Pogliano d. Power Duct e. EAE
EXTRA LOW VOLTAGE (ELV)		
20	***Data Communication & Structured Cabling***	a. Vivanco b. Clipsal c. Panduit
21	***Telephone Cables***	a. Vivanco b. Clipsal (Schneider) c. Panduit
22	***Communication Racks & PDU***	a. Toten b. Corning c. Clipsal (Schneider) d. Panduit
23	***Fire Alarm System***	a. ESSER by Honeywell b. GENT c. EATON/Copper d. TITAN e. Detnov f. Lifeco
24	***Fire Resistance Cables***	a. CAVICEL b. Prysmian c. BELDEN
25	***Public Address System***	a. BOSCH b. TOA c. DSPPA
26	***Speaker Cables***	a. Draka b. Prysmian
27	***Exit & Emergency Light Fixtures***	a. Teknoware b. Menvier (Eaton) c. Schneider Electric

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECURITIES & EXCHANGE COMMISSION OF PAKISTAN

HEAD OFFICE BUILDING

PLOT NO. 25, MAUVE AREA G-11/1, ISLAMABAD, PAKISTAN.



Technical Specifications
Package-2a
Plumbing Works

Sep 2026 | Rev. 00

EA Consulting Pvt Ltd
Head Office:AL-9, 15th Lane, Khayaban-e-Hilal,Phase 7,
Defence Housing Authority, Karachi. 75500 - Pakistan
Phone No. 111-111-584, Fax No. 584-1825
Email : info@eaworld.com | www.eaworld.com

SPECIFICATIONS

INDEX

PLUMBING WORKS

S. No	Section	Description
1.	15140	Domestic Water Piping
2.	15145	Domestic Water Piping Specialties
3.	15150	Sanitary Water Piping Specialties
4.	15155	Drainage Piping Specialties
5.	15194	Fuel gas piping
6.	15440	Plumbing Pumps
7.	15460	Water Conditioning Equipment
8.	15480	Electric Water Heaters
10.	15554	Fuel oil piping
11.	15660	Plumbing Fixtures
List of approved manufacturers- Plumbing		

END OF INDEX

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 15140

Domestic Water Piping

Table of Contents

PART 1 - GENERAL....3
1.1 RELATED DOCUMENTS....3
1.2 SUMMARY....3
1.3 DEFINITIONS....3
1.4 PERFORMANCE REQUIREMENTS....3
1.5 SUBMITTALS....3
1.6 QUALITY ASSURANCE....3
PART 2 - PRODUCTS....4
2.1 MANUFACTURERS....4
2.2 PIPING MATERIALS....4
2.3 DOMESTIC COLD WATER BELOW AND ABOVE GRADE....4
2.4 DOMESTIC HOT WATER PIPING....5
2.5 IRRIGATION PIPES....5
2.6 VALVES....5
2.7 GATE VALVES....6
2.8 GLOBE VALVES....6
2.9 CHECK VALVES....6
2.10 RELIEF VALVES....7
2.11 BALL VALVES....7
2.12 FLOAT VALVES....7
2.13 SOLENOID VALVES....7
2.14 BIB TAPS....7
2.15 AUTOMATIC AIR VALVES....8
2.16 STRAINERS....8

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.17 DOUBLE REGULATING VALVES (Balancing Valves) 8
2.18 PRESSURE REDUCING VALVES 8
2.19 RELIEF VALVES 9
PART 3 - EXECUTION 10
3.1 EXCAVATION 10
3.2 PIPE AND FITTING APPLICATIONS 10
3.3 VALVE APPLICATIONS 10
3.4 PIPING INSTALLATION 11
3.5 HANGER AND SUPPORT INSTALLATION 11
3.6 FIELD QUALITY CONTROL 11

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. This Section includes domestic water piping inside the building.

1.3 DEFINITIONS

A. CPVC: Chlorinated polyvinyl chloride plastic.

B. PEX: Crosslinked polyethylene plastic.

C. PVC: Polyvinyl chloride plastic.

D. PPR: Poly propylene Random

1.4 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with 125 psig (860 kPa) unless otherwise indicated.

1.5 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Water Samples:

C. Field quality-control test reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components

C. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Refer Approved List of Manufacturers.

2.2 PIPING MATERIALS

A. The pipe materials shall as stated below.

2.3 DOMESTIC COLD WATER BELOW AND ABOVE GRADE

1. Polypropylene pipes PP-RCT pipe and fitting PN20 to DIN 8077 for pipe size up to 160mm dia or as per ASTM F2389, with fiberglass Reinforced Middle Layer, pressure rating to comply with temperature and pressure ratings of code requirements for the applicable service.

2. Piping to contain a fiberglass reinforced middle layer.

   a. Piping to be certified by NSF International to comply with NSF 14 and NSF 61, and ASTM F2389 or CSA B137.11.

   b. Polypropylene pipe is to be unthreaded. Threaded transition fittings in accordance with ASTM F2389 to be used where a threaded connection is required.

   c. The Physical properties to be as under.
      1) Thermal Expansion Coefficient
         a) Glass Fiber Reinforced Composite Pipes: 0.035 mm/m^{o}K
            Aluminum Foil Composite Pipes: 0.030 mm/m ^{o}K

3. Polypropylene Fittings: [Socket fusion for sizes NPS 1/2 to NPS 5 (DN 20 to DN 125)] [or] [Molded butt fusion for sizes NPS 6 to NPS 20 (DN 150 to DN 600)] in accordance with ASTM F2389.

   a. Fitting to comply with NSF 14 or CSA B137.11.
   b. Fittings NPS 4-1/2 (DN 115) and smaller to be plain type.

4. The pipe Manufacturer shall possess one of the following certifications
   a. WRAS
   b. DVGW
   c. NSF

2.4 DOMESTIC COLD WATER PIPES ON ROOF (IF INDICATED ON DRAWINGS)

1. Polypropylene pipes PP-RCT pipe and fitting PN20 to DIN 8077 for pipe size up to 160mm dia or as per ASTM F2389, pipe pressure rating to comply with temperature and pressure ratings of code requirements for the applicable service.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. cPVC Schedule 80 pipe as per ASTM D1784 and manufacturing as per ASTM F441 with Solvent Weld fitting to be produced as per ISO 15877 .

2.5 DOMESTIC HOT WATER PIPING

1. Polypropylene pipes PP-RCT pipe and fitting PN20 to DIN 8077 for pipe size up to 160mm dia or as per ASTM F2389, with fiberglass Reinforced Middle Layer, pressure rating to comply with temperature and pressure ratings of code requirements for the applicable service.

2. Piping to contain a fiberglass reinforced middle layer.

    a. Piping to be certified by NSF International to comply with NSF 14 and NSF 61, and ASTM F2389 or CSA B137.11.
    b. Polypropylene pipe is to be unthreaded. Threaded transition fittings in accordance with ASTM F2389 to be used where a threaded connection is required.
    c. The Physical properties to be as under.
        1) Thermal Expansion Coefficient
            a) Glass Fiber Reinforced Composite Pipes: 0.035 mm/moK
            Aluminum Foil Composite Pipes: 0.030 mm/moK

3. Polypropylene Fittings: [Socket fusion for sizes NPS 1/2 to NPS 5 (DN 20 to DN 125)] [or] [Molded butt fusion for sizes NPS 6 to NPS 20 (DN 150 to DN 600)] in accordance with ASTM F2389.

    a. Fitting to comply with NSF 14 or CSA B137.11.
    b. Fittings NPS 4-1/2 (DN 115) and smaller to be plain type.

4. cPVC Sch.80 pipe as per ASTM D1784 and ASTM F441 with Solvent Weld fitting to be produced as per ISO 15877 for pipe sizes above 160mm dia.

5. The pipe Manufacturer shall possess one of the following certifications
    a. WRAS
    b. DVGW
    c. NSF

2.6 IRRIGATION PIPES (within building)

1. uPVC pipes to BS 3505 with Class E with solvent welded fittings to BS 4346 for all pipe sizes.

2. Refer external works section for specifications of buried irrigation pipes

2.7 VALVES

A. Generally, all valves of the same type shall be of the same manufacturer and shall be PN-20. All gate, globe, angle, and swing check valves as a group shall be of the same manufacturer. All valves 50 mm and smaller shall be threaded and have bronze bodies.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. All valves 65 mm and larger shall be Cast iron type and shall be flanged (or grooved for grooved coupling joints).

C. For PPR-CT piping use PPR-CT Coated valves of the same piping material and from the same manufacturer. The valves shall be PN-20 to match the piping specifications.

D. Each valve shall be marked (engraved, stamped, or cast on each valve or metal tag, permanently attached to the valve) at the factory with the following minimum information

1. Manufacturer's Name.

2. Catalogue or Figure No.

3. Size and Pressure Class.

E. Arrows to indicate direction of flow on check, globe, angle, non-return, and eccentric plug valves.

F. The pipe Manufacturer shall possess one of the following certifications

1. WRAS

2. DVGW

3. NSF

2.8 GATE VALVES

A. [Size 50 mm and Smaller]. Furnish bronze valves with screwed-in bonnet, non-rising stem, solid wedge disc, and threaded ends. Pressure rating PN20.

B. [Size 65 mm and Larger]. Furnish Iron Body Bronze Mounted (IBBM) valves, i.e. cast iron body bronze trim valves, with bolted bonnet, non-rising stem, solid wedge disc, flanged ends, and renewable seat rings. Pressure Rating = 16 bars

2.9 GLOBE VALVES.

A. [Size 50mm and Smaller]. Furnish valves designed for minimum PN20 working pressures.

B. [Size 65 mm and Larger]. Furnish valves designed for minimum PN16 working pressure.

2.10 CHECK VALVES

A. [50 mm and smaller]. Furnish swing valves designed for minimum PN20 non-shock working pressures. Valves shall have renewable discs and side plugs, integral seats.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. [Size 65 mm and Larger Water Check Valves]. Valves shall be silent type spring loaded of the double door or wafer style. Valves shall be designed for minimum PN16 non shock water working pressure.

2.11 RELIEF VALVES.

Domestic Water Temperature and Pressure Relief Valve.

A. On hot water storage tanks provide an ASME rated thermostatic, self-closing, temperature and pressure relief valve, located in the relief valve openings of tanks. Valve shall have a minimum thermal discharge capacity equal to the input capacity of the heater standard pressure setting of 600 kPa and standard temperature setting of 100 - 140 degrees C. Relief valve pipe to discharge to floor drain.

2.12 BALL VALVES.

A. [Size 50 mm and Smaller]. Valves shall be standard port, 2-piece construction with screwed ends. Valves shall be designed for minimum PN20. Valves shall have bronze or brass body, stainless steel ball, steel handle with vinyl grip.

B. [Size 65 mm and Larger].Valves shall be standard port, BS 5159 with flanged ends. Valves shall be designed for minimum PN16 working pressure. Valves shall have steel body, chrome or nickel plated steel or stainless steel ball.

2.13 Float Valves

A. Float valves shall be installed as indicated in the drawings to provide consistent level control in reserve supply water storage tanks. The valve shall meet the requirements of the Water Byelaws for air gaps and shall be constructed throughout in approved materials and shall prevent back siphoning. Bronze equilibrium float valves 80 and above shall be flanged end, flat faced and drilled to suit BS4504 PN16.

B. Bronze equilibrium float valves upto 50 shall be screwed end BS2779 parallel and shall be provided complete with back nut.

C. Floats for valve sizes 80mm and above shall be of copper.

2.14 Solenoid Valves

A. Electrically operated solenoid valves shall be single phase 220V and shall be rated for the system pressure

2.15 Bib Taps

A. Bib-cocks shall be in accordance with BS 1010: 1973. They shall be provided with hose union nosepiece and hand wheel operated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.16 Automatic Air Valves

A. Automatic air valves shall have a bronze body with bolted cover and a 9mm top outlet.

2.17 Strainers

A. Up to and including DN50 strainers shall be manufactured from bronze and shall be of the 'Y' type with bolted cap, PN25 temperature/pressure rating.

B. Strainers above DN50 shall be manufactured from cast iron and shall be of the 'Y' type with bolted cap, PN16 temperature/pressure rating and shall be complete with drilled and tapped caps complete with drain cocks.

C. Strainers shall be provided with a medium grade screen sized such that in their clean condition the maximum pressure drop at the design flow rate shall not exceed 6kPa.

2.18 Double Regulating valves (Balancing Valves)

A. Size 50mm and smaller.

Furnish bronze variable office double regulating valve designed for minimum 300 PSI. Parabolic and slotted disk double regulating device. Screwed bonnet, rising stem, hand wheel operated with micrometer style indicator and pressure test points.

The Double Regulating valve shall offer precision of + 5% an all setting for precision control.

B. Size 65mm and larger.

Furnish cast iron variable office double regulating valve for minimum 300 psi Fitted with EPDM coated regulating disk, double regulating device and indicator, flanged to BS 4504 PN20. Inside screw, non-rising copper alloy stem, back seating feature and pressure test point.

2.19 PRESSURE REDUCING VALVES

A. Domestic Water Lines.

Pressure reducing valves shall be pilot controlled, hydraulically operated, diaphragm type with a low by-pass capability. The low-flow by-pass capability shall be achieved by using a balanced direct acting PRV as an integral part of the main valve. At very low flows when the main valve is almost completely closed, to prevent the possibility of cavitations the direct acting valve shall by-pass the main valve and maintain flow.

PRVs shall be bronze construction including the trim. The pressure reducing valves shall be suitable for maximum working pressure that exist within the system and downstream pressure should be site adjustable between 3 and 7 bar. Refer to Schematic drawings for the minimum locations at which PRV's shall be required. (All PRVs shall be equipped with built in pressure guage / PRVs shall be installed

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

as working & standby arrangement weather shown or not shown on drawings for Civil defence approval.

B. Fire protection services:

Where required for installation in the Fire Protection Systems, the PRV shall be direct acting, site adjustable type, of bronze (up to 50mm) or cast iron (65mm and larger) construction.

2.20 RELIEF VALVES

A. Domestic Water Temperature and Pressure Relief Valve.

B. On hot water storage tanks provide an ASME rated thermostatic, self-closing, temperature and pressure relief valve, located in the relief valve openings of tanks. Valve shall have a minimum thermal discharge capacity equal to the input capacity of the heater standard pressure setting of 600 kPa and standard temperature setting of 100 degrees C. Relief valve pipe to discharge to floor drain.

2.21 THERMOSTATIC TYPE MIXING VALVE

A. A Thermostatic Mixing Valve shall be installed on the hot water supply to fixture. It shall be Lead Free, cast copper silicon alloy body.

B. Lead Free, thermostatic valves shall comply with state codes and standards, where applicable, requiring reduced lead content.

C. The valve shall include integral filter washers and check valves and an adjust-ment cap with locking feature. The valve shall be provided with solder (-US), threaded (-UT), CPVC, (-CPVC) Quick Connect (-QC) or PEX (-PEX) or w/press union connections.

D. Thermostatic Mixing Valves are ideal for supplying sinks, baths, showers or lavatories with tempered water.

- Body: Lead Free cast copper silicon alloy
- Disc: Stainless steel
- Thermostat Assembly:Copper
- O-rings: Buna-N; EPDM
- Pistons: Polysulfone (PSU)
- Springs: Stainless Steel

E. Minimum Supply Pressure Static: 30psi (207 kPa)Inlet Temperatures: hot inlet, 120°F – 180°F (49°C – 82°C), cold inlet, 39°F – 85°F (4°C – 29°C)

F. Hot Water Inlet to Outlet Differential Temperature: 5°F (3°C) above set point Temperature Out: Field range: 80°F – 120°F (27°C – 49°C), adjustable. Accurate within ±3°F (1.7°C)

G. Maximum Temperature: 200°F (93°C) Maximum Pressure: 200-300psi

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.22 MODULATING TYPE FLOAT VALVES

A. The valve allows flow into the reservoir to the maximum high level where it closes drip-tight. The valve remains close when the reservoir level drops until the float reaches the pre-determined minimum reservoir level at which time it opens to refill the reservoir.

B. Float Valve shall be modulating type to maintain the tank level

C. Modulating type float valves shall be installed on all Incoming connections to Water tanks, Irrigation tanks, Filter make up water tanks as indicated in the drawings to provide consistent level control in reserve supply water storage tanks.

D. Bronze equilibrium float valves 80 and above shall be flanged end, flat faced and drilled to suit BS4504 PN20.

E. Bronze equilibrium float valves upto 50 shall be screwed end BS2779 parallel and shall be provided complete with back nut.

F. The Body shall be Ductile Iron. Seat rings and stem shall be 316 stainless steel.

G. Floats for valve sizes 80mm and above shall be of copper or Plastic (as per manufacturer recommendation).

H. The valve shall be rated at 300 PSI to withstand a working pressure of 300 PSI without leakage

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavating, trenching, and backfilling are specified in Section "Earthwork."

3.2 PIPE AND FITTING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Grooved joints may be used on aboveground grooved-end piping.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.

2. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Drain Duty: Hose-end drain valves.

B. PPR Coated PN-25 rated ball, butterfly, and check valves may be used in matching piping materials.

3.4 PIPING INSTALLATION

A. Install domestic water piping level without pitch and plumb.

B. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

3.5 HANGER AND SUPPORT INSTALLATION

A. Install supports according to Section "Hangers and Supports."

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

D. Install hangers for PVC/cPVC/PPR and PE piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 (DN 50) and Smaller: 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
5. NPS 8 (DN 200): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

E. Install supports for vertical PVC/cPVC/PPR piping every 48 inches (1200 mm).

3.6 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Test domestic water piping as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to water pressure of 150 psi or 50 psi above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION- 15145

DOMESTIC WATER PIPING SPECIALITIES

Table of Contents

PART 1- GENERAL 4

1.1 WORK INCLUDED 4

1.2 QUALITY CONTROL 4

1.3 SUBMITTALS 4

PART 2 - PRODUCTS 4

2.1 AIR VENTS 4

2.2 EXPANSION COMPENSATORS 5

2.3 FLEXIBLE PIPE CONNECTORS 6

2.4 WATER CHEMICAL FEEDER (I.E. MANUAL DOSING POT) 6

2.5 STRAINERS 6

2.6 UNIONS 6

2.7 PRESSURE GAUGES 7

2.8 THERMOMETERS 7

2.9 THERMOMETER SOCKETS 7

2.10 TEST WELLS 7

2.11 INSULATING COUPLINGS 7

2.12 TEST PLUGS 8

2.13 DUPLEX FILTERS 8

2.14 WATER HAMMER ARRESTOR 8

2.15 PUDDLE FLANGES 9

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.16 FLOW SENSING DEVICES 10
2.17 WATER METERS 10
2.18 PIPING SPECIALITIES IDENTIFICATION 10
2.19 BACKFLOW PREVENTERS 10
2.20 VACUUM BRAEKERS 11
2.21 RELIEF VALVES 11
2.22 CURB STOPS AND SURFACE BOXES 11
2.23 EXPANSION COMPENSATORS 12
2.24 DRAIN POINTS 12
PART 3 - EXECUTION 12
3.1 PREPARATION 12
3.2 INSTALLATION/APPLICATION/PERFORMANCE/ERECTION 12
3.3 THERMOMETERS 13
3.4 TEST WELLS 13
3.5 PRESSURE/TEMPERATURE TEST PLUGS 13
3.6 PRESSURE GAUGES 13
3.7 PRESSURE SNUBBERS 13
3.8 COIL SYPHONS 13
3.9 GAUGE VALVES 14
3.10 EXPANSION LOOPS 14
3.11 EXPANSION COMPENSATORS 14
3.12 FLEXIBLE PIPE CONNECTORS 14
3.13 STRAINERS 14

3.14 BACKFLOW PREVENTER 14

3.15 AIR VENTS 15

3.16 SUCTION DIFFUSERS 15

3.17 FLOW SENSING DEVICES 15

3.18 WATER METERS 16

3.19 DRAIN POINTS 16

3.20 TESTING OF PIPEWORK AND PIPEWORK SPECIALITIES 16

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

PART 1- GENERAL

1.1 WORK INCLUDED

A. Compliance with General Requirements of relevant sections.

B. Conform to General Requirements for Mechanical Services of Division 15.

1.2 QUALITY CONTROL

A. Design working pressure to be 16 bar for all pipe work, specialties and equipment unless stated otherwise. Contractor to ensure that all components of pipe work installation are suitable for the working pressure and test pressure to be applied.

B. All relevant British Standards.

1.3 SUBMITTALS

A. All materials submittals shall include a detailed, clause-wise, compliance statement.

B. All materials submittals shall include detailed catalogues, product literature and descriptions of all equipment and fittings with selection charts, capacities etc. All material submittals shall include copies of relevant standards.

C. Provide detailed shop drawings of the items of equipment being provided, indicating the dimensions, materials and characteristics.

D. Materials selection data to be submitted.

E. Submittals for sample/mock-up of piping specialities required for approval by Consultant.

PART 2 - PRODUCTS

2.1 AIR VENTS

A. Air vents shall be installed on all coils and all other high points required for efficient operation and venting of system.

B. Air vents shall be provided at all high points in the pipe work, whether indicated on the drawings or not.

C. Large diameter automatic air vents shall be provided at all primary venting positions, such as plant rooms and at the head of vertical risers.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. For coils and similar cased appliances, the air cock shall be located for convenient operation external to the outer casing.

E. Air bottles shall be provided at all venting points.

F. Air bottles shall be formed from pipe of equal bore to the pipe being vented and of length equal to the bore plus 150 mm. Each air bottle shall be provided with a 6 mm vent pipe welded into the top and terminating in a conveniently accessible position, approximately 1.600 m above floor level, with a 6 mm lock shield needle valve. The needle valve shall be provided with a 6 mm tailpiece with mitred end.

G. Each automatic air vent shall be preceded by a lock shield pattern stop valve, and the discharge from the air vent shall be 12 mm copper pipe terminating with an open discharge in a position to be agreed over a conveniently located drain, gulley or sump.

H. The contractor shall be responsible for the design and positioning of all air vents.

I. Automatic Vents.

For fire protection systems (i.e. sprinklers and wet risers) the vents shall be approved by the Local Authority.

Vents on air separators shall be float actuated designed to purge free air from the system and provide positive shut-off at the working pressures kPa at a maximum working temperature . Vents shall be tightly sealed against loss of system water and prevent entrance of air in negative pressure situations. Vents shall be constructed of cast iron and fitted with components of stainless steel, brass, EPDM, and silicone rubber.

J. Manual Vents.

The vents on coils and other mechanical equipment shall be as per approved equipment manufacturer's standards. Only these may be manual type and all other vents shall be automatic.

2.2 EXPANSION COMPENSATORS

A. Expansion compensators for 75 mm diameter pipe and larger shall be packless bellow type with equalizing rings, stainless steel bellows, limit stops, internal telescoping sleeves and carbon steel bevelled welding ends.

B. Expansion compensators for 65mm diameter and smaller shall be packless bellows type with stainless steel bellows, anti-torque device, limit stops, guides and threaded pipe ends.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.3 FLEXIBLE PIPE CONNECTORS

The flexible connector shall be made of multi-layer in nylon tire cord fabric reinforcement with EPDM cover and liner. Straight connectors shall have minimum two spheres. Connectors 50mm and smaller may have threaded ends. Larger sizes shall have baked enamel ductile iron floating flanges. There shall be a molded in ductile iron reinforcing ring.

Standard duty flexible connector shall be rated for 1723 kPa at 76.6°C, and 1130 kPa at 121 °C.

Where flexible connectors are connected to unanchored piping or isolated equipment, provide control cables and rods when pressure exceeds the maximum recommended for this application by the manufacturer.

Flexible hoses shall be stainless steel braid and carbon steel fittings.

2.4 WATER CHEMICAL FEEDER (I.E. MANUAL DOSING POT)

The unit shall be a steel one, shot type with the design pressure in accordance to the system pressure. Feeder shall be supplied complete with fill and drain valves, filling funnel, and air cock. Provide non return valve at pipe connections to dosing pot.

2.5 STRAINERS

A. Furnish "Y" type strainers throughout the job unless specifically noted otherwise. Furnish one manufacturer throughout Project.

B. Strainers 50 mm and smaller.

C. Furnish screwed ends, screwed bronze cap and gasket in sizes 40 mm and smaller and with a bolted cap on 50 mm size. Screens on water service shall be made of Type 316 F stainless steel with screen perforation of 0.8mm. Furnish bronze strainers to BS 1400 LG2 in all piping upto 50mm diameter.

D. Strainers 65 mm through 300 mm.

E. Furnish flanged ends, bolted iron cap and gasket cast iron body to BS 1561 – GJL – 250 or Ductile iron. Screens on water service shall be Type 316 stainless steel with screen perforation of 0.6mm. Strainer shall be rated for PN16 (minimum).

2.6 UNIONS

A. All unions in steel pipes shall be minimum 1200 kPa malleable iron, screwed, with brass to iron ground joints.

B. All unions in copper pipe shall be cast bronze, wrought copper or wrought bronze, with threaded or solder-joint tube ends.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.7 PRESSURE GAUGES

A. General.

Provide pressure gauges with white dial and black scale, size 115 mm dial. Locate gauges for easy reading. Install gauges as shown and on all pumps. Equip each gauge with an integral or separate siphon and connect by means of a brass snubber pipe and fittings containing a shut-off cock.

B. Pressure Gause shall be 304 Stainless Steel for corrosion resistance. The Lense shall be polycarbonate or Acrylic glass for clarity and impact resistance. Gauges for Fire pump room shall be of tempered glass.

C. Water system pressure gauges shall have a range to cover pumping head as well as static head. Ideally the gauge should cover 2.5 times the design pressure head.

D. All Gauges shall be Glycol-filled pressure gauges (or glycerin-filled) to offer better durability, vibration dampening, and environmental resistance. The accuracy shall be ±1.6% to ±2.5% of full scale, a standard ambient temperature range shall be -20°C to 60°C.

2.8 THERMOMETERS

A. Thermometers in water systems.

Furnish thermometers of the bimetal dial type with brass insert. The case diameter shall be 160mm. Casing and bezel ring made of stainless steel. Window shall be of instrument glass. Thermometers shall be mounted for convenient reading. Install stems longer than pipe diameters in pipe tee. Ranges shall be as follows:

Chilled Water - 0 to 60 degrees C. Hot Water - 1 to 116 degrees C.

2.9 THERMOMETER SOCKETS

Sockets shall be made of Brass with threaded connections suitable for thermometer stems and temperature control sensing elements in pipeline. Furnish with extension necks for insulated piping systems.

2.10 TEST WELLS

Test wells shall be similar to thermometer sockets except with a brass cap that thread into the inside of the test well to prevent dirt from accumulating. Secure cap to body with a short chain. Furnish with extension necks, where appropriate, to accommodate the pipeline insulation.

2.11 INSULATING COUPLINGS

Provide at all interconnections between piping systems of dissimilar material and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

at all connections of piping systems to equipment where piping and equipment are of dissimilar materials the appropriate sizes of insulating couplings. Couplings shall be specifically designed for the purpose of electrically isolating pipelines from other piping systems or equipment.

2.12 TEST PLUGS

A. Provide test plugs of solid brass or stainless steel at locations shown on Drawings and as required for the efficient and proper testing and commissioning of the system. Plugs shall be capable of receiving either a temperature probe or pressure probe. Fittings shall have a valve core of neoprene suitable for temperatures to 100 deg C., and shall be rated for zero leakage for highest working pressures of the respective systems.

B. Provide two (2) test kits each consisting of a minimum 65 mm dial face pressure gauge, with pressure ranges expected within the system; 25 mm dial thermometer, -4 to 52 degrees C.; and a standard gauge adapter all contained within a carrying case. The pressure gauge and thermometers shall be capable of easy recalibration.

2.13 DUPLEX FILTERS

Where indicated on drawings install duplex filters complete with GRP body, quick release cover for ease of basket removal without the need for tools or lifting gear, resilient cover O-seals, multiple light weight baskets for easy manhandling, sliding gate valves with positive compression seating, stepped angle basket seat for positive basket seating, robust basket support cages complete with replaceable mesh insets, external valve position indicators showing which chamber is on stream, replaceable valve seats, synchronized chain drive and external pressure equalizing valve. All parts in contact with water (except strainer basket) shall be provided with fusion bonded epoxy coating. Strainer basket shall be of bronze.

Refer specification section “Water Conditioning Equipment” for details on Water Filters, softeners and other filtration equipment.

2.14 WATER HAMMER ARRESTOR

A. In open circuit water systems where ever shown on drawings install water hammer arrestors in each branch connection and in particular each vertical branch or pipe run.

B. Water hammer arrestors shall PDI Type A with 15mm thread size. The Body shall be of Seamless L Type copper. The Water hammer arrestors shall be piston type with brass Piston.

A. Water hammer arrestors shall be selected for following conditions.
B. Maximum working pressure: 350 Psi
C. Maximum temperature : 250 deg.F
D. Burst tested 2900 PSI

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Sample Catalogue Cut sheet

WATER HAMMER ARRESTERS

» 650 SERIES **HydraRester**

ITEM # SUBMITTED_____
JOB NAME_____
LOCATION_____
ENGINEER_____
CONTRACTOR_____
PO#_____ TAG_____

SPECIFICATION

Sioux Chief 650 Series piston-type water hammer arresters shall be required in piping systems. Water hammer arresters shall have sufficient volume of air to dissipate the calculated kinetic energy generated in the piping system. Arresters shall be effective when installed at any angle. Arresters shall be approved for installation with no access panel required. Water hammer arresters shall be ANSI/ASSE 1010 2004 certified. Arresters shall be sized and placed per manufacturer's instructions.



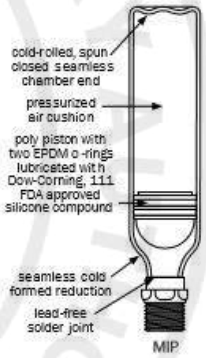
652-A

MATERIALS

Arrester body: type L copper tube
Piston: poly piston with two EPDM o-rings
Male thread fitting: copper MIP thread
Piston lubrication: Dow-Corning, 111 FDA approved silicone compound
PEX F1960 fitting: No Lead EcoBrass 69300

WORKING LIMITS*

Max working temperature: 250°F
Max working pressure: 350 PSIG
Burst tested: to 2,900 PSIG
* PEX and CPVC connection specifications are limited to those called out in their respective ASTM Standards for Fittings (CPVC D2846, PEX F1807, PEX F1960).



INSTALLATION

Angle: May be installed at any angle
Access panels: No access panels required
Sweat connection: Compatible with Press Fittings or Push Fittings

SIZING & PLACEMENT

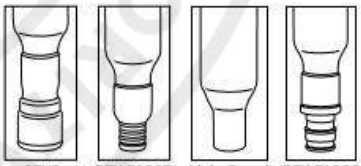
Refer to instructions on product package, catalog or website.

CERTIFICATIONS/APPROVALS

Certified by ASSE to the ANSI/ASSE 1010-2004 standard

DIMENSIONS

Arrester size	A	B	C	D	E	F
Overall height						
male thread	6½"	8¾"	11"	10½"	12⅝"	15½"
male sweat	8¼"	10"	12½"	11"	13½"	16"
CPVC	7½"	9½"	12"	—	—	—
PEX F1807	6½"	8¾"	11"	—	—	—
PEX F1960	6½"	8¾"	11"	—	—	—
Chamber width	1⅜"	1⅜"	1⅜"	2⅛"	2⅛"	2⅛"
Connection size	½"	¾"	1"	1"	1"	1"
Volume (cu. in.)	5	7	11	20	29	36
Fixture units	1–11	12–32	33–60	61–113	114–154	155–330



2.15 PUDDLE FLANGES

A. Where pipe work passes through the external walls of the buildings or trenches below ground level, the Contractor shall supply and cast or built puddle flanges into the structure.

B. Puddle flanges are to be manufactured from the same material as the pipe work of which they form a part.

C. Each puddle flange shall comprise a length of pipe, flanged or screwed at end

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

according to diameter with an undrilled slip on flange welded on the outside at a point where it will be located mid way in the thickness of the wall. The puddle flange is to be painted externally with two coats of bituminous paint before being built into the structure.

D. Refer Grey works specifications for details of Puddle Flanges

2.16 FLOW SENSING DEVICES

A. Contractor shall provide all flow sensing devices as indicated on the drawings. Proper schedule indicating the flow rate that is to be sensed, the type of flow sensing device, and the permanent pressure loss at the design flow rate shall be submitted for approval of the Consultant.

The flow sensors shall be one of following types:

PITOT TUBE FLOW SENSORS: Multi-port averaging type flow sensor designed to sense the velocity of a fluid flowing in a pipe and produce a pressure output that is proportional to the fluid velocity

VORTEX SHEDDING FLOW SENSORS: Wafer type, unit with an analogy output.

All flow sensing devices shall be compatible with BMS system.

2.17 WATER METERS

Meters shall meet local regulations and BS and/or ANSI/AWWA Standards. Install water meters on cold water line to each building, on makeup water line to hot water and chilled water systems ahead of water pressure reducing valve and as shown on drawings. Water meters shall be digital type and shall be linked to BMS for monitoring.

2.18 PIPING SPECIALITIES IDENTIFICATION

Refer to Section 15075 MECHANICAL IDENTIFICATION

2.19 BACKFLOW PREVENTERS

A. Unless otherwise required by BS Standards and Codes, backflow preventers shall be of the double check valve type incorporating resilient elastic and positively tight seals designed to permit water to flow in one direction only.

B. 50 mm (2 inch) nom. dia. and smaller:

   a. Bronze body, stainless steel trim with atmospheric vent, complete with strainer, gate valves, test cocks and air gap fitting at vent connection.

C. 65 mm (2 1/2 inch) and larger:

   a. Bronze body, stainless steel trim with atmospheric vent, complete with

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

flanged strainer and gate valves, test cocks and air gap fitting at vent connection.

D. Backflow preventers shall be suitable for installation in horizontal or vertical position. They shall be pressure rated for 16 bar and BS kite marked.

Construction shall be:

Body	- Bronze
Check valve	- Brass
Drain valve	- Brass
Seals/Membrane	- Nitrile : NBR Rubber
Springs/bolts/Nuts	- Stainless steel

2.20 VACUUM BRAEKERS

A. Chrome plated brass, atmospheric type with flat pipet type, rubber discs and hose thread outlet.

B. Bronze body, pressure type with heat resistant disc opening to atmosphere at less than 12 mm (1/2 inch) mercury vacuum.

2.21 RELIEF VALVES

A. Pressure Relief Valves

a. Bronze body, stainless steel spring and trim, with pipet type manual actuation lever. The unit shall be present and sealed at the factory. The label shall contain the manufacturer's name, serial no., maximum working pressure and set pressure.

B. Pressure and Temperature Relief Valves

a. Bronze body, stainless steel spring and trim, one ceramic coated temperature sensing element and pipet type manual actuation lever. The unit shall be rated for relieving the maximum heat input to the water heater and present and sealed at the factory. The label shall contain the manufacturers name, Serial no., maximum working pressure and temperature, set pressure and temperature and relieving capacity in Btuh.

2.22 CURB STOPS AND SURFACE BOXES

A. All bronze ball valve with union or pack joint ends with extended spindle and base. The base shall have a telesopic extension with threaded top for receiving the lid and arch pattern or directly threaded on base. The lid shall have a brass pentagonal operating head

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.23 EXPANSION COMPENSATORS

A. Provide expansion compensators for the expansion and contraction of all pipes. expansion compensators to have sufficient flexibility to prevent end thrust and movements caused by thermal expansion or contraction causing detrimental distortion or damage of connected equipment. Provide offsets between mains and equipment of sufficient length to safely absorb the expansion of the main. Provide guides as necessary.

B. Provide expansion compensator for all pipes crossing building expansion joints.

2.24 DRAIN POINTS

A. Adequate provisions shall be made for emptying sections of all services as required for maintenance purposes whether indicated on the drawing or not.

B. Particular attention shall be paid to the requirements of the Civil Defence and the NFPA regulations with respect to the provision of drain taps on fire service pipework systems.

C. All cylinders, coils and pumps together with all low points of pipework within plant rooms shall be provided with drain cocks.

D. All other low points shall be provided with drain taps.

E. Drain cocks shall be in accordance with BS 2879 : 1980

F. Schemes involving external distribution mains below ground level are to be provided with ample sized dirt pockets to which the drain cock shall be provided. Underground mains shall be provided with a 54 mm gland cock with hose union outlet at the lowest position for the purpose of flushing out.

PART 3 - EXECUTION

3.1 PREPARATION

Piping and Fittings. Ream all pipes to full inside diameter after cutting and thoroughly clean before erection.

3.2 INSTALLATION/APPLICATION/PERFORMANCE/ERECTION

General:
Provide valves at each piece of equipment to isolate equipment from its connected system. Locate strainers and valves as necessary to provide easy isolation and cleaning of strainers.

Strainers shall be installed ahead of all automatic valves and elsewhere as

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

indicated on Drawings. Provide a ball valve and 1.5 m of rubber hose in the blow off opening of each strainer.

Unions shall be provided adjacent to each screwed type valve and shall be on the outlet side of the valve.

Install thermometers and gauges for easy reading.

Furnish piping accessories where shown and as necessary for complete installation of mechanical Work.

3.3 THERMOMETERS

A. Stem type:

Install in piping systems as indicated on the drawings and/or details using a separable socket in each location.

B. Thermometer Sockets

Install at each point where a thermometer or temperature control sensing element is located in a pipeline.

3.4 TEST WELLS

Install in piping systems as indicated on the drawings and/or details wherever provisions are needed for inserting a thermometer at a later date.

3.5 PRESSURE/TEMPERATURE TEST PLUGS

Install in piping systems as indicated on the drawings and/or details. Do not insulate over test plugs.

3.6 PRESSURE GAUGES

Install in locations where indicated on the drawings and/or details, including any gauge piping, with scale range appropriate to the system operating pressures.

3.7 PRESSURE SNUBBERS

Install in gauge piping for all gauges used on water services.

3.8 COIL SYPHONS

Install in gauge piping for all gauges beside vibrating equipment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.9 GAUGE VALVES

Install at each gauge location as close to the main as possible and at each location where a gauge tapping is indicated.

3.10 EXPANSION LOOPS

Install where indicated on the drawings or details, locating anchors and guides as detailed.

3.11 EXPANSION COMPENSATORS

A. Provide expansion compensators for the expansion and contraction of all pipes. Install expansion compensators to have sufficient flexibility to prevent end thrust and movements caused by thermal expansion or contraction causing detrimental distortion or damage of connected equipment. Provide offsets between mains and equipment of sufficient length to safely absorb the expansion of the main. Provide guides as necessary.

B. If expansion compensators in chilled water lines are installed at a time when the ambient air temperature is above 30°C, they shall be pre-compressed in accordance with manufacturer's installation instructions. Expansion compensator shall have sufficient number of corrugations to absorb the expansion between anchors in the pipe plus not less than 25% safety factor for the temperature range between 4° C to 50° C.

C. Provide one expansion compensator between every two rigid supports for all chilled water risers. Provide guides at distances of 4 pipe diameters, 14 pipe diameters and at 3 meter intervals after that, from the expansion compensator.

D. Provide expansion compensator for all pipes crossing building expansion joints.

3.12 FLEXIBLE PIPE CONNECTORS

A. Provide flexible connectors at all pumps.
B. Provide flexible hoses for all fan coil units
C. Install units as per manufactures printed installation instructions.
D. Support pipes and equipment such that connector carries no weight

3.13 STRAINERS

Install all strainers where required or indicated on the project details, allowing sufficient space for the screens to be removed. Rotate screen retainer where required by the installation so blow down can remove accumulated dirt from the strainer body.

3.14 BACKFLOW PREVENTER

Provide back flow preventer at connections to all fountain, laundry and kitchen equipment, water coolers and as required by BS 6700.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.15 AIR VENTS

A. Manual key type vents:

Install at all high points where air may collect and not be carried by the system fluid. Use a soft Type L copper "pigtail" so the vent can be positioned for venting and collecting any water that might escape.

B. Automatic vents:

Install on the top of air separators on systems using bladder type expansion tanks. Install at other locations as indicated on the drawings or details. All locations to have a ball valve installed upstream of the vent for maintenance purposes.

3.16 SUCTION DIFFUSERS

A. Install at each pump suction connection for end suction pumps where shown. Provide sufficient space for removal of the strainer. Install a capped drain valve in the blowdown connection. Install support below the suction diffuser so the weight of the suction piping does not rest on the pump suction connection.

B. Install a pressure gauge across the suction diffuser, valved so that a single gauge can be used to read the inlet pressure and the outlet pressure across the strainer. Use gauge valves as specified with the gauges. This gauge can be the same one used to read pressures across the pump. Select gauge range appropriate to the system pressures.

C. Open the drain valve and blow down the strainer after system cleaning and again after 30 days of operation. If the unit is furnished with a fine mesh startup strainer, remove this strainer after the system has been flushed and cleaned.

3.17 FLOW SENSING DEVICES

A. Pitot tube flow sensors:

Install where indicated on the drawings and details for flow sensing in hydronic and/or steam piping systems. Butterfly valves installed at the location of a flow sensing device are to have a memory stop.

B. Vortex shedding flow sensors:

Install where indicated on the drawings and details for flow sensing in hydronic and/or steam piping systems. Do not install close to elbows, valves, or other piping specialties which might affect the reading of the sensor; follow manufacturer's installation instructions. Butterfly valves installed at the location of a flow sensing device are to have a memory stop.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.18 WATER METERS

Install water meters on makeup water line to hot water and chilled water systems ahead of water pressure reducing valve.

3.19 DRAIN POINTS

A. Adequate provisions shall be made for emptying sections of all services as required for maintenance purposes whether indicated on the drawing or not.

B. Particular attention shall be paid to the requirements of the Civil Defence and the NFPA regulations with respect to the provision of drain taps on fire service pipe work systems.

C. All cylinders, coils and pumps together with all low points of pipe work within plant rooms shall be provided with drain cocks.

D. All other low points shall be provided with drain taps.

E. Drain taps shall also be provided on the flow and return of all sub-circuits provided with isolating facilities and shall be located on the isolated side of the valves

F. Drain cocks shall be in accordance with BS 2879 : 1980

G. Schemes involving external distribution mains below ground level are to be provided with ample sized dirt pockets to which the drain cock shall be provided. Underground mains shall be provided with a 54 mm gland cock with hose union outlet at the lowest position for the purpose of flushing out.

H. The Contractor shall be responsible for the design and positioning of all drain points.

3.20 TESTING OF PIPEWORK AND PIPEWORK SPECIALITIES

A. Refer to Section 15950 TESTING ADJUSTING AND BALANCING

B. Unless specifically indicated otherwise, Contractor shall apply following general procedures.

C. All pipework shall be tested hydraulically after assembly on site and before any insulation is applied or pipework made inaccessible by building cladding, to a pressure equal to twice the working pressure. If the working pressure is greater than 600 kPa the test pressure may be one and a half times the working pressure. The minimum test pressure for water pipes shall be 700 kPa.

D. Hydraulic pressure tests shall be carried out by means of a purpose made test

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

pump, which shall be locked after the desired pressure is obtained.

E. The test pressure shall be registered at the lowest part of the system being tested and maintained for a period of two hours during which time all parts must remain completely watertight and no pressure loss is indicated on the test gauge. In the case of Fire Mains wet risers and Hose reel supplies, the pressure test shall be maintained for 24 hours. Any leakage must at once be made good and the pressure test repeated until the desired test conditions are maintained. During this period all welds on steel pipe shall be well hammered. Any defects shall be made good and the relevant section shall be re-tested all at the Contractor's expense.

F. Water Heaters, Cylinders, Pumps and any other ancillary items of equipment which may be liable to damage by the test pressure, shall be isolated or suitably protected during the test, and all necessary precautions shall be taken. Any damaged equipment shall be replaced.

G. In order not to delay the building operations sections of the pipe work may be pressure tested independently as the work progresses. All necessary plugs, caps or blank flanges shall be provided for testing and these shall be removed after the pressure tests have been approved.

H. A test certificate shall be issued for each section of the pipe work satisfactorily.

3.21 ADJUSTMENT AND CLEANING

Valves and Specialities.

All valves and specialities shall be adjusted to operate smoothly and without binding or leaking. All vents shall be tested and proven to open freely for passage of air.

Locate strainers as necessary to allow easy cleaning.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 15150

Sanitary Waste and Vent Piping

Table of Contents

PART 1 - GENERAL 2
1.1 RELATED DOCUMENTS 2
1.2 SUMMARY 2
1.3 DEFINITIONS 2
1.4 PERFORMANCE REQUIREMENTS 2
1.5 SUBMITTALS 2
1.6 QUALITY ASSURANCE 3
PART 2 - PRODUCTS 3
2.1 PIPING MATERIALS 3
2.2 ABOVE GROUND SOIL, WASTE AND VENT PIPE 3
2.3 BELOW GROUND SOIL AND WASTE PIPE 4
2.4 STORM WATER PIPE 4
2.5 CONTENSATE DRAIN PIPING (ABOVE AND BELOW GRADE) 4
2.6 PRESSURE PIPING FROM PUMPS (ABOVE AND BELOW GRADE) 4
2.7 IRRIGATION PIPING 4
2.8 SUBSOIL PIPING 5
2.9 SPECIAL PIPE FITTINGS (Autoclave Drainage) ..... **Error! Bookmark not defined.**
2.10 ENCASEMENT FOR UNDERGROUND PIPING CROSSING DRIVEWAYS 5
PART 3 - EXECUTION 7
3.1 EXCAVATION 7
3.2 PIPING INSTALLATION 7
3.3 HANGER AND SUPPORT INSTALLATION 8
3.4 CONNECTIONS 8
3.5 FIELD QUALITY CONTROL 8
3.6 PROTECTION 9

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building:

1. Pipe, tube, and fittings.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. LLDPE: Linear, low-density polyethylene plastic.

D. NBR: Acrylonitrile-butadiene rubber.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

G. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa) .
2. Sanitary Sewer, Force-Main Piping: 150 psig (1035 kPa).

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events.

1.5 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Shop Drawings:

1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.
2. Drainage System: Include plans, elevations, sections, and details.

C. Field quality-control inspection and test reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Piping materials shall be as under. All PVC drainage pipes and fittings shall be Kite Mark (wherever specified).

2.2 ABOVE GROUND SOIL, WASTE AND VENT PIPE

A. All horizontal soil, waste pipes and rain water shall be Poly Propylene (PP) sound proof drainage pipes as per DIN 4109 and Din 4102 and fittings made of mineral-reinforced polypropylene homopolymer and copolymer. The typical density of the mineral filler shall be between 1.65 to 1.90 g/cm3 according to DIN 53479.

B. The sound isolation shall be 13 DB for 4.0 l/s flow rate in accordance with DIN 52379 and DIN 4109

C. The sound proof pipes & fittings shall be fire resistant class B2 to DIN 4102.

D. The sound proof pipes & fittings shall be fungus and bacteria resistant, and shall have smooth surface, corrosion resistant.

E. Soundproof drainage pipe system shall comply with following standards:
1. DIN 4109m sound proof, absorption standards.
2. DIN 4102, B2. Self-extinguishing flameless.
3. DIN 19560 / DIN EN 1451. Hot water resistance, 95°C (Long term), 95°C (short term).

4. Physical Characteristics

Density	1.65 g/cm³ DIN 53479
Elongation at break	50%
Tensile strength E-modulus	20N / mm²

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Linear expansion	
E-modulus	3800 N / mm²
Linear expansion	0.04 mm / mk

5. The floor trap shall also be of sound proof material to DIN 4109.

2.3 BELOW GROUND SOIL AND WASTE PIPE

A. uPVC conforming to the following British Standards:
   1. Pipes 110mm and 300mm diameter: uPVC pipe with solvent weld fitting as per BS 4660 (BS EN 1401) with solvent weld fittings.
   2. All buried piping shall ne SN-8
   3. Pipes larger than 300mm diameter: to BS 3506.

2.4 STORM WATER PIPE

A. Rain water shall be Poly Propylene (PP) sound proof drainage pipes as per DIN 4109 and Din 4102 and fittings made of mineral-reinforced polypropylene homopolymer and copolymer. The typical density of the mineral filler shall be between 1.65 to 1.90 g/cm3 according to DIN 53479
   1. Refer Section 2.02
   2. Pipes and fitting shall be from same brand.

2.5 CONTENSATE DRAIN PIPING (ABOVE AND BELOW GRADE)

A. uPVC conforming to the following British Standards:
   1. Pipes 20mm and 300mm diameter: uPVC class ‘E’ pipe with solvent weld fitting as per BS 3505.
   2. All condensate Drain pipes to be insulated with closed cell rubber insulation as specified in section “Insulation”

2.6 PRESSURE PIPING FROM PUMPS (ABOVE AND BELOW GRADE)

A. uPVC conforming to the following British Standards:
   1. Pipes 20mm and 300mm diameter: Upvc class ‘E’ pipe with solvent weld fitting as per BS 3505.
   2. Pipes and fitting shall be from same brand.

2.7 IRRIGATION PIPING

A. uPVC conforming to the following British Standards:
   1. Pipes 20mm and 300mm diameter: Upvc class ‘E’ pipe with solvent weld fitting as per BS 3505.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.8 SUBSOIL PIPING

A. HDPE PN-100 PN-6 conforming to the following British Standards:

1. All External Storm Drainage pipes shall be high density polyethylene pipes (HDPE) and shall comply with the requirements of DIN 8074/8075 or DIN 19535-1/19535-2 or ISO 4427 type PE 100 PN-6 or as per wall thickness mentioned in Table 1-1. Tests are made in accordance with American Standards ASTM D1248/D3035/F714 or Equivalent ISO Standards.

2. Fabricated Fittings: All Drainage fittings comprising of Drainage- Y, 22.5 Degree bend, 45 degree bend and COP shall be fabricated using the pipe of same specifications and complying ASTM D 3350 or ISO Standard, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.

3. All fitting less than 50mm diameter can be electrofusion type. Compression fittings are also acceptable from branch connectionless than 50mm.

4. The pipes shall be suitable for underground installation.

5. The pipe nominal size and wall thickness shall be to the following dimensions.

Pipe Diameter (mm)	Min Wall Thickness (mm)	Max Wall Thickness (mm)
50	3.0	3.5
75	3.0	3.5
90	3.5	4.1
110	4.2	4.9
125	4.8	5.5
160	6.2	7.1
200	7.7	8.7
225	8.5	9.5
250	9.6	10.8
315	12.1	13.6

2.9 ENCASEMENT FOR UNDERGROUND PIPING CROSSING DRIVEWAYS

A. All Drainage pipes crossing driveways and subjected to heavy traffic shall be provided in concrete encasement.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.10 GEO-TEXTILE (if used)

A. Providing and Laying Typar SF-56 190 GSM, 100% Continuous Polypropylene Nonwoven, Isotropic, Thermally & Mechanically Bonded Geotextile. Having 100 Years Life Oxidation Resistance as per engineer's direction

1. Type: SF-56
2. Fiber Bonding: Thermally Bonded
3. Polymer: 100% Polypropylene, continuous filament and UV Stabilized
4. Fiber diameter: 40 - 50 micron
5. Roll Size: 4.5-meter width, 100-meter length = 450 Sqm Roll
6. Durability: 100 years in all-natural soils
7. According to Quality system ISO 9001, ISO 14001
8. Oxidation Resistance EN ISO 13438: 100% retained strength
9. Chemical Resistance EN 14030: 100% retained strength
10. Microbiological Resistance EN 12225: 100% retained strength

PROPERTY	STANDARDS	VALUE
Area Weight (g/m2)	EN ISO 9864	190
Thickness under 2kN/m2 (mm)	EN ISO 9863-I	0.57
Thickness under 200kN/m2 (mm)	EN ISO 9863-I	0.48
MECHANICAL PROPERTIES		
Energy Absorption (kJ/m2)	EN ISO 10319	5.8
Tensile strength (kN/m)	ASTM D4595	13.1
Elongation (%)	ASTM D4595	52
Tensile Strength at 5% (kN/m)	ASTM D4595	5.7
Puncture strength (N)	ASTM D6241	1850
Tear strength (N)	ASTM D4533	400
Grab Strength (N)	ASTM D4632	1100
Dynamic Cone Puncture (mm)	EN ISO 13433	22
HYDRAULIC PROPERTIES		
Opening Size O90 Wet (µm)	EN ISO 12956	80
Opening Size O95 Dry (µm)	ASTM D4751	100
US Sieve	ASTM D4751	140
Permittivity (1/s)	ASTM D4491	0.65
Permeability (VH50) (10-3mm/s)	EN ISO 11058	35
Flow rate at 10cm WH (l/(m2.s)	BS 6906-3	60
Permeability at 20 kN/m2 (10-4m/s)	DIN 60500-4	1.9
Permeability at 200 kN/m2 (10-4m/s)	DIN 60500-4	1.4

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Geotextile rolls shall be furnished with suitable wrapping for protection and each roll shall be labelled and identified for field identification as well as for inventory and quality control purposes.

C. The surface to receive the geotextile fabric shall be prepared to a relatively smooth condition, free of obtrusions, depressions, and debris.

D. Geotextile installation shall proceed in the direction of construction. Longitudinal joints in the fabric shall have a minimum overlap of 30cm, sewn or otherwise specified by the Engineer.

E. In the event construction machinery is used to place the fabric, the working platform for the machinery shall be the soil and not the previously laid geotextile.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

B. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.

E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2 DN 50 and smaller; 1 percent downward in direction of flow for piping NPS 3 (DN 75) and larger.
2. Horizontal Sanitary Drainage Piping: 1 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

F. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction or Consultant.

3.3 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports are specified in Division 15 Section "Hangers and Supports." Install the following:

B. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and 5 (DN 100 and 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
5. NPS 8 to NPS 12 (DN 200 to DN 300): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

C. Install supports for vertical PVC piping every 48 inches (1200 mm).

3.4 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated.

3.5 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.6 PROTECTION

A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION - 15155

DRAINAGE PIPING SPECIALTIES

Table of Contents

PART 1 - GENERAL 2
1.1 WORK INCLUDED 2
1.2 QUALITY ASSURANCE 2
1.3 SUBMITTALS 2
1.4 MAINTENANCE DATA 2
PART 2 - PRODUCT 2
2.1 MATERIALS 2
2.2 APPLICABLE STANDARDS ..... **Error! Bookmark not defined.**
PART 3 - EXECUTION 9
3.01 GENERAL 9

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Compliance with General Requirements of relevant sections.

B. Conform to General Requirements for Mechanical Services of Division 15.

1.2 QUALITY ASSURANCE

A. Manufacturer qualification

Firms regularly engaged in manufacture of floor drains, cleanouts and roof drains of types and sizes required, whose products have been in satisfactory use in the similar service for not less than 5 years.

1.3 SUBMITTALS

A. Product data

Submit manufacturers technical product data, installation instructions and dimensioned drawings for each type of items.

1.4 MAINTENANCE DATA

Submit maintenance data as per manufacturer recommendations. Include this data, product data, and certification in maintenance manual.

PART 2 - PRODUCT

2.1 MATERIALS

Floor traps: Poly Propylene (PP) Sound Proof Material with rodding eye (110 dia top inlet, 82 dia outlet) with minimum water seal of 7 cm.

Heavy duty 150 x 150mm cover made of Stainless steel 304 or as specified by the Architect in finishes schedule. The open area of strainer shall be at least two third of the cross sectional area of the drain line to which it connects. Note wherever floor drain is indicated it shall be connected to floor trap unless otherwise indicated.

Funnel floor drain where specified shall include a nickel bronze funnel secured to the grating.

Flower bed drain/planter drain where specified shall be heavy duty, dome type coated cast iron body with bottom outlet complete with combination membrane flashing clamp/gravel guard, low silhouette dome and stainless steel mesh screen over dome, no floor trap is required.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Channel grating for Parking shall be heavy duty ductile iron to dimensions as indicated on drawings.

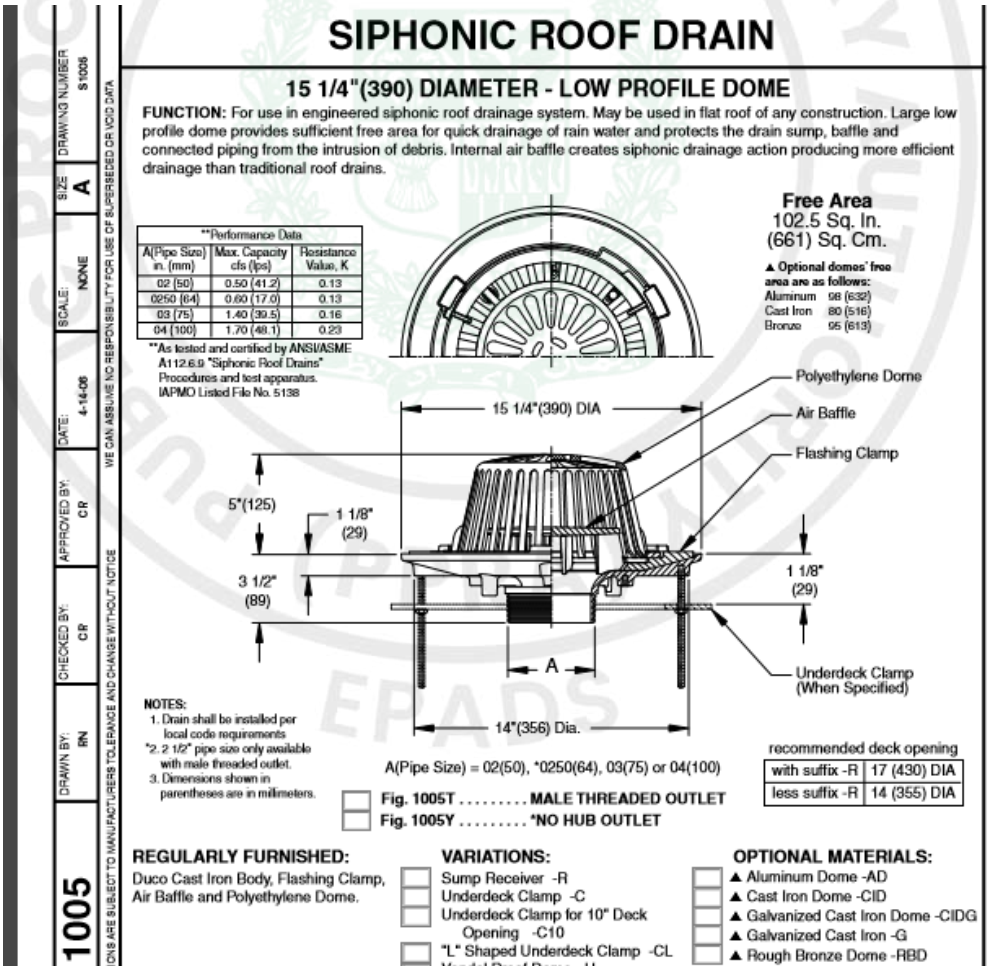
External channel grating and catch basins shall be in heavy duty ductile iron material.

A. Roof Drains

Rain water outlets shall PVC/PP or PE Siphoned Type, Low profile with stainless steel/Polyethylene Dome. Rain water outlets shall be selected to suit the type of roof where installed and shall be provided with a no hub outlet for mechanical jointing to rain water pipe.

Rain water outlets shall be provided with perforated extension assemblies, where required to match the roof construction.

Scupper type rain water outlets shall be Dura coated cast iron body with reversible back or bottom outlet, oblique grate with combination frame and membrane flashing clamp.



e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Clean Outs

Finished Areas: Square type 150mm x 150 mm made of stainless steel 304 body and cover.

Heavy Traffic Areas: Coated cast Iron body with Gasket connection and bronze plug with seal, secured around cast iron cover.

Clean out at high level shall be uPVC screw cap and washer.

C. Grease Interceptors

Large capacity Acid Resistant 304 stainless steel grease interceptor of capacities as per drawings, BOQ with internal First stage Stainless steel strainer, air relief by pass, bronze cleanout plug and visible double wall trap seal with removable pressure equalizing/flow diffusing baffle and sediment tray.

The grease interceptor shall be provided with automatic Self-cleaning cycle which shall be digitally controlled to Removes collected grease & oils from tank without any operator assistance

Constructed of durable, corrosion resistant Stainless Steel materials. Suitable for installation in virtually any location.

Integrated Electrical Assembly with motor, heater, push button controls, and grease outlet to enable fast, do-it-yourself unit operation reversal.

Easy to lift and pour grease collector to simply grease collection container emptying.

- Exterior Construction: 304 Stainless Steel, Bright Finish
- Skimming Rate: 20 lb./hr (9.08 kg/hr)
- Solids Strainer Capacity: 3.7 gallons (14 l)
- 4” Inlet/Outlet (100 mm)520W • 115V • 50/60 Hz1
- Grease interceptors shall be compliant with local authority requirement.
- Grease interceptors shall be PDI Certified.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026



D. Balcony Drains:

All balcony Drains shall be PP/ PVC with 150 x 150 mm PVC/PP grating. All balcony Drains shall be 3" dia outlet. The outlet type shall be side or bottom type as approved by the engineer or as indicated on the drawings.

E. Parking Drains / Area Drains (circular type):

DUCO coated Ductile iron body Area drain 200mm diameter circular type with flashing flange, S.Steel strainer and heavy duty Stainless Steel grating with 110mm

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

bottom outlet to PP push-fit piping as per DIN standards. Parking deck drains made of Polymer PP/PE complying with EN1253 are also acceptable is approved by Engineer.

F. Catch Basins:

Where indicated on drawings the catch basins shall be of 300mm x 300mm shallow type of AISI 304 S.Steel construction with 300 x 300mm 304 S.Steel grating as per EN 1.430.

The catch basin shall also include 250mm diameter x 125mm deep 304 S.Steel sediment bucket/filter basket with opening. The bucket and catch basin shall be of the same manufacturer.

The catch basin shall be with minimum 75mm outlet diameter. The outlet type shall be as per drawings.

The catch basins shall be with integral trap and plug.

The manufacturer/vendor will also provide the outlet connector to connect to PP drainage pipes as per DIN standards.

The Catch basin shall have the following or at-latest one of the following certification.

- DE – LGA
- National Institute of Public Health - Certificate
- PDA - Certificate

G. Large Capacity Oil Interceptors

Large capacity acid resistant coated interior and exterior fabricated steel lint interceptor non skids secured cover, permanent primary straining baffle. Regularly furnished with high inlet and low outlet.

Oil interceptor shall be PDI Certified.

H. Manholes/gully traps covers (Ductile Iron)

1. All covers shall be ductile iron with black bitumen coating. Manhole covers shall have clear opening of 600 x 600 mm.

2. All manholes and gully traps shall be vented as per drainage department requirements.

3. Gully trap covers shall have clear opening of 300 x 300 mm.

4. All manhole covers and frames shall comply with BS 497:1976 (BS EN 124:1994)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. All internal manhole covers shall be bolt down air tight double seal recessed type, they shall be inside concrete filled with surface finish to match surrounding floor. Covers shall be Medium duty, locking and sealed.

6. Covers in paved areas shall be medium duty type having weight as per Table 1

7. Covers in plinth protection shall be light duty having weight as per Table-1

8. Covers in Driveways shall be Heavy duty having weight as per Table-1

Alternate Material for Manholes/gully traps covers (as specified in BOQ)

1. All covers shall be PVC or HDPE, Vehicle Grade having a minimum of 1000kg Load bearing capacity. The Manhole Covers shall only be from AVT.

2. Manhole covers shall have clear opening of 600 x 600 mm and shall be with frame.

3. All manholes and gully traps shall be vented as per drainage department requirements.

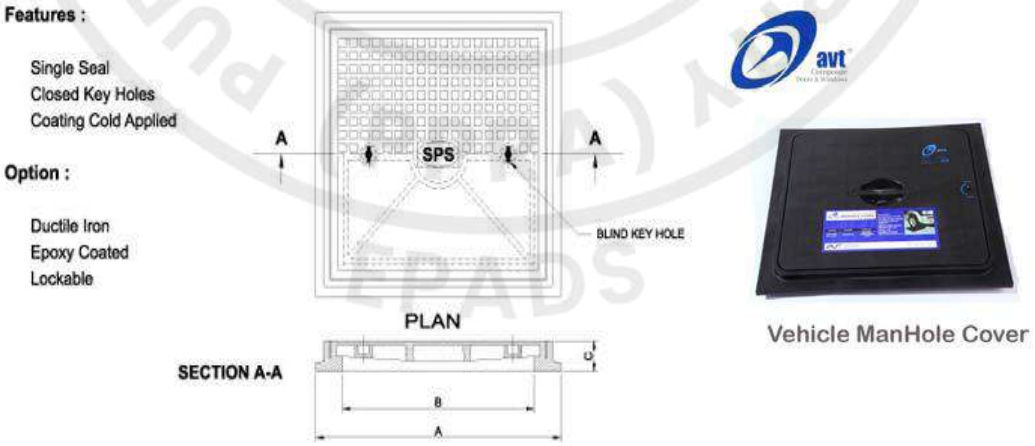
4. Gully trap covers shall have clear opening of 300 x 300 mm.

5. All manhole covers and frames shall comply with BS 497:1976 (BS EN 124:1994) and shall be tested from NED or local test Laboratoty

6. Covers in paved areas shall a minimum load bearing capacity of 250 KG

7. Covers in plinth protection shall be light duty having a minimum load bearing capacity of 250 KG

8. Covers in Driveways shall be vehicle Grade having a minimum of 1000kg Load bearing capacity.



9. Manhole cover shall have the following features.

   - Non Corrosive Material
   - Resistant of SO2 and other chemicals

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Anti-slip surface texture with high strength to Weight ratio.
- Chemical & Impact resistance
- Manhole shall be Lockable for Child Safety
- Shall be made With Poly Propylene

External Manholes:

1. Covers in paved areas shall be medium duty, double seal, and recessed type. They shall be inside concrete/pavement filled with surface finish to match surrounding floor.
2. Covers subject to vehicular traffic shall be kite marked heavy duty, single seal, non-rock with square push fit seal plate complete with lifting key-holes.

Table 1-1 (Manhole Covers Weights)

S.no	Cover material	Clean Opening	Type	Weight	Standard	Remarks
1	Ductile Iron	600 x 600	Light duty	45 Kg	BS EN 124:1994	
2	Ductile Iron	600 x 600	Medium duty	67 Kg	BS EN 124:1994	
3	Ductile Iron	600 x 600	Heavy duty	90 Kg	BS EN 124:1994	

Table 1-2 (Manhole Covers Weights for HDPE/FRP)

S.no	Cover material	Clean Opening	Type	Bearing Capacity	Remarks
1	HDPE/FRP	600 x 600	Light duty	250 Kg	
2	HDPE/FRP	600 x 600	Medium duty	1000 Kg	
3	HDPE/FRP	600 x 600	Heavy duty (Tuck Loading)	25000 Kg (25 Tons)	

I. Gully Grates

Where indicated on drawings provide kite marked kerb gully unit of ductile iron hinged grate, road retaining bar with clear opening size 532x405mm. Unit to be black bitumen coated and shall be designed to deter ingress and help prevent blockage. A GRP grid shall be provided as standard.

Storm water / car park gratings shall be kite marked, heavy duty ductile iron, non-rock clear openings size as indicated on drawings, grey - epoxy coated and shall comply with BS 497.

J. CAST IRON FLOOR DRAINS (Plant Rooms)

Supply and install wherever shown on the drawings floor drains of sizes and shapes as indicated on the drawings.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Each floor shall be of cast iron with 'S' or 'P' trap complete with chrome plated heavy duty bronze strainer fixed by screwing into the drain body. Drain shall receive two coats of asphaltic paint before installation or shall be asphalt painted at factory.

The open area of the strainer shall be at least two-thirds of the cross section area of the drain line to which it connects.

Each floor drain shall have a minimum water seal of 50mm

All floor drains shall have removable chrome plated covers over their strainers.

K. TERRACE DRAINS (TD)

Supply and install all terrace drains and trench drains wherever shown on the drawings and as specified herein.
Each drain shall be constructed of heavy duty Ductile Iron grate with bottom outlet and shall conform to the following requirements:

- Large grate area body with no trap and with gravel guard.
- Adjustable heavy duty elevated dome type strainer.
- Integral flashing flange.

L. KITCHEN DRAINS

All kitchen Drains shall be Stainless steel and shall be as per Kitchen Consultant specifications.

PART 3 - EXECUTION

3.1 GENERAL

A. All roof and floor drains shall be installed with water proof membrane extended up to and within the drain, and flashed to prevent any water penetration through the drain. Water proofing shall be carried out as recommended by the manufacturer and as approved by the Consultant.

B. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Maintain integrity of water proof membrane where penetrated.

C. Position roof drains and floor drains for easy access and maintenance.

D. Unless otherwise mentioned provide traps at each drain to stop seepage of sewer gases into occupied spaces.

E. Provide transition piece with mechanical joint connectors to couple drains to pipes specified.

F. Install floor drains at low points of surfaces to be drained, set grates of drains flush with finish floor or as indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Clean outs shall be installed at change of direction of drainage pipes inside building and where indicated on the drawings. Clean outs shall be not more than 15m apart in horizontal lines for pipe diameters of 100 mm and smaller, and 30 m apart for larger pipes.

H. A clean out shall be provided at the foot of each vertical waste or soil stack and at each floor, the clean out shall be at 0.6 m height from finished floor level.

I. Clean outs on concealed piping shall be extended through and terminate flush with finished wall or floor. Pits or chases may be left in walls or floors provided they are of sufficient size to permit removal of clean outs plug and proper cleaning of the system.

J. Where it is necessary to conceal a cleanout plug, a heavy duty stainless steel covering plate 200 x 200 mm shall be provided which permits ready access to the plug.

K. Cleanouts shall be of the same nominal size as the pipes up to 100 mm pipe diameters and not less than 100 mm for larger piping.

L. Cleanouts shall be so installed that there is a clearance of not less than 450 mm for the purpose of rodding and cleaning.

M. Protect cleanouts during construction period to avoid clogging with dirt and debris and avoid damages from traffic and construction works.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 15194

FUEL GAS PIPING

Table of Contents

PART 1- GENERAL 2
1.1 RELATED DOCUMENTS 2
1.2 SUMMARY 2
1.3 PROJECT CONDITIONS 2
1.4 SUBMITTALS 2
1.5 QUALITY ASSURANCE 3
1.6 DELIVERY, STORAGE, AND HANDLING 3
1.7 COORDINATION 3
PART 2 - PRODUCTS 3
2.1 PIPING MATERIALS 3
2.2 PROTECTIVE COATING 4
2.3 PIPING SPECIALTIES 4
2.4 SPECIALTY VALVES 5
2.5 GAS SHUT-OFF VALVE FOR KITCHEN EQUIPMENT 6
2.6 GAS DETETION PANEL AND DETECTORS 6
2.7 SERVICE METERS 8
2.8 PRESSURE REGULATORS 11
2.9 GAS DETECTION SYSTEM 11
2.10CONTROL UNIT 12
2.11GAS SAMPLING SYSTEM 12
PART 3 - EXECUTION 13
3.1 EXAMINATION 13
3.2 PREPARATION 13
3.3 SERVICE-METER ASSEMBLY INSTALLATION 14
3.4 SERVICE ENTRANCE PIPING. 14
3.5 PIPING INSTALLATION 14
3.6 HANGER AND SUPPORT INSTALLATION 15
3.7 CONNECTIONS 16
3.8 PAINTING 16
3.9 FIELD QUALITY CONTROL 16

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions, including General and Supplementary Conditions and relevant sections Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes fuel gas piping within the building. Products include the following:

1. Pipe, tube, fittings, and joining materials.
2. Protective pipe and fitting coating.
3. Piping specialties.
4. Specialty valves.
5. Service meters.
6. Pressure regulators.

B. Related Sections include the following:

"Natural Gas Distribution" for natural gas service piping, specialties, and accessories outside the building.

1.3 PROJECT CONDITIONS

A. Gas System Pressures: Three pressure ranges. Primary pressure is more than 2.0 psig (13.8 kPa) but not more than 5.0 psig (34.5 kPa), and is reduced to secondary pressures of more than 0.5 psig (3.45 kPa) but not more than 2.0 psig (13.8 kPa), and is reduced again to pressures of 0.5 psig (3.45 kPa) or less.

B. Gas System Pressures: Two pressure ranges. Primary pressure is more than 2.0 psig (13.8 kPa) but not more than 5.0 psig (34.5 kPa), and is reduced to secondary pressure of more than 0.5 psig (3.45 kPa) but not more than 2.0 psig (13.8 kPa).

C. Design values of fuel gas supplied for these systems are as follows:

1. Nominal Heating Value: 1000 Btu/cu. ft. (37.3 MJ/cu. m) for Natural Gas.
2. Nominal Specific Gravity: 0.6.
3. Nominal Heating Value: 95,000 Btu/Gal for LPG.

1.4 SUBMITTALS

A. Product Data: For the following:

1. tubing systems. Include associated components.
2. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Service-meter bars. Include service-meter size of selected models.
4. Service meters. Include pressure rating and capacity of selected models.
5. Service-meter bypass fittings.
6. Pressure regulators. Include pressure rating, capacity, and settings of selected models.

B. Shop Drawings: For fuel gas piping. Include plans and attachments to other work.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Wiring Diagrams: Power, signal, and control wiring.

C. Welding certificates.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For natural gas specialties and accessories to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

B. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. NFPA Standard: Comply with NFPA 54, "National Fuel Gas Code."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify fuel gas supplier. Handle flammable liquids used by Installer with proper precautions and do not leave on premises from end of one day to beginning of next day.

1.7 COORDINATION

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Client not less than five days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Client's written permission.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in relevant section.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer Division 15 section for Piping materials

B. Steel Pipe: ASTM A 53; Type S (seamless); Grade B; Schedule 40; black steel.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1, suitable for fuel gas.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1, suitable for fuel gas.

3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125, suitable for fuel gas.

4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel, suitable for fuel gas.

5. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1, suitable for fuel gas.

6. Joint Compound and Tape: Suitable for fuel gas.

7. Steel Flanges and Flanged Fittings: ASME B16.5, suitable for fuel gas.

8. Gasket Material: Thickness, material, and type suitable for fuel gas.

2.2 PROTECTIVE COATING

A. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use in corrosive atmosphere.

2.3 PIPING SPECIALTIES

A. Flexible Connectors: ANSI Z21.24, copper alloy.

B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

C. Flange Gaskets: Gaskets shall be non-asbestos compressed material in accordance with NFPA 54 and ASME B16.21 1.6 mm thickness, full face or self-centering flat ring type. The gaskets shall contain aramid fibers bonded with styrene butadiene rubber (SBR) suitable for a maximum 316 deg. C (600 deg. F) service.

D. Appliance Connectors: Connectors shall be corrugated bronze metal with brazed inverted flare-type brass fittings complete with transition for IPS connection. Maximum length shall be 1000 mm. Connectors shall be AGA-approved type.

E. Pressure Gages: Pressure gages shall conform to ASME B40.100, Type I, Class 1. Pressure-gage size shall be 90 mm nominal diameter. Case shall be corrosion-resistant steel conforming to any of the AISI 300-series of ASTM A 666, with a No. 4 standard commercial polish or better. All gages shall be equipped with adjustable red marking pointer and damper screw adjustment in inlet connection.

F. Line Strainers: Strainers shall be Y-type with removable basket. Strainers in sizes DN50 (2-inch) IPS and smaller shall have screwed ends; sizes DN65 (2-1/2-inch) IPS and larger shall have flanged ends. Body working pressure rating shall exceed maximum service pressure of system in which installed by at least 50 percent. Body shall have cast-in arrows to indicate direction of flow. All strainer bodies fitted with screwed screen retainer shall have straight threads and shall be gasketed with nonferrous metal. Strainer bodies fitted with bolted-on screen retainers shall have offset blowdown holes. Body material shall be cast bronze or cast iron conforming to

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Class 30 ASTM A 278 A 278M. Minimum free hole area of strainer element shall be equal to not less than 3-4 times the internal area of connecting piping. Strainer screens shall have finished ends fitted to machined screen chamber surfaces to preclude bypass flow. Strainer element material shall be AISI 316 corrosion-resistant.

2.4 SPECIALTY VALVES

A. Valves, NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

B. Valves, NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

C. Appliance Connector Valves: ANSI Z21.15 and CSA International listed.

D. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig (13.8-kPa) minimum pressure rating.

E. Gas Valves, NPS 2 (DN 50) and Smaller: ASME B16.33 and CSA International-listed bronze body and 125-psig (860-kPa) pressure rating.

1. Tamperproof Feature: Include design for locking.

F. Plug Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig (860-kPa) pressure rating.

1. Tamperproof Feature: Include design for locking.

G. General-Duty Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38, cast-iron body, suitable for fuel gas service, with "WOG" indicated on valve body, and 125-psig (860-kPa) pressure rating.

1. Gate Valves: MSS SP-70, OS&Y type with solid wedge.
2. Butterfly Valves: MSS SP-67, lug type with lever handle.

H. Automatic Gas Valves: ANSI Z21.21, with electrical operator for actuation by appliance automatic shutoff device.

I. Electrically Operated Gas Valves: UL 429, bronze, aluminum, or cast-iron body solenoid valve; 120-V ac, 60 Hz, Class B, continuous-duty molded coil. Include NEMA ISC 6, Type 4, coil enclosure and electrically opened and closed dual coils. Valve position shall normally be closed.

J. Emergency Gas Safety Shut-Off Valve with Earthquake Sensor.

1. Permits remote shut-off of fuel gas flow to kitchens.

2. Type: Manually opened, electrically held open, automatic closing upon power interruption. Pneumatic operator is not permitted.

3. Performance: Shall shut bubble tight within 1 second after power interruption. Refer to the drawings for pressure, flow, and valve size requirements.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Construction: UL listed, FM approved, rated for 850 kPa (125 psi) ASME flanged ends for pipe sizes above 50 mm, threaded ends for pipe sizes 50 mm and under. Cast steel body, open and shut indicator. Valves for LP gas service shall be rated at 1725 kPa (250 psi).

5. Earthquake Sensor: UL listed, mechanical device which automatically breaks 120 Volt electrical circuit to safety shut-off valve when earthquake occurs allowing valve to automatically close. Valve shall close within 5 seconds after sensor is subjected to horizontal sinusoidal oscillation having a peak acceleration of 2.94 m/sec2 (0.3G) and a period of 0.4 seconds. The valve shall not shut off when the sensor is subjected for 5 seconds to horizontal, sinusoidal oscillations having: a peak acceleration of 3.92 m/sec2 (0.4G) with a period of 0.1 second; a peak acceleration of 0.78 m/sec2 (0.08G) with a period of 0.4 second; peak acceleration of 0.78 m/sec2 (0.08G) with a period of 1.0 second. Sensor shall be corrosion-resistant for outside location.

2.5 GAS SHUT-OFF VALVE FOR KITCHEN EQUIPMENT

A. Master gas control valve:

1. Bronze body, packless, single Buna- N seat, explosion proof, solenoid operated, normally closed, UL listed, automatic reset, 0 psi operating pressure differential, 80-90 V DC.

B. Control station:

1. Push-button station mounted in 2-gang box, key operated, normally open switch and a normally closed push-button mounted in a stainless-steel faceplate for flush installation inscribed with "GAS VALVE CONTROL" on top, "OPEN" over keyhold, "CLOSE" over push-button, 230 V.

C. Relay panel:

1. Momentary contact operated relay and rectifier mounted in NEMA Type 1 enclosure, 2 pole normally open, 3 wire control, with 230 V coil. Interconnect with the ventilator hood fire protection system. When the hood sprinklers activate, the main gas solenoid valve shall be closed by the flow switch located in the kitchen ventilator hood control panel.

2.6 GAS DETETION PANEL AND DETECTORS

A. Electronic, DDC control type flame proof, wall mounted gas detection and alarm unit with remote gas detectors.

B. It shall be Designed to meet UL standard 2075 for the Standard For Safety for Gas and Vapor Detector and Sensors

C. Sensitivity tested based on UL 1484 Standard for Gas Detectors

D. Surface mounts to a wall using the supplied enclosure rear housing or Flush mounts in a 2 x 4 (1-3/4 inch deep minimum) single gang switch, or handy electrical box

E. Test & Reset switch conducts internal tests and actuates alarm relay

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

F. Solid State Electronic sensors: no maintenance or recalibration

G. N.O. or N.C. SPST Alarm Relay and N.C. SPST Trouble relay to connect to Alarm Control Panels

H. Optional Buzzer: Produces repeating loud tone bursts during alarm, and chirps if sensor trouble is found

I. Alarm Relay: SPST, 100mA, 40VDC

J. Trouble Relay: SPST, 100mA, 40VDC

K. Buzzer Rating: 85 dBA at 10 Feet

L. Operating Temp. Range: 40°F (4.4°C) to 100°F (37.8°C)

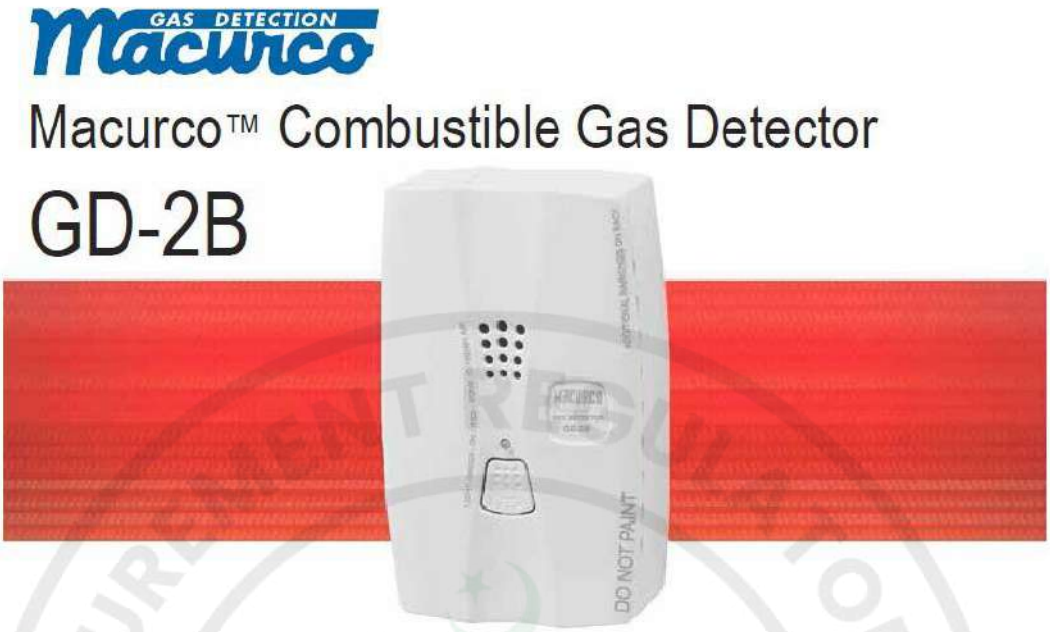
M. Alarm Setting: 25% LEL Per UL 1484 For use with a UL Listed Fire Alarm/Burglary Control Panel

N. LCD display unit, 4 chanels with 3 separate alarm levels per channel. Built-in relay modules with compatible control logic for kitchen hood fire extinguishing system, main fire alarm control panel and BMS.

O. Battery back-up, 230 V AC, 50 HZ, with 24 V DC built in transformer. 4 – 20 MA, output signal per channel.

P. Gas detectors shall be electronic type, flame and explosion proof type construction in IP 66 or IP 55 enclosures. Complete with mounting brackets. Detectors shall be compatible with Gas Detection and Alarm Unit.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026



Methane and Propane Gas Detection

The GD-2B is a low voltage electronic detector of combustible, heating type gases. The GD-2B is designed for connection to Fire Alarm/Burglary Control Panels. The GD-2B is intended for installation in buildings in non-hazardous locations such as residences, retail stores, office buildings, and institutional buildings. This

2.7 SERVICE METERS

A. Service Meters: Static Precision Smart Gas meters with micro thermal measuring principle to determine pressure and temperature. It should include

1. CMOS Sensor Technology
2. MID approval (PTB)
3. Pressure independent
4. Temperature converting
5. Very low starting flow
6. Differentiation between natural gas and air
7. Interfaces wired M-Bus and wM-Bus Radio 868 or 434 MHz according to OMS®
8. Noiseless
9. Wear-free
10. Compact design

B. Technical Specifications

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Measuring principle			Microthermal - pressure independent and temperature converting
Application			Natural gas type H (EN 437), air
Measuring range		m³/h	0.04 ... 6.0
Approval			MID (DE-11-MI002-PTB004), DVGW (DG-4710CM0427), ATEX
Standard temperature for volume output		°C	0, 15 or 20
Standard pressure for volume output		mbar	1013.25
Max. operating pressure	P_{max}	mbar	500
Measuring accuracy Q_t... Q_{max}		%	± 1.5
Measuring accuracy Q_{min}... Q_t		%	± 3.0
Accuracy class			1.5
Battery supply			1 x 3.6 VDC (D-Cell)
Battery lifetime			Up to 20 years
Max. accumulated volume		m³	99'999
Starting flow rate		m³/h	0.009
Heat resistance			HTB 650 °C according to EN 1359
Display			1-line LCD 8-digit
Optical			IRDA interface for communication and testing
M-Bus			Telegram according to EN 13757-3, data reading and parametrization via two wires with polarity reversal protection
Radio M-Bus			868 or 434 MHz according to EN 13757 OMS®, unidirectional, transmission interval 10 seconds up 1 hour, modulation: FSK

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

AERIUS

MICROTHERMAL GAS METER

DIEHL
Metering



APPLICATION

Static microthermal gas meter for accurate measuring and recording of natural gas type H and air in household or commercial applications

FEATURES

- CMOS Sensor Technology
- MID approval (PTB)
- Pressure independent
- Temperature converting
- Very low starting flow
- Differentiation between natural gas and air
- Interfaces wired M-Bus and wM-Bus Radio 868 or 434 MHz according to OMS®
- Noiseless
- Wear-free

1. Exception: Omit meter offset swivel pipes if service-meter bar dimensions match service-meter connections.

C. Service-Meter Bypass Fittings: Ferrous, tee, pipe fitting with integral ball check valve and capped side inlet for temporary fuel gas supply.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.8 PRESSURE REGULATORS

A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.

1. NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
2. NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
3. Service Pressure Regulators: ANSI Z21.80. Include [100-psig- (690-kPa-)] minimum inlet pressure rating.
4. Line Pressure Regulators: ANSI Z21.80 with 2-psig- (13.8-kPa-) minimum and 10-psig (68.9-kPa) inlet pressure rating.
5. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.

B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

2.9 GAS DETECTION SYSTEM

A. General:

1. Name of the manufacturer and the serial numbers shall appear on all major components.

2. Connection Diagrams shall be submitted showing a complete conduit and wiring layout for the equipment to be furnished, including AWG size and type of wire, and number of conductors and connections to the equipment.

3. As-Built Drawings shall provide current factual information including deviations and amendments to the drawings, and concealed and visible changes in the work.

4. Manufacturer's Catalog Data shall be submitted for the combustible gas and oxygen deficient atmospheres detection systems including special tools necessary for the maintenance of the equipment. Spare parts data shall be submitted consisting of one set of fuses of each type and size required, and a hydrogen gas calibration kit.

5. Material, Equipment, and Fixture Lists shall include manufacturer's style or catalog numbers, specification and drawing reference numbers, independent testing laboratory reports, and related descriptive matter on the devices to be installed.

6. Electromagnetic Compatibility: Electrical and electronic systems shall be designed to operate without causing electromagnetic interference to, or malfunctioning due to electromagnetic interference from, other systems or equipment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.10 CONTROL UNIT

A. General Requirements: Control unit shall be 4 channel, operating over a temperature range of 0 to 51 degrees C. Each control unit shall be capable of monitoring 4 detectors. Control unit shall be housed in a weatherproof cabinet suitable for wall mounting. Relays shall be solid state type. Rectifiers shall be solid state type.

B. Control Circuits: Circuits shall be solid state, with plug-in type circuit boards, in a housing suitable for non-hazardous locations.

C. Power Supply Component: Transformer, rectifier, resistors, charger, batteries and other required power-supply components shall be incorporated in the control unit, or a separate power-supply unit may be furnished and installed as approved for the application.

D. Indicator Light and Reset: Each control unit shall have buttons for test, and indicator lights for Power, Malfunction, and Alarm. Indicator lamps shall be color coded as follows: Power (green), Malfunction (yellow) and Alarm (red). Zero, Alarm, and Calibration settings shall be adjustable.

E. Malfunction Circuits: Sensing circuits shall be monitored by individual malfunction circuits. Open circuit shall activate malfunction light and operate relays for remote warning signal and lights.

F. Alarm Unit shall be arranged to operate alarm relays, activating audible and visible alarms, and continue operation until reset by a keyed switch in the unit cabinet. Reset key shall not be removable until conditions have returned to normal. Cabinet shall be locked by the same key used to reset the alarm relays. Audible alarm and red rotating alarm beacon shall be provided as indicated or directed by The Engineer.

2.11 GAS SAMPLING SYSTEM

A. System description: a sequential sampling system for detection of gas in the different spaces. The system shall detects inflammable gas and oxygen in air by applying the detection principle of catalytic combustion method and galvanic cell method respectively and transmits representative alarm by means of relay contacts.

B. General:

1. Name of the manufacturer and the serial numbers shall appear on all major components.

2. Connection Diagrams shall be submitted showing a complete conduit and wiring layout for the equipment to be furnished, including type of wire, and number of conductors and connections to the equipment.

3. As-Built Drawings shall provide current factual information including deviations and amendments to the drawings, and concealed and visible changes in the work.

4. Manufacturer's Catalog Data shall be submitted for system components including special tools necessary for the maintenance of the equipment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. Material, Equipment, and Fixture Lists shall include manufacturer's style or catalog numbers, specification and drawing reference numbers, independent testing laboratory reports, and related descriptive matter on the devices to be installed.

C. The system shall comprise a wall mounting weatherproof steel cabinet housing the sampling pump, pneumatics, solenoid valves, flame arrestors & system electronics. The gas samples shall be sequentially extracted from each monitoring point and analysed LPG. The system shall include automatic sensing and clearing of blocked lines together with internal inflammable gas detector to monitor inside continuously.

D. Controller shall provide display of the gas concentration at each measuring point, with

E. LED's indicating sampling and alarm status, and 3 alarm relays.

F. Sample lines: DN 8 316SS tubing.

G. Detectors:

1. General: samples of detectors shall be submitted for approval.

2. Circuit Design: Detector circuit design shall be suitable for the types and numbers of detectors, as approved, and detector circuit current shall not exceed ratings of the individual detectors and associated relays.

3. Inflammable Gas Detector: inflammable gas detector shall be Galvanic cell method type. Measuring accuracy shall be within ±5% of full scale.

4. Oxygen Detector: Oxygen detector shall be Catalytic combustion method type. Measuring accuracy shall be within ±0.7% of oxygen concentration.

H. Power Supply: Primary power supply shall be a 230-volt, 50 Hz source. An alternate source of power, arranged to become energized automatically within at least ten seconds upon loss of normal power shall be provided.

I. Control system shall be equipped with all necessary interface communication to BMS on Bacnet protocol.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for fuel oil piping system to verify actual locations of piping connections before equipment installation.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.3 SERVICE-METER ASSEMBLY INSTALLATION

A. Install service-meter assemblies aboveground.

1. Set service-meter assembly on, or supported over, precast concrete bases. Excavate earth and make level beds to support bases. Set bases level with top surface projecting 3 inches (75 mm) above finished grade.

B. Include gas valve or plug valve, strainer, service pressure regulator, Service-meter bar for service meter with connections NPS 1 (DN 25) and smaller, and service meter for each assembly.

C. Install gas valve or plug valve and strainer upstream from each service pressure regulator.

D. Install service pressure regulators with vent outlet turned down and with corrosion-resistant-metal insect screen.

E. Install pressure gage upstream and downstream from each service pressure regulator. Pressure gages are specified in Division 15 Section "Meters and Gages."

F. Install service meters downstream from service pressure regulators.

1. Service meters with connections NPS 1 (DN 25) and smaller on meter bars.
2. Service meters with connections larger than NPS 1 (DN 25) supported from piping or set on concrete bases.

3.4 SERVICE ENTRANCE PIPING.

A. Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.

1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.

A. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service-meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting.

B. Install strainer upstream from each earthquake valve.

3.5 PIPING INSTALLATION

A. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
2. In Partitions: Do not install concealed piping in solid partitions
3. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Exception: Accessible above-ceiling space specified above.

B. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.

C. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

D. Connect branch piping from top or side of horizontal piping.

E. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

F. Install corrugated, stainless-steel tubing system according to manufacturer's written instructions. Include striker plates to protect tubing from puncture where tubing is restrained and cannot move.

G. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.

H. Install pressure gage upstream and downstream from each line pressure regulator. Pressure gages are specified in Division 15 Section "Meters and Gages."

I. Install flanges on valves, specialties, and equipment having NPS 2-1/2 (DN 65) and larger connections.

J. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

K. Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches (100 mm) outside building, and vented to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end. Prepare and paint outside of conduits with coal-tar, epoxy-polyamide paint according to SSPC-Paint 16.

3.6 HANGER AND SUPPORT INSTALLATION

A. Pipe hanger and support and equipment support materials and installation requirements are specified in Division 15 Section "Hangers and Supports."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 (DN 25) and Smaller: Maximum span, 96 inches (2438 mm); minimum rod size, 3/8 inch (10 mm).
2. NPS 1-1/4 (DN 32): Maximum span, 108 inches (2743 mm); minimum rod size, 3/8 inch (10 mm).
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 108 inches (2743 mm); minimum rod size, 3/8 inch (10 mm).
4. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Maximum span, 10 feet (3 m); minimum rod size, 1/2 inch (13 mm).
5. NPS 4 (DN 100) and Larger: Maximum span, 10 feet (3 m); minimum rod size, 5/8 inch (16 mm).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.7 CONNECTIONS

A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.

B. Install piping adjacent to appliances to allow service and maintenance.

C. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches (1800 mm) of each appliance. Install union downstream from valve.

D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.

E. Ground equipment according to Division 16 Section "Grounding and Bonding."

1. Do not use gas pipe as grounding electrode.

F. Connect wiring according to Division 16 Section "Conductors and Cables."

3.8 PAINTING

A. Paint exterior service meters, pressure regulators, and specialty valves.

1. Color: AS per SNGPL Requirements

3.9 FIELD QUALITY CONTROL

A. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction.

B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

C. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.

D. Verify correct pressure settings for pressure regulators.

E. Verify that specified piping tests are complete.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION- 15440

PLUMBING PUMPS

Table of Contents

PART 1 - GENERAL....2
1.1 REFERENCE....2
1.2 DESCRIPTION OF WORK....2
1.3 QUALITY ASSURANCE....2
1.4 SUBMITTALS:....2
1.5 PRODUCT DELIVERY, STORAGE AND HANDLING....3
PART 2 - PRODUCTS....3
2.1 PACKAGED PRESSURE SETS – BOOSTERS AND WATER FILTER....3
2.2 SUMP PUMPS....6
2.3 SEWAGE LIFT PUMP SET....8
PART 3 - EXECUTION....9
3.1 EXAMINATION.....9
3.2 CONCRETE EQUIPMENT BASES....9
3.3 INSTALLATION....9
3.4 ALIGNMENT....10
3.5 CONNECTIONS....10
3.6 FIELD QUALITY CONTROL....10
3.7 TESTING AND COMMISSIONING....11
3.8 TRAINING....11

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1 - GENERAL

1.1 REFERENCE

Conform to General Requirements for Mechanical Services of Division 15.

1.2 DESCRIPTION OF WORK

A. Furnish and install pumps as indicated on drawings

B. This section specifies the requirements for the:

a. Water booster pump set Domestic + Filter (as indicated on the drawing and schedules)

b. Hot water Booster Pump Sets (VFD Driven)

c. Cooling Tower Makeup water pumps

d. Sump pumps

e. Sewage Lift Pump set

C. Provide all electrical works related to this section, to comply with the requirements of Division – 16 sections:

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of pumps with characteristics, sizes and capacities as required, whose products have been in satisfactory use in similar service for not less than 20 years.

B. Certification, Pump Performance: Provide pumps whose performances, under specified operating conditions, are certified by manufacturer.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's pump specifications, installation and start-up instructions, and current accurate pump characteristic performance curves with selection points clearly indicated.

B. Shop Drawings: Submit manufacturer's assembly type shop drawings indicating dimensions, weight loadings, required clearances and methods of assembly of components.

C. Submit full hydraulic calculations to verify flow and head of pumps based on shop drawings. Calculations shall be approved by prior to final selection of pump.

D. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to pumps. Submit manufacturer's ladder type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory – installed and portions to be field installed.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Maintenance Data: Submit maintenance data and parts lists for each type of pump, control and accessory, including “trouble – shooting” maintenance guide. Include this data, product data, shop drawings and wiring diagrams in maintenance manual.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle pumps and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged pumps or components, replace with new items.

B. Store pumps and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

2.1 PACKAGED PRESSURE SETS – BOOSTERS AND WATER FILTER

A. General

1. Drains for packing glands and base shall be piped to nearest drain outlet.

2. The designed pump head indicated on the drawings is only approximate and the contractor shall confirm the exact head of the pumps after all the pump selections and the shop drawings are approved.

3. The contractor shall submit for approval and prior to shipment all detailed construction drawings showing exactly in place all pumps with their concrete bases, vibration isolators, pipe connection and power connections.

4. All pumps shall be designed to operate with non-overloading characteristics at manufacturer’s specified RPM

5. All pumps shall be as much as possible selected from one pump manufacturer. Pump operating characteristics shall be in such a way when operating at the speed specified the pump motor will not be overloaded, no matter what the variation in pumping head.

6. All pumps and motors shall be properly set, leveled and aligned on bases and foundation pads in strict accordance with the manufacturer’s instruction and their recommended tolerances. This shall be done before any piping or electrical connections are made.

7. After all connections have been made, and just prior to putting each pump into operation, it shall be checked for levels and alignment.

8. Performance curve data sheets shall be provided with shop drawings for each type and size of pump submitted for approval.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

9. All Plumbing Pumps shall be compatible to interface with BMS System. Interfacing card, BACnet Compliant / compatible and software for interfacing and programming with BMS System shall be provided with Plumbing Pumps.

B. Pump Sets:

1. Supply and install packaged booster water, transfer and Water Filter systems designed for a total system capacity as shown on Pump Schedule. The systems shall be tested and calibrated, and shipped to the job site as an integral unit ready to receive suction and discharge piping and incoming power supply.

2. The pumps shall be vertical Multi-stage centrifugal pump with Individual VFD for each pumps. Floating VFD shall not be acceptable.

3. The pump shall have capacity as shown in the schedules. Each pump shall be constructed with 316 L stainless steel with S.Steel impellers and diffusers, a high temperature mechanical seal with carbon vs silicon carbide, EPDM elastomers throughout, tungsten carbide against ceramic pump bushings and a cast iron motor bracket. Flanges will be ductile iron I slip ring and isolated from liquid. The pump is to be coupled with a NEMA motor and with enclosure using a rigid split coupling. Motor bearing shall be sized to allow a 20,000 minimum hour B10 calculated life. Spring type anti-vibration mounts shall be provided for all water pumps.

4. All pump motors shall be totally enclosed, fan cooled to IP 54, squirrel cage type with Class F. insulation. The minimum motor rating shall be IE5

5. Pumps and motors shall be rated to operate continuously with a maximum ambient air temperature of 50 Degree C.

6. Pumps shall have 316 stainless steel impellers with stainless steel drive shafts.

7. Impeller arrangements shall be such that they can be withdrawn without dismantling pipework connections or disturbing the baseplate.

8. Pumps shall be fitted with mechanical seals. Seals shall be replaceable without stripping down the bearing system.

9. All components used in the construction of pumps shall be selected to assist system working and test pressure.

10. Both water and irrigation Booster pumps shall be complete with integral variable speed drives and with manufacturer sized pressure vessel preferably on the same skid.

11. The pumps shall be complete with temperature control, gate valves, check valves, pressure gauges, thermal bleed circuits, wiring, conduit and interconnecting pipe work, mounted on anti-vibration mountings and neatly arranged and firmly supported by the framework of the unit. Suction connection shall be horizontal, as close to the base as possible to connect to inlet pipe from the water storage tank.

12. The diaphragm pressure vessel shall be constructed of a steel shell with polypropylene lining on internal wetted areas and a butyl rubber diaphragm.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

13. Staging of booster pumps shall be accomplished by solid state current sensing relays, with reset capability within 4%. The electronic relays shall have an external trip set point knob and a dial with LED trip light indicator and built in two seconds delay to prevent false trip due to current surge.

14. Pump service shall be accomplished without disturbing the suction and discharge piping. Combination pressure reducing valves (booster) with non slam feature shall be mounted in each pump circuit. Interconnecting piping between pumps shall preferably be copper or same material as the suction and discharge piping to the pump set assembly. Isolation valves shall be provided for each pump set. Pressure gauges shall be mounted on the suction and discharge headers. The pumps shall be protected from thermal build up, when running at no-flow, by a common thermal relief valve.
15. The pump set control panel shall be in a NEMA I enclosure which includes motor starters, time delays, protected control circuit, transformer, current relays, hand-off-automatic switches for each pump, minimum run timers, and low suction pressure cut out and shall incorporate the following features as applicable:

    • General purpose water resistant enclosure.

    • Main disconnect switch.

    • Fused circuit for each motor.

    • Magnetic starters with three overloads.

    • Current sensing devices.

    • Selector switch for each pump.

    • Control circuit transformer.

    • Minimum run timers.

    • Low limit pressure switch.

    • Low pressure alarm light.

    • Circuit breakers for each pump.

    • High pressure cut-out switch.

    • ‘Power-on' indicating light.

    • Overload indicating lights.

    • Panel mounted gauges.

    • All other components required to achieve the control sequence specified.

    • Alternating relay circuit.

    • Power on: Amber.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Individual motor overload: Red.
- Low suction pressure: Red.

16. Provide automatic pump rotation based on actual runtime. The time difference between pump starts shall be adjustable. The control circuit shall be interlocked so that failure of any starter will energize the succeeding starter. The control panel shall also contain all required contacts for monitoring and control from the Building Management System if required in the control section

17. A pressure switch for each of the Booster/Water filtration pump and a system pressure gauge should be mounted on a common pressure manifold to eliminate using small bore fittings to ensure easy replacement of pressure switch or gauge, and to ensure that the pump set arrangement is compact and has only one common pressure signal source. Demand shall be met in the first instance from the pressure vessel. When the vessel pressure has fallen to a pre-set minimum (the "cut-in" pressure) the first duty pump shall start. In the event of the failure of the duty pump the standby pump shall automatically take its place. As demand reduces and the pressure builds up to a pre-determined cut-out pressure, the pump will stop. An adjustable timer for each pump shall be fitted in the control panel to ensure frequent switching cannot occur.

18. Transfer Pumps switching shall be controlled by float switches and level controllers installed in the roof storage tank.

19. A log level float switch installed in all storage tanks shall prevent dry running of respective pumps.

20. **Valves and Fittings: Provide the following valves and fittings:**
    - Pump isolating gate valves of 300 psi Rating or PN-20 valves.
    - Non return valves of 300 psi Rating or PN-20 valves.
    - Interconnection pipework copper or galvanized steel pipe as appropriate.
    - Pressure manifold mild steel protected with anti-corrosive paint or Galvanized.
    - Strainer on suction Pipe.

2.2 SUMP PUMPS

A. All pump with flow less than and 50 gpm shall be of S.Steel casing while pumps having flow greater than 50 gpm shall be of Cast Iron casing.

B. All pump Impellers shall be stainless steel wear resistant, semi shrouded, multi vane with adjustable diffusers.

C. Shaft shall be Stainless Steel 304SS.

D. Motor shall be squirrel cage induction type, class F insulation capable of a maximum of 15 starts/hour.

E. Motor casings shall be with integral cooling ribs for maximum heat dissipation.

F. Pump motors shall be non-overloading and capable of being run dry or at low heads for extended periods of time. Pump motors shall operate on 380 volt, 3-phase and 60 cycle power.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Motor shall incorporate a heat sensor thermostat in the stator windings for thermal failure alarm.

H. Pumps shall be fitted with two mechanical seals with silicon carbide rotating & seat stainless steel spring, flexible bellows and gaskets. The chamber between the shaft seal to be oil filled.

I. Shaft shall be mounted on pregreased rolling element bearings.

J. Cable junction chamber shall be a sealed terminal chamber with separate gland assemblies incorporating strain relief clamps.

K. Pumps shall be suitable for a maximum depth of submersion with the flanged outlet directed vertical upwards.

L. Pumps shall be selected to match the duties indicated on drawings.

M. Pumps shall be supplied with control panel complete with integrated fuse elements, handoff automatic switch, motor contactor, duty pump selector switch, run/trip lamps for individual pumps etc. Pumps shall be controlled by a unit mounted float control. The pumps shall operate at high level and stop at low level of water in the sump pit.

N. Pumps shall be capable of being removed from the sump without any dismantling and without the need for personnel to enter the sump. Pumps shall be equipped with guide rails and pump disconnects which allow pumps to be lifted. Guide rail shall be manufactured from stainless steel. A Steel chain shall also be rope be supplied for pump removal.

O. Ball bearings shall be used throughout. Pump shall use dual mechanical seals with ceramic/carbide/graphite faces.

P. Valves and Piping:

a. Check Valves shall be of the gravity operated ball style, with a full port passageway. Valve operation shall provide positive shutoff under backflow conditions, including low heads.
b. Shut off valves shall be resilient wedge gate valves meeting AWWA C500.

Q. Pumps shall be supplied complete with control panel for automatic operation and auto changeover of duty/standby pump. Control panel shall have visual/audible alarm and volt free contacts for connection to BMS where required.

R. Mode of control shall be as follows:
a. Low level pump stop float switch.
b. Normal level pump start float switch.
c. High level standby pump float switch.
d. High level alarm float switch.

S. Pump components shall be manufactured from the following materials:
a. Motor: As mentioned Above
b. Pump housing: Grey cast iron for flow less than 50 gpm and S.steel for

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

flow greater than 50 gpm
c. Impeller: Grade 304 stainless steel.
d. Pump sleeve: Grade 316 stainless steel.
e. Shaft: Grade 304 stainless steel.
f. Bearing: Heavy-duty pre-lubricated ball bearings.
g. O-rings: Neoprene rubber.

2.3 SEWAGE LIFT PUMP SET

A. Electric submersible sewage pumps shall be suitable for wet sump or dry pit installation and for intermittent or continuous operation.

B. Pump shall be suitable for a maximum depth of submersion with the outlet directed vertically upwards.

C. Pump components shall be manufactured from the following materials:
a. Motor: 3 phase or single phase, insulation class F, protection type IP68 (refer details below
b. Pump housing: Grey cast iron
c. Impeller: Grey cast iron grinder type.
d. Pump sleeve: Grade 316 stainless steel.
e. Shaft: Grade 304 stainless steel.
f. Bearing: Heavy-duty pre-lubricated ball bearings.
g. O-rings: Neoprene rubber.

T. Pump casing shall be Cast Iron. Pump Impellers shall be stainless steel wear resistant, semi shrouded, multi vane with adjustable diffusers.

D. Motor shall be of the synchronous squirrel cage type, IP68 rating, hermetically enclosed within the stator housing. Stator shall be wound with double lacquered wire and subsequently triple dipped to provide insulation in accordance with IEC 85 temperature Class F (155 Deg. C). Stator winding over temperature shall be prevented by bimetallic thermal switches or thermistors embedded in each of the stator phase windings. Motor shall be designed for a maximum of 15 starts/hour. Motor casing shall be with integral ribs for maximum heat dissipation. Motor casing shall be of cast iron.

E. Cable entry glands shall be suitably designed to effectively seal the junction box from the surrounding liquid at depths upto 10 metres and to mechanically restrain the cable to avoid distortion of the gland rubbers and to prevent kinking of the cable adjacent to the cable entry.

F. Motor shaft shall be of stainless steel series 400 and mounted on robust pre-greased rolling element bearings rated for L10 duty life of at least 100,000 hours at the rated capacity. The shaft seal assembly shall comprise of two independent mechanical face seals mounted in tandem with an interposing oil chamber to cool the seals and to act as an additional leakage barrier. Seal combination shall be high wear resistant tungsten carbide/tungsten carbide.

G. Pump casing shall be constructed of stainless steel, with fluid passages large enough to allow solids of any size which can pass through the impeller.

H. Pump casing shall be smooth profiled volute geometry for clog free operation fitted with replaceable inlet wear rings, fabricated from heat treated stainless steel.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Fabricate impeller of fine grained grey cast iron, Class 30 or better. Impeller shall be dynamically balanced single/multi channel type depending on the pump selection and duty specified.

J. The shredding system shall consist of spiral bottom plate with stationary cuter ring with cutting edges and a shredding motor located below the impeller for optimum blockage free running.

K. A mixing valve mounted directly on the pump casing shall be automatically activated to provide efficient mixing of the sump content prior to discharge.

L. The control panel shall be prewired, with IP65 enclosure and include the following:
   a) Panel mounted, door interlocked disconnect switch.
   b) Circuit breaker and earth leakage breaker for each pump.
   c) Magnetic starters with 3 leg overload protection.
   d) Selector switch Hand Off Auto (HOA) for each pump.
   e) 24 Volt control transformer.
   f) Float switch for high level alarm and pump operating.
   g) Pilot lights for power on, pump failure, high water level.
   h) Volt free contacts to interface with Building Management System for Power ON, HOA switches in auto position, Common fault, pump run/trip, high level and Hours run meter (One per pump).

M. Pump operation shall be automatic controlled through mercury type float switches installed in the sewage collection pit.

N. Pumps shall be supplied with all accessories including foot bends, stainless steel guide rails, stainless steel lifting chains, float switches, gate and check valves on each pump discharge.

O. All fasteners on the submersible pump and motor casing shall be type 304 stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment foundations, and conditions with installer present for compliance with requirements for installation and other conditions affecting pump performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

Examine the installed plumbing and drainage system verify actual locations of piping and connections prior to installation.

3.2 CONCRETE EQUIPMENT BASES

A. Wherever necessary, install concrete equipment bases of dimensions required for plumbing pumps, and controllers.

3.3 INSTALLATION

A. Comply with pump manufacturers written installation and alignment instructions.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Install pumps in locations indicated and arrange to provide access for periodic maintenance, including removal of motors impellers, couplings and accessories.

C. Set basemounted pumps on concrete equipment bases as indicated on drawings. Disconnect couplings halves before setting. Do not reconnect couplings until alignment operations have been completed.

a) Support pump base plate on rectangular metal blocks and shims or on metal wedges having small taper, at points near foundation bolts to provide a gap of 19 to 38 mm between pump base and foundation for grouting.

b) Adjust metal supports or wedges until pump and driver shafts are level. Check couplings faces and pump suctions and discharge flanges to verify that they are level.

D. Install suction and discharge pipe sizes equal to or greater than the diameter of water pump connections.

E. Install valves of types and at locations indicated that are same size as the piping connecting water pump, bypasses, test headers and other piping systems.

F. Install pressure gages on pump suction and discharge pipe work.

G. Support pumps and piping separately so that weight of piping system does not rest on pumps.

H. Install piping accessories, hangers and supports, anchors, valves meters and gages, and equipment as indicated for complete installation.

I. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified as factory mounted. Furnish copy of manufacturers wiring diagram submittal to the Consultant.

J. Verify that electrical wiring is installed according to manufacturer's recommendations and installation requirements. Do not proceed with equipment start up until wiring installation is acceptable.

3.4 ALIGNMENT

A. Align pump and driver shafts after complete unit has been leveled on foundation and after grout has set and foundation bolts have been tightened.

B. After alignment is correct, tighten foundation bolts evenly but not too firmly. Fill base plate completely with non shrink, non metallic grout, with metal blocks and shims or wedges in place. After grout has hardened, fully tighten foundation bolts. Check alignment and take corrective measures required.

3.5 CONNECTIONS

A. Connect suction and discharge side of the piping system to the pumps.

3.6 FIELD QUALITY CONTROL

A. Contractor to ensure services of pump manufacturer representative to supervise

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

field assembly of components, installation of pump units, including piping and electrical connections and field acceptance tests. Report test results in writing.

B. Check all connections for tightness.

C. Perform field acceptance tests for the pump unit (pump, driver and controller) and system piping when pump unit installation is complete. Where possible, fieldcorrect malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or that does not perform as specified and as indicated, then retest to demonstrate compliance. Verify that each pump unit performs as specified and as indicated.

3.7 TESTING AND COMMISSIONING

A. General After completion of the Work, Contractor shall run a test over a sufficient period of time to prove the proper capacity and performance of all apparatus, etc., and the system as a whole.

B. The Contractor shall carry out commissioning and testing of all equipment installed.

C. Startup Services: Contractors shall provide services of pump manufacturer representative to provide startup service and to demonstrate and train's maintenance personnel as specified below:

a. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
b. Review data in the Operating and Maintenance Manual.

D. Commissioning shall be deemed to include all operations required in order to correctly set the plant to work, adjust and calibrate to design conditions to the complete satisfaction of the . The above shall include but not limited to testing and balancing of all related systems, including associated plant and equipment, balancing and adjusting to achieve correct flow rates, including setting valves and other regulating devices.

E. Final setting positions for all regulating and controlling devices shall be recorded and such records shall form part of the manual of the operating and maintenance instructions.

F. All systems shall be field tested and run on load, with all automatic controls in operation and all circuits balanced to produce design conditions, in presence and to the satisfaction of the Engineer.

G. In case of unsuccessful test run, the Contractor shall take necessary step for the rectification and retested to the satisfaction of the Engineer.

H. The Contractor shall also provide at his own cost services of skilled and unskilled staff during the test run of all the systems as required by the Engineer.

3.8 TRAINING

A. Train's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Schedule training with at least 7 days' advance notice.

END OF SECTION

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 15460

WATER CONDITIONING EQUIPMENT

Table of Contents

PART 1 - GENERAL 2
1.1 WORK INCLUDED 2
1.2 DESCRIPTION OF WORK 2
1.3 QUALITY ASSURANCE 2
1.4 SUBMITTALS 2
1.5 PRODUCT DELIVERY, STORAGE AND HANDLING 2
PART 2 - PRODUCTS 3
2.1 PACKAGED ULTRA FILTRATION SYSTEM 3
2.2 MULTIMEDIA FILTER AND CARBON FILTERS 5
2.3 WATER SOFTENERS 6
PART 3 - EXECUTION 10

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Compliance with General Requirement of relevant sections.

B. Conform to General Requirements for Mechanical Services specifications.

1.2 DESCRIPTION OF WORK

A. Furnish and install Plumbing Equipment as indicated on drawings.

B. This section specifies the requirements for the water filtration equipment

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of specified items with characteristics, sizes and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.

B. Certification, test certificates under specified operating conditions shall be provided by manufacturer.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions.

B. Shop Drawings : Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances and methods of assembly of components.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to equipment. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory - installed and portions to be field- installed.

D. Maintenance Data: Submit maintenance data and parts lists for each type of equipment, control and accessory, including "trouble - shooting" maintenance guide. Include this data, product data, shop drawings and wiring diagrams in maintenance manual.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle equipment and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged equipment or components, replace with new.

B. Store equipment and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 2 - PRODUCTS

Equipment shall be compatible to interface with BMS System. Interfacing card, BACnet Compliant / compatible and software for interfacing and programming with BMS System shall be provided with the Equipment.

2.1 PACKAGED FILTRATION SYSTEM (TO BE FINALIZED AFTER WATER TEST REPORT)

A. A packaged filtration plant comprising Stage-1 Multimedia Sand Filter, Stage - 2 Active carbon filters, Water Softeners with brine tank, 05 micron cartridge Filter, 1 Micron box Cartridge filters, and chemical dosing system shall be supplied provided for the facility. Capacity shall be as indicated on the drawings. Refer Equipment schedules for filter capacities

B. Filter tank shall be suitable for a working pressure of 125 Psi -150 Psi and tested at 50% in excess of the working pressure. Shell height to allow a minimum free board space of 100% of the mineral bed depth for adequate expansion during backwashing.

C. All filter media shall be of good quality possessing characteristics of durability, long life, resistance to attrition and shall not impart taste, odour or colour to the water being treated. Filter media shall be selected for removing particulates down to 10 micron size.

D. The filter unit shall be equipped with a fully automatic, self-contained control valve using a cartridge design permitting instant service. Timer to automatically control the filter clean-up cycle on a pre-set schedule. Duration of backwash and rinse cycles to be factory set to accommodate site conditions.

E. The filtration unit shall be suitable for removal of suspended matters, de chlorination, organic removal, and odour removal.

F. The filtration units shall be one complete package and shall be provided by one manufacturers including all above mentioned equipment, interconnecting pipes, Valves, backwash lines, filtration media, Feed and backwash pumps etc. complete in all respects. The contractor shall submit the proposal for consultants review and approval.

G. All Filtration equipment shall be by Culligan or Pentair. Pumps and valves shall be as per approved list of manufactures.

H. <u>The output water quality shall be as per WHO Drinking water standards.</u>

<u>MULTI MEDIA SAND FILTER</u>

Pressure Drop	4 to 6 psi
Max working pressure bar	8.5
Min working pressure bar	1.3
Test pressure bar	10.5

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Max working temperature	100 C
Size of Sand filter	As per Manufacturer recommendation
Inlet Outlet	As per Manufacturer recommendation
Filtration Media	Silica sand
Operating Mode	Manual multiple valve
Media size	1 mm & 0.5 mm Mesh

GRANULAR ACTIVATED CARBON

Pressure Drop	3 to 4 psi
Min working pressure bar	1.3
Max working bar	8.5
Test pressure bar	10.5
Max working Temp	100 C
Size of vessel	As per Manufacturer recommendation
Inlet Outlet	As per Manufacturer recommendation
Purification Media	Granular Activated Carbon

SEDIMENT FILTER 01 MICRON

Make	Taiwan
Maximum pressure	90 psi
Type of Cartridge	Polypropylene fiber
Filtration Micron Rating	05 &01 Micron

ULTRAVIOLET STERLIZER (Water dis-infection unit)

Lamp life	10, 000 running hours
Power consumption	As per Manufacturer recommendation
Ultraviolet output	As per Manufacturer recommendation
Design pressure	125 psi
Operating temperature	35 – 100 C
Ultraviolet dosage	30, 000 MW sec/cm2
Inlet / Outlet	1”





e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.2 MULTIMEDIA FILTER AND CARBON FILTERS.

A. A packaged filtration plant shall comprise of Stage-1 Multimedia Sand Filter operating as 1 Duty and 1 standby and Stage -2 Active carbon filters operating as 1 Duty and 1 standby as well.

B. Refer Equipment schedules for filter capacities

C. Filter tank shall be suitable for a working pressure of 689 KPa (100psi) and tested at 50% in excess of the working pressure. Shell height to allow a minimum free board space of 100% of the mineral bed depth for adequate expansion during backwashing. Tank to be equipped with one manhole located in the top head of the tank. Filter tank to be supported by legs and be painted with a rust inhibiting primer. Filter tank shall be of glass reinforced polyester construction.

D. The collector system shall consist of a plate welded to the complete diameter of the tank and centrally supported by a pier. Plate to accommodate collectors spaced to collect and dispense water laterally. Multiple layers of filter media to be furnished to properly distribute the backwash water and support the mineral bed.

E. Following media shall consist of four layers as follows:

a) Top layer to consist of light weight chips to retain large flat pieces of debris.

b) Second layer to collect the bulk of course turbidity.

c) Third layer to remove finer particles not collected in the upper layers.

d) Bottom layer of high density material to polish the water removing particulates down to 10 micron size.

F. All filter media shall be of good quality possessing characteristics of durability, long life, resistance to attrition and shall not impart taste, odour or colour to the water being treated. Filter media shall be selected for removing particulates down to 10 micron size.

G. The filter unit shall be equipped with a fully automatic, self-contained control valve using a cartridge design permitting instant service. Timer to automatically control the filter clean-up cycle on a pre-set schedule. Duration of backwash and rinse cycles to be factory set to accommodate site conditions.

H. The filtration unit shall be suitable for removal of suspended matters, de chlorination, organic removal, and odour removal.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.3 WATER SOFTENERS

Description: Factory-assembled, pressure-type water softener.

A. Furnish and install a water softener to provide a zero soft water effluent as determined by an ASTM standard soap test method. Each unit shall be capable of a continuous flow rate of flow as indicated in equipment schedule with a pressure drop of 15 psi and a peak flow rate with a pressure drop of 25 psi.

B. The softener vessel(s) shall be designed for a working pressure of 150 psi and a temperature of 120 degrees F. A minimum freeboard volume of 50% shall be provided to assure adequate bed expansion during backwash. Vessel(s) shall be manufactured of fiberglass reinforced polyester (FRP). The exterior side shall be reinforced by a continuous roving glass filament overwrap of the same color as the vessel(s) shell. The vessel(s) shall be supported by a molded polypropylene structural base.

C. The backwash and soft water collector shall be of the hub-radial design and shall require only assembly of the riser pipe upon installation. The radials shall be designed with a higher density of slots at the outer ends to provide adequate distribution and collection of water away from the center of the tank. Internal piping material shall be constructed of cPVC and/or ABS plastic. Systems shall have a single point distributor

D. The combination salt storage and brine measuring tank with cover shall be sized to salt as recommended by manufacturer. The tank shall be of rotationally molded rigid polyethylene. The brine tank shall be equipped with an elevated salt plate for the collection of brine and shall have a chamber to house a brine valve assembly. The brine valve assembly shall include an automatic air eliminator and safety float shut-off valve. It shall open automatically, to educt brine, close to prevent the entrance of air after the brine has been drawn, and permit refill of the tank with the correct amount of water. Brine dosage shall be controlled by the softener control valve through an adjustment on the clock timer. The system shall be designed to allow proper refilling regardless of the salt level in the tank.

E. Controls: Fully automatic; factory wired and factory mounted on unit.

1. Adjustable duration of various regeneration steps.

2. Push-button start and complete manual operation.

3. Twin Alternating Control – The regeneration shall be controlled by a mechanically operated automatic reset water meter installed in the common soft water effluent line. Softeners shall be regenerated based on total gallons through the meter. An alternator shall be supplied to allow only one unit to be in regeneration or standby at a time while the other unit is in-service. This system shall provide a continuous supply of soft water. Indicating lights shall be provided to show which unit is in service and which one is regenerating

4. Sequence of Operation: Multiport pilot-control valve automatically pressure actuates main operating valve through steps of regeneration and return to service.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. Pointer on pilot-control valve shall indicate cycle of operation.

6. Includes means of manual operation of pilot-control valve if power fails.

F. Main Operating Valves: Industrial, automatic, multiport, diaphragm type with the following features:

1. Inlet and outlet connections Constructed of lead-free brass.

2. Mechanically actuated, four position type to accomplish the regeneration steps of backwash, brine draw / slow rinse, fast rinse and brine tank refill.

3. The valve shall contain a fixed orifice eductor nozzle and self-adjusting backwash flow control.

4. Slow opening and closing, non-slam operation.

5. Diaphragm guiding on full perimeter from fully open to fully closed.

6. Self-adjusting, internal, automatic brine injector that draws brine and rinses at constant rate independent of pressure.

7. Sampling cocks for soft water.

8. Special tools are not required for service

G. Flow Control: Automatic, to control backwash and flush rates over wide variations in operating pressure; does not require field adjustments.

9. Demand-Initiated Control: Each mineral tank of twin mineral-tank unit is equipped with automatic-reset-head water meter that electrically activates cycle controllers to initiate regeneration at preset total in gallons. Head automatically resets to preset total in gallons for next service run. Electrical lockout prevents simultaneous regeneration of both tanks.

H. Liner: PE, ABS, or other material suitable for potable water.

I. Handholes: 4 inches (102 mm) round or 4 by 6 inches (102 by 152 mm) elliptical, in top head and lower sidewall of tanks 30 inches (762 mm) and smaller in diameter.

J. Manhole: 11 by 15 inches (280 by 380 mm) in top head of tanks larger than 30 inches (762 mm) in diameter.

K. Controls: Automatic; factory mounted on unit and factory wired.

L. Adjustable duration of various regeneration steps.Push-button start and complete manual operation.Electric time clock and switch for automatic operation, except for manual return to service.

M. Sequence of Operation: Program multiport pilot-control valve to automatically pressure-actuate main operating valve through steps of regeneration.

N. Flow Control: Automatic, to control backwash and flush rates over wide variations in operating pressures, and that does not require field adjustments.

O. Demand-Initiated Control: Equip single mineral-tank units with automatic-reset-head water meter that electrically activates cycle controller to initiate regeneration at preset total in gallons (liters). Design so head automatically resets to preset total in gallons (liters) for next service run.



(Sample selection for Reference only)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Culligan



The Culligan Side Mount (CSM™) Series

WATER SOFTENER SYSTEM

Efficient and Scalable Heavy-Duty Water Treatment System

Use Culligan® equipment to help meet the highest standard of water quality at your facility. The Culligan® Side Mount heavy-duty softener reduces hard water contaminants*, even for large flow volume applications, reducing scale buildup that can affect equipment performance. The Culligan®-exclusive Smart Controller allows you to efficiently set up and manage your water treatment. Using optional accessories, monitor water usage data, such as the flow rate and volume, and regenerate the system as needed, saving resources and money.

The CSM softener is part of the Culligan® Commercial and Industrial Solutions that combine durable and efficient equipment, systems experience, and technical experts who understand your unique requirements. From planning your system to installing your water treatment equipment, Culligan® Commercial and Industrial Solutions offer options that help deliver the quality of water to meet your needs. Contact Culligan® today to learn more about the CSM softener system.

Markets Served:

Clinics
Educational Facilities
Energy / Power
Food / Beverage Production
Food Service / Restaurants
Grocery
Healthcare / Hospitals / Bio-Pharmaceutical
Hospitality / Lodging
Manufacturing
Municipal Drinking Water
Oil / Gas

CULLIGAN® COMMERCIAL & INDUSTRIAL ADVANTAGES:

- Simple System Integration
- Global Product Platform
- Flexible Configurations
- Quick Delivery / Easy Installation
- Exclusive Culligan Advanced Electronics
  - Historical Operating Data
  - Alarm Recognitions
  - US Standard and Metric Readings
  - Remote Monitoring Options
  - Telemetry Options

*Contaminants may not necessarily be in your water.

(Sample selection for Reference only)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 3 - EXECUTION

A. All material shall be installed strictly in compliance with the manufacturer's instructions.

B. Install commercial water softeners on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete.

C. Install brine lines and fittings furnished by equipment manufacturer but not specified to be factory installed.

D. Prepare mineral-tank distribution system and underbed for minerals and place specified mineral into mineral tanks.

E. Install water-testing sets mounted on wall, unless otherwise indicated, and near water softeners.

F. Run all piping as direct as possible, avoiding unnecessary offsets.

G. The interconnecting piping for plants shall be cPVC Sch. 80 and the valves shall be non-corrosive material.

H. The installation shall be carried out and validated by the water treatment plant supplier.

I. Ream all pipes to full inside diameter after cutting and thoroughly clean before erection. All material shall have proper identification marks that can be verified prior installation.

J. After the plants are installed, thoroughly flush all piping before running pumps sterilizing the potable water system.

K. The sterilization works shall be included in the operation and maintenance manual.

PART4-CONNECTIONS

A. Comply with requirements for piping specified in "pipes and Tubes."

B. Drawings indicate general arrangement of piping, fittings, and specialties. Where piping is installed adjacent to equipment, allow space for service and maintenance of equipment.

C. Install shutoff valves on raw-water inlet and soft-water outlet piping of each mineral tank. General-duty valves are specified in Section "Valves for Plumbing Piping."

D. Install pressure gages on raw-water inlet and soft-water outlet piping of each mineral tank. Water softeners with factory-installed pressure gages at locations

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

indicated.

E. Install valved bypass in water piping around water softeners.

F. Install drains as indirect wastes to spill into open drains or over floor drains.

FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Prepare test and inspection reports for consultants review

STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

B. Add water to brine tanks and fill with the following form of salt:

1. Commercial Water Softeners: The media shall be solid, of the proper particle size (not more than 4% through 40 mesh U.S. standard screen, wet screening) and shall contain no plates, shells, agglomerates or other shapes which might interfere with the normal function of the water softener.

C. Sample water softener effluent after startup and at three consecutive seven-day intervals (total of four samples), and prepare certified test reports for required water performance characteristics. Comply with the following:

1. ASTM D 859, "Test Method for Silica in Water."

2. ASTM D 1067, "Test Methods for Acidity or Alkalinity of Water."

3. ASTM D 1068, "Test Methods for Iron in Water."

4. ASTM D 1126, "Test Method for Hardness in Water."

5. ASTM D 1129, "Terminology Relating to Water."

6. ASTM D 3370, "Practices for Sampling Water from Closed Conduits."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain water softeners

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

15480

ELECTRIC HOT WATER STORAGE HEATERS

Table of Contents

1.0 GENERAL……..2

1.1 REFERENCE ……..2

1.2 DESCRIPTION OF WORK …….2

1.3 QUALITY ASSURANCE:…….2

1.4 SUBMITTALS: …….3

1.5 DELIVERY, STORAGE AND HANDLING: …….3

2.1 PRODUCTS……3

2.2 ATERIALS……3

3.0 EXECUTION.....
...5

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

15480

ELECTRIC HOT WATER STORAGE HEATERS

1.1 GENERAL

1.2 Reference

Conform to General Requirements for Mechanical Services of other sections in this specification.

1.3 Description of Work

a) This section describes the Electric Hot Water Storage Calorifiers, Domestic water Heaters and Electric Trace Heating systems as part of domestic water storage and distribution system.

b) The Contractor shall supply, install, test and commission all items to comply with the design.

c) The Contractor shall ensure that the proposed locations of heaters are adequate and enough space is available for removal of elements and vessel itself for servicing and replacement.

d) All heaters shall be factory assembled and electrically prewired.

e) For other related plumbing connections like water pipes, pumps, pipe specialties refer relevant sections of this specification.

f) For other related electrical connections like starters, wires and cables refer to relevant sections of Electrical specification.

1.4 Quality Assurance:

1.3.1 Manufacturer's Qualifications: Firms regularly engaged in manufacture of water heaters of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3.2 Codes and Standard:

a) BS 853, "Calorifiers and storage vessels for central heating and hot water supply".

1.4 Submittals:

1.4.1 Product Data : Submit manufacturer's technical product data including rated capacities and efficiencies of selected model clearly indicated; operating weights; furnished specialties and accessories; and installation and start up instructions.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.4.2 Shop Drawings: Submit manufacturers assembly type shop drawings indicating dimensions, required clearances, and methods of assembly of components.

1.4.3 Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to water heaters. Submit manufacturer's ladder type wiring diagrams for interlock and control wiring required for final installation of water heaters and controls. Differentiate between portions of wiring that are factory installed and portions that are to be field installed.

1.4.4 Maintenance Data: Submit maintenance data and parts lists for each type and size of water heater, control, and accessory; including troubleshooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual.

1.4.5 Certificates: Submit appropriate certificate of shop inspection and data report as required by provisions of ASME Boiler and Pressure Vessel Code.

1.5 Delivery, Storage And Handling:

1.5.1 Handle water heaters and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged water heaters or components; remove from site and replace with new.

1.5.2 Store water heaters and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

Comply with manufacturer's rigging and installation instructions for unloading water heaters, and moving units to final location for installation.

2 PRODUCTS

2.1 Materials

2.1.1 Electric Hot Water Storage Calorifiers (Not Used)

Hot water storage Calorifiers shall be either horizontal or vertical type depending upon the space availability. Heaters shall be fitted with electric immersion heating elements to give the maximum output kW. Vessel shall be constructed to Section IV of the ASME code or equivalent and for working pressure as indicated in the equipment schedules. Vessel shall be glass lined. Manufacturer shall provide five years warranty for the vessel. The warranty period shall commence from the date of provisional Acceptance Certificate.

Entire Vessel and electrical controls shall be encased in a rectangular or cylindrical sheet metal enclosure with baked enamel finish. Tank shall be insulated with fiber glass. Enclosure shall have hinged locking doors over electric controls.

Heating elements shall be constructed of in coloy rated at 415 V, 3 phase, 50 / 60 Hz. Element load density shall not exceed 75 watts per 6.45 Sq.cm (square inch). Elements shall be switched through magnetic contactors and protected by power fuses. Tank shall be cathodically protected with adequate extruded magnesium rod. An electronic low water cutoff device shall be installed for element protection. Manufacturer shall provide a two year warranty for heating elements.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

All controls and power wiring shall be accessible through a hinged door of the electrical compartment. Door shall be provided with safety interlock to prevent access to the electric components when power is "ON". The water heater shall have indicating lights to denote heating stages in operation, element protection, solid state proportional sequencer, shunt trip circuit interrupter, manual reset temperature limiting device, manual override switches and thermal expansion control valve.

Each calorifier shall be complete with following accessories:

a) Inlet/outlet/hot water return/drain connections

b) Temperature and pressure relief valve

c) Temperature and pressure gauges at inlet and outlet.

2.1.2 Domestic Water Heater

a) Hot water heater shall be horizontal type and ceiling mounted type. Where specified these shall be suitable for under sink installation. Vessel shall be glass lined steel. Heating element shall be copper sheathed electric immersion type.

b) Each heater shall be provided with a thermostat with adjustable setting in the range 32 to 82 deg. C and a safety thermal cut out operable at 90 deg. C with manual reset.

c) The vessel and electrical components shall be encased in a sheet metal enclosure suitable for a working pressure of 600 Kpa with baked enamel finish. Tank shall be insulated with polyurethane insulation. A temperature indicator mounted on the casing shall display the temperature of water. Each heater shall be supplied with drain cock and 20 dia safety valve , discharging to the building waste water drainage system via a floor trap and an automatic air vent.

3.0 EXECUTION

3.1.1 General : Install water heater in accordance with manufacturer’s installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer’s recommended clearances.

3.1.2 Support : Place units on concrete pads orient so controls and devices needing services and maintenance have adequate access.

3.1.3 Piping: Connect hot and cold water piping to units with shut off valves and unions, Connect recirculating water line to unit with shut off valve, check valve, and union. Extend relief valve discharge to closest floor drain.

3.1.4 Gages: Provide thermometers and pressure gauges on inlet and outlet piping of water heaters and recirculating pump, in accordance with Basic Mechanical materials and methods section “Meters and gages”

3.1.5 Electrical wiring: Install electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer’s wiring diagram submittal to electrical installer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 16 sections. Do not process with water heater start up until wiring installation is acceptable.

3.1.6 Start up: Start up, test and adjust electric water heaters in accordance with manufacturer's start up instructions. Check and calibrate controls.

END OF SECTION

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SECTION 15554

FACILITY FUEL OIL PIPING

Table of Contents

PART 1 - GENERAL 3
1.1 REFERENCE 3
1.2 SECTION INCLUDES 3
1.3 DEFINITIONS 3
1.4 RELATED WORKS 3
1.5 PERFORMANCE REQUIREMENTS 4
1.6 SUBMITTALS 4
1.7 QUALITY ASSURANCE 5
1.8 DELIVERY, STORAGE, AND HANDLING 6
1.9 COORDINATION 6
1.10 WARRANTY 6
1.11 Extra Materials 6
PART 2 - PRODUCTS 6
2.1 TANK GAUGES 6
2.2 FUEL OIL PIPING 7
2.3 DIESEL OIL PUMPING AND STRAINING SET 7
2.4 ENGINE EXHAUST SYSTEM 8
2.5 FUEL OIL DAY TANK 8
2.6 PIPING SPECIALTIES 9
2.7 JOINING MATERIALS 10
2.8 MANUAL FUEL-OIL SHUTOFF VALVES 10
2.9 SPECIALTY VALVES 11
2.10 FUEL-OIL STORAGE TANK PIPING SPECIALTIES 12
PART 3 - EXECUTION 13
3.1 EXAMINATION 13
3.2 EARTHWORK 13
3.3 PREPARATION 13
3.4 OUTDOOR PIPING INSTALLATION 13
3.5 INDOOR PIPING INSTALLATION 14
3.6 VALVE INSTALLATION 15
3.7 HANGER AND SUPPORT INSTALLATION 16
3.8 FUEL-OIL PUMP INSTALLATION 16

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1 - GENERAL

1.1 REFERENCE

Conform to General Requirements for Mechanical Services of other sections in this specification.

1.2 SECTION INCLUDES

A. This Section includes diesel-fuel-oil distribution systems and the following:
1. Pipes, tubes, and fittings.
2. Piping and tubing joining materials.
3. Piping specialties.
4. Valves.
5. Steel, fuel-oil USTs with STI-P3.
6. Composite, steel, fuel-oil USTs.
7. Jacketed, steel, fuel-oil USTs.
8. FRP fuel-oil USTs.
9. Fuel-oil UST accessories.
10. Fuel-oil storage tank piping specialties.
11. Fuel-oil storage tank pumps.
12. Fuel-transfer pumps.
13. Fuel maintenance system.
14. Liquid-level gage system.
15. Leak-detection and monitoring system.
16. Mechanical sleeve seals.
17. Grout.
18. Concrete bases.

1.3 DEFINITIONS

A. AST: Aboveground storage tank.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

E. FPM: Vinylidene fluoride-hexafluoropropylene copolymer rubber.

F. FRP: Glass-fiber-reinforced plastic.

G. UST: Underground storage tank.

1.4 RELATED WORKS

A. Mechanical Vibration and Sound Controls

B. Mechanical Insulation

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.5 PERFORMANCE REQUIREMENTS

A. Maximum Operating-Pressure Ratings: 3-psig (21-kPa) fuel-oil supply pressure at oil-fired appliances.

B. Delegated Design: Design restraint and anchors for fuel-oil piping, USTs, and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Minimum test-pressure ratings for fuel oil storage tanks are the following:

1. [Inner]Tank, Smaller Than 12-Foot (3.7-m) Diameter: 5 psig (34.5 kPa).
2. Containment Shell, Smaller Than 12-Foot (3.7-m) Diameter: 5 psig (34.5 kPa).
3. [Inner]Tank, 12-Foot (3.7-m) and Larger Diameter: 3 psig (20.7 kPa).
4. Containment Shell, 12-Foot (3.7-m) and Larger Diameter: 3 psig (20.7 kPa).

D. Minimum working-pressure ratings for piping are the following, unless otherwise indicated:

1. Fuel Oil Distribution Piping: [150 psig (1035 kPa)].
2. Fuel Oil Double-Contained Piping:

a. Carrier-Pipe: [150 psig (1035 kPa)].
b. Secondary-Containment Conduit: [5 psig (34.5 kPa)]

1.6 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, and dimensions of individual components and profiles. Also include, where applicable, rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
1. Piping specialties.
2. Valves: Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Each type and size of fuel-oil storage tank. Indicate dimensions, weights, loads, components, and location and size of each field connection.
4. Fuel-oil storage tank accessories.
5. Fuel-oil storage tank piping specialties.
6. Fuel-oil storage tank pumps.
7. Fuel-oil transfer pumps.
8. Fuel maintenance system.
9. Liquid-level gage system.
10. Leak-detection and monitoring system.

B. Shop Drawings: For facility fuel-oil piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
1. Shop Drawing Scale: (1:50).
2. For fuel-oil storage tanks and pumps, include details of supports and anchors.

C. Delegated-Design Submittal: For fuel-oil piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of anchors and seismic restraints.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Design Calculations: Calculate requirements for selecting seismic restraints.
3. Detail fabrication and assembly of pipe anchors, hangers, supports for multiple pipes, and attachments of the same to building structure.

D. Coordination Drawings: Plans and details, drawn to scale, on which fuel-oil piping is shown and coordinated with other installations, using input from installers of the items involved.

E. Site Survey: Plans, drawn to scale, on which fuel-oil piping and tanks are shown and coordinated with other services and utilities.

F. Qualification Data: For qualified professional engineer.

G. Brazing certificates.

H. Welding certificates.

I. Field quality-control reports.

J. Operation and Maintenance Data: For fuel-oil equipment and accessories to include in emergency, operation, and maintenance manuals.

K. Warranty: Sample of special warranty.

1.7 QUALITY ASSURANCE

A. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

B. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Comply with ASME B31.9, "Building Services Piping," for fuel-oil piping materials, installation, testing, and inspecting.

F. Comply with requirements of the EPA and of state and local authorities having jurisdiction. Include recording of fuel-oil storage tanks and monitoring of tanks and piping.

G. Comply with NFPA 30, "Flammable and Combustible Liquids Code," and NFPA 31, "Installation of Oil Burning Equipment," for fuel oil piping materials, components, installations, testing, and inspecting.

H. Comply with PEI RP100-87 Recommended Practices for Installation of Underground Liquid Storage Systems.

I. Local Civil Defense

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.8 DELIVERY, STORAGE, AND HANDLING

A. Lift and support fuel-oil storage tanks only at designated lifting or supporting points, as shown on Shop Drawings. Do not move or lift tanks unless empty.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store pipes and tubes with protective PE coating to avoid damaging the coating and to protect from direct sunlight.

D. Store PE pipes and valves protected from direct sunlight.

1.9 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-oil storage tanks and flexible, double-containment piping and related equipment that fail in materials or workmanship within specified warranty period.
   1. Storage Tanks:
      a. Failures include, but are not limited to, the following when used for storage of fuel oil at temperatures not exceeding 150 deg F (66 deg C):
         1) Structural failures including cracking, breakup, and collapse.
         2) Corrosion failure including external and internal corrosion of steel tanks.
      b. Warranty Period: Ten (10) years from date of Substantial Completion.
   2. Flexible, Double-Containment Piping and Related Equipment:
      a. Failures due to defective materials or workmanship for materials installed together, including piping, dispenser sumps, entry boots, and sump mounting adapters.
      b. Warranty Period: Ten (10) years from date of Substantial Completion.

1.11 Extra Materials

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Drive Belt: One for each belt-driven pump.

PART 2 - PRODUCTS

2.1 TANK GAUGES

A. Provide an electric gauging system compatible with tank size that provides a continuous signal. Gauging system shall be unaffected by change in the specific gravity of the tank liquid. A high / low level alarm switch shall be mounted on the gauges. Provide all contacts and necessary connection as required for monitoring the levels by the control system.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Scales to be calibrated on one side in litres graduated for equal litre units based on actual tank dimensions, on the other side in millimetre/centimetre graduated for every 6 mm of tank depth.

C. Each gauge shall be filled with red indicating fluid having a specific gravity of not more than 3.0.

D. Connections between tank and gauges shall consist of double copper tubing encased in flameproof covering. The copper tubing shall be not less than 3 mm (1/8") O.D. and provided with suitable end connections.

E. Tank fittings shall be provided with a 38 mm (1 1/2") male pipe thread with a stuffing box and stuffing box nut through which 13mm (1/2") pressure pipe extends. The pressure fitting shall be provided with a 13 mm (1/2") female pipe thread. Tank fittings and pressure fittings shall be made of solid bar stock to prevent leak possibilities.

2.2 FUEL OIL PIPING

A. Refer Division 15 section for Piping materials

B. Steel Pipe: ASTM A 53; Type S (seamless); Grade B; Schedule 40; black steel.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with welded fittings according to ASME B1.20.1, suitable for diesel and other fuels.

2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1, suitable for fuel oil.

3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125, suitable for fuel.

4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel, suitable for fuel and dieasel.

5. Gasket Material: Thickness, material, and type suitable for fuel and diesel.

C. Alternate Material of Fuel Oil piping shall be in black mild steel to BS 1387 – heavy weight, with screwed malleable iron fittings for pipes up to 50 mm to BS 143 & 1256 and to BS EN 10242 and for pipe of 65 mm and above, Butt welded fittings to BS 1965 part 1.

2.3 DIESEL OIL PUMPING AND STRAINING SET

A. Description: UL 79, multistage centrifugal fuel oil pump for flammable liquids.

B. Provide packaged type duplex fuel oil pumping and straining set (with one electrical pump with flame proof motor) with a capacity of two times the total fuel consumption of engine at full load. Pump sets shall be factory assembled, piped, wired and tested. Pumps shall be activated by a switch in the day tank. Provide one manual pump of equal capacity and make necessary piping connections with valves.

C. Controls for Pumps Supplying Fuel-Oil-Burning Equipment: Pump controller panel complying with UL 353 and UL 508C and with interlock and terminals for connections to fuel-oil-burning equipment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. Support base shall be fabricated of not less than 6 mm steel plate with 75 mm side rails continuously welded to form a 25 mm high overflow lip, complete with 13 mm drain plug. Strainer and pumps shall be bolted to individual bases, which, in turn, are welded to the support base.

E. Piping shall be complete to suction, discharge and return line connections. Provide gate valves and unions arranged to permit removal of either pump while the system is in operation. Install check valves and relief valves on pump outlet and gate valves on the inlet side of pressure gauges.

F. Suction strainer shall be flanged connection, duplex type, one-piece, cast-iron body, ASTM A 48 Class 30, with 1.2 mm perforation brass baskets.

G. Oil pump set shall be factory assembled on a structural steel channel beam base to include pumps, motors, flexible couplings etc. Pump set shall be suitable for diesel oil.

H. Pump Set shall be compatible to interface with BMS System. Interfacing card, BACnet Compliant / compatible and software for interfacing and programming with BMS System shall be provided.

I. Valves
   1. Gate valves to be bronze body, screwed connection, 1378 kPa.
   2. Check valves to be bronze body, angle type, screwed connection, stamped 413 kPa, adjustable 275 to 550 kPa, similar to Bailey No. 118, or equal and approved.

2.4 ENGINE EXHAUST SYSTEM

A. Exhaust pipes shall be of Schedule 40 black steel and of adequate size to ensure that back pressure does not exceed the value specified by the manufacturer.

B. The exhaust pipe shall be connected through airtight flexible coupling to the engine. Bends in exhaust pipe shall have a radius of not less than three times the pipe diameter.

C. Exhaust pipes shall be adequately lagged with 75mm thick (minimum) calcium silicate moulded insulation having a density of 175 kg/m3 (11 lb/ft3) and canvassed so that the surface temperature does not exceed 60oC.

D. When exhaust pipes pass through walls or roof a suitable weatherproof sleeve or thimble shall be provided to isolate exhaust pipe from the building. A silencer of heavy duty residential type shall be provided in the exhaust system and it shall also be lagged.

E. Exhaust pipes and mufflers shall be supported from the ceiling by special vibration isolating hangers and the pipe shall be slanted away from the engine and a condensate trap fitted at the lowest points. Approved rain caps shall be installed at the discharge end of the exhaust pipes on the roof.

2.5 FUEL OIL DAY TANK

A. Provide where indicated on plans welded steel fuel oil tanks and supports. Tanks shall bear a fixed nameplate bearing the material gauge and tank capacity.

B. Tanks to be fabricated of not less than 6.0 mm thick steel plate as per ASTM A131 or A36 throughout, with stiffeners and reinforcement as required

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Provide tanks complete with a 600 mm diameter manhole, brass bolts, cover and metallic gasket and welded outlets to accommodate the piping connections. Test each tank to 1 bar test pressure.

D. Exterior of tanks to be painted with one coat of red lead and one coat of bitumastic shop coat solution.

E. Tanks to be mounted on steel gantry. Size of the steel gantry to be determined as required maintaining the integrity of the bottom of the fuel oil storage tank. A minimum of 18 mm of grout between the steel gantry and the top of the concrete plinth should be provided.

F. Provide tapings in top of tank for all piping and sensor connections, including fuel oil supply pipe, fuel oil return pipe, vent, gauge, high level sensor, low level sensor, etc.

2.5 A VERTICAL FUEL TANKS

A. Manufacturers:
1. Ace Tank & Equipment Co.
2. Adamson Global Technology Corporation.
3. Brown Tank.
4. Buffalo Tank Company, Inc.
5. Cardinal Tank Corp.
6. Clawson Tank Company.
7. Containment Solutions, Inc.; Hoover Containment Div.
8. Highland Tank & Mfg. Co.
9. Modern Welding Co., Inc.
10. Steel Tank & Fabricating Co., Inc.

B. Description: UL 142[or STI F921], double-wall, vertical, steel tank; with primary- and secondary-containment walls and interstitial space.

C. Construction: Fabricated with welded, carbon steel suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and maintained temperature up to 150 deg F (66 deg C).

2.5 b FUEL OIL ACCESSORIES

D. Tank Manholes: 22-inch (560-mm) minimum diameter; bolted, flanged, and gasketed; on top and at side of tank as per Tank configuration or as approved.

E. Threaded pipe connection fittings on top or sides of tank as indicated, for fill, supply, return, vent, sounding, and gaging. Include cast-iron plugs for shipping.

F. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.

G. Lifting Lugs: For handling and installation.

H. Ladders: Carbon-steel ladder outside tank, anchored to top and side wall..

1. Cage: Include welded steel cage around ladders for tanks [20 feet (6 m)] or higher.

2.6 PIPING SPECIALTIES

A. Y-Pattern Strainers:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for (DN 50) and smaller; flanged ends for (DN 65) and larger.
3. Strainer Screen: 60 mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (860 kPa).

B. Basket Strainers:
1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for (DN 50) and smaller; flanged ends for (DN 65) and larger.
3. Strainer Screen: 60 mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (860 kPa).

C. T-Pattern Strainers:
1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
2. End Connections: Grooved ends.
3. Strainer Screen: 60 mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
4. CWP Rating: 750 psig (5170 kPa).

D. Manual Air Vents:
1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: (DN 15).
5. Discharge Connection: (DN 6).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 225 deg F (107 deg C).

2.7 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for fuel oil.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

D. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

2.8 MANUAL FUEL-OIL SHUTOFF VALVES

A. General Requirements for Metallic Valves, (DN 50) and Smaller for Liquid Service: Comply with UL 842.
1. CWP Rating: 125 psig (860 kPa)
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dry seal Threads on Flare Ends: Comply with ASME B1.20.3.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.
5. Service Mark: Initials "WOG" shall be permanently marked on valve body.

B. General Requirements for Metallic Valves, (DN 65) and Larger: Comply with UL 842.
1. CWP Rating: 125 psig (860 kPa).
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

C. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated brass.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Separate packnut with adjustable-stem packing threaded ends.
6. Ends: Threaded, flared, or socket as indicated in the valve schedule.
7. CWP Rating: 600 psig (4140 kPa).
8. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated bronze.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Threaded-body packnut design with adjustable-stem packing.
6. Ends: Threaded, flared, or socket as indicated in the valve schedule.
7. CWP Rating: 600 psig (4140 kPa).
8. Service Mark: Initials "WOG" shall be permanently marked on valve body.

2.9 SPECIALTY VALVES

A. Pressure Relief Valves: Comply with UL 842.
1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
2. Body: Brass, bronze, or cast steel.
3. Springs: Stainless steel, interchangeable.
4. Seat and Seal: Nitrile rubber.
5. Orifice: Stainless steel, interchangeable.
6. Factory-Applied Finish: Baked enamel.
7. Maximum Inlet Pressure: 150 psig (1035 kPa).
8. Relief Pressure Setting: 60 psig (414 kPa).

B. Oil Safety Valves: Comply with UL 842.
1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
2. Body: Brass, bronze, or cast steel.
3. Springs: Stainless steel.
4. Seat and Diaphragm: Nitrile rubber.
5. Orifice: Stainless steel, interchangeable.
6. Factory-Applied Finish: Baked enamel.
7. Manual override port.
8. Maximum Inlet Pressure: 60 psig (414 kPa).
9. Maximum Outlet Pressure: 3 psig (21 kPa).

C. Emergency Shutoff Valves: Comply with UL 842.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
2. Single or Double poppet valve.
3. Body: ASTM A 126, cast iron.
4. Disk: FPM.
5. Poppet Spring: Stainless steel.
6. Stem: Plated brass.
7. O-Ring: FPM.
8. Packing Nut: PTFE-coated brass.
9. Fusible link to close valve at 165 deg F (74 deg C).
10. Thermal relief to vent line pressure buildup due to fire.
11. Air test port.
12. Maximum Operating Pressure: 0.5 psig (3.45 kPa).

D. Mechanical Leak Detector: Comply with UL 842.
1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
2. Body: ASTM A 126, cast iron.
3. O-Rings: Elastomeric compatible with fuel oil.
4. Piston and Stem Seals: PTFE.
5. Stem and Spring: Stainless steel.
6. Piston Cylinder: Burnished brass.
7. Indicated Leak Rate: Maximum 3 gph (3 mL/s) at 10 psig (69 kPa).
8. Leak Indication: Reduced flow.

2.10 FUEL-OIL STORAGE TANK PIPING SPECIALTIES

A. Fitting Materials: Cast iron, malleable iron, brass, or corrosion-resistant metal; suitable for fuel-oil service.
1. Surface, Flush-Mounted Fittings: Waterproof and suitable for truck traffic.
2. Aboveground-Mounted Fittings: Weatherproof.

B. Spill-Containment Fill Boxes: Flush mounting, with drainage feature to drain oil into tank, threaded fill-pipe connection, and wrench operation.

C. Fill Boxes: Flush mounting, with threaded fill-pipe connection and wrench operation.

D. Locking Fill Boxes: Flush mounting, with locking-type inner fill cap for standard padlock and threaded fill-pipe connection.

E. Supply and Sounding Drop Tubes: Fuel-oil supply piping or fitting, inside tank, terminating 6 inches (150 mm) above bottom of tank, and with end cut at a 45-degree angle (1:1 slope).

F. Pipe Adapters and Extensions: Compatible with piping and fittings.

G. Suction Strainers and Check Valves: Bronze or corrosion-resistant metal components.

H. Foot Valves and Antisiphon Valves: Poppet-type, bronze or corrosion-resistant metal components.

I. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

J. Metal Manholes: [22-inch- (560-mm-)] <Insert dimension> minimum diameter frame and cover. Furnish manhole units of adequate size for access to fittings if size is not indicated.

K. Monitoring Well Caps: Locking pipe plug and manhole.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for fuel-oil piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.3 PREPARATION

A. Close equipment shutoff valves before turning off fuel oil to premises or piping section.

B. Comply with NFPA 30 and NFPA 31 requirements for prevention of accidental ignition.

3.4 OUTDOOR PIPING INSTALLATION

A. Install underground fuel-oil piping buried at least 18 inches (457 mm) below finished grade.
   a. If fuel-oil piping is installed with less than 12 inches (305 mm) of cover to finished grade, install in containment piping.

B. Steel Piping with Protective Coating:
   a. Apply joint cover kits to pipe after joining, to cover, seal, and protect joints.
   b. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer. Review protective coating damage with Architect prior to repair.
   c. Replace pipe having damaged PE coating with new pipe.

C. Install vent pipe at a minimum slope of 2 percent downward toward fuel-oil storage tank sump.

D. Assemble and install entry boots for pipe penetrations through sump sidewalls for liquid-tight joints.

E. Install metal pipes and tubes, fittings, valves, and flexible connectors at piping connections to UST.

F. Install fittings for changes in direction in rigid pipe.

G. Install system components with pressure rating equal to or greater than system operating pressure.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Install sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

I. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

J. Mechanical Sleeve Seal Installation: Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

K. Install pressure gage on suction and discharge from each pump.

3.5 INDOOR PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install escutcheons for penetrations of walls, ceilings, and floors.
   a) New Piping:
      1. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
      2. Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
      3. Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
      4. Piping at Ceiling Penetrations in Finished Spaces: One-piece casting ,cast-brass type with polished chrome-plated finish.
      5. Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.
      6. Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
      7. Piping in Unfinished Service Spaces: One-piece, stamped-steel type concealed or exposed-rivet hinge and set screw spring clips.
      8. Piping in Equipment Rooms: One-piece, cast-brass type.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

9. Piping in Equipment Rooms: One-piece, stamped-steel type with set screw spring clips.
10. Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

I. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

J. Verify final equipment locations for roughing-in.

K. Comply with requirements for equipment specifications in Division 22 and Division 23 Sections for roughing-in requirements.

L. Conceal pipe installations in walls, pipe spaces, or utility spaces; above ceilings; below grade or floors; and in floor channels unless indicated to be exposed to view.

M. Prohibited Locations:
   b) Do not install fuel-oil piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
   c) Do not install fuel-oil piping in solid walls or partitions.

N. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

O. Connect branch piping from top or side of horizontal piping.

P. Install unions in pipes NPS 2 (DN 50) and smaller at final connection to each piece of equipment and elsewhere as indicated. Unions are not required on flanged devices.

Q. Do not use fuel-oil piping as grounding electrode.

R. Install strainer on inlet side of fuel-oil pump.

3.6 VALVE INSTALLATION

A. Install manual fuel-oil shutoff valves on branch connections to fuel-oil appliance.

B. Install valves in accessible locations.

C. Protect valves from physical damage.

D. Install metal tag attached with metal chain indicating fuel-oil piping systems.

E. Install oil safety valves at inlet of each oil-fired appliance.

F. Install pressure relief valves in distribution piping between the supply and return lines.

G. Install one-piece, bronze ball valve with hose end connection at low points in fuel-oil piping.

H. Install manual air vents at high points in fuel-oil piping.

I. Install emergency shutoff valves at dispensers.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.7 HANGER AND SUPPORT INSTALLATION

A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
   1. NPS 1-1/4 (DN 32) and Smaller: Maximum span, 84 inches (2130 mm); minimum rod size, 3/8 inch (10 mm).
   2. NPS 1-1/2 (DN 40): Maximum span, 108 inches (2740 mm); minimum rod size, 3/8 inch (10 mm).
   3. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (10 mm).
   4. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 1/2 inch (13 mm).
   5. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).
   6. NPS 4 (DN 100): Maximum span, 13 feet (4 m); minimum rod size, 5/8 inch (16 mm).

B. Support vertical steel pipe at each floor and at spacing not greater than 15 feet (4.5 m).

3.8 FUEL-OIL PUMP INSTALLATION

A. Transfer Pumps:
   1. Install pumps with access space for periodic maintenance including removal of motors, impellers, and accessories.
   2. Set pumps on and anchor to concrete base.

B. Install two-piece, full-port ball valves at suction and discharge of pumps.

C. Install mechanical leak-detector valves at pump discharge.

D. Install Y-pattern basket strainer on inlet side of simplex fuel-oil pumps.

E. Install check valve on discharge of simplex fuel-oil pumps.

F. Install suction piping with minimum fittings and change of direction.

G. Install vacuum and pressure gage, upstream and downstream respectively, at each pump to measure the differential pressure across the pump. Pressure gages are specified in Division 23 Section “Meters and Gages for HVAC Piping.”

3.9 LEAK-DETECTION AND MONITORING SYSTEM INSTALLATION

A. Install leak-detection and monitoring system. Install alarm panel inside building where indicated.
   1. Fuel-Oil Storage Tanks: Install probes or use factory-installed integral probes Use factory-installed integral probes in interstitial space.
   2. Fuel-Oil Piping: Install leak-detection sensor probes in fuel-oil storage tank and at low points in piping and cable probes in interstitial space of piping.
   3. Install liquid-level gage.

END OF SECTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 15660

PLUMBING FIXTURES

Table of Contents

PART 1 - GENERAL 1
1.1 RELATED DOCUMENTS 1
1.2 SUMMARY 1
1.3 DEFINITIONS 1
1.4 SUBMITTALS 1
1.5 QUALITY ASSURANCE 1
1.6 DELIVERY, STORAGE, AND HANDLING 1

PART 2 - PRODUCTS 1
2.1 MATERIALS 1
2.2 FAUCETS 2
2.3 TOILET SEATS 2
2.4 FIXTURE SUPPORTS 2
2.5 WATER CLOSETS 3
2.6 URINAL 3
2.7 BATHTUBS 3
2.8 LAVATORY 4
2.9 LAVATORY (counter type) 5
2.10 SINKS 5

PART 3 - EXECUTION 6
3.1 EXAMINATION 6
3.2 APPICATION 6
3.3 PLUMBING FIXTURE INSTALLATION 7
3.4 FIELD QUALITY CONTROL 8
3.5 PROTECTION 8
3.6 CONNECTIONS 9
3.7 ADJUSTING AND CLEANING 9

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions, including General and Supplementary Conditions and relevant sections of Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes plumbing fixtures and trim, faucets, other fittings, and related components.

1.3 DEFINITIONS

A. Accessible: Plumbing fixture, building, facility, or portion thereof that can be approached, entered, and used by physically handicapped, disabled, and elderly people.

1.4 SUBMITTALS

A. Product Data for each plumbing fixture category and type specified. Include selected fixture, trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category from one source and by a single manufacturer.

1. Exception: Where fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for this category.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver plumbing fixtures in manufacturer's protective packing, crating, and covering.

B. Store plumbing fixtures on elevated platforms in dry location.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Refer Architect Specifications, Fixture Selections and Schedules. In the Absence of such table refer the following values.

B. Minimum flow rates of the Fixtures shall be as under.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1	Water closet	Dual flush 6.0/3.0 liters Flushing cycle (full/Low)
2	Wash Basin Mixer	1.9 Liters Per Minute @ 417.7 Kpa
3	Kitchen Sink Mixer	5.0 Liters Per Minute @ 417.7 Kpa
4	Shower Head	6.0 Liters Per Minute @ 551.6 Kpa
5	Bidet	5.0 Liters Per Minute @ 417.7 Kpa
6	Urinal	5.0 liters Flush or flush Valve

2.2 FAUCETS

A. Lavatory Faucets, <Refer Architecture fixture selection and Specifications>:
   a. Body Material: As Specified by the Architect in Fixture Schedule.
   b. Finish: As Specified by the Architect in Fixture Schedule.
   c. Maximum Flow Rate: Maximum 1.9 L/min. at 417.7 Kpa,
   d. Mounting: As per Architecture Finishing schedule.
   e. Refer Lavatory specifications

B. Shower Heads, <Refer Architecture fixture selection and Specifications>::
   a. Shower Installation: Wall mounted, shower head connected to shower arm. All external trim will be chrome plated metal.
   b. Shower Heads: Chrome plated metal head, adjustable ball joint, self cleaning with automatic flow control device to limit discharge to not more than 5.7 l/m (1.5 gpm). Body, internal parts of shower head and flow control fittings will be copper alloy or CRS. Install showerhead 1829 mm (72 inches) above finished floor.
   c. Valves: Type T/P combination thermostatic and pressure balancing, with chrome plated metal lever with adjustment for rough-in variations, type operating handle and chrome plated brass or CRS face plate. Valve body will be any suitable copper alloy. Internal parts will be copper, nickel alloy, CRS or thermoplastic material. Valve inlet and outlet will be 13 mm (1/2 inch) IPS. Provide external screwdriver check stops, and temperature limit stops. Set stops for a maximum temperature of 50 degrees C (122 degrees F). Install valve 1372 mm (54 inches) from bottom of shower receptor. All exposed fasteners will be vandal resistant. Valve will provide a minimum of // 5.7 l/m (1.5 gpm) flow.
   d. Finish: As Specified by the Architect in Fixture Schedule.

2.3 TOILET SEATS

A. Toilet Seats :

   1. Toilet seat for water-closet-type fixture.

      a. Material: Molded, solid plastic.
      b. Configuration: front with cover.
      c. Size: Regular.
      d. Class: Standard commercial.
      e. Body Material: As Specified by the Architect in Fixture Schedule.
      f. Finish: As Specified by the Architect in Fixture Schedule.

2.4 FIXTURE SUPPORTS

A. Water-Closet Supports :

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Combination carrier designed for standard mounting height of wall-mounting, water-closet-type fixture.

2.5 WATER CLOSETS

A. Water Closets, <Refer Architecture fixture selection and Specifications> :

B. Use following in absence of Architectural specifications.

1. Water Closet shall be Wall Hung as per ASME A112.19.2) for guest rooms with siphon jet 4.8 L (1.28 gallons) / 6 L (1.6 gallons) dual flush oscillating bio-guard handle, wall outlet. Top of seat will be between 400 mm and 432 mm (16 inches and 17 inches) above finished floor. Handicapped water closet will have seat set 450 mm (18 inches) above finished floor.

2. Seat: Institutional/Industrial, extra heavy duty, chemical resistant, solid plastic, open front less cover for elongated bowls, integrally molded bumpers, concealed check hinge with stainless steel post. Seat will be posture contoured body design. Color will be white.

3. Flushing mechanism will be: Pressure assisted, close coupled, flushometer tank, //4.8 L (1.28 gallons) per flush with wall mounted frame.

4. Stops, tank-angle of chrome coating.

2.6 URINAL

A. Refer Architecture fixture selection and Specifications :

B. Use following in absence of Architectural specifications.

1. Urinal shall be Wall Hung, ASME A112.19.2 bowl with integral flush distribution, wall to front of flare 343 mm (13.5 inches) minimum. Wall hung with integral trap, siphon jet flushing action 1.9 L (0.5 gallons) or 4 L (1.0 gallons) per flush with 50 mm (2 inches) back outlet and 20 mm (3/4 inch) top inlet spud.

2. Support urinal with chair carrier and install with rim 600 mm (24 inches) above finished floor.

3. Flushing Device: Large chloramines resistant diaphragm, semi-red brass body, exposed flush valve, water saver design, solid-ring pipe support, and 20 mm (3/4 inch) capped screwdriver angle stop valve. Set centerline of inlet 292 mm (11-1/2 inches) above urinal. Valve body, cover, tailpiece, and control stop will be in conformance with ASTM alloy classification for semi-red brass.

2.7 BATHTUBS

A. Refer Architecture fixture selection and Specifications :

B. Use following in absence of Architectural specifications.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Bathtub (Recessed, with Shower, Thermostatic Valve, ASME A112.19.1) as per dimensions indicated on the drawings, recessed, wide rim.

    1. Drain: Pop-up, 40 mm (1-1/2 inches).

2. Shower Installation: Wall mounted, detachable spray assembly with handspray and hose attached to a 762 mm (30 inches) chrome bar with adjustable slide, elevated vacuum breaker, supply wall connection and flange, diverter valve, over the rim tub spout, thermostatic/pressure balanced mixing valve.

3. Shower Head: Metallic shower head with 1500 mm (60 inches) length of rubber lined CRS or chrome plated brass interlocked, metal flexible reinforced hose connection to 15 mm (1/2 inch) supply, with automatic flow control device to limit discharge to not more than 5.7 l/m (1.5 gpm) 170 kPa (25 psig). Design showerhead to fit in palm of hand. Provide CRS or chrome plated metal wall bar with an adjustable swivel hanger for showerhead. Fasten wall bar securely to wall.

4. Valve: Type T/P combination thermostatic and pressure balancing, wall mounted shower with chrome plated metal lever type operating handle with adjustment for rough-in variation and chrome plated brass or CRS face plate. Valve body will be any suitable copper alloy. Internal parts will be copper, nickel alloy, CRS, or thermoplastic material. Valve inlet and outlet will be 15 mm (1/2 inch) IPS. Provide external screwdriver check stops and temperature limit stops. Set stops for a maximum temperature of 43.3 degrees C (110 degrees F). All exposed fasteners will be vandal resistant. Valve will provide a minimum of 5.7 L/m (1.5 gpm) flow rate.

2.8 LAVATORY

A. Refer Architecture fixture selection and Specifications :

B. Use following in absence of Architectural specifications.

1. Lavatory (Single Lever Handle Control ASME A112.19.2) straight back, Aas per dimensions indicated on the drawings, first quality vitreous china. Punching for faucet on 102 mm (4 inches) centers. Set with rim 864 mm (34 inches) above finished floor.

2. Faucet: Solid cast brass construction with chrome finish, vandal resistant, heavy-duty single lever handle, and center set. Control will be washer less ceramic disc cartridge type. Provide laminar flow control device, adjustable hot water limit stop, and vandal proof screws. Flow will be limited to 1.9 L/m (0.5 gpm)

3. Drain: Cast or wrought brass with flat grid strainer offset tailpiece, chrome plated. Provide cover per A.D.A 4-19.4.

4. Stops: Angle type, see paragraph “Stops”.

5. Trap: Cast copper alloy or PP plastic, 38 mm by 32 mm (1 1/2 inches by 1 1/4 inches) trap. Adjustable with connected elbow and 1.4 mm thick (17 gauge) tubing extensions to wall. Exposed metal trap surface and connection hardware will be chrome plated with a smooth bright finish.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.9 LAVATORY (counter type)

A. Refer Architecture fixture selection and Specifications :

B. Use following in absence of Architectural specifications.

1. Lavatory (Sensor Control, Counter Mounted ASME A112.19.2) vitreous china, self-rimming, as per dimension indicated on drawings. Mount unit in countertop. Support countertop with ASME A112.19.1, Type 1, chair carrier with exposed arms.

2. Faucet: Brass, chrome plated, gooseneck spout with outlet 102 mm to 127 mm (4 inches to 5 inches) above rim. Electronic sensor operated, 102 mm (4 inches) center set mounting, w solid brass hot/cold water mixer adjusted from top deck with barrier free design control handle // and inline filter. Provide laminar flow control device. Breaking the light beam will activate the water flow. Flow will stop when user moves away from light beam. // All connecting wiring between transformer, solenoid valve and sensor will be cut to length with no excess hanging or wrapped up wiring allowed. //

3. Drain: Cast or wrought brass with flat grid strainer, offset tailpiece, chrome plated. Set trap parallel to wall.

4. Stops: Angle type chrome plated with steel tubes.

5. Trap: Cast copper alloy, 38 mm by 32 mm (1 1/2 inches by 1 1/4 inches) P-trap, adjustable with connected elbow and 1.4 mm thick (17 gauge) tubing extension to wall. Set trap parallel to the wall. Exposed metal trap surface and connection hardware will be chrome plated with a smooth bright finish.

6. Provide cover for exposed piping, drain, stops and trap per A.D.A.

2.10 SINKS

A. Refer Architecture fixture selection and Specifications :

B. Use following in absence of Architectural specifications.

1. Service Sink, class 1, single bowl, acid resistant enameled stainless steel, approximately as per dimensions indicated on drawings, raised back without faucet holes. Set sinks rim 711 mm (28 inches) above finished floor.

2. Faucet: Solid brass construction, 9.5 L/m (2.5 gpm) combination faucet with replaceable Monel seat, removable replacement unit containing all parts subject to wear, integral check/stops, mounted on wall above sink. Spout will have a pail hook, 19 mm (3/4 inch) hose coupling threads, vacuum breaker, and top or bottom brace to wall. Four-arm handles on faucets will be cast, formed, or drop forged copper alloy. Escutcheons will be either forged copper alloy or CRS. Exposed metal parts, including exposed part under valve handle when in open position, will have a smooth bright finish.

3. Drain: Grid.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Trap: Trap standard, painted outside and enameled inside with acid-resistant enamel, drain through adjoining wall.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for potable, hot- and cold-water supply piping systems; soil, waste, and vent piping systems; and supports. Verify that locations and sizes of piping and locations and types of supports match those indicated, before installing and connecting fixtures. Use manufacturer's roughing-in data when roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 APPICATION

A. Include supports for plumbing fixtures according to the following:

1. Carriers: For wall-hanging water closets and fixtures supported from wall construction.

2. Chair Carriers: For wall-hanging urinals, lavatories, sinks, drinking fountains, and electric water coolers.

3. Heavy-Duty Chair Carriers: For accessible urinals, lavatories, and other fixtures here indicated.

4. Reinforcement: For floor-mounted lavatories and sinks that require securing to wall and recessed, box-mounted, electric water coolers.

5. Fabricate reinforcement from 2-by-6-inch fire-retardant-treated-wood blocking between studs steel plates attached to studs, in wall construction, to secure fixtures to wall. Include length that will extend beyond ends of fixture mounting bracket and attach to at least 2 studs.

B. Include fitting insulation kits for accessible fixtures according to the following:

1. Lavatories: Cover hot- and cold-water supplies, stops and handles, drain, trap, and waste to wall.

2. Lavatories: Cover hot-water supply, stop and handle, drain, trap, and waste to wall.

3. Sinks: Cover hot- and cold-water supplies, stops and handles, drain, trap, and waste to wall.

4. Sinks: Cover hot-water supply, stop and handle, drain, trap, and waste to wall.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. Fixtures with Offset Drain: Cover hot- and cold-water supplies, offset drain, trap, and waste to wall.

6. Fixtures with Offset Drain: Cover hot-water supply, offset drain, trap, and waste to wall.

7. Other Fixtures: Cover exposed fittings below fixture

3.3 PLUMBING FIXTURE INSTALLATION

A. Assemble plumbing fixtures and trim, fittings, faucets, and other components according to manufacturers' written instructions.

B. Install fixtures level and plumb according to manufacturers' written instructions, roughing-in drawings, and referenced standards.

C. Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals.

D. Install floor-mounted, back-outlet water closets with fittings and gasket seals.

E. Install wall-hanging, back-outlet water closets with support manufacturer's tiling frame or setting gage.

F. Install toilet seats on water closets.

G. Install wall-hanging, back-outlet urinals with gasket seals.

H. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for handicapped people to reach.

I. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

J. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.

K. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.

L. Fasten recessed, wall-mounted fittings to reinforcement built into walls.

M. Fasten wall-mounted fittings to reinforcement built into walls.

N. Fasten counter-mounting plumbing fixtures to casework.

O. Secure supplies to supports or substrate within pipe space behind fixture.

P. Set shower receptors and mop basins in leveling bed of cement grout.

Q. Install individual stop valve in each water supply to fixture. Use gate or globe valve where specific stop valve is not specified.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Exception: Omit stop valves on supplies to emergency equipment, except when permitted by authorities having jurisdiction. When permitted, install valve chained and locked in OPEN position.

R. Install water-supply stop valves in accessible locations.

S. Install faucet, laminar-flow fittings with specified flow rates and patterns in faucet spouts when faucets are not available with required rates and patterns. Include adapters when required.

T. Install supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

U. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts when faucets are not available with required rates and patterns. Include adapters when required.

V. Install shower, flow-control fittings with specified maximum flow rates in shower arms.

W. Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes, except where otherwise indicated.

X. Install disposers in sink outlets. Install switch where indicated, or in wall adjacent to sink if location is not indicated.

Y. Install hot-water dispensers in back top surface of sink or in counter with spout over sink.

Z. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

AA. Seal joints between fixtures and walls, floors, and counters using sanitary-type, 1-part, mildew-resistant, silicone sealant according to sealing requirements specified in Division 7 Section "Joint Sealants." Match sealant color to fixture color.

3.4 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed.

B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized and demonstrate proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.5 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Do not allow use of fixtures for temporary facilities, except when approved in writing by Owner.

3.6 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other Division 15 Sections.

B. Supply and Waste Connections to Plumbing Fixtures: Refer to plumbing fixture schedules at the end of this Section for fitting sizes and connection requirements for each plumbing fixture.

C. Supply and Waste Connections to Equipment Specified in Other Sections: Connect equipment with supply inlets, supply stops, supply risers, and traps specified in this Section. Use fitting sizes required to match connected equipment. Connect fittings to plumbing piping.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Arrange for electric-power connections to fixtures and devices that require power. Electric power is specified in Division 16 Sections.

3.7 ADJUSTING AND CLEANING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust disposers, hot-water dispensers, and controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at drinking fountains, electric water coolers, faucets, shower valves, and flushometer valves having controls, to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Include the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.

2. Remove sediment and debris from drains.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

MISC SECTIONS

INDEX

1. 15145 - Water Storage Tank Connections & Accessories -
2. 15145-A - Tank & Sump Pit Covers.
3. 15155 - Foot Valves 3" & 4" & Y-Strainers 3" & 4" .
4. 15155-A - UPVC Cowl for Vent Pipes 50/100/150mm -
5. 15451 - Toilet Accessories -
6. 15440 - General Mechanical Requirements - Painting, Shop/As-Built Drawings, Test Run -
7. 15440-A - Plumbing Pumps - Cooling Tower Makeup & Treated Waste Water Transfer Pump Sets
8. 15519 - Electric Water Heater EWH 50/80/100/150L - Premium Ceiling Hung
9. 15160 - tube well Works -

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

1. SECTION 15145 - WATER STORAGE TANK CONNECTIONS & ACCESSORIES -

a) 4" dia Connection to existing Tube well in Basement-4 including water meter, Gate valves, Level Indicate and Modulating Valve for Auto Shut off etc. complete - Job
b) 3" dia Connection to existing City Network including water meter, Gate valves, Level Indicate and Modulating Valve for Auto Shut off etc. complete - Job
c) 4" Goose neck for underground Water Tank & Grey Water tanks with Stainless steel Insect Mesh for insect as per drawing and specifications -
d) Connection to overhead water tanks using Float switch or Pressure Switch -

1.01 SCOPE:
Complete connection works for underground water tank, grey water tanks, overhead water tanks, existing tubewell and city network.

1.02 MATERIAL :
a) Tube well Connection 4" dia:
- Water meter 4" dia suitable for tube well water, mechanical type, PN16, with companion flanges.
- Gate valves 4" dia cast iron flanged PN16, 2 no's (inlet/outlet).
- Level Indicator: External clear tube type level indicator 25mm dia with brass fittings and aluminum scale for underground tank.
- Modulating Valve / Float valve for auto shut off: 4" dia modulating float valve / altitude valve for automatic level control, fast closing, PN16, with SS float.
- Piping: GI / PPRCT piping 4" dia from tube well to tank with flexible connector.

b) City Network Connection 3" dia:
- Water meter 3" dia mechanical type, PN16.
- Gate valves 3" dia cast iron PN16.
- Level Indicator and Modulating Valve for auto shut off same as above but 3" dia.

c) Goose Neck 4" dia:
- 4" dia goose neck vent pipe 180 degree bend, fabricated from GI pipe / uPVC as per drawing, height as per detail.
- Stainless steel insect mesh 24 mesh (SS 304) fixed at open end with clamp to prevent insect entry.

d) Overhead Tank Connection:
- Float switch or Pressure Switch for overhead tanks for pump auto on/off.
- Float switch mercury-free type with cable, 10A rating.
- Pressure Switch Danfoss type or equivalent, range adjustable.

1.03 EXECUTION:
- Connections made to existing tube well line in Basement-4 after proper shutdown.
- Water meter installed with bypass arrangement and isolation valves before and after.
- Level indicator tube fixed vertically outside tank with brass elbows and aluminum scale marked in feet/meters.
- Modulating valve installed at tank inlet with float inside tank for auto shut off when tank full.
- Goose neck vents installed on underground water tank and grey water tanks, overflow connected to drain with visible tundish.
- Float / pressure switch wiring to pump control panel for auto operation of transfer pumps.
- All piping supports at 1.5m, painting as per colour code.
- Testing for leakage and auto shut off operation.

1.04 MEASUREMENT: Job and Nos. as per BOQ.

2. SECTION 15145-A - TANK & SUMP PIT COVERS -

BOQ REFERENCE:
a) Medium Duty PVC Cover For RCC water tanks -
b) Heavy Duty Covers For Sump pits - c) Heavy Duty Covers For Sump pits -

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.01 SCOPE:
Providing covers for RCC water tanks and sump pits.

1.02 MATERIAL :
a) Medium Duty PVC Cover for RCC water tanks:
- Material: Medium duty PVC / HDPE / Polypropylene moulded cover, size as per opening (600x600mm or as per tank opening), water tight, odour tight, double seal EPDM gasket, light duty rating.
- Features: SS hinges, lockable arrangement, lifting handle, anti-UV.
- Colour: As approved, light grey.

b) Heavy Duty Covers for Sump Pits:
- Material: Heavy duty cover - ductile iron / MS chequered plate / FRP grating as per BOQ rate, load class as per requirement (Medium to Heavy duty), size as per pit.
- Type: Solid top, gasketed for sewage sump to prevent gas escape, frame galvanized steel embedded in RCC.
- Lifting: Lifting keys / handles, anti-theft bolts.
- Frame: Galvanized steel angle frame embedded in RCC with sealant.

1.03 EXECUTION:
- Cover frame grouted in RCC slab level ±2mm, flush with FFL.
- Cover installed water tight with EPDM seal.
- For sump pits, discharge pipe penetration sealed with EPDM boot, vent provision as per detail.
- Installation flush, grouted, level, anti-theft bolts fixed.

1.04 STANDARD: BS 497 / BS EN 124 for manhole covers.

3. SECTION 15155 - FOOT VALVES 3" & 4" & Y-STRAINERS 3" & 4" -

1.01 SCOPE:
Providing and fixing foot valves and Y-strainers for pump suction and water lines.

1.02 MATERIAL :
a) Foot Valve 3" & 4" dia:
- Type: Foot valve with built-in strainer, cast iron / bronze body, SS 304 strainer mesh, leather / EPDM flap, low head loss, self-cleaning, PN16.
- Features: Vertical / horizontal installation, priming facility, flow arrow marked.
- Size: 80mm (3") and 100mm (4") dia.

b) Y-Strainer 3" & 4" dia:
- Body: Cast iron GG25 epoxy coated inside/outside, PN16 flanged, SS mesh 0.8mm - 1.5mm perforated.
- Features: Bolted cover, drain plug 15mm ball valve with hose for blowdown, pressure gauge tappings before/after.

1.03 EXECUTION:
- Foot valve installed at pump suction inside underground water tank, submerged minimum 300mm below low water level, with guide pipe.
- Y-strainer installed before pumps and PRVs with isolation valves for cleaning.
- Companion flanges, gaskets EPDM WRAS, SS bolts used.
- Flow direction arrow observed.

1.04 MEASUREMENT: Nos. as per BOQ.

4. SECTION 15155-A - UPVC COWL FOR VENT PIPES 50/100/150MM - As Per BOQ

BOQ REFERENCE:
- Providing and fixing UPVC cowl for vent pipe including all accessories complete in all respects.

1.01 SCOPE:
Providing and fixing UPVC cowl for vent pipes on roof.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.02 MATERIAL -:
- Material: Injection moulded UPVC cowl, UV stabilized, white/grey, weather resistant -10 to +60°C.
- Size: 50mm, 100mm, 150mm dia as per vent pipe diameter, push-fit / solvent weld socket.
- Design: Mushroom / Dome type with integral bird / insect screen to prevent rain ingress, free venting free area ≥100% pipe area, anti-downdraft.
- Accessories: Silicone sealant, SS screw for fixing.

1.03 EXECUTION:
- Cowl fixed on top of vent stack minimum 150mm above roof / parapet level.
- Sealed with silicone, screwed with SS screw.
- Vent pipe terminated as per drawing.

1.04 STANDARD: BS 4514 for vent terminal.

1.05 MEASUREMENT: Nos. as per BOQ.

5. SECTION 15451 - TOILET ACCESSORIES - As Per BOQ

1.01 SCOPE:
Supply, installation and fixing bath toilet accessories.

1.02 MATERIAL - AS PER BOQ (SS 304, 18/8, 1.2mm satin/brushed No.4, concealed fixing):
a) Toilet Paper Holder: Double roll, SS 304, wall mounted, hinged cover, 200x120mm.
b) Hand Spray / Muslim Shower: Brass chrome plated with 1.2m flexible SS braided hose, wall bracket, flow 6 LPM, with 1/2" stop cock.
c) Liquid Soap Dispenser: Wall mounted 500ml, SS 304 pump, anti-clog, viewing window, lockable, plus Soap Dish SS 304 wall mounted with drainage holes.
d) WC Cleaning Brush: Wall mounted SS 304 holder with ceramic / nylon brush, concealed, replaceable head.
e) Robe Hooks: Double hook SS 304, 50mm projection, load 15kg.
f) Towel Railing: 600mm long, 22mm dia SS 304 tube, end brackets concealed, load 10kg.
g) Hand Dryer: Automatic hand dryer, 1000W, drying time ≤15 sec, noise ≤75dB, HEPA filter, IPX4, stainless body, vandal proof.

1.03 EXECUTION:
- Heights per ADA / architect: Paper holder 600mm AFF, spray 700mm, soap 900mm, hooks 1600mm, towel rail 1000mm.
- Fixed with SS screws and wall plugs, drilling, masking, silicone at back to prevent water ingress.
- Concealed fixing, no visible screws front.
- Testing for robust fixing and operation.

1.04 MEASUREMENT: Nos. as per BOQ.

6. SECTION 15440 - GENERAL MECHANICAL REQUIREMENTS - PAINTING, SHOP & AS-BUILT DRAWINGS, TEST RUN - As Per BOQ

1.01 SCOPE: General mechanical requirements for plumbing works.

A) PAINTING & FINISHES -:
Scope: Providing painting and finishing including stenciling and identification tags as specified in technical specifications and as directed by Engineer In charge, complete in all respect.

Material:
- Surface preparation: Cleaning with wire brush Sa2.0.
- Primer: 1 coat zinc phosphate epoxy primer 50 micron.
- Top Coats: 2 coats premium synthetic enamel ICI Dulux / Berger or equivalent, colour coded per BS 1710 / BS 1710:
Potable Water - Green, Hot Water - Red band, Grey water - Grey, Rainwater - Black.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Direction arrows every 3m, stenciling pipe size / service every 6m intervals at walls / valves.
- Equipment: 2 coats epoxy enamel colour as per manufacturer.
- Supports: Black enamel.
- ID Tags: Anodized aluminium 50mm dia with SS wire, engraved valve number, service, size. Laminated flow diagram at each plant room A3 size framed.

Execution:
Painting of all exposed pipes, equipment, supports, valves. Colour bands and arrows as per BS 1710.

B) SHOP DRAWINGS & AS-BUILT DRAWINGS -:
Scope: Providing shop drawings and as-built drawings in A1 size with electronic copies, as specified in specifications, complete in all respect and as directed by Engineer In charge.

Shop Drawings: AutoCAD A1 size 1:50, coordinated with all services (architectural, structural, electrical, HVAC), sections, supports, invert levels, builder works. Submit 3 prints + PDF + DWG for approval before procurement, including calculations if required.

As-Built: After completion, red-line marked final drawings A1 size 4 sets + 2 sets laminated for plant rooms + electronic DWG + PDF on USB. Include O&M manual 3 sets.

C) TEST RUN -:
Scope: Providing two months test run in summer / winter, as specified in specifications, as advised by Consultant/Client and as directed by Engineer In charge. After satisfactory completion of test run, a certificate will be issued to the Contractor.

Execution:
- Provide 60 days test run peak summer/winter.
- Include full-time operator + engineer, consumables, log sheets hourly, water quality tests, performance verification.
- Training client staff 5 days.
- Snag closure.
- After successful issue Test Run Certificate, performance data signed by consultant, contractor, client.

Standard: BS 1710 Colour, BS 4800 Paint, ISO 128 Drawing, ASHRAE Guideline 0 Commissioning.

7. SECTION 15440-A - PLUMBING PUMPS - COOLING TOWER MAKEUP & TREATED WASTE WATER TRANSFER PUMP SETS -

BOQ REFERENCE:
- Constant Speed Cooling tower Makeup Pump Set (1 Duty + 1 Standby) Set: 1 Duty + 1 standby (40 GPM @ 50FT Head) - Nos. 1 @ Rs 4,201,351
- Constant Speed Treated water transfer Pump Set (1 Duty + 1 Standby) Flow = 200 GPM @ 430FT head - Nos. 1 @ Rs 5,891,318
From BOQ: Supply, Installation, testing & commissioning of below mentioned Packaged pump sets including pump foundation, Pressure vessel, control panel, wiring from panel to pumps, valves, piping, accessories, etc. from Suction header to Discharge header, as indicated on the drawing, as per specifications and Engineers approval.

1.01 SCOPE: Supply, installation, testing & commissioning of packaged pump sets for cooling tower makeup and treated waste water transfer.

1.02 MATERIAL -:
a) Cooling Tower Makeup Pump Set - 40 GPM @50FT Head (12m) - 1 Duty + 1 Standby:
- Type: End suction / inline vertical centrifugal pump, cast iron casing, bronze impeller, stainless steel shaft, mechanical seal SiC/SiC, 2900 rpm.
- Motor: TEFC, IE3/IE4, 2.2kW approx, 400V/3Ph/50Hz, IP55.
- Accessories: Suction/discharge flexible joints, Y-strainers, pressure gauges 0-10 bar glycerin filled, non-return valve, isolation valves, auto air vent, base frame anti-vibration mounts, inertia

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

base.
- Controls: Combined control panel with star-delta / DOL starter, alternation, dry run protection, pressure switch + level electrodes from cooling tower basin, BMS Modbus RTU, hour run meter, fault indication.

b) Treated Waste Water Transfer Pump Set - 200 GPM @430FT Head (131m) - 1 Duty + 1 Standby - HIGH HEAD:
- Type: Vertical multistage inline pump, stainless steel impellers and chambers (SS 304/316) suitable for treated waste water (corrosive), mechanical seal SiC/SiC, efficiency ≥70%.
- Motor: 45-55kW approx, IE3/IE4, 400V, IP55, VFD ready. Head very high - hydraulic verification mandatory. Contractor to verify NPSH, system curve. If single pump cannot achieve 430ft economically, submit alternate proposal e.g. 2 pumps in series for Engineer approval within BOQ rate (as per premium spec note but without extra cost).
- Accessories: Suction/discharge flexible joints, Y-strainers 4" dia, pressure gauges 0-16 bar glycerin, non-return, isolation, auto air vent, base frame anti-vibration mounts 90% isolation.
- Controls: Same as above, pressure switch + level electrodes from source tank, SCADA/BMS.

c) Common:
- Pressure Vessel: Diaphragm type as per manufacturer for each set.
- Pump Foundation: Concrete foundation with anti-vibration pads.
- Piping: From suction header to discharge header with valves and accessories.

1.03 EXECUTION:
- Foundation, alignment, grouting, anti-vibration mounts.
- Suction header from tank, discharge header to cooling towers / irrigation tanks.
- Wiring from panel to pumps with cable tray.
- Factory test curve and site performance test as per HI standard, 72 hours continuous run.
- Testing for flow, head, pressure setting, alternation, dry run protection.

1.04 STANDARD: HI 1.4, ISO 9906 Gr2B, IEC 60034, EN 733, ASHRAE 90.1.

8. SECTION 15519 - ELECTRIC WATER HEATER EWH 50/80/100/150L - CEILING HUNG - BOQ REFERENCE:
- Providing and fixing of Ceiling hung electric Water heater of below mentioned capacity with all accessories, Thermostat, Drain Tank, inlet and outlet valves, Air Vent, Pressure relief valve, Air relief valves as indicated in the drawings, as per specifications and engineers approval
- EWH 50 Litres -
- EWH 80 Litres -
- EWH 100 Litres
- EWH 150 Litres -

1.01 SCOPE: Providing and fixing ceiling hung electric water heaters.

1.02 MATERIAL -:
a) Type: Storage electric water heater, ceiling hung horizontal, capacity 50/80/100/150L, suitable for hard water.
b) Construction:
- Inner Tank: Enameled steel 2.5mm or stainless steel 1.5mm, glass-lined, magnesium anode 30mm dia replaceable, pressure 8 bar tested at 12 bar.
- Insulation: 30mm PUF 40kg/m3, thermal conductivity <0.02 W/mK, standing loss <0.8kWh/day.
- Outer: Pre-coated steel white, IPX4.
- Heating: Incoloy 800 element 2-3kW (1.5kW for 50L), dry type, efficiency 98%, recovery 80L/hr @45°C rise.
c) Controls: Adjustable thermostat 32-82°C capillary, safety thermal cutout 90°C manual reset, overload protection.
d) Accessories (as per BOQ and drawing):
- Thermostat
- Drain Tank / Drain Pan: 1.2mm SS 304, 25mm drain to floor drain
- Inlet and outlet valves: Brass ball valves 20mm
- Air Vent: Automatic air vent 15mm

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Pressure Relief Valve: 8 bar with drain to safe waste
- Air Relief Valves
- Expansion vessel 8L for 100L and above
- Flexible SS hoses
- Timer 24hr, BMS contact for on/off + fault

1.03 EXECUTION:
- Installation: Ceiling hung with 4x M10 SS threaded rods, seismic bracing, clear service space 600mm, drip tray mandatory.
- Piping: Inlet from cold water line with isolation valve, outlet to hot water PPR line, drain to floor drain.
- Electrical: 20A DP switch with neon, earth bonding, ELCB.
- Testing: Pressure test, heating test, thermostat ±2°C, safety valve operation.
- Performance: Heat up <60min, energy label B or better as per EN 60379.

1.04 STANDARD: EN 60335-2-21, CE, IEC 60529 IPX4, WRAS.

1.05 MEASUREMENT: Nos. as per BOQ.

9. SECTION 15160 - TUBEWELL WORKS - TEST BORE & TUBE WELL -

BOQ REFERENCE :
- TEST BORE - Drilling of one 10-inch diameter test borehole to a minimum depth of 600 ft, complete with drilling, removal of cuttings, necessary temporary/permanent 8-inch dia heavy-duty uPVC Class-E borehole casing with threaded/socketed joints, couplers, centralizers and slotted screen where required, borehole cleaning, development and flushing, strata logging, groundwater-level measurement, representative formation sampling, all necessary drilling equipment, tools, consumables, water, labour, transportation, mobilization and demobilization, and all incidental works necessary to complete the test borehole in all respects -
- Supply, Installation of below mentioned Stainless Steel Submersible pumps sets including Guide Rails with Chain, Automatic control panel, Level indicator and High level warning indicator, connection with BMS System, wiring, Gate valves, Non Return Valves piping, accessories - S.Steel Submersible Pump 01 & 02 (1 Duty + 1 Support/Standby) (70 GPM @100FT Head) Set 1
- Providing and installation of 10 inch dia test bore complete in all respect (if sub soil water is not achieved) - Job 1
- TUBE WELL - Drilling, construction, development and testing of one perfectly vertical 16-inch dia tube well to a minimum depth of 600 ft, complete with 12-inch dia PVC Class-E plain and slotted screen casing, couplers and accessories, approved graded gravel filter pack, cement/bentonite grouting and sanitary sealing, borehole development, flushing and disinfection, water-level measurements, step-drawdown, constant-rate pumping and recovery tests, water sampling and laboratory testing, and all necessary materials, labour, equipment, transportation, mobilization and demobilization, including coordination and acquiring NOC from CDA before start of work and all incidental works necessary to complete and commission a fully operational tube well capable of demonstrating a minimum sustainable yield of 60,000 gallons/day - Job 1
- Supply, install, test and commission one stainless steel submersible borehole pump complete with submersible motor, control panel, power cable, riser pipe, non-return valve, isolation valve, wellhead assembly, piping, fittings, supports, accessories, electrical connections, testing and commissioning, having a duty of 100 GPM at 600 ft total dynamic head with a 30 HP motor - Job 1
- Submission of water quality report as per WHO standards - Job 1

1.01 SCOPE: Design, drilling, developing, testing, commissioning of deep tubewell and test bore.

A) TEST BORE 10" dia 600ft deep:
Method: Rotary direct/reverse, dia 450mm pilot to 350mm final, temporary casing, soil logging every 3m.
Casing & Screen: 250mm (10") dia uPVC Class D / MS ERW 6mm thick hot-dip galvanized blank pipe up to 30m, screen 20-60m slotted 1.5mm opening, gravel pack 3-6mm washed silica 100mm annulus, centralizers @3m, bottom cap bail plug.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Development: Gravel pack washed, disinfected, development air lifting + over pumping 48hrs till sand free <5ppm, yield test 72hr step drawdown + constant rate pump test with observation well, recovery test, water quality test.
Documents: Strata log, water level measurement, formation sampling, drilling equipment, tools, consumables, mobilization/demobilization.

B) TUBE WELL 16" dia minimum 600ft deep - 60,000 gallons/day yield:
Same as above but 16" dia drilling, 12" dia PVC Class-E plain and slotted screen casing, graded gravel filter pack, cement/bentonite grouting and sanitary sealing, borehole development, flushing and disinfection, water level measurements, step-drawdown, constant-rate pumping and recovery tests, water sampling and lab testing, coordination and acquiring NOC from CDA before start of work.
Yield: Minimum sustainable 60,000 gallons/day.

C) BOREHOLE PUMP 100 GPM @600ft TDH 30HP:
Submersible pump SS, 100 GPM @600ft head, 30HP motor, with submersible motor, control panel star-delta, power cable, riser pipe GI Class C / SS304 80mm, non-return valve, isolation valve, wellhead assembly, piping, fittings, supports, accessories, electrical connections, testing and commissioning.
Head Works: RCC chamber 1200x1200 CI cover D400, flow meter, pressure gauge, sampling tap, chlorination dosing point, earthing, lightning protection.

D) WATER QUALITY REPORT:
Submission as per WHO standards - physical, chemical, bacteriological parameters from approved lab .

Standard: BS 631, IS 2800, BS 8220, WHO Water Quality.
Warranty: 2 years against sand pumping, 5 years casing.
Measurement: Job as per BOQ

END OF SECTFION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

LIST OF APPROVED MANUFACTURERS (PLUMBING)		
S. No.	**Material / Item**	**Manufacturers/ Suppliers**
1	***PPR Pipes & Fittings, & PPR Coated /Standard Valves***	a. Dadex b. Nepro c. Popular d. George Fisher e. Aqua Therm f. Formul g. Valsir
2	***cPVC / Condensate Pipes for Exposed Works***	a. Flowguard; b. Hydroseal; c. Nepro; d. Prestige Plastics; e. AGM
3	***Brass / Bronze Valves***	a. Scon, b. Mech, c. Watts, d. Hattersley
4	***Cast Iron / Ductile Iron Valves & Specialties (NRV, Strainers)***	a. Scon, b. Mech, c. Watts, d. Hattersley
5	***Pressure Reducing Valves (PRV)***	a. Cla-Val b. SINGER c. Watts d. Mech
6	***Water Supply & Booster Pump Sets***	a. GRUNDFOS; b. WILO; c. LOWARA; d. KSB e. Ebara; f. Xylem
7	***Recirculation & Transfer Pumps***	a. GRUNDFOS; b. WILO; c. LOWARA; d. KSB e. Ebara; f. Xylem
8	***Submersible / Drainage / Sump Pumps***	a. GRUNDFOS; b. WILO; c. LOWARA; d. KSB e. Ebara; f. Xylem

9	***Water Meters***	a. Kent, b. Badger, c. Watts, d. B-Meter, e. Diehl
10	***CI / Ductile Iron Manhole Covers***	a. JAWS b. Oozley c. ALPINE
11	***UPVC Drainage Pipes & Fittings (Standard)***	a. Dadex b. Nepro c. Popular d. George Fisher e. Aqua Therm f. Formul g. Valsir
12	***Channel Drains, Floor Drains & Cleanouts***	a. JAWS; b. Watts, c. Afzaal Brothers
13	***Hot Water & Condensate Pipe Insulation***	a. AEROFOAM XLPE; b. INCOFLEX XLPE; c. AEROFLEX; d. ARMAFLEX
14	***Sanitary Fixtures (Executive Areas)***	a. Roca , b. Grohe, c. American Standard
15	***Sanitary Fixtures (Standard / General Floors)***	a. Zilver, b. Porta, c. Sera, d. Marachi
16	***Sanitary Faucets & Mixers (Executive & General)***	a. Zilver, b. Faisal, c. Sonex, d. Grohe
17	***Galvanized Iron (GI) / Mild Steel Pipes***	a. International Industries Ltd. (IIL) b. Jamal Pipe Industries; c. Bashir Pipe Industries
18	***Water Heaters (Electric & Dual Gas/Electric)***	**Electric:** a. Ariston, b. Canon; **Dual Fuel:** a. Corona, b. Nasgas, c. Tesla
19	***Pipe Supports, Hangers & Anchors***	a. Fischer; b. Hilti; c. Sikla

20	***Grease & Oil Interceptors***	a. WATTS b. WADE c. Kessel; d. JR SMITH

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

PUBLIC PROCUREMENT REGULATORY AUTHORITY
(PPRA)
EPADS

ARCHITECTURAL SPECIFICATION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

ARCHITECTURAL SPECIFICATION

TABLE OF CONTENT

S.no	Index no		Description
1	Section 01002	-	Project Identification and Signboard
2	Section 01020	-	Allowances
3	Section 01026	-	Unit Prices
4	Section 01027	-	Applications for Payment
5	Section 01030	-	Alternates
6	Section 01035	-	Modification Procedures
7	Section 01040	-	Coordination
8	Section 01045	-	Cutting and Patching
9	Section 01050	-	Field Engineering
10	Section 01200	-	Project Meetings
11	Section 01300	-	Submittals
12	Section 01400	-	Quality Controls
13	Section 01421	-	Reference Standards and Definitions
14	Section 01500	-	Construction Facilities and Temporary
15	Section 01631	-	Substitutions
16	Section 01700	-	Contract Closeout
17	Section 01740	-	Warranties
18	Section 02005	-	Precast Concrete Kerbs
19	Section 02006	-	Interlocking Precast Concrete Pavers
20	Section 02520	-	Portland cement Concrete Paving
21	Section 03005	-	Concrete Toppings
22	Section 03355	-	Special Concrete Finishes
23	Section 04200	-	Unit Masonry
24	Section 05004	-	Ornamental Metalwork
25	Section 05500	-	Metal Fabrications
26	Section 05511	-	Metal Stairs
27	Section 05521	-	Pipe and Tube Railings
28	Section 05530	-	Gratings
29	Section 05720	-	Ornamental Handrails and Railings
30	Section 05810	-	Expansion Joint Cover Assemblies
31	Section 06001	-	Rough Carpentry
32	Section 06200	-	Finish Carpentry
33	Section 06402	-	Interior Architectural Woodwork
34	Sections 07001	-	Liquid Applied Waterproofing
35	Section 07004	-	Pre-finished Metal Panels
36	Section 07005	-	Modified Bituminous Membrane
37	Section 07006	-	Sheet Metal Flashing and Trim
38	Sections 07007	-	Roof Hatches

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

S.no	Index no		Description
39	Section 07115	-	Sheet Waterproofing
40	Section 07160	-	Bituminous Damp-roofing
41	Section 07190	-	Water Repellents
42	Section 07210	-	Building Insulation
43	Section 08114	-	Custom Steel Doors and Frames
44	Sections 08163	-	Sliding Aluminum Framed Glass Doors
45	Section 08211	-	Flush Wood Doors
46	Section 08212	-	Stile and Rail Wood Doors
47	Section 08305	-	Access Doors
48	Section 08311	-	Aluminum Sliding Glass Doors
49	Section 08410	-	Aluminum Entrances and Storefronts
50	Section 08520	-	Aluminum Windows
51	Section 08710	-	Finish Hardware
52	Section 08710	-	Door Hardware
53	Section 08800	-	Glazing
54	Section 08920	-	Glazed Aluminum Curtain Wall
55	Section 08975	-	Structural Sealant Glazing System
56	Section 09004	-	Floor Finishes
57	Section 09220	-	Portland cement Plaster
58	Section 09255	-	Gypsum Board Assemblies
59	Section 09310	-	Ceramic Tile
60	Section 09340	-	Marble and Granite Finishes
61	Section 09350	-	Cement Tiles
62	Section 09511	-	Acoustical Panel Ceiling
63	Section 09512	-	Acoustical Tile Ceiling
64	Section 09546	-	Linear Metal Ceilings
65	Section 09600	-	Stone Paving and Flooring
66	Section 09651	-	Resilient Floor Tile
67	Section 09680	-	Carpet
68	Section 09690	-	Carpet Tile
69	Section 09800	-	Special Coatings
70	Section 09900	-	Painting
71	Section 09950	-	Wall Coverings
72	Section 10001	-	Wall and Corner Guards
73	Section 10155	-	Toilet Compartments
74	Section 10200	-	Louvers and Vents
75	Section 10350	-	Flagpoles
76	Section 10425	-	Signs
77	Section 10505	-	Metal Lockers
78	Section 10801	-	Toilet and Bath Accessories
79	Section 10810	-	Stone Impregnator or Hard Surface Floor and Wall

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A01002

PROJECT IDENTIFICATION AND SIGNBOARD

PART 1 - GENERAL

1.1 SCOPE

Section Includes: Project identification signs.

1. Maintenance
2. Removal / Handover

2.0. MAINTENANCE

2.1 Maintain signs and supports, clean and repair where deterioration or damages have occurred to the satisfaction of the Engineer's Representative at no additional cost. Replace defective lamps and pay electricity supply charges until substantial completion.

2.2 Repaint as necessary.

3.0 RELOCATION

Relocate Project Identification signs if required by the Contract Drawings.

4.0 REMOVAL / HANDOVER

At handover the temporary signs shall be dismantled and removed off site.

5.1 MEASUREMENT AND PAYMENT

A. No separate payment shall be made for the work covered in this section of the specification and all costs of Construction Facilities and Temporary Controls shall be covered in the unit rates of the Contractor for other items.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01020

ALLOWANCES

1.1 GENERAL

A. Selected materials and equipment, and in some cases installation, are specified in the Contract Documents by allowances. Allowances are established to defer selection of actual materials and equipment until additional information is available. Additional requirements will be issued by Change Order.

B. Types of allowances required include the following:
1. Lump-sum allowances.
2. Unit-cost allowances.
3. Contingency allowances.
4. Inspection and testing allowances.

C. Division 1 Section "Modification Procedures" specifies procedures for submitting and handling Change Orders.

D. Selection and Purchase: At the earliest practical date after award of the Contract, advice the Engineer of the date when selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

E. At the Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

F. Purchase products and systems from the designated supplier.

G. Submittals: Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1. Submit invoices or delivery slips to show quantities of materials delivered to the site for use in fulfilling each allowance.

H. Contingency Allowances: Use contingency allowance only as directed for the Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

1. Related costs for products and equipment ordered under the contingency allowance, including delivery, installation, taxes, insurance, and similar costs, are not part of the Contract Sum.
2. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.
3. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Inspection and testing allowances include the cost of engaging inspection or testing agencies, the actual inspections and tests, and reporting the results.

1. The allowance does not include incidental labor required to assist the testing agency or costs for retesting upon failure of previous tests and inspections. Costs of services not required by the Contract Documents are not included in the allowance.

2. At Project closeout, credit unused amounts remaining in the inspection and testing allowance to Owner by Change Order.

J. Unused Materials: Return unused materials for credit to Owner, after installation has been completed and accepted.

1. Prepare and deliver unused material for storage by Owner when it is not economically practical to return the material for credit. Otherwise, disposal of unused material is the Contractor's responsibility.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01026

UNIT PRICES

1.1 GENERAL

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if the estimated quantities of Work required by the Contract Documents are increased or decreased.

B. Unit prices include necessary material, plus costs for delivery, installation, insurance, overhead, profit, and applicable taxes.

C. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

1. The Employer reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Employer 's expense, by an independent surveyor acceptable to the Contractor.

D. Schedule: A "Unit Price Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials described under each unit price.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01027

APPLICATIONS FOR PAYMENT

1.1 GENERAL

A. Coordinate the Bills of Quantities and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

B. Bills of Quantities: Coordinate preparation of the Bills of Quantities with preparation of the Contractor's Construction Schedule.

1. Correlate line items in the Bills of Quantities with other required administrative schedules and forms, including:
   a. Contractor's Construction Schedule.
   b. Application for Payment forms, including Continuation Sheets.
   c. List of subcontractors.
   d. List of products.
   e. List of principal suppliers and fabricators.
   f. Schedule of submittals.

2. Submit the draft measurements at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.

C. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Bills of Quantities. Provide at least one line item for each Specification Section.

1. Include the following Project identification:
   a. Project name and location.
   b. Name of Architect.
   c. Project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Bills of Quantities in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.
   h. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

facilitate evaluation of Applications for Payment. Break subcontract amounts down into several line items. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.

4. Provide a separate line item for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.

5. Provide separate line items for initial cost of the materials, for each subsequent stage of completion, and for total installed value.

6. Show line items for indirect costs and margins on costs only when such items are listed individually in Applications for Payment. Each item in the Bills of Quantities and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.

   a. Temporary facilities and items that are not direct cost of work-in-place may be shown as separate line items or distributed as general overhead expense.

7. Update and resubmit the Bills of Quantities when Change Orders or Construction Change Directives change the Contract Sum.

D. Applications for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

E. Payment-Application Times: Payment dates are indicated in the Agreement. The period covered by each application is the period indicated in the Agreement.

F. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment.

G. Application Preparation: Complete every entry, including notarization and execution by a person authorized to sign on behalf of the Contractor. The Architect will return incomplete applications without action.

1. Entries shall match data on the Bills of Quantities and the Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

H. Transmittal: Submit 3 executed original copies of each Application for Payment to the Architect within 24 hours. One copy shall be complete, including waivers of lien and similar attachments.

1. Transmit each copy with a transmittal listing attachments and recording appropriate information related to the application.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of lien from every entity who may file a lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retain age, on each item.

2. When an application shows completion of an item, submit final or full waivers.

3. Submit each Application for Payment with Contractor's waiver of lien for the period of construction covered by the application.
   a. Submit final Applications for Payment with final waivers from every entity involved with performance of the Work covered by the application who may file a lien.

4. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Bills of Quantities.
4. Contractor's Construction Schedule (preliminary if not final).
5. Submittal Schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. Copies of building permits.
8. Copies of licenses from governing authorities.
9. Certificates of insurance and insurance policies.
10. Performance and payment bonds.

K. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

1. Administrative actions and submittals that shall precede or coincide with this application include the following:
   a. Occupancy permits.
   b. Warranties and maintenance agreements.
   c. Test/adjust/balance records.
   d. Maintenance instructions.
   e. Meter readings.
   f. Changeover information related to Owner's occupancy.
   g. Final cleaning.
   h. Application for reduction of retainage and consent of surety.

L. Final Payment Application: Administrative actions and submittals that must

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Transmittal of Project construction records to the Owner.
4. Certified property survey.
5. Proof that taxes, fees, and similar obligations were paid.
6. Removal of temporary facilities and services.
7. Change of door locks to Owner's access.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01030

ALTERNATES

1.1 GENERAL

A. An alternate is an amount proposed by bidders and stated on the Bid Form for certain work that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

B. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.

C. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01035

MODIFICATION PROCEDURES

1.1 GENERAL

A. Minor Changes in the Work: The Engineer will issue instructions authorizing minor changes in the Work.

B. Employer-Initiated Change Order Proposal Requests: The Engineer will issue a description of proposed changes in the Work that require adjustment to the Contract Sum or Time. The description may include supplemental or revised Drawings and Specifications.

1. Proposal requests are for information only. Do not consider them an instruction to stop work or to execute the proposed change.
2. Within 20 days of receipt, submit an estimate of cost necessary to execute the change for the Employer's review.

a. Include an itemized list of products required and unit costs, with the total amount of purchases.
b. Indicate taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Indicate the effect the change will have on the Contract Time.

C. Contractor-Initiated Proposals: When unforeseen conditions require modifications, the Contractor may submit a request for a change to the Engineer.

1. Describe the proposed change. Indicate reasons for the change and the effect of the change on the Contract Sum and Time.
2. Include an itemized list of products required and unit costs, with the total amount of purchases.
3. Indicate taxes, delivery charges, equipment rental, and amounts of trade discounts.

D. Proposal Request Form: Use specified format, if any.

E. Allowance Adjustment: Base Change Order Proposals on the difference between the purchase amount and the allowance, multiplied by the measurement of work-in-place. Allow for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs only where indicated as part of the allowance.
2. Prepare explanations and documentation to substantiate margins claimed.
3. Submit substantiation of a change in work claimed in the Change Orders related to unit-cost allowances.

F. Construction Change Directive: In case of a Proposal Request as per the

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

terms of the contract, the Engineer may issue a Construction Change Directive instructing the Contractor to proceed with a change.

1. The Construction Change Directive contains a description of the change and designates the method to be followed to determine change in the Contract Sum or Time.

G. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completing the change, submit an itemized account and supporting data to substantiate Contract adjustments.

H. Change Order Procedures: Upon the Employer's approval of a Proposal Request, the Engineer will issue a Change Order.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01040

COORDINATION

1.1 GENERAL

A. This Section includes requirements for coordinating construction operations including, but not necessarily limited to, the following:

1. Coordination drawings if required under the contract.
2. Administrative and supervisory personnel.
3. Cleaning and protection.

1.2 COORDINATION

A. Coordinate construction to assure efficient and orderly installation of each part of the Work. Coordinate operations that depend on each other for proper installation, connection, and operation.

1. Schedule operations in the sequence required to obtain the best results where installation of one part depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1) Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required procedures with other activities to avoid conflicts and assure orderly progress. Such activities include, but are not limited to, the following:

1) Preparation of schedules.
2) Delivery and processing of submittals.
3) Progress meetings.
4) Project closeout activities.

D. Conservation: Coordinate construction to assure that operations are carried out with consideration for conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not incorporated in, the Work.

E. Coordination Drawings: Prepare coordination drawings if needed for installation of products and materials fabricated by separate entities.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Prepare coordination drawings where limited space necessitates maximum utilization of space for efficient installation of different components.

1. Show the relationship of components shown on separate shop drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section "Submittals."

F. Staff Names: Within 15 days of commencement of construction, submit a list of the Contractor's staff assignments, including the superintendent and other personnel at the Project Site. Identify individuals and their responsibilities. List their addresses and telephone numbers.

1. Post copies in the Project meeting room, the temporary field office, and each temporary telephone.

1.3 PRODUCTS (Not Applicable)

1.4 EXECUTION

A. Inspection of Conditions: Require Installers of major components to inspect substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Coordinate temporary enclosures with inspections and tests to minimize the need to uncover completed construction.

C. Clean and protect construction in progress and adjoining materials, during handling and installation. Apply protective covering to assure protection from damage.

D. Clean and maintain completed construction as necessary through the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

E. Limiting Exposures: Supervise construction to assure that no part is subject to harmful, dangerous, or damaging exposure. Such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Water or ice.
5. Solvents and chemicals.
6. Abrasion.
7. Soiling, staining, and corrosion.
8. Combustion.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01045

CUTTING AND PATCHING

1.1 GENERAL

A. Cutting and Patching Proposal: Submit a proposal describing procedures in advance of the time cutting and patching will be performed. Request approval to proceed. Include the following:

1. Describe extent of cutting and patching. Show how it will be performed and indicate why it cannot be avoided.
2. Describe changes to existing construction. Include changes to structural elements and operating components and changes in the building's appearance and other significant visual elements.
3. List products to be used and firms that will perform Work.
4. Indicate dates when cutting and patching will be performed.
5. Utilities: List utilities that will be disturbed or relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
7. Approval to proceed does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.

B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain approval before cutting and patching the following structural elements:
   a. Foundation construction.
   b. Bearing and retaining walls.

C. Operational Limitations: Do not cut and patch operating elements in a manner that would reduce their capacity to perform as intended. Do not cut and patch operating elements in a manner that would increase maintenance or decrease operational life or safety.

1. Obtain approval before cutting and patching the following operating elements or safety related systems:
   a. Primary operational systems and equipment.
   b. Fire protection systems.
   c. Electrical wiring systems.

D. Visual Requirements: Do not cut and patch exposed construction in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch in a manner that would result in visual evidence of cutting and patching. Remove and replace

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

construction cut and patched in a visually unsatisfactory manner.

1. Retain the original Installer to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer, engage a recognized experienced and specialized firm.

   a. Ornamental metal.
   b. Matched-veneer woodwork.
   c. Stucco and ornamental plaster.

E. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged in such a manner as not to void warranties.

1.2 PRODUCTS

A. Use materials identical to existing materials. Use materials that visually match adjacent surfaces to the fullest extent possible if identical materials are unavailable. Use materials whose performance will equal that of existing materials.

1.3 EXECUTION

A. Examine surfaces to be cut and patched and conditions under which work is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action.

   1. Before proceeding, meet with parties involved. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect existing construction to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.

D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

E. Avoid cutting pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

F. Performance: Employ skilled workmen. Proceed at the earliest feasible time and complete without delay.

   1. Cut construction to install other components or perform other construction and subsequent fitting and patching required to restore surfaces to their original condition.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Cutting: Cut using methods that will not damage elements retained or adjoining construction. Comply with the original Installer's recommendations.

1. Use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
5. Where services are required to be removed, relocated, or abandoned, by-pass utility services before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

H. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove floor and wall coverings and replace with new materials to achieve uniform color and appearance.

    a. Where patching occurs in a smooth painted surface, extend final paint coat over entire surface containing the patch after the area has received primer and second coat.
        1. Patch, repair, or rehang ceilings as necessary to provide an even-plane surface of uniform appearance.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar items. Clean piping, conduit, and similar features before applying paint or finishing materials. Restore damaged pipe covering to its original condition.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01050

FIELD ENGINEERING

1.1 GENERAL

A. This Section specifies requirements for field-engineering services including, but not limited to, the following:

1. Land survey work.
2. Civil-engineering services.
3. Damage surveys.
4. Geotechnical monitoring.

B. Submit a certificate certifying location and elevation of improvements.

C. Final Property Survey: Submit 10 copies of final property survey.

D. Project Record Documents: Submit a record of Work performed and record survey data.

E. Surveyor Qualifications: Engage a land surveyor registered in the state where the Project is located.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Identification: The Engineer / drawings will identify existing control points and property line corner stakes.

B. Verify layout information, in relation to property survey and existing benchmarks, before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

1. Do not change or relocate benchmarks or control points without written approval. Report destroyed reference points or requirements to relocate reference points because of changes in grades.
2. Replace destroyed Project control points. Base replacements on the original survey control points.

C. Establish and maintain a minimum of 2 permanent benchmarks.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

D. Existing Utilities: The existence of underground utilities and construction is not guaranteed. Verify location of underground utilities and other construction before beginning site work.

1. Prior to construction, verify location and invert elevation at points of

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

connection of sanitary and storm sewers, and water-service piping.

E. Work from lines and levels established by the property survey. Establish benchmarks and markers to set lines and levels at each story of construction and to locate each element. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in construction activities of marked lines and levels provided for their use.
2. As construction proceeds, check every element for line, level, and plumb.

F. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.

1. Record deviations from lines and levels. Advise the Engineer when deviations exceed tolerances. On Project Record Drawings, record deviations that are accepted and not corrected.
2. On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

G. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.

H. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.

I. Existing Utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

J. Final Property Survey: Prepare a final property survey showing significant features for the Project. Include certification that metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have final property survey recorded by governing authorities as official "property survey."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01200

PROJECT MEETINGS

1.1 GENERAL

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Preconstruction conferences.
2. Preinstallation conferences.
3. Progress meetings.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction. Review responsibilities and personnel assignments.

C. Attendees: Authorized representatives of the Employer, Engineer, Architect, Project Manager and their consultants; the Contractor and its superintendent; major subcontractors; and other concerned parties shall attend.

1. Participants shall be familiar with the Project and authorized to conclude matters relating to the Work.

D. Agenda: Discuss items that could affect progress, including the following:

1. Tentative construction schedule.
2. Critical work sequencing.
3. Submittal of Shop Drawings, Product Data, and Samples.
4. Use of the premises.

E. Preinstallation Conferences: Conduct a conference before each activity that requires coordination with other operations.

F. Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation shall attend. Advise the Engineer of scheduled meeting dates.

1. Review the progress of other operations and preparations for the activity under consideration at each preinstallation conference, including requirements for the following:

a. Compatibility problems and acceptability of substrates.
b. Time schedules and deliveries.
c. Manufacturer'srecommendations.
d. Warranty requirements.
e. Inspecting and testing requirements.

1. Record significant discussions and agreements and disagreements, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner, Engineer and the Architect.
2. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate actions necessary to resolve problems and reconvene the conference.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Progress Meetings: Conduct progress meetings at the Project Site at regular intervals. Notify the Owner, Engineer and the Architect of scheduled dates. Coordinate meeting dates with preparation of the payment request.

H. Attendees: The Owner, Engineer, Architect, and other entities concerned with current progress or involved in planning, coordination, or future activities shall be represented. Participants shall be authorized to conclude matters relating to the Work.

I. Agenda: Review and correct or approve minutes of the previous meeting. Review items of significance that could affect progress. Include topics for discussion appropriate to Project status.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule. Determine how to expedite construction behind schedule; secure commitments from parties involved to do so. Discuss revisions required to insure subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including the following:

a. Time.
b. Sequences.
c. Status of submittals.
d. Deliveries and off-site fabrication problems.
e. Temporary facilities and services.
f. Quality and work standards.
g. Change Orders.

1. Reporting: Distribute meeting minutes to each party present and to parties who should have been present. Include a summary of progress since the previous meeting and report.
2. Schedule Updating: Revise the Contractor's Construction Schedule after each meeting where revisions have been made. Issue the revised schedule concurrently with the report of each meeting.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01300

SUBMITTALS

1.1 GENERAL

A. Submittal Procedures: Coordinate submittal preparation with construction, fabrication, other submittals, and activities that require sequential operations. Transmit in advance of construction operations to avoid delay.

1. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination until related submittals are received.

2. Processing: Allow 2 weeks for initial review. Allow more time if the Engineer must delay processing to permit coordination. Allow 2 weeks for reprocessing.
   a. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

3. Submittal Preparation: Place a permanent label on each submittal for identification. Provide a (100- by 125-mm) space on the label or beside title block to record review and approval markings and action taken. Include the following information on the label for processing and recording action taken.
   a. Project name.
   b. Date.
   c. Name and address of the Engineer.
   d. Name and Address of the Architect.
   e. Name and address of the Contractor.
   f. Name and address of the subcontractor.
   g. Name and address of the supplier.
   h. Name of the manufacturer.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.

4. Submittal Transmittal: Package each submittal appropriately. Transmit with a transmittal form. The Engineer will not accept submittals from sources other than the Contractor.

5. Transmittal Form: On the form, record requests for data and deviations from requirements. Include Contractor's certification that information complies with requirements.

B. Contractor's Construction Schedule: Prepare a horizontal bar-chart-type, contractor's construction schedule. Provide a separate time bar for each activity and a vertical line to identify the first working day of each week. Use the same breakdown of Work indicated in the "Schedule of Values." Indicate estimated completion in 10 percent increments. As Work

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

progresses, mark each bar to indicate actual completion.

1. Submit within 30 days of the date established for "Commencement of the Work."
2. Prepare the schedule on stable transparency, or other reproducible media, of width to show data for the entire construction period.
3. Secure performance commitments from parties involved. Coordinate each element with other activities; include minor elements involved in the Work. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
4. Coordinate with the Schedule of Values, list of subcontracts, Submittal Schedule, payment requests, and other schedules.
5. Indicate completion in advance of Substantial Completion. Indicate Substantial Completion to allow time for the Engineer's procedures necessary for certification of Substantial Completion.
6. Phasing: Show how phased completion affects the Work.
7. Work Stages: Indicate important stages for each portion of the Work.
8. Area Separations: Provide a separate time bar to identify each construction area for each portion of the Work. Indicate where each element must be sequenced with other activities.

C. Submittal Schedule: After developing the Contractor's Construction Schedule, prepare a schedule of submittals. Submit within 10 days of submittal of the Construction Schedule.

1. Coordinate with list of subcontracts, Schedule of Values, list of products, and the Contractor's Construction Schedule.

2. Prepare the schedule in chronological order. Provide the following information:
   a. Date for first submittal.
   b. Related Section number.
   c. Submittal category (Shop Drawings, Product Data, or Samples).
   d. Name of the subcontractor.
   e. Description of the Work covered.
   f. Date for the Engineer's final approval.

3. Schedule Distribution: Distribute copies of the Contractor's Construction Schedule and the Submittal Schedule to the Engineer, Architect, Owner, subcontractors, and parties required to comply with submittal dates. Post copies in the field office.

   a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their Work and are no longer involved in construction activities.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Updating: Revise the schedule after each meeting or activity where revisions have been made. Issue the updated schedule concurrently with the report of each meeting.

D. Daily Construction Reports: Prepare a daily report recording events at the site. Submit duplicate copies to the Engineer at weekly intervals. Include the following information:

1. List of subcontractors at the site.
2. High and low temperatures, general weather conditions.
3. Accidents and unusual events.
4. Stoppages, delays, shortages, and losses.
5. Meter readings and similar recordings.
6. Emergency procedures.
7. Orders and requests of governing authorities.
8. Services connected, disconnected.
9. Equipment or system tests and startups.
10. Substantial Completions authorized.

E. Shop Drawings: Submit newly prepared information drawn to scale. Indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information. Include the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet Size: Except for templates and full-size Drawings, submit one correctable, reproducible print and one blue- or black-line print on sheets at least 215 by 280 mm but no larger than 890 by 1220 mm. The Engineer will return the reproducible print.
   a. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

F. Product Data: Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, mark copies to indicate applicable information.

1. Include the following information:
   a. Manufacturer's printed recommendations.
   b. Compliance with trade association standards.
   c. Compliance with recognized testing agency standards.
   d. Application of testing agency labels and seals.
   e. Notation of dimensions verified by field measurement.
   f. Notation of coordination requirements.

2. Preliminary Submittal: Submit a preliminary single copy of Product Data

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

where selection of options is required.

3. Submittals: Submit 2 copies; submit 4 copies where required for maintenance manuals. The Engineer will retain one and return the other marked with action taken.

    a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.

4. Distribution: Furnish copies to installers, subcontractors, suppliers, and others required for performance of construction activities. Show distribution on transmittal forms. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

    a. Do not use unmarked Product Data for construction.

G. Samples: Submit full-size Samples cured and finished as specified and identical with the material proposed. Mount Samples to facilitate review of qualities.

1. Include the following:
    a. Specification Section number and reference.
    b. Generic description of the Sample.
    c. Sample source.
    d. Product name or name of the manufacturer.
    e. Compliance with recognized standards.
    f. Availability and delivery time.
2. Submit Samples for review of size, kind, color, pattern, and texture, for a check of these characteristics, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed. Where variations are inherent in the material, submit at least 3 units that show limits of the variations.
    a. Refer to other Sections for requirements for Samples that illustrate workmanship, fabrication techniques, and details of assembly, connections, operation, and similar characteristics.
    b. Refer to other Sections for Samples to be incorporated in the Work. Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
    c. Samples not incorporated into the Work, or designated as the Owner's property, are the Contractor's property and shall be removed from the site.

3. Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from standard choices. The Engineer will review and return submittals indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

similar characteristics, submit 3 sets. One set will be returned marked with the action taken. Maintain sets of Samples, at the Project Site, for quality comparison.

a) Unless noncompliance with Contract Documents is observed, the submittal may serve as the final submittal.

b) Sample sets may be used to obtain final acceptance of the construction associated with each set.

5. Distribution of Samples: Distribute additional sets to subcontractors, manufacturers, and others as required for performance of the Work. Show distribution on transmittal forms.

H. Quality Assurance Submittals: Submit quality-control submittals, including design data, certifications, manufacturer's instructions, and manufacturer's field reports required under other Sections of the Specifications.

1. Certifications: Where certification that a product or installation complies with specified requirements is required, submit a notarized certification from the manufacturer certifying compliance.

a. Signature: Certification shall be signed by an officer authorized to sign documents on behalf of the company.

I. Engineer's Action: Except for submittals for the record or information, where action and return are required, the Engineer will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.

1. Action Stamp: The Engineer will stamp each submittal with an action stamp. The Engineer will mark the stamp appropriately to indicate the action taken.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01400

QUALITY CONTROL

1.1 GENERAL

A. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by the Engineer.

B. Contractor Responsibilities: Unless they are the responsibility of another entity, Contractor shall provide inspections and tests specified elsewhere and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.

1. Where inspections and tests are the Contractor's responsibility, the Contractor shall employ and pay a qualified Material Engineer of the Contractor to perform these services. Costs for these services are included in the Contract Sum.
2. Where inspections and tests are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.
3. Where inspections and tests are the Owner's responsibility, the Owner will engage the services of a qualified independent testing agency to perform those services. Payment will be made from the Inspection and Testing Allowance, as authorized by Change Orders.
    a. Where the Owner engages an agency to test or inspect part of the Work and the Contractor is required to engage an entity to test or inspect the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless the Owner agrees in writing.

C. Retesting: The Contractor is responsible for retesting where results of inspections and tests prove unsatisfactory and indicate noncompliance with requirements.

1. The cost of retesting is the Contractor's responsibility where tests performed indicated noncompliance with requirements.

D. Auxiliary Services: Cooperate with agencies performing inspections and tests. Provide auxiliary services as requested. Notify the agency in advance of operations to permit assignment of personnel. Auxiliary services include the following:

1. Providing access to the Work.
2. Furnishing incidental labor and facilities to assist inspections and tests.
3. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
4. Providing facilities for storage and curing of test samples.
5. Delivering samples to testing laboratories.
6. Providing preliminary design mix proposed for use for materials mixes that require control by the Material Engineer of the Contractor.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

7. Providing security and protection of samples and test equipment.

E. The Material Engineer of the Contractor shall cooperate with the Engineer in performing its duties. In case the Engineer is not satisfied with the Material Engineer of the contractor, the Engineer may hire the services of an Independent agency at contractor's cost for testing purposes which shall provide qualified personnel to perform inspections and tests.

1. The agency shall notify the Engineer and the Contractor of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency shall not release, revoke, alter, or enlarge requirements or approve or accept any portion of the Work.
3. The agency shall not perform duties of the Contractor.

F. Coordination: Coordinate activities to accommodate services with a minimum of delay. Avoid removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling inspections, tests, taking samples, and similar activities.

G. Submittals: The Material Engineer of the Contractor shall submit a certified written report, in duplicate, of each inspection and test to the Engineer. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection or test through the Contractor.

1. Submit additional copies of each report to the governing authority, when the authority so directs.
2. Report Data: Reports of each inspection, test, or similar service include, but are not limited to, the following:
   a. Date of issue.
   b. Project title and number.
   c. Name of the Material Engineer of the Contractor.
   d. Dates and locations of samples and tests or inspections.
   e. Names of individuals making the inspection or test.
   f. Designation of the Work and test method.
   g. Identification of product and Specification Section.
   h. Complete inspection or test data.
   i. Test results and an interpretation of test results.
   j. Ambient conditions at the time of sample taking and testing.
   k. Comments or professional opinion on whether inspected or tested Work complies with requirements.
   l. Name and signature of laboratory inspector.
   m. Recommendations on retesting.

H. Qualifications for Service Agencies: Engage inspection and testing service agencies that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

and tests to be performed.

1. Each agency shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Repair and Protection: Upon completion of inspection, testing, and sample taking, repair damaged construction. Restore substrates and finishes. Comply with Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for inspection and testing.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01421

REFERENCE STANDARDS AND DEFINITIONS

1.1 GENERAL

A. Definitions: Basic contract definitions are included in the Conditions of the Contract.

B. "Indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.

C. "Directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Engineer, requested by the Engineer, and similar phrases.

D. "Approved," when used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.

E. "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide" means to furnish and install, complete and ready for the intended use.

I. "Installer" is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
2. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

corresponding generic name, such as "carpenter."

J. "Project site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. Specification Format: These Specifications are organized into Divisions and Sections based on the 16-division format and CSI/CSC's "Master Format" numbering system.

M. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Section Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

N. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

O. Publication Dates: Comply with standards in effect as of the date of the Contract Documents.

P. Copies of Standards: Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Q. Abbreviations and Names: Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-producing organization, authorities having jurisdiction, or other entity applicable to the context of the text provision.

R. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.1 GENERAL

A. Summary: This Section specifies construction facilities and temporary controls including temporary utilities, support facilities, and security and protection facilities.

B. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

C. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

E. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. Submit reports of tests, inspections, meter readings, and procedures performed on temporary utilities. At the earliest time, change over from use of temporary service to use of permanent service.

1.2 PRODUCTS

A. Materials: Provide new materials. If acceptable to the Engineer, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

1. Lumber and Plywood: Comply with Division 6 Section "Rough Carpentry." Provide best quality lumber and plywood for temporary offices and sheds. Provide exterior, Grade B-B high-density concrete form overlay plywood for signs. Provide 16-mm thick exterior plywood for other uses.
2. Roofing Materials: Minimum 22ga GI corrugated sheeting on roofs of

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

temporary offices, shops, and sheds.

3. Paint: Comply with Division 9 Section "Painting."
   a. For exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
   b. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
   c. For interior walls of temporary offices, provide 2 coats interior latex-flat wall paint.
4. Tarpaulins: Waterproof, fire-resistant, tarpaulins. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
5. Water: Potable water approved by local health authorities.
6. Open-Mesh Fencing: 3-mm- thick, galvanized 50-mm chainlink fabric fencing 2 m high with galvanized barbed-wire top strand and galvanized steel pipe posts, 38 mm I.D. for line posts and 64 mm I.D. for corner posts.

B. Equipment: Provide new equipment. If acceptable to the Engineer, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

1. Water Hoses: 19-mm, heavy-duty, abrasion-resistant, flexible rubber hoses 30 m long. Provide adjustable shutoff nozzles at hose discharge.
2. Electrical Outlets: Properly configured, polarized outlets. Provide outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
3. Electrical Power Cords: Grounded extension cords. Use hard-service cords where exposed to abrasion and traffic.
4. Lamps and Light Fixtures: General service incandescent lamps. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
5. Heating Units: Temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
6. Fire Extinguishers: Hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
   a. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

1.3 EXECUTION

A. Installation, General: Use qualified personnel to install temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
2. Conditions of Use: Keep temporary facilities clean and neat in appearance. Operate safely and efficiently. Relocate as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

B. Temporary Utility Installation: Engage the local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with company and existing users for a time when service can be interrupted to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer. Neither the Owner nor Engineer will accept cost or use charges as a basis of claims for Change Orders.
5. Temporary Water Service: Install temporary water service and distribution piping of sizes and pressures adequate for construction. Maintain service until permanent water service is in use. Sterilize piping prior to use.
6. Temporary Electric Power: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear. Install service underground.
    a. Power Distribution: Install wiring overhead and rise vertically where least exposed to damage.
    b. Temporary Lighting: Provide temporary lighting with local switching to fulfill security requirements and illumination for construction operations and traffic conditions.
7. Temporary Heat: Provide temporary heat for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations. Coordinate ventilation requirements to produce ambient condition required and minimize consumption of energy.

    a. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

oil heaters with individual space thermostatic control. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

8. Temporary Telephones: Provide temporary telephone service for personnel engaged in construction. Install a separate line for each temporary office and first-aid station. Provide a dedicated telephone line for a fax machine in the field office. At each telephone, post a list of important telephone numbers.

9. Sanitary Facilities: Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs. Provide toilet tissue, and all similar disposable materials for each facility. Provide covered waste containers.

   a. Toilets: Install self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

      1) Provide separate facilities for male and female personnel.

   b. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up. Dispose of drainage properly. Supply cleaning compounds.

      1) Provide safety showers, eyewash fountains, and similar facilities for safety, and sanitation of personnel.

   c. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled drinking-water units.

10. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

    a. Filter out soil, construction debris, chemicals, and similar contaminants that might clog sewers or pollute waterways.
    b. Connect temporary sewers to the municipal system, as directed by sewer department officials. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
    c. Provide earthen embankments and similar barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.

C. Support Facilities Installation: Locate field offices, storage sheds, and other construction and support facilities for easy access. Maintain facilities until near Substantial Completion. Remove prior to Substantial Completion.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

1. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 9 m of building lines.

2. Field Offices: Provide heated and air-conditioned, insulated, weathertight temporary offices of size to accommodate personnel at the Project Site. Provide offices on foundations adequate for normal loading. Provide units with lockable entrances, operable windows, and serviceable finishes. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:

    a. Furnish field offices with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase. Equip with a water cooler and toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.

3. Storage and Fabrication Sheds: Install sheds equipped to accommodate materials and equipment involved. Sheds may be open shelters or fully enclosed spaces within the building.

4. Temporary Paving: Construct temporary paving for roads, storage areas, and parking where the same permanent facilities will be located. Comply with Division 2 Section "Hot-Mixed Asphalt Paving."

    a. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.

        1) Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.

    b. Delay installation of the final course of permanent paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.
    c. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

5. Dewatering Facilities and Drains: For temporary drainage and dewatering operations not directly associated with construction, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain excavations and construction free of water.

6. Temporary Enclosures: Provide temporary enclosures for protection of construction from exposure, foul weather, other construction operations, and similar activities. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

requirements to avoid dangerous conditions.

a. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 2.3 sq. m or less with plywood or similar materials.
b. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.

7. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees.

8. Temporary Elevator Use: Refer to Division 14 Sections for elevators.

9. Project Signs: Install project identification and other signs where indicated to inform the public and persons seeking entrance to the Project. Support on framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs. Engage an experienced sign painter to apply graphics. Comply with details indicated.

10. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

11. Waste Collection and Disposal: Collect waste daily. Comply with requirements of NFPA 241. Enforce requirements strictly. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

    a. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 27 deg C.

12. Pest Control: Retain an exterminator or pest control company to perform extermination and control procedures at regular intervals so the Project will be free of pests at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

13. Stairs: Provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

D. Security and Protection Facilities Installation: Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion.

1. Temporary Fire Protection: Until permanent facilities supply fire-protection needs, install and maintain temporary fire-protection facilities of types needed to protect against controllable fire losses. Comply with NFPA 10 and NFPA 241.
    a. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell. Maintain unobstructed access to fire extinguishers.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Store combustible materials in containers in fire-safe locations.

c. Prohibit smoking in hazardous fire-exposure areas.

d. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

2. Permanent Fire Protection: At the earliest date, complete installation of the permanent fire-protection facility and place into operation and use. Instruct key personnel on use of facilities.

3. Barricades, Warning Signs, and Lights: Comply with code requirements for erection of barricades. Paint with appropriate colors, graphics, and warning signs. Where appropriate and needed, provide lighting, including flashing red or amber lights.

   a. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates to enclose the entire site or the portion sufficient to accommodate construction.
   b. Provide open-mesh, chainlink fencing with posts set in a compacted mixture of gravel and earth.

4. Provide plywood fence, 2.5 m high, framed with four 50-by-100-mm rails, and preservative-treated wood posts spaced not more than 2.5 m apart.

5. Security Enclosure and Lockup: Install temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, and theft. Provide a secure lockup where materials and equipment are of value and must be stored.

6. Environmental Protection: Operate temporary facilities and conduct construction in ways that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making equipment to hours that will minimize complaints.

E. Operation: Enforce discipline in use of temporary facilities. Limit availability to intended uses to minimize waste and abuse.

F. Maintenance: Maintain facilities in operating condition until removal. Protect from damage by freezing temperatures and similar elements. Maintain temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid damage.

G. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect during excavation.

H. Termination and Removal: Remove each temporary facility when the need has ended, when replaced by a permanent facility or no later than Substantial Completion. Complete or restore permanent construction delayed because of interference with the temporary facility. Repair

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.

2. Remove temporary paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with oil, asphalt and other petrochemical compounds, and substances that might impair growth of plant materials or lawns. Repair or replace paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities used during the construction period.

    a. Replace air filters and clean inside of ductwork and housings.
    b. Replace worn parts and parts subject to unusual operating conditions.
    c. Replace burned out lamps.

1.4 MEASUREMENT AND PAYMENT

A. No separate payment shall be made for the work covered in this section of the specification and all costs of Construction Facilities and Temporary Controls shall be covered in the unit rates of the Contractor for other items.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01631

SUBSTITUTIONS

1.1 GENERAL

A. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed after award of the Contract are considered requests for substitutions. The following are not requests for substitutions:

1. Substitutions requested during the bidding period and accepted by Addendum prior to award of the Contract.
2. Revisions to the Contract Documents requested by the Owner.
3. Specified options included in the Contract Documents.
4. Contractor's compliance with regulations issued by governing authorities.

B. Substitution Request Submittal: The Engineer will consider requests for substitution received within 60 days after commencement of the Work.

1. Submit 3 copies of each request for substitution. Submit requests according to procedures required for change-order proposals.
2. Identify the product or method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide documentation showing compliance with the requirements for substitutions and the following information:
   a. Coordination information, including a list of changes needed to other Work that will be necessary to accommodate the substitution.
   b. A comparison of the substitution with the Work specified, including performance, weight, size, durability, and visual effect.
   c. Product Data, including Drawings and descriptions of products and installation procedures.
   d. Samples, where applicable or requested.
   e. A statement indicating the effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the substitution on Contract Time.
   f. Cost information, including a proposal of the net change, if any in the Contract Sum.
   g. Certification that the substitution conforms to the Contract Documents and is appropriate for the applications indicated.
   h. The Contractor's waiver of rights to additional payment or time that may become necessary because of the failure of the substitution to perform adequately.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Engineer's Action: If necessary, the Engineer will request additional information within one week of receipt of a request for substitution. The Engineer will notify the Contractor of acceptance or rejection within 2 weeks of receipt of the request. Acceptance will be in the form of a change order.

    a. Use the product specified if the Engineer cannot make a decision within the time allocated.

1.2 PRODUCTS

A. Conditions: The Engineer will receive and consider a request for substitution when one or more of the following conditions are satisfied. Otherwise, the Engineer will return the requests without action except to record noncompliance with these requirements.

1. Extensive revisions to the Contract Documents are not required.
2. Changes are in keeping with the intent of the Contract Documents.
3. The specified product cannot be provided within the Contract Time. The Engineer will not consider the request if the specified product cannot be provided as a result of failure to pursue the Work promptly.
4. The request is related to an "or-equal" clause.
5. The substitution offers the Owner a substantial advantage, in cost, time, or other considerations, after deducting compensation to the Engineer for redesign and increased cost of other construction.
6. The specified product cannot receive approval by a governing authority, and the substitution can be approved.

B. The Contractor's submittal and the Engineer's acceptance of Shop Drawings, Product Data, or Samples for construction not complying with the Contract Documents do not constitute an acceptable request for substitution, nor do they constitute approval.

1.3 EXECUTION (Not Applicable)

1.4 MEASUREMENT AND PAYMENT

A. No separate payment shall be made for the work covered in this section of the specification and all costs of Substitutions shall be covered in the unit rates of the Contractor for other items.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01700

CONTRACT CLOSEOUT

1.1 GENERAL

A. Closeout requirements for specific construction activities to be carried out as described in the appropriate Sections/Divisions.

B. Substantial Completion: Before requesting inspection for certification of Substantial Completion, complete the following:

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete.

   a. Include supporting documentation for completion and an accounting of changes to the Contract Sum.

2. Advise the Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
4. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
5. Deliver tools, spare parts, extra stock, and similar items.
6. Changeovers locks and transmit keys to the Owner.
7. Complete startup testing of systems and instruction of operation and maintenance personnel. Remove temporary facilities, mockups, construction tools, and similar elements.
8. Complete final cleanup requirements, including touchup painting.
9. Touch up and repair and restore marred, exposed finishes.

C. Inspection Procedures: On receipt of a request for inspection, the Engineer will proceed or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued in accordance with the Conditions stipulated in the Contract.

1. The Engineer will repeat inspection when requested and assured that the Work is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

D. Final Acceptance: Before requesting inspection for certification of final acceptance and final payment, complete the following:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Final payment request with releases and supporting documentation. Include insurance certificates where required.
2. Submit a statement, accounting for changes to the Contract Sum.
3. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
4. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion.
5. Submit consent of surety to final payment.
6. Submit a final settlement statement.
7. Submit evidence of continuing insurance coverage complying with insurance requirements.

E. Reinspection Procedure: The Engineer will reinspect the Work upon receipt of notice that the Work has been completed, except for items whose completion is delayed under circumstances acceptable to the Engineer.

1. Upon completion of reinspection, the Engineer will prepare a certificate of final acceptance. If the Work is incomplete, the Engineer will advise the Contractor of Work that is incomplete or obligations that have not been fulfilled but are required.
2. If necessary, reinspection will be repeated.

F. Record Document Submittals: Do not use record documents for construction. Protect from loss in a secure location. Provide access to record documents for the Engineer's reference.

G. Record Drawings: Maintain a set of prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.

1. Mark sets with red pencil. Use other colors to distinguish between variations in separate categories of the Work.
2. Organize record drawing sheets into manageable sets. Bind with durable-paper cover sheets; print titles, dates, and other identification on the cover of each set.

H. Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications. Give attention to substitutions and selection of options and information on concealed construction. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Engineer for the Owner's records.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Maintenance Manuals: Organize operation and maintenance data into sets of manageable size. Bind in individual, heavy-duty, 51-mm, 3-ring, and binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Shop Drawings and Product Data.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires maintenance to provide instruction in proper operation and maintenance. Include a detailed review of the following items:

1. Maintenance manuals.
2. Spare parts, tools, and materials.
3. Lubricants and fuels.
4. Identification systems.
5. Control sequences.
6. Hazards.
7. Warranties and bonds.
8. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following:

1. Startup and shutdown.
2. Emergency operations and safety procedures.
3. Noise and vibration adjustments.

C. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.

1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass. Remove glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
5. Clean the site of rubbish, litter, and foreign substances. Sweep paved

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

D. Pest Control: Engage a licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.

E. Removal of Protection: Remove temporary protection and facilities.

F. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.

1.4 MEASUREMENT AND PAYMENT

A. No separate payment shall be made for the work covered in this section of the specification and all costs of Contract Closeout shall be covered in the unit rates of the Contractor for other items.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 01740

WARRANTIES

1.1 GENERAL

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

F. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

G. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

countersign such commitments are willing to do so.

H. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Engineer.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within 15 days of completion of that designated portion of the Work.

I. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Engineer, for approval prior to final execution.

1. Refer the relevant Divisions/ Sections for specific content requirements and particular requirements for submitting special warranties.

J. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 115-by-280-mm paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. List of Warranties: As follows:

B. Schedule: Provide warranties on products and installations as specified in the following Sections:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A02005

PRECAST CONCRETE KERBS

PART 1 GENERAL

1.1 SCOPE

This Section includes pre-cast concrete kerbs and edgings.

1.2 PERFORMANCE REQUIREMENTS

Structural Performance: Design, Engineer, fabricate, and install pre-cast concrete units to withstand design loads within limits and under conditions indicated.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver pre-cast concrete units to Project site in such quantities and at such times to ensure continuity of installation. Store units at Project site to prevent cracking, distorting, warping, staining, or other physical damage, and so that markings are visible. Store curb unit on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If unit become wet, do not install until they are in an airdried condition. Care shall be taken not to chip or damage units edges during transit, storage and handling.

Lift and support units only at designated lifting or supporting points shown on Shop Drawings.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

Reinforcing Bars: ASTM A 615, Grade 60 (ASTM A 615M, Grade 460), deformed.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150 Type II. White cement should be used where white concrete is required.

B. Normal-Weight Aggregates: ASTM C 33, with coarse aggregates meeting Class 5S and MNL117 requirements.

C. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete.

D. Water-Reducing Admixture: ASTM C 494, Type A.

2.3 FABRICATION

A. Accurately position steel dowels and other anchorage hardware for attachment of loose hardware and secure in place during pre-casting

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

operations. Locate anchorage hardware where it does not affect the position of the main reinforcement or the placing of concrete.

B. Supply steel dowels, and other anchorage hardware shapes not provided by other trades necessary for securing pre-cast concrete units to supporting and adjacent members.

C. Cast-in holes and other accessories in pre-cast concrete units to receive dowels and other similar work as indicated. Coordinate with other trades for installation of cast-in items.

D. Reinforcement: Comply with the recommendations of CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.

2. Accurately position, support, and secure reinforcement against displacement during concrete placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces. Do not use plastic-coated or uncoated metal chair supports.

   Place reinforcement to maintain at least 19-mm minimum cover after finishing. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

E. Mix concrete according to MNL-117 and requirements of this Section. Following concrete batching, no additional water may be added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of pre-cast concrete units. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Do not install pre-cast units until supporting concrete has attained minimum allowable design compressive strength.

3.2 INSTALLATION

A. Install pre-cast concrete units plumb, level, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.

B. Anchor pre-cast concrete units in position. Remove temporary shims, wedges, and spacers as soon as possible after anchoring are completed.

3.3 MEASUREMENT AND PAYMENT

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A02006

INTERLOCKING PRECAST CONCRETE PAVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Particular Conditions and Specification Sections, apply to this Section.

1.2 SCOPE

This Section includes Interlocking pre-cast concrete pavers.

1.3 SUBMITTALS

A. Product data for the following:
   1. Concrete pavers.
   2. Mortar and grout materials.
   3. Edge restraints.

B. Samples for initial selection in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures and patterns available for type of unit paver indicated.

C. Samples for verification in full-size units of each type of unit paver indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

D. Shop drawings including unit pavers color, pattern, and interface with other paving units.

PART 2 - PRODUCTS

2.1 UNIT PAVERS

Pre-cast Concrete Pavers: Interlocking paving units, ASTM C 936, locally manufactured, heavy duty type. Obtain each type of unit paver from one source produced in a single batch to ensure products of consistent quality in appearance and physical properties.

1. Color and texture to Engineer's approval.
2. Shall be manufactured by casting concrete under pressure in steel moulds.

Pavers shall be of interlocking shapes, as selected from manufacturer's standard range.

Concrete shall be of a minimum cement content of 300kg per each cubic meter of finished concrete, and a minimum characteristic compressive strength of 180kg/cm2 after 28 days.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Add mineral-base, non-fading pigments to BS NO.1014 to concrete mix to attain colors indicated on Drawings for blocks.

Thickness: Pavers shall be 60mm thick for sidewalks and 80 mm thick for driveways.

Pavers shall be of sharp, straight edges free of chipping and of smooth finished surfaces. Cross section of unit pavers shall be solid, compact and free of any voids or defects.
Crushed Stone: Pit-run gravel or limestone with sound, hard, durable, angular grains free from injurious amounts of clay, loam or other deleterious materials. Percentage of wear by Los Angeles test, AA.SHTO designation T 96 shall not exceed 50 at 500 revolutions.

2.2 SAND SETTING-BED MATERIALS

A. Graded Aggregate for Sub-base: ASTM D 2940.

B. Graded Aggregate for Base: ASTM D 2940.

C. Sand for leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements of ASTM C-33 for fine aggregate.

D. Sand for Joints: Fine, sharp, washed natural sand or crushed stone with 100 percent passing No. 16 (1.18mm) sieve and no more than "10 percent passing No. 200 (0.075mm) Sieve.

2.3 CONTROL AND EXPANSION JOINT

Provide control and expansion joint at distance of maximum 4 meters both sides. Locate joints as per approved drawing. Metal joints will be of galvanized steel used as a functional element.

PART 3 - EXECUTION

3.1 PREPARATION

A. Vacuum clean concrete substrates to remove dirt, dust, debris, and loose particles.

B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

C Proof-roll prepared sub-grade surface to check for unstable areas and areas requiring additional compaction. Do not proceed with installation of unit pavers until deficient sub-grades have been corrected and are ready to receive sub-base for unit pavers.

3.2 INSTALLATION, GENERAL

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. Do not use unit pavers with chips, cracks, voids, discoloration's, and other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, un-chipped edges. Cut unit to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible.

For concrete pavers, a block splitter may be used.

D. Joint Pattern: Match field-constructed mock-up.

3.3 SAND SETTING-BED PAVER APPLICATIONS

A. Compact soil sub-grade uniformly to at least 95 percent of ASTM D 1557 laboratory density.

B. Place sand base in thickness indicated. Compact by tamping and screed to depth required to allow setting of pavers.

C. Place graded sand for sub-base over compacted sub-grade. Provide compacted thickness of base and sub-base indicated. Compact sub-base to 100 percent of ASTM D 1557 maximum laboratory density.

D. Place sand for leveling course and screed to a thickness of 1 to 25 to 38 mm. taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

E. Treat leveling base with soil sterilizer to prohibit growth of grass and weeds.

F. Set pavers with a minimum joint width of 1.5 mm and a maximum of 3 mm, being careful not to disturb leveling base. Use string lines to keep straight lines.

G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of 16- to 22-kN compaction force at 80 to 90 Hz. Perform at least 3 passes across paving with vibrator.

H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

Sprinkle sand over surface and sweep into joints. Recover joints with additional sand until firm joints are achieved. Remove excess sands. Set interlocking blocks at the panel selected. Where indicated on Drawings, maintain sloping finished surfaces to drain surface water.
Use only concrete saws to cut units and produce pieces of special dimensions as required.
Full height of joints shall be filled with clean sand.
Clean sidewalks and roadways from any remaining material.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 02520

PORTLAND CEMENT CONCRETE PAVING

1.1 GENERAL

A. Submittals: Submit the following:

1. Product data for reinforcement, accessories, admixtures, joint systems, curing compounds, and dry-shake color materials.
2. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
3. Laboratory test reports for evaluation of concrete materials and mix design tests.
4. Material certificates, signed by concrete manufacturer and Contractor, certifying that each concrete material complies with or exceeds requirements, may be submitted in lieu of material laboratory testing when acceptable to Architect.

B. Quality Assurance: Comply with provisions of ACI 301, "Specifications for Structural Concrete for Buildings," ACI 318, "Building Code Requirements for Reinforced Concrete," and CRSI "Manual of Standard Practice," except where more stringent requirements are indicated.

1. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
2. Concrete Testing Service: Engage a qualified independent testing agency to perform materials evaluation testing and to design concrete mixes.

1.2 PRODUCTS

A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves of a 100-foot or less radius.

B. Reinforcing Materials: As follows:

1. Deformed Reinforcing Bars: ASTM A 615, Grade 60, unless otherwise indicated.
2. Welded Steel Wire Fabric: ASTM A 185, flat sheets, not rolls.
3. Plain, Cold-Drawn Steel Wire: ASTM A 82.

C. Concrete Materials: As follows:

1. Portland Cement: ASTM C 150, Type 1.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Fly Ash: ASTM C 618, Type F.

3. Aggregates: ASTM C 33, Class 4, except aggregates of proven durability

may be used when acceptable to Architect.

4. Water: Potable.

5. Fiber Reinforcement: ASTM C 1116, Type III.

D. Admixtures: Provide admixtures that are compatible with one another and do not contain more than 0.1 percent chloride ions.

1. Air-Entraining Admixture: ASTM C 260.

2. Water-Reducing Admixture: ASTM C 494, Type A.

3. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

5. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

E. Curing Materials: As follows:

1. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

2. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

3. Moisture-Retaining Cover: Waterproof paper, polyethylene film, or white burlap-polyethylene sheet complying with ASTM C 171.

4. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A or B, wax free.

5. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B.

6. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.

F. Related Materials: As follows:

1. Nonslip Aggregate: Factory-produced, rustproof, nonglazing, fused aluminum oxide granules or crushed emery, unaffected by freezing, moisture, and cleaning materials.

2. Dry-Shake Color Hardener: Packaged dry combination of materials consisting of Portland cement, graded quartz aggregate, nonfading mineral-oxide coloring pigments, and plasticizing admixture. Color as selected by Architect.

3. Traffic Paint: Alkyd-resin ready-mixed, complying with AASHTO M 248, Type S. Color as selected by Architect.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Mix Design: Comply with mix design procedures specified in ACI 301 and proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:

1. Compressive Strength: 3500 psi at 28 days.
2. Water-Cement Ratio: 0.45 maximum at point of placement.
3. Slump Limit: 3 inches at point of placement.
4. Air Content: 5.5 to 7.0 percent.

H. Fiber Reinforcement: Add to mix at rate recommended by manufacturer.

I. Site Mixing: Use drum-type batch machine mixer, mixing not less than 1-1/2 minutes for 1 cu. yd. or smaller capacity. Increase mixing time at least 15 seconds for each additional cu. yd.

J. Ready-Mixed Concrete: Comply with requirements and ASTM C 94.

1.3 EXECUTION

A. Surface Preparation: Proof-roll prepared subbase and remove loose material from surface.

B. Forms: Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations.

C. Reinforcement: Accurately position and support reinforcement, and secure against displacement. Set wire ties with ends directed into concrete.

1. Install welded wire fabric in lengths as long as practicable; lap at least one full mesh and lace splices with wire.

D. Joints: Locate and install contraction, construction, isolation, and expansion joints as indicated or required.

E. Concrete Placement: Comply with ACI 304 for measuring, mixing, transporting, and placing concrete. Place concrete in a continuous operation within planned joints or sections.

1. Moisten subbase when required to provide a uniform dampened condition at time concrete is placed.
2. Consolidate placed concrete according to ACI 309R using mechanical vibrating equipment supplemented with hand rodding and tamping.
3. Screed and darby or bull-float the surface before excess moisture or bleed water appears on the surface.
    a. 4.Protect concrete from cold or hot weather during mixing, placing, and curing as follows.
    b. a. In cold weather, comply with ACI 306R.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

c. In hot weather, comply with ACI 305R.

F. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across concrete, perpendicular to line of traffic, to provide a uniform gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across concrete surface, perpendicular to line of traffic, to provide a uniform fine line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

G. Final Tooling: Tool edges and joints formed in fresh concrete with a jointing tool to a radius of 3/8 inch. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.

H. Nonslip Aggregate Finish: Apply nonslip aggregate finish to float-finished paving surface. Uniformly spread 25 lb of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.

1. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.

I. Dry-Shake Color Finish: Apply dry-shake material following first floating operation at rate of 100 lb per 100 sq. ft., unless a greater amount is recommended by the manufacturer.

1. Uniformly apply 2/3 of the material over the concrete surface with a mechanical spreader, and embed by float finishing. Uniformly distribute remainder of the material to ensure uniform color, and embed by floating.
2. Apply a light hand-trowel finish followed by a broom finish to concrete. Apply curing compound recommended by the dry-shake material manufacturer immediately after the final finishing.

J. Protection: In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control film. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

K. Curing: Begin curing after finishing concrete but not before free water has disappeared from exposed surfaces.

1. Moisture-cure concrete by water ponding, continuous fog spraying,

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

continuously wetted absorptive cover, or by moisture-retaining-cover curing. Keep concrete continuously moist for not less than 7 days.

2. Apply membrane-forming curing compound to concrete as soon as final finishing operations are complete. Apply uniformly according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

L. Traffic Paint: Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

M. Field Quality Control: Employ a qualified independent testing and inspection agency to sample concrete, perform tests, and submit test reports during concrete placement as follows:

N. Field Quality Control: The Owner will employ a testing agency to sample concrete, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
   a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
   b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.
   c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
   d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
   e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.

1. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

are used.

2. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
5. Test results will be reported in writing to Architect, ready-mix manufacturer and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.
6. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
7. Additional Tests: The testing agency will make additional tests of concrete when test results indicate slump, air entrainment, concrete strengths, or other characteristics have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

O. Remove and replace concrete paving that is broken, damaged, or defective, and does not meet the requirements of this Section.

P. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement.

Q. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A03005

CONCRETE TOPPINGS

PART 1 – GENERAL

1.1 SCOPE

This Section includes concrete screeds or concrete topping with positive slope as required as shown on drawings, particularly at driveways, walkways, steps, and landing, kitchen and coolers areas.

1.2 SYSTEM DESCRIPTION

A. Concrete screed, shall be laid to thickness as shown on drawing or as implied by the situation.

B. The minimum cube strength of concrete must be 30 MPa.

C. Concrete screed will act as a base to receive, any floor finishes such as, epoxy material, self leveling screed, or similar finishes items.

1.3 SU8MITTALS

A. Submit laying recommendations and procedures.

B. Provide a sample of concrete screed, for every type to be used.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.5 MOCK-UP

Lay sand cement screed for an area of 2 square meters, along with control joints at places as directed by Engineer. Coordinate work along with other disciplines, to have a final finish. Approved mock-up can remain as part of final work.

PART 2 – PRODUCTS

2.1 RELATED MATERIALS

A. Portland Cement: ASTM C 150, Type I and Type II

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.

1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.

2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Engineer.

3. Aggregates shall be hard, durable and free of material that reacts with cement or causes staining.

C. Water: Portable water as per ASTM Standards.

D. Ready mix Concrete: Comply with requirements of ASTM C 94.

E. Mesh reinforcement: shall confirm to ASTM A 185

2.2 RELATED MATERIALS

A. Epoxy Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with share 'A' hardness of 80 as per ASTM 22AO.

B. Epoxy Adhesive: As per ASTM C 881.

2.3 CONCRETE SCREED MIXES

Comply with ACI standard 211.1 or BS 8110-85. Assume responsibility for strength, consistency, water/cement ratio, and handling of concrete cement fine aggregate and various sizes of coarse aggregate shall be measured by weight.

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 25 percent solids content, minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. Examine substrates, for conditions affecting performance of screed. Proceed with application only after unsatisfactory conditions have been corrected.

B. Verify that base slabs are visibly dry and free of moisture. Test for capillary moisture by the plastic sheet method according to ASTM D 4263.

3.2 PREPARATION

A. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete. Mechanically abrade base slabs to produce a heavily scarified surface profile with an amplitude of 6mm.

1. Prepare and clean existing base slabs. Fill voids, cracks, and cavities in base slabs.

2. Mechanically remove contaminants from existing concrete that might impair bond of screed.

3. Saw cut existing contraction and construction joints to a depth of 1/2-inch (13 mm) and fill with epoxy joint filler.

B. Install joint-filler strips where screed abuts vertical surfaces, such as column pedestals, foundation walls, grade beams and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with screed surface, unless otherwise indicated.

2. Terminate full-width joint-filler strips 1/2 inch (13 mm) below screed surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.3 APPLICATION

A. Existing Concrete: Apply bonding agent, mixed according to manufacturer's written instructions, and scrub into dry base slabs to a thickness of (1.5 to 3 mm), without puddling. Place screed while adhesive is still tacky.

B. Completely cover the wet substrate surfaces with grout, applied with force and brushed in to assure full coverage.

C. Apply bond coat not less than 16 mm thick immediately after application of grout and bring to true lines, levels and profiles. Thoroughly compact and roughen the bond coat to form a key for the topcoat.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. Before the bond coat has set, apply the topcoat to such thickness that the total of the work measured from substrate to finished surface will be shown less only thickness of finish covering.

E. Place screed continuously in a single layer, tamping and consolidating to achieve tight contact with bonding surface. Do not permit cold joints or seams to develop within pour strip.

1. Screed surface with a straightedge and strike off to correct elevations.
2. Slope surfaces uniformly where indicated.
3. Begin initial floating using bull floats to form a uniform and open-textured surface plane free of humps or hollows.

F. Finishing: Consolidate surface with power-driven floats as soon as screed can support equipment and operator. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Hard Trowel Finish: After floating surface, apply first trowel finish and consolidate screed by power-driven trowel so no blisters develop. Continue troweling passes and re-straighten until surface is smooth and uniform in texture.

2. Finish and measure surface so gap at any point between screed surface and an unleveled freestanding 3-m- long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 6.4 mm.

3. Broom Finish: Apply a broom finish to driveways and ramp immediately after float finishing, slightly roughen trafficked surface by brooming with fiber bristle broom perpendicular to main traffic route. Co-ordinate required final finish with Engineer before application.

G. Construction Joints: Construct joints true to line with faces perpendicular to surface plane of screed, at locations indicated or as approved by Engineer.

1. Coat face of construction joint with epoxy adhesive at locations where screed is placed against hardened or partially hardened screed.

H. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades.

1. Cut (3mm) wide joints into concrete when cutting action will not tear, abrade, or othe1".Nise damage surface and before screed develops random contraction cracks.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Form joints in screed over contraction joints in base slabs, unless otherwise indicated.

3. Construct contraction joints for a depth equal to one-half of screed thickness, but not less than 13 mm deep.

3.4 PROTECTION AND CURING

A. General: Protect freshly placed screed from premature drying and excessive cold or hot temperatures.

B. Evaporation Retarder: Apply evaporation retarder to screed surfaces in hot, dry, or windy conditions before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying screed, but before float finishing.

C. Begin curing immediately after finishing screed. Cure by one or a combination of the following methods, according to screed manufacturer's written instructions:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with water or absorptive cover, water saturated and kept continuously wet. Cover screed surfaces and edges with 12-inch (300mm) lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing and sealing compound: Apply uniformly in two coats in continuous operations by power spray or roller according to manufacturer's written instructions.

3.5 JOINT FILLING

A. Prepare and clean contraction joints and install epoxy joint filler, according to manufacturer's written instructions, once screed has fully cured.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install epoxy joint filler full depth of contraction joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.6 REPAIRS

Repair and patch defective screed areas, including areas that have not bonded to concrete substrate.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.7 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 03355

SPECIAL CONCRETE FINISHES

1.1 GENERAL

A. Submit Samples of each type of special concrete finish, approximately 450 by 450 by 50 mm thick, matching quality of finishes, colors, and textures indicated.

B. Construct mockups for each special concrete finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect one week in advance of the dates and times when mockups will be constructed.
3. In presence of Architect, demonstrate the repair of a blemished or damaged portion of an exposed-face surface.
4. Obtain Architect's approval of mockups before start of final unit of Work.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups from Project site at the time of Substantial Completion. Approved mockups in an undisturbed condition may become part of the completed Work.

1.2 PRODUCTS

A. Concrete materials and mix proportions are specified in Division 3 Section "Cast-in-Place Concrete."

B. Use other materials and accessories for the Work, including surface retarders when required, to reproduce finish of design reference sample or mockup.

1.3 EXECUTION

A. Scrubbed Concrete Finish: Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed. Rinse scrubbed surfaces with clean water. Remove only enough concrete mortar from surfaces to match design reference sample or mockup.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. High-Pressure Water-Jet Finish: Apply finish in as continuous an operation as possible to concrete with a minimum compressive strength of 10.3 MPa. Coordinate with formwork construction, concrete placement schedule, and formwork removal to ensure that surfaces to be finished are treated at the same age for uniform results. Maintain a uniform surface texture to match design reference sample or mockup.

C. Abrasive-Blast Finish: Apply finish in as continuous an operation as possible to concrete 24 to 72 hours after casting when compressive strength ranges between 6.9 and 10.3 MPa. Coordinate with formwork construction, concrete placement schedule, and formwork removal to ensure that surfaces to be finished are treated at the same age for uniform results. Maintain a uniform surface texture to match design reference sample or mockup with a depth of cut, as follows:

1. Brush: Remove cement matrix to eliminate surface sheen and expose face of fine aggregate. No reveal.
2. Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color. Maximum reveal 1.5 mm.
3. Medium: Generally expose coarse aggregate with slight reveal. Maximum reveal 6 mm.
4. Heavy: Expose and reveal coarse aggregate to a maximum projection of one-third of its diameter; reveal 6 to 12 mm.

D. Bushhammer Finish: Apply finish in as continuous an operation as possible to concrete cured not less than 14 days. Maintain required depth of cut and general aggregate exposure and provide a uniform surface texture to match design reference sample or mockup.

E. Repair damaged special concrete-finished surfaces to match color, texture, and uniformity of surrounding surfaces and to match repairs to approved mockups.

F. Clean surfaces given special concrete finishes after treatment to remove stains, markings, dust, and debris.

G. Wash and rinse surfaces, without changing the appearance of concrete finishes, according to special concrete finish applicator's recommendations. Protect other Work from staining or damage due to cleaning operations.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 04200

UNIT MASONRY

1.1 GENERAL

A. Allowances: Furnish face brick under the Face Brick Allowance in Division 1 Section "Allowances."

B. Performance Requirements: Provide unit masonry that develops installed compressive strengths (f'm) at 28 days as indicated.

C. Submittals: In addition to product data, submit the following:

1. Shop drawings for reinforcing detailing fabrication, bending, and placement of reinforcing bars.
2. Samples for masonry units and mortar showing the full range of colors and textures available.
3. Material certificates for each different masonry product required.
4. Material test reports from a qualified independent testing agency for mortar, grout mixes, and masonry units.

D. Preconstruction Testing: Employ and pay a qualified independent testing agency to perform the following tests to establish compliance of proposed materials with specified requirements:

1. Clay Masonry Unit Test: For each different clay masonry unit indicated, test units per ASTM C 67.
2. Concrete Masonry Unit Test: For each different concrete masonry unit indicated, test units for strength, absorption, and moisture content per ASTM C 140.
3. Prism Test: For each type of wall construction indicated, test masonry prisms per ASTM E 447, Method B.
4. Test mortar properties per test methods of ASTM C 270.
5. Evaluate mortar composition and properties per ASTM C 780.
6. Test grout compressive strength per ASTM C 1019.

E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

F. Mockup: Construct sample wall panels approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness, including face

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

and back-up wythes as well as accessories, to verify selections made under sample submittals and to demonstrate aesthetic effects of materials and execution.

G. Cold-Weather Requirements: Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:

1. Cold-Weather Construction: Heat mixing water and sand to produce mortar and grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing. Heat masonry units to 40 deg F (4 deg C) if grouting.

2. Cold-Weather Protection: Cover masonry with insulating blankets or provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) for 48 hours after construction. Install wind breaks when wind velocity exceeds 15 mi./h (25 km/h).

H. Hot-Weather Requirements: Protect unit masonry work from excessive evaporation of water from mortar and grout. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.

1.2 PRODUCTS

A. Colors, Textures, and Patterns: Provide masonry units and mortar for exposed work matching Architect's samples or, if none, as selected by Architect from manufacturer's full range of colors, textures, and patterns.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Compressive Strength: 1900 psi (13.1 MPa) minimum average net-area compressive strength.
2. Compressive Strength: As required to produce concrete unit masonry construction of compressive strength indicated.
3. Weight Classification: Lightweight.
4. Weight Classification: Medium weight.
5. Weight Classification: Normal weight.
6. Provide Type I, moisture-controlled units.
7. Provide Type II, nonmoisture-controlled units.
8. Size: Manufactured to the actual dimensions of 3/8 inch (10 mm) less than nominal sizes indicated on Drawings:
9. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
10. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
11. Provide square-edged units for outside corners, except where indicated as bullnose.

C. Prefaced Concrete Masonry Units: Lightweight concrete units indicated

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

below with manufacturer's standard smooth resinous tile facing, complying with ASTM C 744:

1. For Units to Which Prefaced Surfaces Are Applied: ASTM C 90, Type I, hollow, moisture-controlled units. Comply with requirements for unfaced units except as otherwise indicated.

2. Size: Manufactured to dimensions indicated for unfaced units, but with prefaced surfaces having 1/16-inch- (1.5-mm-) thick returns of facing to create 1/4-inch- (6.5-mm-) wide mortar joints with modular coursing.

D. Concrete Building Brick: ASTM C 55 and as follows:

1. Compressive Strength: 3500 psi (24.1 MPa) minimum average net-area compressive strength.
2. Compressive Strength: As required to produce concrete unit masonry construction of compressive strength indicated.
3. Weight Classification: Lightweight.
4. Weight Classification: Medium weight.
5. Weight Classification: Normal weight.
6. Provide Type I, moisture-controlled units.
7. Provide Type II, nonmoisture-controlled units.

E. Brick, General: Provide shapes indicated and as follows:

1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.
2. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

F. Face Brick: ASTM C 216 and as follows:

1. Grade: SW.
2. Grade: MW or SW.
3. Compressive Strength: 3000 psi (20.7 MPa) minimum average net-area compressive strength.
4. Compressive Strength: 5500 psi (37.9 MPa) minimum average net-area compressive strength.
5. Compressive Strength: 8000 psi (55.2 MPa) minimum average net-area compressive strength.
6. Compressive Strength: As required to produce clay masonry construction

   of compressive strength indicated.
7. Initial Rate of Absorption: Between 5 and 20 g/30 sq. in. (g/194 sq. cm) per minute when tested per ASTM C 67.
8. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet (3 m).

9. Type: FBS.
10. Type: FBX.
11. Type: FBA.
12. Size: As indicated in BIA Technical Note 10B for the size designation below, within tolerances specified in ASTM C 216:
    a. Size: Standard.
    b. Size: Modular.
    c. Size: Engineer Modular.
    d. Size: Closure Modular.
    e. Size: Utility.

G. Building (Common) Brick: ASTM C 62 and as follows:

1. Grade: SW.
2. Grade: MW or SW.
3. Grade: NW, MW, or SW.
4. Compressive Strength: 3000 psi (20.7 MPa) minimum average net-area compressive strength.
5. Compressive Strength: 5500 psi (37.9 MPa) minimum average net-area compressive strength.
6. Compressive Strength: 8000 psi (55.2 MPa) minimum average net-area compressive strength.
7. Compressive Strength: As required to produce clay masonry construction of compressive strength indicated.
8. Size: Match size of face brick.

H. Hollow Brick: ASTM C 652 and as follows:

1. Grade: SW.
2. Grade: MW or SW.
3. Compressive Strength: 3000 psi (20.7 MPa) minimum average net-area compressive strength.
4. Compressive Strength: 5500 psi (37.9 MPa) minimum average net-area compressive strength.
5. Compressive Strength: 8000 psi (55.2 MPa) minimum average net-area compressive strength.
6. Compressive Strength: As required to produce clay masonry construction of compressive strength indicated.
7. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet (3 m).
    a) Type: HBS.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b) Type: HBX.
c) Type: HBA.
d) Type: HBB.
e) Class: H40V (void areas between 25 and 40 percent of gross cross-sectional area).
f) Class: H60V (void areas between 40 and 60 percent of gross cross-sectional area).

8. Size: Bricks manufactured to the following actual dimensions within tolerances specified in ASTM C 652:

a. 6-Inch Utility: 5-5/8 inches (143 mm) thick by 3-5/8 inches (92 mm) high by 11-5/8 inches (295 mm) long.

b. b. 8-Inch Utility: 7-5/8 inches (194 mm) thick by 3-5/8 inches (92 mm) high by 11-5/8 inches (295 mm) long.

I. Ceramic-Glazed Structural Clay Facing Tile: ASTM C 126 and as follows:

1. Grade S (Select).

2. Type I (single-faced units), where only one finished face is exposed when units are installed.

3. Sizes: 8W Series with actual face dimensions of 7-3/4 inches (197 mm) high by 15-3/4 inches (400 mm) long by thicknesses indicated.

4. Provide special shapes where required for corners, jambs, coved bases, sills, and other special conditions indicated.

a. Provide bullnose units for outside corners, unless otherwise indicated.

J. Mortar and Grout Materials: As follows:

1. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
2. Masonry Cement: ASTM C 91.
3. Mortar Cement: U.B.C. Standard No. 21-14.
4. For pigmented mortars, use premixed, colored-cement or cement-lime mix of formulation required to produce color indicated.
5. Hydrated Lime: ASTM C 207, Type S.
6. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.

a. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone, as required to match Architect's sample.

7. Aggregate for Grout: ASTM C 404.
8. Mortar Pigments: Iron oxides and chromium oxides, compounded

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

for use in mortar mixes and with a record of satisfactory performance in masonry mortars.

9. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

10. Water: Potable.

K. Steel Reinforcing Bars: Billet steel complying with ASTM A 615, Grade 60 (ASTM A 615M, Grade 400).

L. Deformed Reinforcing Wire: ASTM A 496, with ASTM A 153, Class B-2 zinc coating.

M. Joint Reinforcement: Provide joint reinforcement formed from galvanized carbon-steel wire, ASTM A 641 (ASTM A 641M), Class 1, for interior walls; and ASTM A 153, Class B-2, for exterior walls.

1. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet (3 m), with prefabricated corner and tee units, and complying with requirements indicated below:
    a. Wire Diameter for Side Rods: 0.1483 inch (3.8 mm).
    b. Wire Diameter for Side Rods: 0.1875 inch (4.8 mm).
    c. Wire Diameter for Cross Rods: 0.1483 inch (3.8 mm).
    d. Wire Diameter for Cross Rods: 0.1875 inch (4.8 mm).

2. For single-wythe masonry, provide ladder design with single pair of side rods:

3. For single-wythe masonry, provide truss design with single pair of side rods:

4. For multiwythe masonry, provide type as follows:

    a. Ladder design with 1 side rod for each face shell of hollow masonry units more than 4 inches (100 mm) in width, plus 1 side rod for each wythe of masonry 4 inches (100 mm) or less in width.
    b. Truss design with 1 side rod for each face shell of hollow masonry units more than 4 inches (100 mm) in width, plus 1 side rod for each wythe of masonry 4 inches (100 mm) or less in width.
    c. Tab design with single pair of side rods and rectangular box-type cross ties extended into the outer wythe.
    d. Adjustable (2-piece) tab design with single pair of side rods and rectangular cross ties and with separate adjustable ties engaging the cross ties and extended into the outer wythe.

N. Ties and Anchors, General: Provide ties and anchors that comply with the following requirements, unless otherwise indicated.

1. Wire: As follows:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating for exterior walls; and with ASTM A 641 (ASTM A 641M), Class 1 coating for interior walls.

2. Steel Sheet: As follows:

a. Galvanized Steel Sheet: ASTM A 366 (ASTM A 366M) (commercial quality) cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153, Class B-3, for sheet-metal ties and anchors in exterior walls; ASTM A 526, G 60 (ASTM A 526M, Z 180) (commercial quality), steel sheet zinc coated by hot-dip process on continuous lines prior to fabrication, for sheet-metal ties and anchors in interior walls.

O. Bent Wire Ties: Individual units prefabricated from bent wire to comply with requirements indicated.

P. Adjustable Anchors for Connecting to Structural Frame: Provide 2-piece assemblies as described below, wire diameter as indicated:

1. For Anchorage to Concrete: Dovetail sheet metal anchor section and triangular-shaped wire tie section sized to extend within 1 inch (25 mm) of masonry face.

2. For Anchorage to Steel Framing: Crimped 1/4-inch- (6.4-mm-) diameter wire anchor section for welding to steel and triangular-shaped wire tie section sized to extend within 1 inch (25 mm) of masonry face.

Q. Rigid Anchors: Steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins. Shop paint with 2 coats of coal-tar epoxy-polyamide paint.

R. Adjustable Masonry-Veneer Anchors: Provide 2-piece assemblies, for attachment over sheathing to metal studs, allowing vertical or horizontal differential movement between wall and wall framing parallel to plane of wall and capable of withstanding a 100-lbf (445-N) load in either tension or compression without deforming over, or developing play in excess of, 0.05 inch (1.3 mm).

1. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a triangular wire tie and a rib-stiffened, sheet-metal anchor section with screw holes top and bottom and with a raised, rib-stiffened strap stamped into center for connection of wire tie.

2. Seismic Masonry-Veneer Anchors: Units consisting of a rib-stiffened, sheet-metal anchor section with screw holes top and bottom and with a raised, rib-stiffened strap stamped into center for attachment of connector section that is designed to engage a continuous wire embedded in the veneer mortar joint.

S. Embedded Flashing Materials: As follows:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Sheet-Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Flashing and Sheet Metal" and below:

   a. Stainless Steel: 0.0156 inch (0.4 mm) thick.

   b. Copper: 10-oz./sq. ft. (3-kg/sq. m) weight or 0.0135 inch (0.3 mm) thick for fully concealed flashing, 16-oz./sq. ft. (5-kg/sq. m) weight or 0.0216 inch (0.5 mm) thick elsewhere.

3. Copper-Fabric Laminate: Copper sheet weighing 7 oz./sq. ft. (2 kg/sq. m), bonded with asphalt between 2 layers of glass-fiber cloth.

4. Rubberized Asphalt Sheet Flashing: Manufacturer's standard composite flashing product consisting of a pliable and highly adhesive rubberized asphalt compound, 26 mils (0.7 mm) thick, bonded completely and integrally to a high-density, cross-laminated polyethylene film, 4 mils (0.1 mm) thick, to produce an overall thickness of 30 mils (0.8 mm).

T. Miscellaneous Masonry Accessories: As follows:

1. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated.
2. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated, made from styrene-butadiene rubber complying with ASTM D 2000, Designation M2AA-805.

3. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

4. Weep Holes: Provide the following:
   a. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch (9-mm) outside diameter by 4 inches (100 mm) long.

   b. Wicking Material: Cotton sash cord, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity between wythes:

U. Insulation: As follows:

1. Loose-Granular Perlite Insulation: ASTM C 549, Type II or IV.
2. Extruded Polystyrene Board Insulation: ASTM C 578, Type IV.
3. Polyisocyanurate Board Insulation: FS HH-I-1972/1, Class 2.

V. Masonry Cleaners: As follows:

1. Job-Mixed Detergent Solution: Solution of 1/2-cup (0.14-L) dry measure tetrasodium polyphosphate and 1/2-cup (0.14-L) dry measure laundry detergent dissolved in 1 gal. (4 L) of water.

2. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

designed for removing mortar/grout stains, efflorescence, and other stains from masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

W. Mortar and Grout Mixes: Do not use admixtures unless otherwise indicated. Do not use calcium chloride in mortar or grout.

1. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:

2. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification, for job-mixed mortar; and ASTM C 1142 for ready-mixed mortar, of types indicated below:

3. Mortar for Unit Masonry: Comply with U.B.C. Standard No. 21-15, Proportion Specification, for Mortar Cement mortar of types indicated below:
   a. Limit cementitious materials in mortar to portland cement and lime.
   b. For masonry below grade, in contact with earth, reinforced masonry, and where indicated, use Type S.
   c. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.

4. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
   a. For portland cement-lime mortar, limit pigments to not more than 10 percent of cement content by weight.
   b. For masonry cement mortar, limit pigments to not more than 5 percent of cement content by weight.

5. Grout for Unit Masonry: Comply with ASTM C 476. Use grout of consistency to completely fill spaces intended to receive grout.

X. Source Quality Control: The Owner will employ and pay a qualified independent testing agency to perform the following tests:

1. Brick Tests: ASTM C 67, for each type and grade of brick indicated, except 5 bricks will be selected at random for each 100,000 units or fraction thereof installed.
2. Concrete Masonry Unit Tests: ASTM C 140, for each type of concrete masonry unit indicated.

1.3 EXECUTION

A. Cut masonry units with motor-driven saws. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

C. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. (g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.

D. Construction Tolerances: As follows:

1. Variation from Plumb: For vertical lines and surfaces do not exceed 1/4 inch in 10 feet (6 mm in 3 m), nor 3/8 inch in 20 feet (10 mm in 6 m), nor 1/2 inch in 40 feet (12 mm in 12 m) or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet (6 mm in 3 m) nor 1/2 inch (12 mm) maximum.

2. Variation from Level: Do not exceed 1/4 inch in 20 feet (6 mm in 6 m) nor 1/2 inch in 40 feet (12 mm in 12 m).

3. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet (12 mm in 6 m) nor 3/4 inch in 40 feet (19 mm in 12 m).

4. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch (6 mm) nor plus 1/2 inch (12 mm).

5. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch (3 mm).

E. Lay out walls in advance for accurate spacing of surface bond patterns and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

F. Bond Pattern for Exposed Masonry: Lay exposed masonry in the bond pattern indicated; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

G. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

H. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

J. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.

1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.

K. Provide continuous horizontal-joint reinforcement as indicated. Install with a minimum cover of 5/8 inch (16 mm) on exterior, 1/2 inch (13 mm) elsewhere. Lap a minimum of 6 inches (150 mm).

1. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections.

L. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide a 1-inch (25-mm) open space between masonry and structural member, unless otherwise indicated.

2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.

M. Anchor masonry veneers to metal studs with masonry-veneer anchors to comply with the following requirements:

1. Fasten each anchor section through sheathing to metal studs with 2 metal fasteners of type indicated.

2. Embed tie section in masonry joints. Provide not less than 2-inch (50-mm) air space between back of masonry veneer and face of sheathing.

N. Provide masonry lintels where shown. Provide precast lintels matching concrete masonry units in color, texture, and compressive strength and with reinforcement bars indicated or required to support loads indicated.

O. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

1. Extend flashing 4 inches (100 mm) at ends and turn up not less than 2 inches (50 mm) to form a pan.

P. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

Q. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

temporary loads that may be placed on them during construction.

R. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

1. Do not exceed the following pour heights for fine grout:
   a. For minimum widths of grout spaces of 3/4 inch (19 mm) or for minimum grout space of hollow unit cells of 1-1/2 by 2 inches (38 by 51 mm), pour height of 12 inches (305 mm).
   b. For minimum widths of grout spaces of 2 inches (51 mm), pour height of 60 inches (1524 mm).

2. Do not exceed the following pour heights for coarse grout:
   a. For minimum widths of grout spaces of 1-1/2 inches (38 mm), pour height of 12 inches (305 mm).
   b. For minimum widths of grout spaces of 2 inches (51 mm), pour height of 60 inches (1524 mm).
   c. For minimum widths of grout spaces of 2-1/2 inches (63 mm) or for minimum grout space of hollow unit cells of 3 by 3 inches (76 by 76 mm), pour height of 12 feet (3.6 m).

S. Field Quality Control: The Owner will employ and pay a qualified independent testing agency to perform the following tests during construction for each 5000 sq. ft. (460 sq. m) of wall area or portion thereof:

1. Mortar Properties: ASTM C 270.
2. Mortar Composition and Properties: ASTM C 780.
3. Grout: ASTM C 1019.
4. Prism-Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM E 447, Method B, and as follows: 1 set of prisms at 7 days and 1 set at 28 days.

T. Parging: Parge predampened masonry walls, where indicated, with Type S or Type N mortar applied in 2 uniform coats with a smooth, steel-trowel finish. Form a wash at top of parging and a cove at bottom. Damp cure parging for at least 24 hours.

U. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.

V. Final Cleaning: After mortar is thoroughly set and cured, remove mortar particles with nonmetallic scrapers, and clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.

2. Protect adjacent surfaces from contact with cleaner.

3. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

4. Clean brick by bucket and brush method described in BIA

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Technical Note No. 20 Revised, using the specified masonry cleaner.

5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain.

W. Masonry Waste Disposal: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A05004

ORNAMENTAL METALWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Particular Conditions and Specification Sections, apply to this Section.

1.2 SUMMARY

A. The Section includes

1. All ornamental works shown in the Scope of this Bid Package.

1.3 SUBMITTALS

A. Product Data: For each product used in cladding, including finishing materials and methods.

B. Shop Drawings: Show fabrication and installation of work. Include plans, elevations, component details, and attachments to other Work. Indicate materials and profiles of each ornamental metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

C. Samples for Verification: For each profile and pattern of fabricated metal and for each type of metal finish required, prepared on metal of same thickness indicated for the Work. If finishes involve normal color and texture variations, include sample sets, consisting of two or more units, showing the full range of variations expected.

1. Include 300mm square samples of sheets and fabric panels.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for installation of ornamental metal specified in this Section by the same firm that fabricated it. .

B. Fabricator Qualifications: A firm experienced in producing ornamental metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 2 - PRODUCTS

2.1 METALS

A. General

1. Metal Surfaces: For the fabrication of all metal work, use only materials, which are smooth and free of surface blemishes. Do not use materials, which have stains and discolorations including welds, which do not match material, or do not match the Engineer's samples in color and grain characteristics.

2. Surface Flatness and Edges: For exposed work, provide materials which have been cold-rolled, cold-finished, cold drawn, extruded, stretcher leveled, machine cut and otherwise produced to the highest commercial standard for flatness with edges and corners sharp and true to angle or curvature as required.

3. Alloys and Tempers: Wherever alloys or tempers of metals are not shown or specified, or are shown or specified only by series or other general designation, provide the specific alloy to match the Engineer's sample and other work in the same area, which is shown or specified to have the same finish. Use the temper or hardness, which will provide the greatest strength and durability, consistent with necessary forming, fabrication and finish processes.

4. All ornamental metal work shall be of consistent finish and color and should be a single alloy composition capable of being formed, extended rolled into shapes as indicated on the drawings.

B. Aluminum: Provide the forms and types shown and specified for each item of work. Provide in standard commercial tempers and hardness, as required for fabrication, strength and durability. Finish designation shown on the drawings are NAAMM standards:

1. Pre-finished Aluminum Screens:
   a. Extruded Bars : As per ASTM B 317 -92A & B221-92A
   b. Mold Castings : As per ASTM B 108-92A
   c. Structural Shapes : As per ASTM B 308/B-92A

C. Copper Alloys, Bronze & Brass

1. Extruded Shapes : ASTM B 455
2. Plates and Bars : ASTM B 36/B 36M
3. Seamless Tubes : ASTM B 135

D. Stainless Steel

1. Tubing : ASTM A 554
2. Pipe : ASTM A 312A
3. Bars & Shapes : ASTM A 376, Type 304
4. Wire Rope : ASTM 492

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Steel and Iron: All components shall be hot dip galvanized

1. Steel Tubing: Cold formed, ASTM A 500
2. Steel Plate, Shapes and Bars: ASTM A 492

2.2 MISCELLANEOUS MATERIALS

A. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners: Use fasteners of same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting ornamental metal components and for attaching them, to other work, unless otherwise indicated.

2.3 F A8RICATION, GENERAL

A. Form to required shapes and sizes, with true curves, lines, and angles. Provide components in sizes and profiles indicated, but not less than that needed to comply with requirements indicated for structural performance.

2.4 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of metal panel walls.

3.2 INSTALLATION, GENERAL

A. Provide anchorage devices and fasteners where necessary for securing work to in-place construction.

B. Set products accurately in location, alignment, and elevation; measured from established lines and levels. Provide temporary bracing or anchors in

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

formwork for items to be built into concrete, masonry, or similar construction.

C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of ornamental metal, restore finishes to eliminate any evidence of such corrective work.

D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

E. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.

1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude non uniform oxidation and discoloration.

3.3 PROTECTION

A. Protect finishes of ornamental metal from damage during construction period with temporary protective coverings approved by ornamental metal fabricator. Remove protective covering at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be re-finished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

3.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION- S05500

METAL FABRICATION

1.1 GENERAL

A. Submittals: In addition to Product Data, submit the following:

1. Shop Drawings detailing fabrication and erection.
2. Templates for anchor bolts.
3. Samples for each type of extruded nosing and tread.

1.2 PRODUCTS

A. General: Provide materials with smooth, flat surfaces without blemishes.

B. Ferrous Metals: As follows:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
3. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
4. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
5. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.
6. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless otherwise indicated.
7. Slotted Channel Framing: Cold-formed metal channels 1-5/8 by 1-5/8 inches (41 by 41 mm) with flange edges returned toward web and with 9/16-inch- (14.3-mm-) wide slotted holes in webs at 2 inches (51 mm) o.c. Channels made from galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.079-inch (2-mm) nominal thickness.
8. Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010) malleable iron or ASTM A 48, Class 30 (ASTM A 48M, Class 200) gray iron.
9. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Aluminum: As follows:

1. Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T6.

2. Rolled Tread Plate: ASTM B 632/B 632M, alloy 6061-T6.

D. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664 and compatible with finish paint systems indicated.

E. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.

F. Galvanizing Repair Paint: High-zinc-dust-content paint for regularizing welds in steel, complying with SSPC-Paint 20.

G. Fasteners: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

H. No shrink, Nonmetallic Grout: Factory-packaged, no staining, no corrosive, nongaseous grout complying with ASTM C 1107.

I. Concrete Fill: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

J. Fabrication, General: Use connections that maintain structural value of joined pieces. Shear and punch metals cleanly and accurately. Remove burrs.

1. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.

2. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes.

3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

K. Steel Ladders: Comply with ANSI A14.3 and as follows:

1. For elevator pit ladders, comply with ASME A17.1.

2. Side rails: Continuous, 1/2-by-2-1/2-inch (12-by-64-mm) steel flat bars, spaced 18 inches (457 mm) apart.

3. Bar Rungs: 3/4-inch- (19-mm-) diameter steel bars, spaced 12

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

inches (300 mm) o.c.

4. Fit rungs in centerline of side rails; plug-weld and grind smooth.

5. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.

6. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or riveting.

7. Galvanize exterior ladders and safety cages.

L. Loose Bearing and Leveling Plates: Provide for steel items bearing on masonry or concrete. Drill plates to receive anchor bolts.
1. Galvanize plates.

M. Loose Steel Lintels: Fabricate from shapes and to sizes indicated.
1. Galvanize lintels located in exterior walls.

N. Shelf Angles: Fabricate to sizes indicated and for attachment to framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c.
1. Galvanize shelf angles to be installed in exterior walls.

2. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

O. Miscellaneous Framing and Supports: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work. Fabricate from structural steel of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.
1. Where indicated to be cast into concrete or built into masonry, equip with integrally welded anchors at 24 inches (600 mm) o.c.

2. Fabricate steel girders for wood frame construction from continuous steel shapes. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches (600 mm) o.c.

3. Fabricate steel pipe columns for supporting wood frame construction with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness.

P. Prefabricated Building Columns: Assemblies consisting of load-bearing structural-steel members protected by insulating concrete fireproofing encased in an outer non-load-bearing steel shell and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-resistance ratings indicated.
1. Manufacturers: Subject to compliance with requirements, provide prefabricated building columns by one of the following:
   a. Black Rock Column, Inc.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Dean: George H. Dean Inc.
c. Firetrol Division, Dean Lally L.P.

Q. Miscellaneous Steel Trim: Fabricate units with continuously welded joints and smooth exposed edges. Miter corners and use concealed splices where possible. Provide cutouts, fittings, and anchorages; coordinate assembly and installation with other work.

R. Structural-Steel Door Frames: Fabricate from structural shapes and bars fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops secured with countersunk machine screws. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide steel strap anchors, with a minimum 6-inch (150-mm) embedment, welded to frame jambs no more than 12 inches (300 mm) from both bottom and head of frame, and not more than 30 inches (750 mm) apart.

2. Extend bottom of frames to floor with steel angle clips welded to frames.

3. Galvanize exterior frames.

S. Metal Floor Plate: As follows:

1. Fabricate from rolled-steel floor plate.

2. Fabricate from rolled-stainless-steel floor plate.

3. Fabricate from rolled-aluminum-alloy tread plate.

4. Fabricate from steel plate with abrasive granules rolled into surface.

5. Fabricate from steel plate with abrasive material metallically bonded to steel by a proprietary process.

   a. Products: Subject to compliance with requirements, provide one of the following:

6. Provide flush drop handles, made from same metal as plates, at each end of each removable section.

T. Cast Nosings, Treads, and Thresholds: Fabricate of metal indicated below, with an integral abrasive finish and with anchors for embedding in concrete.

1. Metal: Cast gray iron, Class 20.

2. Metal: Cast aluminum.

3. Metal: Cast bronze (leaded red or semi-red brass).

4. Metal: Cast nickel silver (leaded nickel bronze).

U. Extruded Nosings and Treads: Extruded-aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

an epoxy-resin binder.

1. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.

2. Provide solid-abrasive-type units without ribs.

3. Provide anchors for embedding units in concrete.

4. Drill for mechanical anchors and countersink. Locate not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c.

V. Pipe Guards: 3-by-3-by-5/16-inch (76-by-76-by-8-mm) steel angles, extending from floor to 42 inches (1100 mm) above floor, with 3/8-inch (10-mm) steel base plates for bolting to floor. Provide at least two vertical angles at each location. Connect tops of angles and anchor to wall or column with 1/4-by-2-inch (6-by-50-mm) steel strap braces welded to angles and bolted to wall.

W. Pipe Bollards: Fabricate from Schedule 40 steel pipe.

1. Cap bollards with 1/4-inch- (6-mm-) minimum steel plate.

2. Fabricate bollards with 3/8-inch- (10-mm-) thick steel base plates drilled at all four corners for 3/4-inch (19-mm) anchor bolts.

3. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch (6-mm) thick steel plate welded to bottom of sleeve.

X. Finish metal fabrications after assembly. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Shop prime ferrous-metal items not indicated to be galvanized.

1. Hot-dip galvanize items indicated to be galvanized to comply with ASTM A 123 or ASTM A 153/A 153M as applicable.

2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

3. Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

1.3 EXECUTION

A. Installation, General: Provide anchorage devices and fasteners for securing metal fabrications to in-place construction. Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.

1. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

2. Fit exposed connections accurately together. Weld connections, unless otherwise indicated. Do not weld, cut, or abrade galvanized

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

surfaces.

B. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack with nonshrink, nonmetallic grout.

C. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill space between bollard and sleeve solidly with nonshrink, nonmetallic grout.

D. Anchor bollards in place with concrete footings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

E. Anchor bollards to existing construction with postinstalled anchors and bolts. Provide four 3/4-inch (19-mm) anchors at each bollard, embedded at least 4 inches (100 mm) in existing concrete.

F. Fill bollards solidly with concrete, mounding top surface.

G. Touch up shop paint after erection. Clean field welds, bolted connections, and abraded areas and paint with the same material as used for shop painting.

H. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 05511

METAL STAIRS

1.1 GENERAL

A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved:

1. Treads and Platforms of Metal Stairs: Uniform load of 100 lbf/sq. ft. (4.79 kN/sq. m) or a concentrated load of 300 lbf (1.33 kN) on an area of 4 sq. in. (25.8 sq. cm), whichever produces the greater stress.

2. Stair Framing: Stresses resulting from loads specified above in addition to stresses resulting from railing system loads.

3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch (6.4 mm), whichever is less.

B. Structural Performance of Handrails and Railings: Comply with ASTM E 985, based on testing per ASTM E 894 and ASTM E 935.

C. Structural Performance of Handrails and Railings: Capable of withstanding structural loads required by ASCE 7 without exceeding the allowable design working stress of materials involved.

D. Structural Performance of Handrails and Railings: Capable of withstanding the following structural loads without exceeding the allowable design working stress of materials involved:

1. Top Rail of Guards: Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and a uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward. Concentrated and uniform loads need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and a uniform load of 50 lbf/ft. (730 N/m) applied in any direction. Concentrated and uniform loads need not be assumed to act concurrently.

3. Infill Area of Guards: Horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Load on infill area need not be assumed to act concurrently with loads on top rails.

E. Submittals: In addition to Product Data, submit the following:

1. Shop Drawings detailing fabrication and installation of metal stairs. Include structural analysis data signed and sealed by a qualified professional engineer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Samples of materials and finishes as requested by Architect.

F. Coordinate installation of metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including concrete inserts. Deliver such items to Project site in time for installation.

1.2 PRODUCTS

A. General: Provide materials with smooth, flat surfaces without blemishes.

B. Ferrous Metals: As follows:

22. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

23. Steel Tubing: ASTM A 500.

24. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless otherwise indicated.

25. Rolled-Steel Floor Plate: ASTM A 786/A 786M.

26. Wire Rod for Grating Crossbars: ASTM A 510 (ASTM A 510M).

27. Cold-Rolled Steel Sheet: ASTM A 366/A 366M, commercial quality.

28. Hot-Rolled Steel Sheet: ASTM A 569/A 569M, commercial quality.

C. Fasteners: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

D. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664 and compatible with finish paint systems indicated.

E. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

F. Concrete Fill: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

G. Precast Concrete Treads: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight concrete with a minimum 28-day compressive strength of 5000 psi (35 MPa) and a total air content of not less than 4 percent or more than 6 percent. Reinforce with galvanized, welded wire fabric, 2 by 2 inches (50 by 50 mm) by 0.062-inch- (1.6-mm-) diameter wire.

H. Fabrication, General: Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms.

1. Shear and punch metals cleanly and accurately. Remove sharp or rough

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

areas and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.

2. Weld connections using materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds and surfaces smooth and blended.

3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

I. Steel-Framed Stairs: Fabricate stringers of structural-steel channels, plates, or a combination of both. Construct platforms of structural-steel channel headers and miscellaneous framing members.

1. Fabricate and join so bolts are not exposed on finished surfaces.

2. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods to support landings from floor construction above. Locate hanger rods within stud space of shaft-wall construction.

3. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

J. Metal Risers, Subtread Pans, and Subplatforms: Form from steel sheet of thickness necessary to support indicated loads, but not less than 0.0677 inch (1.7 mm).

1. At Contractor's option, provide metal-pan subtreads filled with reinforced concrete during fabrication.

2. Provide epoxy-resin-filled treads, reinforced with glass fibers, with slip-resistant, abrasive surface.

K. Formed-Metal Risers, Treads, and Platforms: Form from steel sheet of thickness necessary to support indicated loads, but not less than 0.0966 inch (2.5 mm). Finish tread and platform surfaces with epoxy-bonded abrasive finish.

L. Steel Floor Plate Treads, Risers, and Platforms: Form from raised-pattern steel floor plate of thickness necessary to support indicated loads, but not less than 1/4 inch (6.4 mm). Form treads with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and weld treads to brackets.

M. Floor Grating Treads and Platforms: Fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual for Steel Stainless Steel, and Aluminum Gratings and Stair Treads."

1. Fabricate treads and platforms from welded steel grating with 1-1/4-by-3/16-inch (32-by-5-mm) bearing bars at 15/16 inch (24 mm) o.c. and crossbars at 4 inches (100 mm) o.c., NAAMM designation: W-15-4 (1-1/4 x 3/16) STEEL.

2. Fabricate with steel floor plate no sings.

3. Secure treads to stringers with bolts and weld grating to platform framing.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

N. Handrails and Railings: Comply with requirements indicated for design, dimensions, details, and member sizes, but not less than that needed to withstand indicated loads.

1. Configuration: 1-1/2-inch- (38-mm-) square top and bottom rails, 1-1/2-inch- (38-mm-) square posts, and 1/2-inch-(13-mm-) square pickets spaced not more than 4 inches (101 mm) clear.
2. Configuration: 1-5/8-inch (41-mm) OD top, bottom, and intermediate rails and 1-1/2-inch- (38-mm-) square posts. Space intermediate rails not more than 12 inches (305 mm) clear.
3. Interconnect members by butt-welding or welding with internal connectors.
4. Form changes in direction of handrails and rails by bending or by inserting prefabricated flush-elbow fittings.
5. Form curves by bending in jigs to produce uniform curvature without buckling, twisting, cracking, or otherwise deforming exposed surfaces.
6. Close exposed ends of handrail and railing members.
7. Provide wall returns at ends of wall-mounted handrails.
8. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for attaching to other work. For galvanized railings, provide galvanized fittings, brackets, and other components.
9. Connect railing posts to stair framing by direct welding.

O. Handrails and Railings: Comply with applicable requirements in Division 5 Section "Pipe and Tube Railings."

P. Finishes: Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal stairs after assembly.

1. Hot-dip galvanize items indicated to be galvanized. Comply with ASTM A 123 or ASTM A 153/A 153M as applicable.
2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC SP 3, "Power Tool Cleaning."
3. Apply shop primer to prepared surfaces. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

1.3 EXECUTION

A. Installation, General: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, and free from rack.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded. Do not weld, cut, or abrade surfaces of galvanized units that are for bolted or screwed field connections.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Install recast treads with adhesive supplied by manufacturer.

D. Attach handrails to wall with wall brackets.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

2. Use type of bracket with predrilled hole for exposed bolt anchorage.

E. Touch up shop paint after erection. Clean field welds, bolted connections, and abraded areas and paint with the same material as used for shop painting.

F. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 05521

PIPE AND TUBE RAILINGS

1.1 GENERAL

A. Structural Performance of Handrails and Railings: Comply with ASTM E 985, based on testing per ASTM E 894 and ASTM E 935.

B. Structural Performance of Handrails and Railings: Capable of withstanding structural loads required by ASCE 7 without exceeding allowable design working stresses of materials involved.

C. Structural Performance of Handrails and Railings: Capable of withstanding the following structural loads without exceeding allowable design working stresses of materials involved:

1. Top Rail of Guards: Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward. Concentrated and uniform loads need not be assumed to act concurrently.

2. Handrails Not Serving As Top Rails: Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and uniform load of 50 lbf/ft. (730 N/m) applied in any direction. Concentrated and uniform loads need not be assumed to act concurrently.

3. Infill Area of Guards: Horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Load on infill need not be assumed to act concurrently with loads on top rails.

D. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

E. Submittals: In addition to Product Data, submit the following:

1. Shop Drawings showing railing layout and details, with structural computations.

2. Samples for each type of exposed finish required.

3. Test reports from an independent testing agency indicating handrails and railings comply with ASTM E 985.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Aluminum Pipe and Tube Railings:

   a. Pakistan Cables.
   b. Crudesons.
   c. Lucky Aluminum.
   d. Japan Metal.

2. Stainless-Steel Pipe and Tube Railings:

   Imported

3. Steel Pipe and Tube Railings:

   Contractor to submit the sample for approval

B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for use and finish indicated, and with not less than the strength and durability of the alloy and temper designated below.

1. Extruded Bar and Tube: ASTM B 221 (ASTM B 221M), alloy 6063-T5/T52.
2. Extruded Structural Pipe and Tube: ASTM B 429, alloy 6063-T6.
3. Drawn Seamless Tube: ASTM B 210 (ASTM B 210M), alloy 6063-T832.
4. Plate and Sheet: ASTM B 209 (ASTM B 209M), alloy 6061-T6.
5. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), alloy 6061-T6.
6. Castings: ASTM B 26/B 26M, alloy A356-T6.

C. Stainless Steel: Grade or type designated below:

1. Tubing: ASTM A 554, Grade MT 304.
2. Pipe: ASTM A 312/A 312M, Grade TP 304.
3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
4. Plate: ASTM A 666, Type 304.
5. Tubing: ASTM A 554, Grade MT 316L.
6. Pipe: ASTM A 312/A 312M, Grade TP 316L.
7. Castings: ASTM A 743/A 743M, Grade CF 8M or CF 3M.
8. Plate: ASTM A 666, Type 316L.

D. Steel and Iron: Provide the form indicated, complying with the following:

1. Steel Pipe: ASTM A 53, Type F or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.

   a. Black finish, unless otherwise indicated.
   b. Galvanized finish for exterior installations and where indicated.

2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. ron Castings: Gray iron complying with ASTM A 48, Class 30 (ASTM A 48M, Class 200).

E. Brackets, Flanges, and Anchors: Cast or formed metal of same material and finish as supported rails.

F. Welding Electrodes and Filler Metal: Provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

G. Fasteners: Same basic metal as fastened metal; concealed unless otherwise indicated or unavoidable and standard with systems indicated.

H. Anchors: Fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined per ASTM E 488.

I. Shop Primers: Provide primers to comply with applicable requirements in Division 9 Section "Painting."

J. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; with good resistance to corrosion; and compatible with finish paint systems indicated.

K. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

L. Grout and Anchoring Cement: Premixed, nonshrink, nonmetallic grout complying with ASTM C 1107 or erosion-resistant, nonshrink, anchoring cement; recommended by manufacturer for use indicated.

M. Fabrication, General: Fabricate to design, dimensions, and details indicated, but not less than that required to support structural loads.

1. Form changes in direction of railing members as follows:
    a. By bending.
    b. By mitering.
    c. By inserting prefabricated flush-elbow fittings.
    d. By any method indicated above, applicable to change in direction involved.

2. Form curves by bending in jigs to produce uniform curvature without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

3. Welded Connections: Connect handrail and railing members by welding. Cope and weld or use welded-in fittings. Weld connections continuously.

4. Nonwelded Connections: Connect handrail and railing members with

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

concealed mechanical fasteners and fittings.

a. Fabricate splice joints for field connection using an epoxy structural adhesive.

1. Welded Connections for Aluminum Pipe: Connect handrail and railing members with concealed internal welds, using manufacturer's standard system of sleeve and socket fittings.

2. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to connect handrails and railings to other work.

a. For galvanized handrails and railings, provide galvanized brackets, flanges, fittings, and anchors.

1. Close exposed ends of handrail and railing members with prefabricated end fittings.

2. Provide wall returns at ends of wall-mounted handrails.

N. Mechanical Finish: AA-M12, mill finish.

O. Class I, Clear Anodic Finish: AA-M12C22A41 complying with AAMA 607.1.

P. Class I, Color Anodic Finish: AA-M12C22A42/A44 complying with AAMA 606.1 or AAMA 608.1.

Q. 180-Grit Polished Finish: Oil-ground, uniform, textured finish.

R. 320-Grit Polished Finish: Oil-ground, uniform, smooth finish.

S. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123.

T. Shop-Primed Galvanized Finish: Hot-dip galvanize after fabrication to comply with

U. ASTM A 123, clean, treat with metallic-phosphate process, and apply primer.

V. Shop-Primed Steel Finish: Prepare to comply with SSPC-SP 7, "Brush-off Blast Cleaning" and apply primer.

1.3 EXECUTION

A. Installation, General: Perform cutting, drilling, and fitting required to install handrails and railings. Set units accurately in location, alignment, and elevation.

1. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

B. Anchor posts in concrete by inserting into preset steel pipe sleeves and grouting annular space.

C. Anchor posts in concrete by inserting into formed or core-drilled holes and grouting annular space.

D. Anchor posts to metal surfaces with oval flanges.

E. Anchor railing ends into concrete and masonry with round flanges connected with postinstalled anchors and bolts.

F. Attach handrails to wall with wall brackets.

1. For wood stud partitions, use hanger or lag bolts set into wood backing between studs.

2. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs or fasten to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

G. Touchup Painting: Clean field welds, bolted connections, and abraded areas and paint with same material used for shop painting.

H. Galvanizing Repair: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A05530

GRATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Particular Conditions and other Specification Sections, apply to this Section.

1.2 SCOPE

This Section includes the following:
- Metal bar gratings.
- Heavy-duty metal bar gratings.
- Metal frames and supports for gratings.

Extent of metal gratings is shown on drawings.

1.3 RELATED SECTIONS

The following sections include requirements which relate to structural general specifications.

1.4 REFERENCE STANDARDS

Works shall be performed in strict accordance with the stipulations of the British Standard Specifications (BS), the American Society for Testing and Materials (ASTM) or other approved International Standards and Sound Practice.

BRITISH STANDARD SPECIFICATIONS (BS) NO.

BS 641 - Dimensions of small rivets for general purposes.
BS 693 - General requirements for oxy-acetylene welding of mild steel.
BS 729 - Hot-Dip Galvanized Coatings on Iron and Steel Articles.
BS 2981- Hot Dip Galvanizing

AMERICAN SOCIETY FOR TESTING AND MATERIALS ASTM NO.

A36 - Specifications for Carbon Structural Steel
A123 - Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A570 - Specifications for Steel, Sheet and Strips, Carbon, Hot Rolled, Structural Quality.

1.5 PERFORMANCE REQUIREMENTS

1.5.1 Structural Performance: Provide gratings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials involved, including anchors and connections:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.5.2 For Light Weight: Floors capable of withstanding a uniform load of 200 kg/m2 or a concentrated load of 150 kg, whichever produces the greater stress.

1.5.3 For Heavy Weight: Floors capable of withstanding a uniform load of 500 kg/m2 or a concentrated load of 400 kg, whichever produces the greater stress. Limit deflection to L/360 or 6.0 mm, whichever is less.

1.6 SUBMITTALS

Submit the following in accordance with Conditions of the Contract and Division-1 Specification Sections.

1.6.1 Product Data

Provide product data for the following:

- Formed metal plank gratings.
- Clips and anchorage devices for gratings.
- Paint products.

1.6.2 Shop Drawings: Show fabrication and installation details for gratings. Include plans, elevations, sections, and details of connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

For installed products indicated to comply with design loads, include structural analysis data signed by the engineer responsible for their preparation.

1.6.3 Samples: Submit 2 sets 150 mm long of representative samples of materials and finished
Products, tread, wearing surfaces, railing components and as may be requested by Engineer.

1.7 QUALITY ASSURANCE

1.7.1 Fabricator Qualifications: A firm experienced in producing gratings similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

1.7.2 Welding: Certify that each welder has satisfactorily passed qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.8 PROJECT CONDITIONS

1.8.1 Field Measurements: Where gratings are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.8.2 Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating gratings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.9 COORDINATION

Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work shall be manufacturers with good previous experience and approved by Engineer.

2.2 MATERIALS

Steel gratings shall be constructed in mild steel, heavily galvanized after fabrication.

Ferrous Metals: Materials shall be fiat, smooth, and free from surface blemishes including pitting, seam marks, roller marks and roughness.

- Steel Plates, Shapes, and Bars: ASTM A 36/A
- Wire Rod for Grating Crossbars: ASTM A 510.
- Uncoated Steel Sheet: ASTM A 570.
- Welding Rods and Bare Electrodes: Select according to metal alloy to be welded.

2.3 PAINT

2.3.1 Shoo Primer for Ferrous Metal: Fast-curing, lead and chromate-free, universal modified-alkyd primer, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field applied topcoats despite prolonged exposure.

2.3.2 Bituminous Paint: Cold applied asphalt mastic containing no asbestos fibers, or cold applied asphalt emulsion.

2.4 FASTENERS

Shall be of same materials and finish as supported rails.

Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating where built into exterior walls. Select fasteners for type, grade, and class required.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.4.1 Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, with hex nuts, and where indicated, flat washers.

2.4.2 Plain Washers: Round, carbon steel.

2.4.3 Lock Washers: Helical, spring type, carbon steel.

2.4.4 Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified testing agency.

Material: Carbon steel components zinc plated.

2.5 FABRICATION

Fabricate steel gratings for locations shown with dimensions, spacing and anchorage as indicated on Drawings.

2.5.1 Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installations.

Form from new materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

Shear and punch metals cleanly and accurately. Remove burrs.

Ease exposed edges to a radius of approximately 1 mm, unless otherwise indicated.

Fit exposed connections accurately together to form hairline joints.

Allow for thermal movement resulting from maximum change in ambient temperature in the fabrication and installation to prevent buckling, opening of joints and overstressing of welds and fasteners.

2.5.2 Welding: Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Weld corners and seams continuously, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

Remove sharp and rough areas on exposed traffic surface.

2.5.3 Anchorages: Provide for anchorage of type indicated, coordinate with supporting structure. Fabricate and space anchoring devices to secure

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

gratings, frames, and supports rigidly in place and to support indicated loads.

2.5.4 Metal Bar Gratings: Fabricate welded or riveted 'steel gratings as follows:

Grating Mark: With bearing bars not less than (25 x 10 mm) bearing bars at 25 mm o.c., and crossbars 25 x 12 mm at 100 mm o.c. or with bearing bar size not less than that required to comply with structural performance requirements.

Fabricate welded, heavy-duty steel gratings as follows: 50 x 12 mm bearing bars at 30 mm o.C., and crossbars 50 x 16 mm at 100 mm o.c.

2.5.5 Traffic Surface for Steel Bar Gratings: As follows:

- Plain
- Serrated
- Applied abrasive finish consisting of aluminum oxide aggregate in an epoxy-resin adhesive.

2.5.6 Steel Finish: Shop primer applied according to manufacturer's standard practice.

2.5.7 Fabricate Removable Grating Sections with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.

Provide not less than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.

For non-heavy duty provide not less than four saddle clips for each grating section composed of rectangular bearing bars 4.8 mm or less in thickness and spaced 24 mm or more o.c., with each clip designed and fabricated to fit over two bearing bars, or provide not less than four weld lugs for each grating section composed of rectangular bearing bars 4.8 mm or less in thickness and spaced less than 24 mm o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.

Furnish threaded bolts with nuts and washers for securing grating to supports.

Furnish self-drilling fasteners with washers for securing grating to supports.

Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.

Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Edge-band opening in grating that interrupts four or more bearing bars with bars of the same size and material as bearing bars.

Do not notch bearing bars at supports to maintain elevations.

Where gratings are pierced by pipes, ducts, and structural members, cut openings neatly and accurately to size and weld a strap collar not less than 6 mm thick to the cut ends. Divide panels into sections only to the extent required for installation where grating platforms and runways are to be placed around previously installed pipe, ducts, and structural members.

2.6 GRATING FRAMES AND SUPPORTS

Steel Frames and Supports: Fabricate from structural steel shapes, plates, and bars of welded construction to sized, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

Fix steel frame to concrete or floor according to location and details.

Equip units with integrally welded necessary anchors for casting into concrete or building into masonry for securing frame in place.

Unless otherwise indicated, space anchors 600 mm o.c. and provide minimum anchor units in the form of steel straps 32 mm wide by 6 mm thick by 200 mm long.

Galvanize frames and supports in the following locations:
- Exterior
- Interior, where indicated

2.7 FINISHES

Finish gratings frames and supports after assembly.

Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with ASTM A 123.

Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces. Apply shop primer to uncoated surfaces of gratings, frames, and supports, except those with galvanized finishes and those to be embedded in concrete, of masonry, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL

3.1.1 Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in locations, alignment, and elevation, measured from established lines and levels and free from rack.
Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are of bolted or screwed field connections.

3.1.2 Field Welding: Comply with the following requirements:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

3.2 INSTALLING METAL BAR GRATINGS

Install gratings to comply with recommendations that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

Attach removable units to supporting members with type and size of clips and fasteners indicated, or if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

Attach non-removable units to supporting members by welding where both materials are the same, otherwise, fasten by bolting as indicated above.

3.3 ADJUSTING AND CLEANING

Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting.

Apply by brush or spray to provide a minimum 0.05 mm dry film thickness.

Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing.

3.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 05720

ORNAMENTAL HANDRAILS AND RAILINGS

1.1 GENERAL

A. Structural Performance of Handrails and Railings: Comply with ASTM E 985, based on testing per ASTM E 894 and ASTM E 935.

B. Structural Performance of Handrails and Railings: Capable of withstanding structural loads required by ASCE 7 without exceeding allowable design working stresses of materials involved.

C. Structural Performance of Handrails and Railings: Capable of withstanding the following structural loads without exceeding allowable design working stresses of materials involved:

1. Rail of Guards: Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward. Concentrated and uniform loads need not be assumed to act concurrently.

2. Handrails Not Serving As Top Rails: Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and uniform load of 50 lbf/ft. (730 N/m) applied in any direction. Concentrated and uniform loads need not be assumed to act concurrently.

3. Infill Area of Guards: Horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Load on infill need not be assumed to act concurrently with loads on top rails.

4. Glass-Supported Handrails and Railings: Same loads indicated for top rails and infill areas of guards based on a safety factor of four, with each section of top rail supported by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.

D. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

E. Submittals: In addition to Product Data, submit the following:

1. Drawings showing railing layout and details, with structural computations.

2. Samples for each type of exposed finish required.

3. Test reports from an independent testing agency indicating

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

handrails and railings comply with ASTM E 985.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. [Insert Name of Manufacturer].

B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for use and finish indicated, and with not less than the strength and durability of the alloy and temper designated below.

1. Extruded Bar and Tube: ASTM B 221 (ASTM B 221M), alloy 6063-T5/T52.
2. Extruded Structural Pipe and Tube: ASTM B 429, alloy 6063-T6.
3. Drawn Seamless Tube: ASTM B 210 (ASTM B 210M), alloy 6063-T832.
4. Plate and Sheet: ASTM B 209 (ASTM B 209M), alloy 6061-T6.
5. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), alloy 6061-T6.
6. Castings: ASTM B 26/B 26M, alloy A356-T6.

C. Copper Alloys: As follows:

1. Extruded Shapes: ASTM B 455, alloy UNS No. C38500.
2. Seamless Pipe: ASTM B 43, alloy UNS No. C23000.
3. Seamless Tube: ASTM B 135 (ASTM B 135M), alloy UNS No. C23000.
4. Composition Bronze Castings: ASTM B 62, alloy UNS No. C83600.
5. Sand Castings: ASTM B 584, alloy UNS No. C86500.
6. Plates and Bars: ASTM B 36/B 36M, alloy UNS No. C28000.

D. Stainless Steel: Grade or type designated below:

1. Tubing: ASTM A 554, Grade MT 304.
2. Pipe: ASTM A 312/A 312M, Grade TP 304.
3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
4. Plate: ASTM A 666, Type 304.

E. Steel and Iron: As follows:

1. Steel Tubing: ASTM A 500, grade as required by structural loads.
2. Steel Rails and Bars: ASTM A 29/A 29M, Grade 1010.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Iron Castings: Malleable iron, ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).
5. Iron Castings: Gray iron, ASTM A 48, Class 30 (ASTM A 48M, Class 200).

F. Brackets, Flanges, and Anchors: Cast or formed metal of same material and finish as supported rails.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type 1, Quality q3, complying with surface and edge compression testing requirements of ASTM C 1048 and impact testing requirements of 16 CFR, Part 1201 for Category II materials.

1. Clear Glass: Class 1.
2. Tinted Glass: Class 2, manufacturer's standard tint color indicated below:
   a. Bronze.
   b. Gray.
3. Thickness: 6.0 mm.
4. Thickness: 12.0 mm.
5. Thickness: 19.0 mm.
6. Thickness: As indicated on Drawings.
7. Manufacturing Process: Horizontal (roller-hearth) process with roll-wave distortion parallel with bottom edge of glass.
8. Manufacturing Process: Vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option.

H. Plastic Glazing: Acrylic sheet complying with ASTM D 4802, Category A-1 or A-2, Finish 1, and as follows:

1. Color: Colorless (clear).
2. Color: Transparent bronze.
3. Color: Transparent gray.
4. Thickness: 12.0 mm.
5. Thickness: Match glass thickness.

I. Glazing Cement and Accessories: As recommended or supplied by railing manufacturer for bonding glass to metal subrails.

J. Wood Rails: Hardwood rails of species and profile indicated; bonded to aluminum subrail; with manufacturer's standard transparent finish.

K. Electrical Components: Fluorescent light fixtures and electrical components that comply with NFPA 70 and that are listed and labeled by UL.

L. Fasteners: Same basic metal as fastened metal; concealed unless otherwise indicated or unavoidable and standard with systems indicated.

M. Anchors: Fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined per ASTM E 488.

N. Shop Primers: Provide primers to comply with applicable requirements in Division 9 Section "Painting."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

O. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; with good resistance to corrosion; and compatible with finish paint systems indicated.

P. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

Q. Grout and Anchoring Cement: Premixed, no shrink, nonmetallic grout complying with ASTM C 1107 or erosion-resistant, no shrink anchoring cement; recommended by manufacturer for use indicated.

R. Fabrication, General: Fabricate to design, dimensions, and details indicated, but not less than that required to support structural loads.

1. Form changes in direction of railing members as follows:
   a. By bending.
   b. By mitering.
   c. By inserting prefabricated flush elbow fittings.
   d. By any method indicated above, applicable to change in direction involved.

2. Form curves by bending in jigs to produce uniform curvature without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

3. Welded Connections: Connect handrail and railing members by welding. Cope and weld or use welded-in fittings. Weld connections continuously.

4. Brazed Connections: Connect copper-alloy handrails and railings members by brazing. Braze corners and seams continuously.

5. No welded Connections: Connect handrail and railing members with concealed mechanical fasteners and fittings.
   a. Fabricate splice joints for field connection using epoxy structural adhesive.
   b. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to connect handrails and railings to other construction.

1. Close exposed ends of handrail and railing members with prefabricated end fittings.

2. Provide wall returns at ends of wall-mounted handrails.

3. Factory-bond glass to aluminum base and top-rail channels in railing manufacturer's plant using glazing cement.

S. Aluminum, Class I, Clear Anodic Finish: AA-M12C22A41 complying with

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

AAMA 607.1.

T. Aluminum, Class I, Color Anodic Finish: AA-M12C22A42/A44 complying with AAMA 606.1 or AAMA 608.1.

U. Copper-Alloy, Buffed Finish: CDA M21.

V. Copper-Alloy, Medium-Satin Finish: CDA M32.

W. Stainless-Steel, Bright, Directional Polish: No. 4 finish.

X. Stainless-Steel, Mirror like Reflective, No directional Polish: No. 8 finish.

Y. Shop-Primed Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123, clean, treat with metallic-phosphate process, and apply primer.

Z. Shop-Primed Steel Finish: Prepare per SSPC-SP 7, "Brush-off Blast Cleaning," and apply primer.

1.3 EXECUTION

A. Installation, General: Perform cutting, drilling, and fitting required to install handrails and railings. Set units accurately in location, alignment, and elevation.

1. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).

2. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Anchor posts in concrete by inserting into preset steel pipe sleeves and grouting annular space.

D. Anchor posts in concrete by inserting into formed or core-drilled holes and grouting annular space.

E. Anchor posts to metal surfaces with fittings designed for railing system and for this purpose.

F. Anchor rail ends to concrete and masonry with sleeves concealed within rail ends and anchored with post installed anchors and bolts.

G. Anchor rail ends to concrete and masonry with flanges connected to rail ends and anchored with post installed anchors and bolts.

H. Attach handrails to wall with wall brackets or end fittings.

1. For wood stud partitions, use hanger or lag bolts set into wood backing between studs.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs or fasten to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

I. Install glass-supported handrails and railings to comply with railing manufacturer's written instructions. Attach base channel to building structure, then insert and connect factory-fabricated and -assembled glass panels.

J. Install post-supported glass handrails and railings to comply with railing manufacturer's written instructions.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 05810

EXPANSION JOINT COVER ASSEMBLIES

1.1 GENERAL

A. Submittals: Submit the following according to Conditions of the Contract and Division

1. Product data including specifications, installation instructions, details, profiles, and finishes.

B. Fire-Resistance Ratings: Not less than the rating of adjacent construction.

1.2 PRODUCTS

A. Available Manufacturers: Subject to compliance with requirements.

1. [Insert name of Manufacturer].

B. Extruded Preformed Seals: Single- or multicultural electrometric profiles with or without continuous, longitudinal, and internal baffles.

C. Preformed Sealant: Electrometric sealant complying with ASTM C 920, Use T, factory-formed and -bonded to metal frames or anchor members.

D. Seismic Seals: Two single-layered electrometric profiles retained in frames at wide joints designed to withstand earthquake movement. At manufacturer's option, omit interior profile for interior application.

E. Fire Barriers: Tested in maximum joint width condition per ANSI/UL 263, NFPA 251, U.B.C. 43-1, or ASTM E 119.

F. Moisture Barrier: Continuous, flexible, vinyl moisture barrier under covers.

G. Fire-Rated Joint Covers: With fire barrier seals to provide fire-resistive rating not less than the rating of adjacent construction.

H. Metal Floor-to-Floor Joint Cover Assemblies: Provide continuous, extruded, metal frames of profile indicated.

1. Exposed Cover: One frame on each side of joint supporting floor plate and filler.
2. Flat Cover Plates: Extend flat plates to lap each side of joint.
3. Fixed Cover Plates: One side of the cover plate attached to frame permitting free movement on other side.
4. Self-Centering Cover Plates: Concealed centering device permitting free movement of cover plate on both sides.
5. Floor Cover Plate Wearing Surfaces: Recessed to receive full thickness of flooring material.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Floor-to-Wall Joints: Frame on floor side only, unless wall side frame required by manufacturer.

1. Angle Cover Plates: Attach angle cover plates to wall.

J. Wall, Ceiling, and Soffit Joint Cover Assemblies: Provide expansion joint cover assemblies in intersecting planes of same appearance.

1. Fixed Metal Cover Plates: Anchor frame on one side permitting free movement on other side.
2. Floating Metal Cover Plates: Cover plate secured to frames permitting free movement on both sides.
3. Self-Centering Cover Plates: Concealed centering device permitting cover plate free movement on both sides.
4. Flexible Filler: Secure the approved flexible filler between frames to compress and expand with movement.

K. Compression Seals: Preformed, electrometric extrusions having internal baffle system with lubricant and adhesive for installation.

L. Aluminum Finishes: Finish designations prefixed by AA.

1. Mill Finish: AA-M10 (unspecified mill finish).
2. Class II, Clear-Anodized Finish: AA-M12C22A31.
3. Class I, Clear-Anodized Finish: AA-M12C22A41.
4. Class II, Color-Anodized Finish: AA-M12C22A32/A34.
5. Class I, Color-Anodized Finish: AA-M12C22A42/A44.
   a. Color: Selected from within standard industry colors and color density range.
6. Baked Enamel Finish: AA-C12C42R1x. Comply with manufacturer's specifications for cleaning, conversion coating, and painting.
   a. Organic Coating: Thermosetting modified acrylic enamel.
   b. Color: Selected from manufacturer's standard colors.
7. High-Performance Organic Coating: AA-C12C42R1x.
   a. Fluoropolymer Two-Coat Coating System: Primer and fluoropolymer topcoat; 70 percent polyvinylidene fluoride resin. Comply with AAMA 605.2.
      1. Resin Manufacturers: Ausimont USA, Inc. (Hylar 5000) or Elf Atochem North America, Inc. (Kynar 500).
      2. Color and Gloss: Selected from manufacturer's standard choices for color and gloss.
      3. Factory-prime concealed metal surfaces that will be in contact with concrete and masonry surfaces when installed.

M. Natural Satin Bronze Finish: CDA Designation M32, mechanical finish, directional textured, medium satin.

N. Stainless Steel Finishes: Comply with NAAMM "Metal Finishes Manual."

1. Bright, Cold-Rolled Unpolished Finish: AISI No. 2B finish.
2. Bright, Directional Polish: AISI No. 3 finish.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

O. Factory Finish: Manufacturer's standard factory finish.

1.3 EXECUTION

A. Preparation: Comply with these specifications and manufacturer's instructions and recommendations including preparation of substrate, applying materials, and protecting installed units.

B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for anchoring to concrete or forming recesses into concrete for placement and grouting frames.

C. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required. Install in true alignment in relationship to established lines and levels. Allow adequate free movement for metal thermal expansion and contraction. Set floor covers flush with adjacent finished floor materials. Install wall, ceiling, roof, and soffit covers in continuous contact with adjacent surfaces.

D. Extruded Preformed Seals: Install seals to comply with manufacturer's instructions and with minimum number of end joints.

E. Electrometric Sealant Joint Assemblies: Seal end joints and transitions according to manufacturer's directions.

F. Seismic Seals: Install seals according to manufacturer's instructions.

G. Fire Barriers: Install fire barriers, including transitions and end joints according to manufacturer's instructions so that fire-rated construction is continuous.

H. Cleaning and Protection: Remove protective covering only after finish work in adjacent areas is complete. Clean exposed metal surfaces to comply with manufacturer's instructions.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A06001

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SCOPE

A. Furnish all labour, materials, tools and equipment, and perform all operations and services necessary for the complete installation of all the work of this section.

The work shall include but will not necessarily be limited to the following:

1. Framing carpentry rough hardware and accessory items.
2. Permanent and temporary bracing.
3. Roof curbs and fillets as required.
4. Grounds in openings.
5. Miscellaneous framing and sheathing.
6. Backing material for waterproofing and insulation at external walls.
7. Preservative treatment of wood.
8. Preservative treatment of marine timber decking.
9. Fire retardant treatment of wood.
9. Temporary and permanent grounds, blocking and supports required by other trades.
10. Wood grounds, blockings, nails, fasteners, connectors, furring and the like.
11. Blocking and backing for washroom accessories, including Employer supplied equipment, fixtures, mechanical and electrical equipment and other items as required including fastenings and hardware as shown or where required.
12. Provide wood or plywood backing at windows and doors as detailed and to wood base skirting.

1.2 SUBMITTALS

A. Product data for Miscellaneous Lumbers.

B. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:

1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. For fire retardant-treated wood products include certification by treating plant that treated material complies with specified standard and other requirements.
4. Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.
5. Warranty of chemical treatment manufacturer for each type of treatment.

1.3 REFERENCES

A. WOOD PRODUCTS

1. National Forest Products Association (USA) (Specifications for Wood Construction)
2. Western Wood Products Association (Western Lumber Grading Rules)
3. ASTM D-245 Methods of Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber.
4. ASTM D-4442 Test Methods for Moisture Content of Wood.
5. B.S. 4978 Timber Grades for Structural use.

B. WOOD PRESERVATIVES

American Wood Preservers Bureau (LP-22 Standards)

B.S. 4261 Glossary of terms relating to timber preservation.

C. FASTENERS AND SUPPORTS

1. American National Standards (ANSI) USA
   a. 8 18.2.1 Square and Hex 80lts and Screws. (ANSI/ASME 8 18.2.1)
   b. B 18.5 Round Head Bolts (ANSI/ASME B 18.5) c. B 18.6.1 Wood Screws (ANSI/ASME B 18.6.1)
2. ASTM D 1761 Methods of Testing Metal Fasteners in wood.
3. Federal Specifications (USA) FF N-105 Nails, Staples and Spikes.
4. British Standards
   a. BS 1202 Nails
   b. BS 1210 Wood screws
   c. BS 4190 Black hexagon bolts, screws and nuts.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

Lumber Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

A Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. Any species and grade that complies with the following requirements for species group as defined in Table 8.1a of N.F.P.A National Design Specification, for extreme fiber stress in bending "Fb" for single and repetitive members, and for modulus of elasticity "E":
   a. Group II species, "Fb" of 1200 psi for single member use and of 1400 psi for repetitive member use, and "E" of 1,600,000 psi.

2.2 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: "Standard" grade light-framing-size lumber of any species or board-size lumber as required. "No. 3 Common" or "Standard" grade boards per WCLIB or WWPA rules or "No.2 Boards" per SPIB rules.

E. TIMBER GENERALLY

1. Timber shall be well seasoned and free from decay, insect attack except pinhole borers, and knots wider than half of the width of the section.

F. SOFTWOOD

1. To be
   a. Deodar
   b. Oak

G. HARDWOOD

1. To be
   a. Redwood (Red Meranti)
   b. Golden Teak
   c. Teak

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

d. Sheesham
e. Pine

H. MOISTURE CONTENT

1. Timber shall be kiln dried to a maximum moisture content of 8% by weight.

2. Timber required to be treated with preservatives or fire retardant shall be seasoned and kiln dried before treatment, and re-dried after treatment.

2.3 PLYWOOD

Provide marine grade plywood. All plywood shall used on the job shall be made with exterior quality waterproof and non-staining glue.

2.4 FASTENERS

A. Nails, Wire, Brads, and Staples: ASTM F 1667.

B. Power Driven Fasteners.

C. Wood Screws: ANSI B18.6.1. D. Lag Bolts: ANSI 818.2.1.

D. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

E. Countersink nail heads on exposed carpentry work and fill holes.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drilled as required.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.2 WOOD GROUNDS, NAILERS AND BLOCKING

A. Install wood grounds. nailers and blocking where shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrates are required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install permanent grounds of dressed, pressvative treated, key-bevelled lumber not less than 1½ inches wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.3 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 06200

FINISH CARPENTRY

1.1 GENERAL

A. Submittals: In addition to Product Data, submit Samples for each finish and type of siding and paneling.

1.2 PRODUCTS

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

B. Softwood Plywood: Comply with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood."

C. Hardwood Plywood: Comply with HPVA HP-1, "Interim Voluntary Standard for Hardwood and Decorative Plywood."

D. Preservative Treatment: Comply with NWWDA I.S. 4 for exterior finish carpentry to receive water-repellent preservative treatment.

E. Fire-Retardant Treatment: Where indicated, use materials impregnated with fire-retardant chemicals per AWPA C20; exterior type or interior Type A as required.

F. Exterior Standing and Running Trim: Provide finished lumber and moldings complying with the following requirements:

1. Species and Grade: Smooth-textured, Clear All Heart redwood; RIS.
2. Species and Grade: Saw-textured, Clear Heart, western red cedar; NLGA, WCLIB, or WWPA.
3. Species and Grade: Smooth-textured, B & B, southern yellow pine; SPIB.

G. Primed Hardboard Trim: Provide trim made from high-temperature cured, high-resin, wood fiber composite; factory primed on face and 2 edges; and recommended by manufacturer for exterior use.

H. Interior Standing and Running Trim: Provide finished lumber and moldings complying with the following requirements:

1. Species and Grade: C Select, eastern white pine; NELMA or B & Btr. Select or Supreme, Idaho white, lodgepole, ponderosa, or sugar pine; WWPA.
2. Species and Cut: Rift-sawn, clear, kiln-dried red oak selected for compatible grain and color.

I. Wood Molding Patterns: Provide stock moldings made to patterns included in WMMPA WM 7 and graded under WMMPA WM 4.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Base: WM 623 (ogee base).
2. Base: WM 713 (ranch base).
3. Base: WM 753 (beaded-edge base).
4. Casing: WM 327 (clamshell casing).
5. Casing: WM 366 (featheredge casing).
6. Casing: WM 376 (beaded-edge casing).
7. Shoe Mold: Clear, kiln-dried red oak; WM 126, 1/2-by-3/4-inch (13-by-19-mm) quarter-round shoe.
8. Moldings for Transparent Finish: N-Grade.
9. Moldings for Painted Finish: P-Grade.

J. Shelving: 3/4-inch (19-mm) particleboard shelving with radiused and filled front edge.

K. Stairs and Railings: As follows:

1. Interior Stair Treads: 1-1/16-inch (27-mm), clear, kiln-dried, edge-glued, rift-sawn red oak stepping with half-round nosing.
2. Exterior Stair Treads: 1-1/4-inch (32-mm), kiln-dried, pressure-preservative-treated, southern yellow pine, B & B stepping with half-round nosing.
3. Interior Railings: Clear, kiln-dried, hard maple railing stock of pattern indicated, either solid or laminated.
4. Exterior Railings: Clear, kiln-dried, pressure-preservative-treated, southern yellow pine railing stock of pattern indicated.

L. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with applicable requirements of HPVA HP-1.

1. Face Veneer Species: Rotary-cut natural birch.
2. Face Veneer Species: Plain sliced red oak.
3. Face Veneer Species: Plain sliced brown ash.
4. Thickness: 1/4 inch (6.4 mm).
5. Thickness: 5/16 inch (7.9 mm).
6. Thickness: 5 mm.

M. Hardboard Paneling: Interior factory-finished hardboard paneling 1/4 inch (6.4 mm) thick complying with ANSI/AHA 135.5.

1. Finish: Class I.
2. Finish: Class II.
3. Surface-Burning Characteristics: Flame spread of 25 or less and smoke developed of 450 or less, per ASTM E 84.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

N. Board Paneling: Interior wood board paneling complying with WMMPA WM 9, pattern as indicated.

1. Species and Grade: Knotty No. 1, southern yellow pine.
2. Species and Grade: Knotty No. 1, eastern white, lodgepole, ponderosa, or sugar pine.
3. Species and Grade: Clear No. 1, western red cedar.

O. Lumber Siding: Kiln-dried lumber siding complying with DOC PS 20, in size and pattern indicated.

1. Species and Grade: Clear All Heart redwood; RIS.
2. Species and Grade: Clear Heart, western red cedar; NLGA, WCLIB, or WWPA.
3. Species and Grade: B & B, southern pine; SPIB.

P. Plywood Siding: Exterior-type, APA 303 series siding, 1/2-inch- (12.7-mm-) thick, medium-density overlay, V-grooves at 6 inches (152.4 mm) o.c.

Q. Plywood Siding: Exterior-type, APA 303 series siding, 1/2 inch (12.7 mm) thick, cedar faced, rough sawn, Texture 1-11; grooves 4 inches (101.6 mm) o.c.

R. Hardboard Siding: Primed hardboard, in panel sizes indicated, complying with ANSI/AHA A135.6, with panel manufacturer's standard exterior enamel primer.

1. Type: 1/2-inch- (12.7-mm-) thick-by-8-inch- (203-mm-) wide beaded-edge lap siding.
2. Type: 1/2-inch- (12.7-mm-) thick shiplap-edge panels, with grooves 5-1/2 inches (140 mm) o.c., simulating wood drop siding.
3. Type: 7/16-inch- (11-mm-) thick shiplap-edge panels, channel grooved with grooves 8 inches (203.2 mm) o.c.
4. Texture: Smooth.
5. Texture: Wood-grain textured.

S. Fasteners for Exterior Finish Carpentry: Provide nails of stainless steel, hot-dip galvanized steel, or no corroding aluminum.

1.3 EXECUTION

A. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours.

B. Prime and back prime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Division 9 Section "Painting."

C. Install finish carpentry plumb, level, true, and aligned with adjacent

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

materials. Use concealed shims where required for alignment. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.

D. Standing and Running Trim: Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Stagger joints in adjacent and related trim. Cope at returns and miter at corners.

E. Paneling: Install according to manufacturer's recommendations. Select and arrange units on each wall for best match of adjacent units where grain character or color variations are noticeable. Install with uniform tight joints between units.

F. Siding: Install siding and flashing according to manufacturer's recommendations. Do not allow nails to penetrate more than one thickness of siding, unless otherwise recommended by siding manufacturer. Seal joints at inside and outside corners and at trim locations.

G. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 06402

INTERIOR ARCHITECTURAL WOODWORK

1.1 GENERAL

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction prior to woodwork installation.

B. Rough carriages for stairs are a part of interior architectural woodwork. Platform framing and other rough framing associated with stair work are specified in Division 6 Section "Rough Carpentry."

C. Submittals: In addition to product data, submit the following:

1. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
2. Samples of lumber and panel products for each species and cut indicated for transparent finish, and each material indicated for opaque finish, with one-half of exposed surfaces finished.
3. Samples of laminate-clad panel products, for each type, color, pattern, and surface finish.
4. Samples of thermoset decorative-overlay surfaced panel products, for each type, color, pattern, and surface finish.
5. Samples of solid surfacing materials.

D. AWI Quality Standard: Comply with "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute.

E. WIC Quality Standard: Comply with "Manual of Millwork" of the Woodwork Institute of California.

F. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.2 PRODUCTS

A. Woodwork Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

B. Woodwork for Transparent Finish: Grade and species as follows:

1. Grade: Premium.
2. Grade: Custom.
3. Grade: Economy.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Wood Species: Red oak, rift cut.
5. Wood Species: Hickory, plain sawn/sliced.
6. Wood Species: African mahogany, quarter sawn/sliced.
7. Wood Species: Hard maple, plain sawn/sliced.
8. Wood Species: As indicated.

C. Woodwork for Opaque Finish: Grade and species as follows:

1. Grade: Premium.
2. Grade: Custom.
3. Grade: Economy.
4. Wood Species: Eastern white pine, sugar pine, Idaho white pine.
5. Wood Species: Any closed-grain hardwood listed in referenced woodworking standard.

D. Panel Products: As follows:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2.
3. Medium-Density Fiberboard: ANSI A208.2., made without formaldehyde.
4. Particleboard: ANSI A208.1, Grade M-2.
5. Particleboard: ANSI A208.1, Grade M-2 made with phenol-formaldehyde resins.
6. Softwood Plywood: PS 1.
7. Hardwood Plywood and Face Veneers: HPVA HP-1.
8. Formaldehyde Emission Level for Medium-Density Fiberboard: Comply with requirements of NPA 9.

E. High-Pressure Decorative Laminate: NEMA LD 3.

F. Thermoset Decorative Overlay: Decorative surface of thermally fused polyester or melamine-impregnated web, bonded to specified substrate and complying with ALA 1992.

G. Solid Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with the material and performance requirements of ANSI Z124.3, Type 5 or Type 6, without a precoated finish.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Avonite; Avonite, Inc.
   b. Corian; Dupont Polymers.
   c. Surell; Formica Corp.
   d. Fountainhead; Nevamar Corp.
   e. Swanstone; The Swan Corporation.
   f. Gibraltar; Ralph Wilson Plastics Co.

H. Fire-Retardant-Treated Materials: Where indicated, use materials pressure impregnated with Exterior or Interior Type A fire-retardant chemical to comply with AWPA C20. Kiln-dry material after treatment. Discard material that does not comply with referenced woodworking standard.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

I. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame spread of 25 or less and smoke developed of 25 or less per ASTM E 84.

J. Cabinet Hardware: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware."

1. Cabinet Hardware Schedule: Refer to schedule at end of this Section for cabinet hardware required for architectural cabinets.
2. Hardware Standard: Comply with BHMA A156.9 for items indicated by reference to BHMA numbers or referenced to this standard.
3. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA code number indicated.
   a. Dark, Oxidized, Satin Bronze, Oil-Rubbed, on Bronze Base: BHMA 613 and matching Architect's sample.
   b. Bright Brass: BHMA 605.
   c. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
   d. Satin Stainless Steel, Stainless-Steel Base: BHMA 630.
4. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of BHMA A156.9.

K. Clear Float Glass for Doors: ASTM C 1036, Type I, Class 1, Quality q3, 6 mm thick, unless otherwise indicated.

L. Clear, Tempered Float Glass for Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality q3; manufactured by horizontal (roller hearth) process, with exposed edges seamed before tempering, 6 mm thick, unless otherwise indicated.

M. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

N. Rough Carriages for Stairs: Comply with requirements of Division 6 Section "Rough Carpentry" for structural framing lumber. Kiln dry to less than 15 percent moisture content.

O. Fabrication, General: Complete fabrication, including assembly and finishing, before shipment to Project site to maximum extent possible. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Backout or groove backs of flat trim members, kerf backs of other wide, flat members, except for members with ends exposed in finished work.
2. Assemble casings in plant except where limitations of access to place of installation require field assembly.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Shop-cut openings, to maximum extent possible. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.
4. Install glass to comply with FGMA "Glazing Manual" For glass in wood frames, secure glass with removable stops.

P. Wood Cabinets (Casework) for Transparent Finish: As follows:

1. AWI Type of Cabinet Construction: Flush overlay.
2. AWI Type of Cabinet Construction: Reveal overlay.
3. AWI Type of Cabinet Construction: Reveal overlay on face frame.
4. AWI Type of Cabinet Construction: Flush inset.
5. AWI Type of Cabinet Construction: Flush inset with face frame.
6. WIC Construction Style: Style A Frameless.
7. WIC Construction Style: Style B Face Frame.
8. WIC Construction Type: Type I multiple self-supporting units rigidly joined together.
9. WIC Construction Type: Type II single-length sections to fit access openings.
10. WIC Door and Drawer Front Style: Flush overlay.
11. WIC Door and Drawer Front Style: Reveal overlay.
    a) Reveal Dimension: 1/2 inch (13 mm).
    b) WIC Door and Drawer Front Style: Lipped.
    c) WIC Door and Drawer Front Style: Flush.
    d) Grain Matching: Run and match grain vertically for drawer fronts, doors, and fixed panels.
    e) Grain Matching: Run and match grain horizontally for drawer fronts, doors, and fixed panels.
    f) Grain Matching: As indicated.
    g) Veneer Matching: Book, balance, and center match.
    h) Veneer Matching: Book and balance match.
    i) Veneer Matching: Slip and balance match.
    j) Veneer Matching: Slip and running match.
    k) Veneer Matching: Random match.
    l) Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers except where located directly under tops.

Q. Wood Cabinets (Casework) for Opaque Finish: As follows:

1. AWI Type of Cabinet Construction: Flush overlay.
2. AWI Type of Cabinet Construction: Reveal overlay.
3. AWI Type of Cabinet Construction: Reveal overlay on face frame.
4. AWI Type of Cabinet Construction: Flush inset.
5. AWI Type of Cabinet Construction: Flush inset with face frame.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

6. WIC Construction Style: Style A Frameless.
7. WIC Construction Style: Style B Face Frame.
8. WIC Construction Type: Type I multiple self-supporting units rigidly joined together.
9. WIC Construction Type: Type II single-length sections to fit access openings.
10. WIC Door and Drawer Front Style: Flush overlay.
11. WIC Door and Drawer Front Style: Reveal overlay.
12. Reveal Dimension: 1/2 inch (13 mm).
13. WIC Door and Drawer Front Style: Lipped.
14. WIC Door and Drawer Front Style: Flush.
15. Panel Product for Exposed Surfaces: Medium-density fiberboard.
16. Panel Product for Exposed Surfaces: Medium-density overlay.
17. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers except where located directly under tops.

R. Laminate-Clad Cabinets (Plastic-Covered Casework): As follows:

1. AWI Type of Cabinet Construction: Flush overlay.
2. AWI Type of Cabinet Construction: Reveal overlay.
3. AWI Type of Cabinet Construction: As indicated.
4. WIC Construction Style: Style A Frameless.
5. WIC Construction Style: Style B Face Frame.
6. WIC Construction Type: Type I multiple self-supporting units rigidly joined together.
7. WIC Construction Type: Type II single-length sections to fit access openings.
8. WIC Door and Drawer Front Style: Flush overlay.
9. WIC Door and Drawer Front Style: Reveal overlay.
10. Reveal Dimension: 1/2 inch (13 mm).
11. WIC Door and Drawer Front Style: Lipped.
12. WIC Door and Drawer Front Style: Flush.
13. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
    a. Horizontal Surfaces Other than Tops: GP-50, 0.050-inch (1.270-mm) nominal thickness.
    b. Post formed Surfaces: PF-42, 0.042-inch (1.067-mm) nominal thickness.
    c. Vertical Surfaces: GP-50, 0.050-inch (1.270-mm) nominal thickness.
    d. Vertical Surfaces: GP-28, 0.028-inch (0.711-mm) nominal thickness.
    e. Edges: GP-50, 0.050-inch (1.270-mm) nominal thickness.
    f. Edges: GP-28, 0.028-inch (0.711-mm) nominal thickness.
    g. Edges: PVC tape, 0.018-inch (0.460-mm) minimum thickness matching laminate in color, pattern, and finish.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

h. Edges: PVC T-mold matching laminate in color, pattern, and finish.

14. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
    a. Surface Material: High-pressure decorative laminate, Grade GP-28.
    b. Surface Material: High-pressure decorative laminate, Grade CL-20.
    c. Surface Material: Thermoset decorative overlay.
    d. Surface Material: Woodwork fabricator's standard cured wet film.

15. Colors, Patterns, and Finishes: Provide colors and textures of laminate surfaces complying with the following:
    a. Match Architect's sample.
    b. Match color, pattern, and finish indicated by reference to laminate manufacturer's standard designations.
    c. Provide Architect's selections from laminate manufacturer's full range of colors and finishes.

Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers except where located directly under tops.

S. Countertops: As follows:

1. Type of Top: Panel product for transparent finish (wood veneer laminated over core) as follows:
    a. Veneer Matching: Book, balance, and center match.
    b. Veneer Matching: Book and balance match.
    c. Veneer Matching: Slip and balance match.
    d. Veneer Matching: Slip and running match.
    e. Veneer Matching: Random match.
    f. Edge Treatment: Solid wood matching face for species and cut.
    g. Edge Treatment: Wood veneer matching face for species and cut.

2. Type of Top: High-pressure decorative laminate as follows:
    a. Grade: GP-50, 0.050-inch (1.270-mm) nominal thickness.
    b. Grade: PF-42, 0.042-inch (1.067-mm) nominal thickness.
    c. Colors, Patterns, and Finishes: Provide colors and textures of laminate
    surfaces complying with the following:
        1. Match Architect's sample.
        2. Match color, pattern, and finish indicated by reference to laminate manufacturer's standard designations.
        3. Provide Architect's selections from laminate manufacturer's full range of colors and finishes.
    d. Edge Treatment: Same as laminate cladding on horizontal

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

surfaces.

e. Edge Treatment: Lumber edge for transparent finish matching wood species and cut on cabinet surfaces.

3. Type of Top: Solid surfacing material as follows:

a. Fabrication: Fabricate tops in one piece with shop-applied backsplashes and edges. Comply with solid surfacing material manufacturer's recommendations for adhesives, sealers, fabrication, and finishing.

b. Solid Surfacing Material Thickness: 1/2 inch (13 mm).

c. Solid Surfacing Material Thickness: 3/4 inch (19 mm).

d. Colors, Patterns, and Finishes: Provide colors complying with the following:

1. Match Architect's sample.
2. Match color, pattern, and finish indicated by reference to manufacturer's standard designations.
3. Provide Architect's selections from manufacturer's full range of colors and finishes.

T. Flush Wood Paneling for Transparent Finish: As follows:

1. Veneer Matching: Book, balance, and center match.
2. Veneer Matching: Book and balance match.
3. Veneer Matching: Slip and balance match.
4. Veneer Matching: Slip and running match.
5. Veneer Matching: Random match.
6. Panel-Matching Method: No matching between panels is required. Select panels for similarity of grain pattern and color, and arrange sequence of panels for optimum color and grain matching between adjacent panels.
7. Panel-Matching Method: Match panels within each separate area by the following method:

a. Remanufactured sets used full width.

b. Remanufactured sets selectively reduced in width.

c. Sequence-matched, uniform-size sets.

8. Fire-Test-Response Characteristics: Provide panels composed of wood veneer and fire-retardant particleboard that are identical to units tested for the following surface-burning characteristics per ASTM E 84.

a. Flame Spread: 75 or less.

b. Smoke Developed: 450 or less.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

U. Stair work and Rails: Finishes for stair parts as follows:

1. Treads: Transparent.
2. Treads: Opaque.
3. Risers: Transparent.
4. Risers: Opaque.
5. Stringers: Transparent.
6. Stringers: Opaque.
7. Balusters: Transparent.
8. Balusters: Opaque.
9. Handrails: Transparent.
10. Handrails: Opaque.
11. Scotia, Cove, and Other Moldings: Transparent.
12. Scotia, Cove, and Other Moldings: Opaque.

V. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard or fire-retardant, medium-density fiberboard with veneered, exposed surfaces and identical in construction to units tested for use in fire door assemblies per ASTM E 152.

1. Fire Rating: 20 minutes.

W. Shop Finishing: Finish wood cabinets (casework), counter tops, and paneling at the fabrication shop. Defer only final touch up, cleaning, and polishing until after installation.

1. Grade: Same grades as items to be finished.
2. Grade: Premium.
3. Grade: Custom.
4. Grade: Economy
5. Back priming: Apply one coat of sealer or primer compatible with finish coats to concealed surfaces of woodwork. Apply 2 coats to back of paneling.
6. Washcoat for Stained Finish: Apply a vinyl washcoat to woodwork made from closed-grain wood before staining and finishing.
7. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
8. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
9. Transparent Finish: Comply with requirements indicated below for finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523.
    a. AWI Finish System TR-4: Conversion varnish.
    b. AWI Finish System TR-5: Catalyzed vinyl lacquer.
    c. AWI Finish System TR-6: Catalyzed polyurethane.
    d. WIC Finish System #1d.: Vinyl lacquer (catalyzed).
    e. WIC Finish System #2: Conversion varnish.
    f. WIC Finish System #3: Catalyzed polyurethane.
    g. Staining and Sheen: Match Architect's sample.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

10. Opaque Finish: Comply with requirements indicated below for finish system, color, effect, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523.
    a. AWI Finish System OP-1: Standard lacquer.
    b. AWI Finish System OP-4: Conversion varnish.
    c. AWI Finish System OP-6: Catalyzed polyurethane.
    d. WIC Finish System #1a.: Lacquer.
    e. WIC Finish System #3: Catalyzed polyurethane.
    f. WIC Finish System #6: Synthetic enamel.
    g. Color and Sheen: Match Architect's sample.
    h. Color and Sheen: Match color and sheen indicated by reference to a coating manufacturer's standard designations.
    i. Color and Sheen: As selected by Architect from the full range available in finish system specified.

1.3 EXECUTION

A. Preparation: Condition woodwork to average prevailing humidity conditions in installation areas, and examine and complete work as required, including back priming and removal of packing, before installing.

B. Install woodwork to comply with AWI Section 1700 for the same grade specified above for type of woodwork involved.

C. Install woodwork to comply with WIC Section 26 for the same grade specified above for type of woodwork involved.
    1. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
    2. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

D. Standing and Running Trim: Install with minimum number of joints, using full-length pieces to the greatest extent possible. Stagger joints in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler and sand smooth.

E. Tops: Anchor securely to base units. Seal space between backsplash and wall.

F. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips and by blind nailing on backup strips, splined-connection strips, and similar associated trim and framing.

G. Stair work and Rails: Cut carriages to accurately fit treads and risers and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

securely anchor to supporting substrates. Glue treads to risers, and glue and nail treads and risers to carriages. Glue and wedge treads and risers to housed stringers. Glue and dowel or pin balusters to treads and railings, and railings to newel posts.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A07001

LIQUID APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SCOPE

A. This section includes liquid applied waterproofing at fountain areas, wet areas at places as shown on drawings.

1.2 SUBMITTALS

A. Product Data for type of waterproofing slurry specified, including manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

B. Shop Drawings showing locations and extent of waterproofing slurry, including details for substrate joints and cracks, sheet flashings, penetrations, tie-ins with adjoining construction, and other termination conditions.

C. Product test reports from a qualified independent testing agency evidencing compliance of waterproofing with requirements and other physical properties reported by manufacturer based on comprehensive testing of products according to current standard test methods within previous 5 years.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer who has completed waterproofing similar to that indicated for this Project and who is acceptable to waterproofing manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date manufactured and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer. Protect stored materials from direct sunlight.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Apply waterproofing within range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.6 WARRANTY

A. Special Warranty; Submit a written warranty signed by waterproofing manufacturer and Installer agreeing to repair or replace waterproofing that does not meet requirements or that does not remain watertight during the specified warranty period.

1. Warranty Period: 10 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C 150, Type I.

B. Slurry-Coat Aggregate: ASTM C 144, sand.

C. Trowel-Coat Aggregate: ASTM C 33, fine aggregate.

D. Water: Potable.

E. Liquid applied Waterproofing (Non-toxic): A blend of portland cement, specially treated sand, and active chemicals formulated to penetrate by capillary action into concrete or masonry and to chemically react with free lime in the presence of water to develop crystalline growth within concrete or masonry capillaries.

F. Patching Compound: Ready-mixed cementitious waterproofing and repair mortar for filling and patching tie holes, honeycombs, reveals, and other imperfections.

2.2 MIXING

Mixing shall be in accordance with the written recommendations of the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which waterproofing systems will be applied, with Installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Do not proceed with installation until after minimum concrete curing period recommended by waterproofing manufacturer.

2. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage affecting other construction.

C. Remove grease, oil, bitumen, form release agents, paints, and other penetrating contaminants from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.3 APPLICATION

A. Apply cementitious waterproofing to both horizontal and vertical surfaces as per manufacturer's recommendations.

1. Surfaces: Uniformly apply waterproofing on vertical and horizontal surfaces in no less than two slurry coatings at a rate as recommended by the manufacturer.

2. Vertical construction joints: Apply two slurry coatings of waterproofing immediately prior to placing contiguous concrete.

B. Moisture cure all cementitious waterproofing for a minimum of two (2) days as recommended by the manufacturer. After waterproofing has aged for at least two (2) weeks, neutralize all waterproofed surfaces that will remain exposed.

C. Form a continuous waterproof envelope which will prevent leakage. Take immediate remedial measures to stop water infiltration during the construction and guarantee periods.

3.4 FIELD QUALITY CONTROL

A. On completion of installation make preparation for testing in the presence of the MEW.

B. Flood with clean water. After 48 hours, check for leaks.

C. If leaking is found, patch using new waterproofing materials; repeat flood test. Repair damage to building.

D. When area is proved watertight, drain water and obtain MEW approval.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.5 PROTECTING AND CLEANING

A. Protect waterproofing from damage and wear during application and remainder of construction period according to manufacturer's written instructions.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.6 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A07004

PRE-FINISHED METAL PANELS

PART 1 - GENERAL

1.1 SCOPE

A. Fixing of pre-finished aluminum panel to vertical profiles as detailed on drawing at exterior and interior areas, aluminum coating etc. as indicated on drawings.

B. All supporting system, anchoring, adhesives and related accessories of the manufacturer.

C. The extent of work is as shown on drawings or as implied therein.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide wall panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

B. Water Penetration: Provide wall panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward acting. The design Wind Speed shall be taken as 160 km/hr and the corresponding pressure shall be calculate using any universally acceptable code

C. Structural Performance: Provide wall panel assemblies capable of withstanding design wind loads indicated under in-service conditions with deflection no greater than the following, based on testing manufacturer's standard units according to ASTM E 330 by a qualified independent testing and inspecting agency.

1. Maximum Deflection: 1/140 of the span.

1.3 SUBMITTALS

A. Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

B. Shop Drawings: Show layouts of panels, details of corner conditions, joints, panel profiles, structural supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field assembled work.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Samples: Provide sample panels (300 mm) long by actual panel width, in the profile, style, color, and texture indicated. Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed metal wall panel projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Mockups: Before installing wall panels, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using exposed and concealed materials indicated for the completed Work.

1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Engineer.

2. Notify Engineer 7 days in advance of the dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Engineer's approval of mockups before proceeding with construction of wall panels.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

    a. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Packaged panels for protection against damage during transportation or handling.

B. Handling: Exercise care in unloading, storing, and erecting wall panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather-tight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.6 PROJECT CONDITIONS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

A. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal wall panels within the specified warranty period and agreeing to repair finish or replace wall panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

B. Finish Warranty Period: 10 years from date of Substantial Completion.

C. Special Weather-tight Warranty: Submit a written warranty executed by manufacturer agreeing to repair or replace metal roof panel assembly that fails to remain weather-tight within the specified warranty period.

D. Weather-tight Warranty Period: 5 years from date of Substantial Completion.

1.8 MOCK-UP

A. Construct a complete mock-up for a 15.0 square meter wall panel. Assemble to illustrate component assembly including through wail flashings, attachments, anchors and perimeter sealants.

If approved by the Engineer mock-up can remain as part of the Works.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Products and manufactures specified hereinafter are specified for the purposes of establishing minimum quality standards. Products which are equal to or better than those specified and which conform to the design requirements and color selections may be acceptable subject to the Engineer's approval.

2.2 ACCEPTABLE MANUFACTURERS

List of suppliers and manufacturers is to be approved by the Engineer.

2.3 PANEL EXTERIOR SHEET MATERIAL

A. Pre-coated aluminum panel sheet, of 4mm thickness, with 3 mm polyethylene insulation and min. 0.5mm aluminum sheet on both sides, mill finished. Weight of the sheet min. 5.5 kg/m2. Sheet having a dB rating of 26. Colour will be as directed by Engineer.

B. Aluminum sheet 0.5mm. thick on each face will have the following properties:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.	Alloy PERALUMAN	100 (AR Mgl - NS41)
2.	Tensile Strength	125 N/mm2
3.	0.2% proof stress	80 N/mm2
4.	Elongation	10%
5.	Modulus of elasticity	70.00 N/mm2

C. Thermal conductivity of the core material (K-valve) will be 0.29 w/mk.

D. Panel when tested to fire behavior must have results as per BS 476.

2.4 ACCESSORIES

A. Aluminum Channel: Aluminum channel of standard manufacturer's size or as detailed in drawings, Engineer to select the sizes from manufacturer's standard size.

B. Steel Brackets: Steel brackets of manufacturer's standard size and thickness as required.

C. Pins: Steel pins of 10mm thickness, with spring washers on either side.

D. Gasket: Manufacturer's standard type suitable for use with panel system, permanently resilient.

E. Sealants: Refer Section 07920.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.

1. Use stainless-steel fasteners for exterior applications and galvanized steel fasteners for interior applications.

2. Provide exposed fasteners with heads matching color of panel by means of plastic caps or factory-applied coating.

3. Provide metal-backed neoprene washers under heads of exposed fasteners located on weather side of panels.

B. Accessories: Unless otherwise specified, provide components required for a complete wall panel assembly including trim, copings, fascia, mullions, sills, corner units, clips, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

1. Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross-linked, polyolefin-foam flexible closure strips. Cut or pre-mold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weather-tight construction.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Sealing Tape: Pressure-sensitive, 100 percent solids, polysobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape.

3. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant as recommended by panel manufacturer.

C. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4mm) dry film thickness per coat, unless otherwise indicated. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

A. General: Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials that are non-compatible or could result in corrosion or deterioration of either materials or finishes.

C. Fabricate panel joints with captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

2.7 SECONDARY FRAMING

A. Panel Supports and Anchorage: Provide grits, furring channels, angles, plates, bracing, and other secondary framing members as recommended by the manufacturer.

1. Grits: C- or Z-shaped sections fabricated from 0.0598 inch (1.5mm) thick, shop-painted, roll formed steel.

2. Flange and Sag Bracing: 1-5/8 x 1-5/8 inch (41 x 41mm) angles, fabricated from 0.0598 inch (1.5 mm) thick, shop-painted, roll-formed steel.

3. Base or Sill Angles: Fabricate from 0.079 inch (2.0 mm) thick, cold-formed, galvanized steel sections.

4. Secondary structural members shall be manufacturer's standard sections fabricated from 0.079 inch (2.0 mm) thick, cold-formed galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of metal panel walls.

1. Panel Supports and Anchorage: Examine wall framing to verify that grits, angles, and other secondary structural panel support members and anchorage have been installed to meet requirements of panel manufacturer.

2. Do not proceed with wall panel installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate metal wall panels with rain drainage work; flashing; trim; and construction of soffits, walls, and other adjoining work to provide a leak-proof, secure, and non-corrosive installation.

B. Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

C. Secondary Structural Supports: Install grits, angles, and other secondary structural panel support members and anchorage according to the Light Gauge Structural Institute's "Guide Specifications," for "Manufactured Roof and VI/all Panels."

3.3 PANEL INSTALLATION

A. General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting exterior panels by torch is not permitted.

2. Install panels with concealed fasteners.
3. Locate and space exposed fasteners in true vertical and horizontal alignment. Use proper tools to obtain controlled, uniform compression for positive seal without rupture of neoprene washer.

B. Accessories: Install components required for a complete wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not otherwise indicated, types recommended by panel manufacturer.

1. Install weather-seal to prevent air and moisture penetration. Flash and seal panels at ends and intersections with other materials with rubber, neoprene, or other closures to exclude weather.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Seal panel end laps with a bead of tape or sealant, full width of panel. Seal side joints where recommended by panel manufacturer.

D. Panels: Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up according to sealant manufacturer's written instructions.

1. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.

2. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

3. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

E. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.

F. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on level, plumb, and location lines as indicated and within 1/8 inch (3 mm) offset of adjoining faces and of alignment of matching profiles.

3.4 CLEANING AND PROTECTING

A. Damaged Units: Replace panels and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

B. Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

3.5 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A07005

MODIFIED BITUMINOUS MEMBRANE

PART 1 - GENERAL

1.1 SCOPE

This section includes the modified bituminous sheet waterproofing for torch-applied applications at below grade level and at roof areas.

1.2 SUBMITTALS

A. Product Data for type of waterproofing specified, including manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

B. Shop Drawings showing locations and extent of waterproofing, including details for substrate joints and cracks, sheet flashings, penetrations, tie-ins with adjoining construction, and other termination conditions.

C. Samples, 75-by-150-mm minimum size, of each waterproofing material required for Project.

D. Product test reports from a qualified independent testing agency evidencing compliance of waterproofing with requirements and other physical properties reported by manufacturer based on comprehensive testing of products according to current standard test methods within previous 5 years.

1.3 QUALITY ASSURANCE

Installer Qualifications: Engage specialist with 5 years experience in waterproofing works similar to that indicated for this Project and who is acceptable to waterproofing manufacturer.

1.4 SYSTEM DESCRIPTION

A. Below-grade Waterproofing

1. Below-grade Waterproofing System to be capable of resisting ground and surface water pressures from the sides and underneath the building by providing a continuous and impervious membrane which excludes the visible penetration of water and provides a vapour seal and to be suitable for Middle East situations.

2. Membrane to consist of a minimum of 2 layers of flame bonded membrane, 4 (O.2) mm thick.

B. Roof Areas

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Roofing membranes shall be installed with ply loose laid, mopped or torched to a sloped sand cement screed sub-base sloped to cast-in-place roof drains as per manufacturer's instruction or as directed by Engineer. Membrane shall be lapped up walls and up over all parapets. Lap membrane minimum of 50mm down outside face. Install all flashings as detailed.

2. Membrane to consist of a minimum of 1 layer of flame bounded membrane, 4 (O.2) mm thick.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Apply waterproofing within range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1.6 WARRANTY

A. Special Warranty: Submit a written warranty signed by waterproofing manufacturer and Installer agreeing to repair or replace waterproofing that does not meet requirements or that does not remain watertight during the specified warranty period.

1. Warranty Period: 10 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURER OR PRODUCT

A. Refer List of Approved Suppliers @ Conditions of Contract.

B. Primer: As recommended by the manufacturer of waterproofing membrane.

C. Protection Board: As recommended by the manufacturer of sheet membrane waterproofing. The thickness of protection board should not be less than 6mm.

D. Substitutions: To be demonstrated as equal to / or greater than those specified and to the approval of the Engineer. Alternative products must be only those that offer full technical literature, test certificates and other documentation and on site visits by technical representatives of those products.

2.2 MEMBRANE MATERIALS

A. Membrane for Roof: A polymer - bitumen modified with elastomers and plastomers. The reinforcement is a non-woven fabric of continuously extruded spun bound polyester which is rot proof. The compound is a mixture of distilled bitumen to give excellent durability and flexibility at low temperature. Membrane to have following characteristics:

a. Thickness : 4mm

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Tensile Strength : 750 / 650 N/5 cm
c. Elongation : 50 L/50 T
d. Resistance to tear : 10 L/10 T

B. Membrane for Basement: Membrane to be a composite waterproofing membrane where the reinforcement is impregnated with SBS (Styrene Butadiene Co-polymer) bitumen at the bottom and with APP (Atactic Polypropylene) bitumen on the upper face. The membrane must have the following characteristics:

a. Elongation to break
b. Tensile strength LIT
c. Resistance to static puncture
d. Resistance to tear
e. Thickness
f. Weight kg/sq. m.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which waterproofing systems will be applied, with Installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Do not proceed with installation until after minimum concrete curing period recommended by waterproofing manufacturer.

2. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage affecting other construction.

C. Remove grease, oil, bitumen, form release agents, paints, and other penetrating contaminants from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.3 INSTALLATION

A. Install membrane waterproofing in accordance with manufacturer's printed instructions except as hereinafter specified.

B. Prime surfaces in accordance with manufacturer's instruction.

C. Follow the recommended technique of the membrane manufacturer for cleaning, seam, lap and splice areas, for the method and sequence of forming filed joints in the membrane.

D. Flash all pipes, conduits, sleeves, and other projections passing through membrane waterproofing and provide tight construction throughout. Install accessories where required as per recommendations of the manufacturer.

E. Upon completion of any portion of water proofing, immediately cover that portion with protective covering.

3.4 SEAM INSTALLATION

Clean splice areas, apply splicing cement and in-seam sealant, and firmly roll side and end laps of overlapping sheets according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet terminations.

3.5 SHEET FLASHING INSTALLATION

A. Install UV stable thermal and ozone resistant sheet flashings and preformed flashing accessories and adhere to substrates according to waterproofing manufacturer's written instructions.

B. Extend deck waterproofing sheet to form wall flashings.

3.6 PROTECTION COURSE INSTALLATION

A. Install protection course over waterproofing membrane according to manufacturer's written instructions and before commencing subsequent construction operations. Minimize exposure of membrane.

3.7 FIELD QUALITY CONTROL

A. Test each area (including areas below ground level) for leaks after waterproofing and before protection course and overlaying construction are placed. Plug or dam drains and fill with water to a depth of 50 mm or to within 75 mm of top of sheet flashings. Maximum water depth shall not exceed 100 mm. Flood each area for 24 hours.

B. Correct deficiencies in or remove waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. After flood tests repair leaks and make further repairs until waterproofing installation is watertight.

3.8 PROTECTING AND CLEANING

A. Protect waterproofing from damage and wear during application and remainder of construction period according to manufacturer's written instructions.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.9 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A07006

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SCOPE

Furnish all labour, materials, tools appliances and equipment, and perform all operations and services necessary for the complete installation of Flashing and all related components as indicated and detailed on the drawings.

1.2 PERFORMANCE REQUIREMENTS

General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

1.3 SUBMITTALS

A. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

B. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

C. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal colour and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Mock-ups: Prior to installing sheet metal flashing and trim, construct mock-ups indicated to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution.

1.5 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 2 - PRODUCTS

2.1 METALS

A. Aluminium: Alloy and temper recommended by aluminium producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

1. Mill-Finish Aluminium Sheet: ASTM B 209 (ASTM B 209M), 3003-H14, with a minimum thickness of 0.040 inch (1.0 mm), unless otherwise indicated.

2. Anodized Aluminium Sheet: ASTM B 209 (ASTM B 209M), 5005-H14, with a minimum thickness of 0.050 inch (1.2 mm).

3. Factory-Painted Aluminium Sheet: ASTM B 209 (ASTM B 209M), 3003-H14, with a minimum thickness of 0.040 inch (1.0 mm), unless otherwise indicated.

4. Extruded Aluminium: ASTM B 221 (ASTM B 221M), alloy 6063-T52, with a minimum thickness of 0.080 inch (2.0 mm) for primary legs of extrusions that are anodized, unless otherwise indicated.

B. Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch (0.5 mm) thick, unless otherwise indicated.

C. Galvanized Steel Sheet: ASTM A 526, G 90 (ASTM A 526M, Z 275), commercial quality, or ASTM A 527, G 90 (ASTM A 527M, Z 275), lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch (1.0 mm) thick, unless otherwise indicated.

D. Aluminium-Zinc Alloy-Coated Steel Sheet: ASTM A 792, Class AZ-50 coating, Grade 40 (ASTM A 792M, Class AZ-150 coating, Grade 275) or to suit project conditions, with 55 percent aluminium, not less than 0.0396 inch (1.0 mm) thick, unless otherwise indicated.

2.2 COUNTER FLASHING

A. Provide to secure fixing of waterproofing membrane to the parapets and upstands.

2.3 COPINGS

A. Provide copings in shapes and sizes indicated, with shop-fabricated corners. Include anchor plates, cleats or other attachment devices, concealed splice plates; and trim other accessories indicated or required for complete installation, with no exposed fasteners. Provide exposed coping components fabricated from extruded aluminium in thickness indicated, but not less than 0.060 inch (1.5 mm).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Finish: Powder organic coating in accordance with BS 6496, colour to match sample board.

2.4 GUTTERS

A. Provide gutters in shapes and sizes indicated, with mitered and welded corners. Include steel straps formed from at least 0.028-inch- (007-mm-) thick, galvanized steel sheet; hangers or other attachment devices, screens, end plates; and trim and other accessories indicated or required for complete installation. Provide gutters fabricated from extruded aluminium in thickness indicated, but not less than 1.5mm.

2.5 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Burning Rod for Lead: Same composition as lead sheet.

B. Solder: ASTM B 32, Grade Sn50, used with rosin flux.

C. Solder for Stainless Steel: ASTM B 32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a non-corrosive rosin flux over tinned surfaces.

D. Fasteners: Same metal as sheet metal flashing or other non-corrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

E. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.

F. Mastic Sealant: Polysobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

2.6 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Worth that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

2.7 FINISHES

Exposed aluminum surfaces: Powder coated to finish to BS 6496. Color to Engineer's approval

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

B. Separations: Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

3.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A07007

ROOF HATCHES

PART 1 GENERAL

1.1 SCOPE

A. This Section includes access roof hatches in the slab.

1.2 SUBMITTALS

A. Product data for type of access panel assembly specified, including details of construction relative to materials, individual components, profiles and finishes.

1. Include complete schedule, including types, general locations, sizes and ceiling construction details, locking provisions, and other data pertinent to installation.

B. Shop drawings showing fabrication and installation of access panels and frames, including anchorage, and accessory items.

C. Samples, 75mm x 125mm minimum size, of panel face material showing factory-finished colour and texture.

1.3 QUALITY ASSURANCE

A. Verification: Determine specific locations and sizes for access panels needed to gain access to concealed equipment, and indicate on schedule specified under "Submittals" Article.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminium: ASTM B 221.

2.2 ROOF HATCHES

A. Door and frame: Aluminium

B. Hinge: Continuous aluminium piano hinge, set to open 180 degrees.

C. Latch: flush screw driver operated cam latches.

D. Finish: Powder coated, white colour.

E. Size: 600x600 mm.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

F. Roof hatches shall be provided wherever required to serve the maintenance for electromechanical services.

PART 3 EXECUTION

3.1 PREPARATION

A. Advise Installers of other work about specific requirements relating to access panel installation, including sizes of openings to receive access panel and frame as well as locations of supports, inserts, and anchoring devices. Coordinate delivery with other work to avoid delay.

3.2 INSTALLATION

A. Comply with manufacturer's instructions for installing access panels.

3.3 ADJUST AND CLEAN

A. Adjust hardware and panels after installation for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

3.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A07115

SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract including General and Special Conditions apply to work of this Section.

1.2 SCOPE

This Section covers the work of sheet waterproofing as required by the Contract and includes the following type:

- Torch-applied bituminous sheet waterproofing

1.3 REFERENCE STANDARDS

Sheet waterproofing work shall be performed in strict accordance with the stipulations of the latest edition of Karachi Municipality Standards and the specifications of the American Society of Testing and Materials (ASTM), as referenced to throughout this Section, or other approved equivalent international standards and Sound Practice.

AMERICAN SOCIETY FOR TESTING AND MATERIALS ASTM No.
D 5 Test Method for Penetration of Bituminous Materials
D 36 Test Method for softening Point of Bitumen (Ring-and-Ball Apparatus) D 570 Test Method for Water Absorption of Plastics
D 751 Methods of Testing Coated Fabrics
G 53 Recommended Practices for Operating Light-and-Water-Exposure Apparatus (Fluorescent Un-Condensation Type) of Exposure of Nonmetallic Materials

1.4 SUBMITTALS

Submit the following in accordance with Conditions of the Contract and Division-1 Specification Sections:

1.4.1 Product Data: Submit manufacturer's technical product data, installation instructions and recommendations for sheet waterproofing material required. Include data substantiating that materials comply with requirements.

1.4.2 Quality Control / Quality Assurance Program: A complete description of the manufacturer's and installer's quality control / quality assurance Programs for manufacturing, fabrication, handling, installation, testing, repairing and providing waterproofing sheets. The document shall include a complete description of seaming and repairing by extrusion welding or other recommended methods. Contractor should submit a ten-year guarantee for the performance of the water proofing system.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.4.3 Samples: Submit six samples of sheet waterproofing and sheet seams. Sheet samples shall be 200 by 250 mm. Seam samples shall be 300 mm plus seam width by 450 mm.

1.4.4 Test Results: Submit factory test results and materials certification demonstrating conformance with the requirements of this section.

1.4.5 Shops Drawings: Submit shop drawings indicating details of penetrations required through sheet waterproofing works.

1.5 QUALITY ASSURANCE

1.5.1 General: Obtain primary materials from a single manufacturer to the greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.

1.5.2 System Performance: Provide sheet waterproofing products which have been produced and installed to establish and maintain watertight continuous seals. Waterproofing membranes shall not be deteriorated in excess of limitations published by manufacturer.

1.5.3 Sequencing and Scheduling: The work in this section requires careful coordination with the work of other sections to prevent damage to sheet waterproofing courses. The Contractor shall not allow delays in the work resulting from disputes of responsibility between different trades.

1.5.4 Install Qualifications: A firm which has specialized for not less than three years in application and installation of sheet waterproofing materials required for the project and which is acceptable to manufacturers of primary materials.

1.5.5 Single Responsibility: As applicable, assign work closely associated with sheet waterproofing including expansion joints and sealer joints to a single installer for undivided responsibility.

1.5.6 Testing: All materials used shall comply with the requirements of the referenced standards when tested in accordance with the methods indicated.

1.6 JOB CONDITIONS

1.6.1 Substrate: Proceed with sheet waterproofing work only after substrate construction and penetrating work have been completed.

1.6.2 Weather: Proceed with sheet waterproofing work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.7 DELIVERY, STORAGE AND HANDLING

All sheet waterproofing materials shall be on Site before commencement of work. Materials shall be delivered to Site in the manufacturer's tightly-closed

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

labeled packages. Labels shall indicate manufacturer's name or trade mark, method of application, date of manufacture and date of expiry.

Primers shall be used directly from the fully labeled cans in which they were delivered by the manufacturer.

Roll goods shall be stored in a dry place protected from sun and weather. Rolls shall be placed on clean floors or platforms in such a way as to prevent damage to ends and soiling with foreign matters.

Handle roll goods with care. Do not drop rolls on edges or ends.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Provide sheet waterproofing materials which comply with the specified requirements or provide other similar alternative products which are certified in writing by manufacturer to be superior in performance for application indicated.

2.1.2 Torch-Applied Bituminous Sheets: Material shall be absolutely impermeable-to-water-or-to-water vapor sheets manufactured of non-woven polyester reinforcement that is impregnated and coated with a mixture of polymer modified bitumen. Upper and lower surfaces of membrane shall be covered with a thin film of polyethylene and sanded.

Employed sheets shall be of excellent properties of resistance to atmospheric agents and aging and of ensuring stability at high temperatures and shall meet the following properties:

Parameter	Test Method	Value
Thickness, mm	ASTM D 751	4 mm (nominal)
Weight		3.5 kg / m^2
Reinforcement		150 gm / m^2
Softening Point (R+B) of Concrete Mixture	ASTM D 36	135°C
Penetration of (DOW) of Coating Mixture	ASTM D 5	20-30 dmm
Water Absorption	ASTM D 570	Less than 0.15% No signs of deterioration
Resistance to Aging Due to UV-Radiation	ASTM G 53	After 2000 hours
Tear Resistance Longitudinal Transversal	 UEA tc UEA tc	 170 N 170 N
Resistance to Thermal Aging	UEA tc	No signs of deterioration after the test

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Size: The membrane shall be supplied in rolls of a minimum width of 1 meter. Length shall be as long as available in manufacturer's standard range.

Primer: Employ manufacturer's recommended type of surface priming material compatible with ASTM 041.

2.2 ACCEPTABLE MANUFACTURERS

Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Works include, but shall not be limited to, the following:

For Bituminous Sheets:

- FOSROC, U. K .
- HITCHINS WATERPROOFING, SINGAPORE
- Esha Nederland B.v., The Netherlands
- OWI, Dermabit vyaterproofing Industries Companies Ltd., UK.

PART 3- EXECUTION

3.1 INSPECTION

Examine substrates and conditions under which sheet waterproofing work shall be performed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 PREPARATION OF SUBSTRATE

Installation of metal fittings, plumbing work and similar work affecting sheet waterproofing shall be completed before work begins.

All cracks, breaks, holes, sharp projections or other unusual irregularities in surfaces shall be remedied before beginning of work. All intersections between vertical and horizontal surfaces shall be rounded using cement-sand mortar as specified for Portland Cement Plaster in Division 9, Section 09220.

Surfaces shall be clean, dry, and free of grease, loose materials, excessive dust and foreign material which would interfere with sheet waterproofing application.

3.3 INSTALLATION OF TORCH-APPLIED BITUMINOUS SHEETS

Mop the surface to be waterproofed with primer at intensity not less than 300 gm/m2 and allow a drying time of 24 hours to elapse.

Place the sheets and unroll and make necessary field measurements to provide proper fit of sheets. Allow for at least 100-mm-wide laps at middle and 150-mm-wide ones at sides. Re-roll sheets without changing orientation. Sheets shall be unrolled again while heating lower surface by means of a gas torch. Heating shall be done in a manner sufficient to provide melting of the lower surface of the sheets but not to deteriorate sheets. Rounded trowel shall be used to press

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

sheets in place to provide adhesion between bitumen sheets and primed surfaces.

Ensure perfect adhesion of sheets at overlaps. Produced waterproofed surfaces shall be smooth and free of wrinkles or folds.

3.4 FIELD QUALITY CONTROL

3.4.1 In-place Inspection of Torch-applied Bituminous Sheets: Visually inspect installed sheets for perfect adhesion to underlying surfaces and smoothness. Inspect laps to ensure perfect adhesion of sheet ends and perfect adhesion to waterproofed surfaces.

3.4.2 In-place Testing of Horizontal Decks: Before completed membranes on horizontal surfaces are covered by overlaying courses, test for leaks with 50 mm depth of water maintained for 24 hours.

Repair any leaks revealed by examination of substrates and repeat test until no leakage is observed.

3.5 CLEAN-UP AND PROTECTION

3.5.1 Clean-Up: After completion, remove any masking materials and debris form exposed surfaces caused by sheet waterproofing installation.

3.5.2 Protection: Institute required procedures for protection of completed membrane during installation of work over membrane and throughout remainder of construction period. Do not allow traffic of any type on unprotected membrane.

3.6 SHEET WATERPROOFING SCHEDULE

Unless otherwise indicated on Drawings, install and apply sheet waterproofing materials as follows:

- Torch-applied bituminous sheets shall be used for waterproofing of concrete roof slabs except for those used as parking areas.

3.7 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 07160
BITUMINOUS DAMPPROOFING

1.1 GENERAL

A. Submittals: Submit product data for each type of product specified, including data substantiating that materials comply with local regulations controlling use of volatile organic compounds (VOCs).

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hot-Applied Asphalt Damp proofing:
   a. [insert name of manufacturer].
2. Cold-Applied, Cut-Back Asphalt Damp proofing:
   a. [insert name of manufacturer]
3. Cold-Applied, Asphalt Emulsion Dampproofing:
   a. [insert name of manufacturer].

B. Bituminous Dampproofing, General: Provide products recommended by manufacturer for designated application.

1. Odor Elimination: Provide material warranted by manufacturer to be odor free after drying for 24 hours under normal conditions.

C. Hot-Applied Asphalt Dampproofing: Dampproofing asphalt, complying with ASTM D 449, Type I.

D. Cold-Applied, Cut-Back Asphalt Dampproofing: Asphalt and solvent compound providing a firm, moisture-resistant, vapor-resistant, elastic coating.

1. Trowel Grade: Asphalt roof cement complying with ASTM D 4586, Type I.
2. Semimastic Grade: Asphalt roof coating complying with ASTM D 4479, Type I.
3. Spray Grade: Asphalt roof coating complying with ASTM D 4479, Type I.

E.C Cold-Applied, Asphalt Emulsion Dampproofing: Asphalt-based emulsions recommended by the manufacturer for dampproofing.

1. Trowel Grade: Emulsified asphalt mastic complying with ASTM D 1187, Type I.
2. Trowel Grade: Emulsified asphalt mastic complying with ASTM D 1227, Type III or IV.
3. Semimastic Grade: Emulsified asphalt semimastic complying with ASTM D 1227, Type III or IV.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Spray Grade: Emulsified asphalt complying with ASTM D 1227, Type III.

F. Primer: Asphalt primer complying with ASTM D 41, for asphalt-based dampproofing.

G. Glass Fabric: Woven glass fabric, treated with asphalt, complying with ASTM D 1668, Type I

H. Protection Course, Board Type: Premolded, 1/8-inch- (3-mm-) thick, multi-ply, semirigid board, with a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt and faced on one side with polyethylene film.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Protection Course II; ChemRex, Inc.; Sonneborn Building Products Div.
   b. Bituthene Asphaltic Hardboard; Grace: W.R. Grace & Co.
   c. PC-2 Protection Course; Meadows: W.R. Meadows, Inc.

I. Protection Course, Roll Roofing Type: Smooth-surfaced roll roofing complying with ASTM D 224, Type II.

1.3 EXECUTION

A. Preparation: Clean substrate and comply with recommendations of prime materials manufacturer.

1. Install cant strips and similar accessories as recommended by prime materials manufacturer.
2. Fill voids, seal joints, and apply bond breakers as recommended by prime materials manufacturer.
3. Install separate flashings and corner protection stripping as recommended by prime materials manufacturer.
4. Prime substrate as recommended by prime materials manufacturer.
5. Protection of Other Work: Prevent spillage and migration onto other surfaces of adjoining work.

B. Application: Apply dampproofing where indicated on Drawings. Apply 1 or 2 coats as recommended by manufacturer.

1. Reinforcement: At changes in plane or as shown, install lapped course of glass fabric in first coat of dampproofing compound.

2. Apply vertical dampproofing down walls from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches (150 mm) over outside face of footing. Extend 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when the Project is completed.

C. Hot-Applied Asphalt Dampproofing: Apply on exterior surfaces only. Do not apply when substrate condition causes foaming.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Apply a coat at a rate of 20 lb or 2.5 gal./100 sq. ft. (98 kg or 1 L/sq. m), to a uniform film thickness of not less than 30 mils (0.8 mm).

2. Apply a second coat, as specified above, after allowing 24 hours for first coat to cure. Double the thickness of second coat where first application has failed to produce a smooth, shiny, impervious coat.

D. Cold-Applied, Cut-Back Asphalt Dampproofing: Apply on exterior surfaces only.

1. Spray Grade: Apply at a rate of 1.25 to 2 gal./100 sq. ft. (0.5 to 0.8 L/sq. m), to produce a uniform, dry-film thickness of not less than 12 mils (0.3 mm).

BITUMINOUS DAMPPROOFING 07160 – 2

1. Apply a second coat, as specified above, after allowing 24 hours for first coat to dry. Apply second coat at a rate of 0.8 to 1.25 gal. /100 sq. ft. (0.3 to 0.5 L/sq. m). Double the thickness of second coat where first application has failed to produce a smooth, shiny, impervious coat.

2. Semimastic Grade: Apply at a rate of 5 gal./100 sq. ft. (2 L/sq. m), to produce a uniform, dry-film thickness of not less than 30 mils (0.8 mm).

3. Trowel Grade: Apply at a minimum rate of 7 gal./100 sq. ft. (2.8 L/sq. m), to produce an average, dry-film thickness of 70 mils (1.8 mm) but not less than 30 mils (0.8 mm) at any point.

E.C Cold-Applied, Asphalt Emulsion Dampproofing: Apply on either exterior or interior surfaces.

1. spray Grade: Apply at a rate of 1.5 to 2.5 gal./100 sq. ft. (0.6 to 1 L/sq. m), to produce a uniform, dry-film thickness of not less than 15 mils (0.4 mm). Apply in 2 coats, if necessary, to obtain required thickness, allowing time for complete drying between coats.

2. Semimastic Grade: Apply at a rate of 5 gal./100 sq. ft. (2 L/sq. m), to produce a uniform, dry-film thickness of not less than 30 mils (0.8 mm).

3. Trowel Grade: Apply at a minimum rate of 7 gal./100 sq. ft. (2.8 L/sq. m), to produce an average, dry-film thickness of 60 mils (1.5 mm) but not less than 30 mils (0.8 mm) at any point.

F. Protect exterior, below-grade dampproofing membrane from damage until backfill is completed. Remove overspray and spilled materials from surfaces not intended to receive dampproofing.

G. Protection Course: Comply with dampproofing materials manufacturer's recommendations for method of support or attaching of protection materials. Support with spot application of trowel-grade mastic where not

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

otherwise indicated.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 07190

WATER REPELLENTS

1.1 GENERAL

A. Submit Product Data for each product specified.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [Insert Name of Manufacturer].

B. Silanes: Penetrating water repellent. A monomeric compound containing alkyltrialkoxysilanes with alcohol, mineral spirits, water, or other proprietary solvent carrier.
1. With 3.3-lb/gal. (400-g/L) VOCs or less.

2. With more than 3.3-lb/gal. (400-g/L) VOCs.

C. Siloxanes: Penetrating water repellent. Alkylalkoxysiloxanes that is oligomerous with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier.
1. With 3.3-lb/gal. (400-g/L) VOCs or less.

2. With more than 3.3-lb/gal. (400-g/L) VOCs.

D. Silane/Siloxane Blends: Consisting of silanes and siloxanes blended to achieve a particular penetration and protection on a specific substrate.
1. With 3.3-lb/gal. (400-g/L) VOCs or less.

2. With more than 3.3-lb/gal. (400-g/L) VOCs.

E. Proprietary Blends: Consisting of one or several different resins (silanes, siloxanes, or acrylics), polymers, stearates, or oils plus other compounds or products of components.
1. With 3.3-lb/gal. (400-g/L) VOCs or less.

2. With more than 3.3-lb/gal. (400-g/L) VOCs.

F. Silicone Sealer: Film-forming, polymerized, silicone-resin water repellent for dense substrates; solvent-or water-based solution containing not less than 3 and up to 5 percent solids by weight; complying with FS SS-W-110.
1. With 3.3-lb/gal. (400-g/L) VOCs or less.

2. With more than 3.3-lb/gal. (400-g/L) VOCs.

G. Acrylic: Water-clear, breathing coating of acrylic resins; water-based, solvent-based, or acrylic emulsion solution.
1. Containing 15 percent solids or more by volume and with 3.3-

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

lb/gal. (400-g/L) VOCs or less.

2. Containing 15 percent solids or more by volume and with more than 3.3-lb/gal. (400-g/L) VOCs.

3. Containing less than 15 percent solids by volume and with 3.3-lb/gal. (400-g/L) VOCs or less.
4. Containing less than 15 percent solids by volume and with more than 3.3-lb/gal. (400-g/L) VOCs.

1.3 EXECUTION

A. Preparation: Clean substrate and test for moisture content according to repellent manufacturer's written instructions.

1. Formed Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.

2. Clay Brick Masonry: Clean clay brick masonry per ASTM D 5703.

B. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.

C. Protect Adjoining Work: Cover nearby surfaces of aluminum and glass. Cover live plants and grass.

D. Coordination with Sealants: Do not apply water repellent until sealants have been installed and cured.

E. Application: Comply with manufacturer's written instructions. Apply a heavy-saturation coat using low-pressure spray equipment. Apply a second coat per manufacturer's written instructions.

F. Manufacturer's Field Service: Provide services of a factory-authorized technical service representative to inspect substrate before application and to instruct applicator on product and application method

G. Remove protective coverings from adjacent surfaces and other protected areas.

H. Clean adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses per manufacturer's written cleaning instructions. Repair damage caused by water-repellent application.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 07210

BUILDING INSULATION

1.1 GENERAL

A. Submittals: Product Data for each type of insulation product specified.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated as determined by testing identical products per ASTM E 84, ASTM E 119, or ASTM E 136 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1.2 PRODUCTS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Extruded-Polystyrene Board Insulation: ASTM C 578 for type indicated below:

1. Type IV, 1.60-lb/cu. ft. (26-kg/cu. m) minimum density.
2. Type V, 3-lb/cu. ft. (48-kg/cu. m) minimum density.
3. Type VI, 1.80-lb/cu. ft. (29-kg/cu. m) minimum density.
4. Type VII, 2.20-lb/cu. ft. (35-kg/cu. m) minimum density.
5. Type X, 1.30-lb/cu. ft. (21-kg/cu. m) minimum density.
6. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

C. Extruded-Polystyrene Drainage Panels: ASTM C 578 for type indicated below, fabricated with tongue-and-groove edges and with one side having a matrix of vertical and horizontal drainage channels and faced with insulation manufacturer's standard nonwoven filtration fabric.

1. Type IV, 1.60-lb/cu. ft. (26-kg/cu. m) minimum density.
2. Type VI, 1.80-lb/cu. ft. (29-kg/cu. m) minimum density.
3. Type VII, 2.20-lb/cu. ft. (35-kg/cu. m) minimum density.

D. Molded-Polystyrene Board Insulation: ASTM C 578 for type indicated below:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Type I, 0.9-lb/cu. ft. (15-kg/cu. m) minimum density.

2. Type II, 1.35-lb/cu. ft. (22-kg/cu. m) minimum density.

3. Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) minimum density.

4. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

E. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation faced on both sides with aluminum foil to comply with requirements indicated below:

1. Federal Standard: FS HH-I-1972/1, Class 1 (no reinforced core) or 2 (reinforced core).

2. ASTM Standard: ASTM C 1289, Type I, Class 1 or 2.

3. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 4 inches (101 mm).

4. Thermal Resistively: 7.2 deg F x h x sq. ft./Btu x in. at 75 deg F (50 K x m/W at 24 deg C).

F. Cellular Glass Insulation: ASTM C 552 for type and with other requirements indicated below:

1. Type I (flat block).

2. Type IV (board) faced on both sides with manufacturer's special kraft paper sheets laminated to glass block with asphalt.

3. Unfaced insulation passes ASTM E 136 for combustion characteristics.

G. Unfaced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA or ASTM C 553, Types I, II, and III.

1. Nominal Density: Not less than 1.5 lb/cu. ft. (24 kg/cu. m) nor more than 1.65 lb/cu. ft. (26 kg/cu. m).

2. Thermal Resistivity: 4.13 deg F x h x sq. ft./Btu x in. at 75 deg F (28.6 K x m/W at 24 deg C).

3. Surface-Burning Characteristics: Smoke-developed indices of 25 and 50, respectively.

H. Foil-Faced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA or ASTM C 553, Types I, II, and III; faced on one side with foil-scrim-Kraft vapor retarded.

1. Nominal Density: 1.5 lb/cu. ft. (24 kg/cu. m).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Thermal Resistivity: 4.13 deg F x h x sq. ft./Btu x in. at 75 deg F (28.6 K x m/W at 24 deg C).

3. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

I. Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA and IB.

1. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

2. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

3. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

4. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.4 deg F x h x sq. ft./Btu x in. at 75 deg F (30.5 K x m/W at 24 deg C).

5. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

J. Foil-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Type IA and IB, faced on one side with foil-scrim-Kraft or foil-scrim-polyethylene vapor retarder.

1. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

2. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

3. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

4. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.4 deg F x h x sq. ft./Btu x in. at 75 deg F (30.5 K x m/W at 24 deg C).

5. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

K. Glass-Mat-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Type IA and IB, faced on one side with black glass-fiber mat.

1. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

2. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

3. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.55 deg F x h x sq. ft./Btu x in. at 75 deg F (31.5 K x m/W at 24 deg C).

4. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

L. Unfaced, Slag-Wool-/Rock-Wool-Fiber Board Insulation: ASTM C 612 for type indicated below and passing ASTM E 136 for combustion characteristics.

1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Type IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

2. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F (28.8 K x m/W at 24 deg C).

3. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F (30 K x m/W at 24 deg C).

4. Fiber Color: Regular color, unless otherwise indicated.

5. Fiber Color: Darkened, where indicated.

6. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 15 and 5, respectively.

M. Foil-Faced, Slag-Wool-/Rock-Wool-Fiber Board Insulation: ASTM C 612 for type indicated below, passing ASTM E 136 for combustion characteristics of unfaced board, and faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder.

1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Type IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

2. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F (28.8 K x m/W at 24 deg C).

3. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F (30 K x m/W at 24 deg C).

4. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 5, respectively.

N. Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

without membrane facing) of type described below:

1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

2. Mineral-Fiber Type: Fibers manufactured from glass.

3. Mineral-Fiber Type: Fibers manufactured from slag or rock wool.

4. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

O. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III, Class A (blankets with reflective vapor-retarder membrane facing and flame spread of 25 or less); with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.

1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

2. Mineral-Fiber Type: Fibers manufactured from glass.

3. Mineral-Fiber Type: Fibers manufactured from slag or rock wool.

P. Perlite Loose-Fill Insulation: ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and limited dust generation during application).

Q. Cellulosic-Fiber Loose-Fill Insulation: Recycled cellulosic-fiber loose-fill-type insulation complying with ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.

R. Glass-Fiber Loose-Fill Insulation: Glass fibers processed to comply with ASTM C 764 for type (method of application) indicated below; maximum flame-spread and smoke-developed indices of 5 and 5, respectively, and as follows:

1. Type 1 for pneumatic application.

2. Type 2 for poured application.

S. Self-Supported, Spray-Applied, Cellulosic Insulation: Recycled or virgin wood-based cellulosic fiber complying with ASTM C 1149 for type indicated below, chemically treated for flame-resistance, processing, and handling characteristics.

1. Type I - products applied with liquid adhesive.

2. Type II - products applied with dry adhesive activated by water during installation.

T. Slag-Wool-Fiber Board Safing Insulation: Semirigid boards designed for use

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

as fire stop at openings between edge of slab and exterior wall panels, produced by combining slag-wool fibers with thermosetting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 4 lb/cu. ft. (64 kg/cu. m); passing ASTM E 136 for combustion characteristics; thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

1. Calking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.

2. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

U. Polyethylene Vapor Retarder: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).

V. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft. (12 kg/100 sq. m), with maximum permeance rating of 0.0507 perm (2.9 ng/Pa x s x sq. m).

1. Products: Subject to compliance with requirements, provide one of the following:

   a. DURA-SKRIM 6WW; Raven Industries, Inc.

   b. Griffolyn T-65; Reef Industries, Inc., Griffolyn Div.

W. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either a nonwoven grid of nylon cord or polyester scrim and weighing not less than 22 lb/1000 sq. ft. (10 kg/100 sq. m), with maximum permeance rating of 0.1317 perm (7.53 ng/Pa x s x sq. m) and flame-spread and smoke-developed indices of not more than 5 and 75, respectively.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. DURA-SKRIM 2FR; Raven Industries, Inc.

   b. Griffolyn T-55 FR; Reef Industries, Inc., Griffolyn Div.

X. Foil-Polyester Film Vapor Retarder: 2 layers of 0.5-mil- (0.013-mm-) thick polyester film laminated to an inner layer of 1-mil- (0.025-mm-) thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0 g/h x sq. m and with maximum flame-spread and smoke-developed indices of 15 and 5, respectively.

1. Product: Subject to compliance with requirements, provide the following:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Alumiseal Zero Perm; Alumiseal Corporation.

Y. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

Z. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

AA. Asphalt Coating for Cellular Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by cellular glass block insulation manufacturer.

AB. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch (6 mm) thick, formed under heat and pressure, standard sizes.

AC. Eave Ventilation Troughs: Preformed rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

AD. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.

2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches (2.67 mm) in diameter, length to suit depth of insulation indicated.

AE. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle, capable of holding insulation securely in position indicated with self-locking washer in place, and complying with the following requirements:

1. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.

2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches (2.67 mm) in diameter, length to suit depth of insulation indicated.

AF. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

1. Where spindles will be exposed to human contact after installation, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

AG. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.

1. Air Space: 1 inch (25 mm).
2. Air Space: 2 inches (50 mm).
3. Air Space: 3 inches (76 mm).

AH. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1.3 EXECUTION

A. Installation, General: Comply with insulation manufacturer's written instructions applicable to products and application indicated.

1. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
2. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement
3. Apply single layer of insulation to produce thickness indicated.
4. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.

C. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.

D. Place loose-fill insulation into spaces and onto surfaces as shown, either by pouring or by machine blowing to comply with ASTM C 1015.

1. For cellulosic loose-fill insulation, comply with the Cellulose Insulation Manufacturers Association's "Special Report--Standard Practice for Installing Cellulose Insulation."

E. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system.

F. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08114

CUSTOM STEEL DOORS AND FRAMES

1.1 GENERAL

A. Submittals: Submit Product Data, Shop Drawings, a door schedule, and Samples representing the required construction of doors and frames for Project.

B. Quality Assurance: Comply with HMMA 861.

C. Fire-Rated Door Assemblies: NFPA 252, identical to assemblies tested per ASTM E 152, and labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide custom steel doors and frames by one of the following:

1. [Insert Name of Manufacturer].

B. Hot-Rolled Steel Sheets: ASTM A 569 (ASTM A 569M).

C. Cold-Rolled Steel Sheets: ASTM A 366 (ASTM A 366M).

D. Galvanized Steel Sheets: ASTM A 526 (ASTM A 526M) with A 60 or G 60 (Z 180 or ZF 180) coating designation.

E. Stainless-Steel Sheets: ASTM A 167, Type 302 or 304, with No. 4 finish, unless otherwise shown.

F. Doors: Provide flush-design doors, 1-3/4 inches (44 mm) thick, complying with HMMA 861. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces and stile edges, except around glazed or louvered panel inserts, unless otherwise indicated.

For interior doors, fabricate units of 2 outer, cold-rolled, stretcher-leveled steel sheets not less than 0.0478 inch (1.2 mm) thick.

For exterior doors, fabricate units of 2 outer, galvanized, stretcher-leveled steel sheets not less than 0.0635 inch (1.6 mm) thick.

Where stainless-steel doors are indicated, fabricate units of 2 outer stainless-steel sheets not less than 0.0500 inch (1.3 mm) thick.

G. Panels: Provide panels of same materials, construction, and finish as specified for doors.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. Frames: Provide units complying with HMMA 861 with corners mitered, reinforced, and continuously welded full depth and width of frames.

1. For interior openings 48 inches (1200 mm) or less in width, fabricate frames from either hot-or cold-rolled steel sheets not less than 0.0598 inch (1.5 mm) thick.

   For interior openings over 48 inches (1200 mm) in width, fabricate frames from either hot- or cold-rolled steel sheets not less than 0.0747 inch (1.9 mm) thick.
   For exterior openings, fabricate frames from galvanized steel sheets not less than 0.0785 inch (2.0 mm) thick.

   For stainless-steel doors, fabricate frames from stainless-steel sheets not less than 0.0625 inch (1.6 mm) thick.

I. Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where indicated. Butt weld mullions and transom bars at crossings and to jambs according to HMMA 820. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.

J. Jamb Anchors: Furnish jamb anchors as required to secure frames to adjacent construction.

K. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

L. Rubber Door Silencers: Except on weatherstripped doors, drill stop in strike jamb to receive 3 silencers on single-door frames and drill head jamb stop to receive 4 silencers on double-door frames. Install plastic plugs to keep holes clear during construction.

M. Plaster Guards: Provide 0.0179-inch- (0.45-mm-) thick steel plaster guards or dust-cover boxes, welded to frame, at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

N. Door Louvers: Fabricate louvers and mount flush into doors without overlapping moldings on surface of door facing sheets.

O. Provide internal support as recommended by louver manufacturer. Prime paint after fabrication, except stainless steel.

   Interior Louvers: Sight-proof, stationary type, constructed of inverted Y-shaped blades.

   Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible links at 150 deg F (65 deg C) and labeled and listed for use in fire-rated door assemblies.

P. Provide stops and moldings around solid, glazed, and louvered panels where indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Q. Form fixed stops and moldings integral with frame, unless otherwise indicated.

R. Provide removable stops and moldings where indicated or required, formed of not less than 0.0359-inch- (0.9-mm-) thick steel sheets matching steel of frames. Secure with countersunk flat or oval head machine screws spaced uniformly not more than 12 inches (300 mm) o.c. Form corners with butted hairline joints.

S. Coordinate rabbet width between fixed and removable stops with type of glass or panel and type of installation indicated.

T. Provide terminated "hospital" stops on interior door frames where indicated on Drawings. Terminate stops 6 inches (150 mm) above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded steel filler plate, with welds ground smooth and flush with frame.

U. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

V. Hardware Preparation: Prepare doors and frames to receive hardware, including cutouts, reinforcing, mortising, drilling, and tapping according to final hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series specifications for door and frame preparation for hardware.

1. Hardware Reinforcement: As specified in HMMA 861 and located according to HMMA 830.

W. Finishes, General: Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

X. Shop Painting: Clean, treat, and paint exposed surfaces of steel doors and frames, including galvanized surfaces, but excluding stainless-steel surfaces.

Apply pretreatment to cleaned metal surfaces; use cold phosphate solution (SSPC-PT 2), hot phosphate solution (SSPC-PT 4), or basic zinc chromate-vinyl butyral wash primer (SSPC-Paint 27).

Apply shop coat of prime paint within time limits recommended by pretreatment manufacturer. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.02 mm).

Y. Galvanized Steel Finishes: Apply primers and finishes to doors and frames after fabrication.

Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply baked-on or air-dried primer immediately after cleaning and pretreatment.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Factory-Applied Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, air-dried or baked-enamel or polyester finish consisting of prime coat and topcoat, with a minimum dry film thickness of 1.25 mils (0.03 mm) for topcoat. Comply with paint manufacturer's instructions.
   a. Color and Gloss: As indicated by manufacturer's color and gloss designations.
   b. Color and Gloss: Match Architect's sample.
   c. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

Z. Steel Finishes: Apply primers and finishes to doors and frames after fabrication.
Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1. Comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

Pretreatment: Immediately after surface preparation, apply a conversion coating suited for top coating to be applied.

Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

Factory-Applied Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, air-dried or baked-enamel or polyester finish consisting of prime coat and topcoat that complies with ANSI A250.3. Comply with paint manufacturer's instructions to achieve a minimum dry film thickness of 1.25 mils (0.03 mm) for topcoat.

a. Color and Gloss: As indicated by manufacturer's color and gloss designations.
b. Color and Gloss: Match Architect's sample.
c. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

AA. Stainless-Steel Finishes: Grind and polish surfaces to produce No. 4 finish.

1.3 EXECUTION

A. Frame Installation: Install custom steel frames for doors, transoms, sidelights, borrowed lights, and other openings according to manufacturer's installation instructions and as specified.

Setting Masonry Anchorage Devices: Provide masonry anchorage devices where required for securing frames to in-place concrete or masonry construction.

2. Placing Frames: Set frames accurately in position, plumb, align, and brace securely until permanent anchors are set. After wall construction is complete,

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

a. At existing concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage devices.

b. At fire-rated openings, place frames according to NFPA 80.

B. Door Installation: Fit non-fire-rated doors accurately in their respective frames, with clearances as specified in HMMA 861.

C. Place fire-rated doors with clearances as specified in NFPA 80.

D. Comply with NFPA 105 for installing smoke-control doors.

E. Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.

F. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

G. Factory Finish Touchup: Minor finish imperfections may be repaired provided finish matches new work finish and is acceptable to Architect; otherwise remove and replace.

H. Stainless-Steel Touchup: Smooth abraded areas of stainless steel and polish to match undamaged finish.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08163

SLIDING ALUMINUM-FRAMED GLASS DOORS

1.1 GENERAL

A. Comply with provisions of AAMA/NWWDA 101/I.S.2 for standards of performance, materials, components, and fabrication, unless more stringent requirements are indicated.

B. AAMA Performance Requirements: Provide sliding aluminum-framed glass doors of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.

1 Performance Class and Grade: LC25.
2 Performance Class and Grade: C30.
3 Performance Class and Grade: HC40.
4 Exception to AAMA/NWWDA 101/I.S.2: In addition to requirements for performance class and performance grade, design glass framing system to limit lateral deflections of the edges of the glass to less than 1/175 of glass-edge length at design pressure based on structural computations.

C. Condensation Resistance: Where sliding aluminum-framed glass doors are indicated to be "thermally improved," provide doors tested for thermal performance according to AAMA 1503.1, showing a condensation-resistance factor of 45.

D. Thermal Transmittance: Provide sliding aluminum-framed glass doors with a U-value maximum of 0.69 Btu/sq. ft. x h x deg F (3.9 W/sq. m x K) at 15-mph (24-km/h) exterior wind velocity when tested according to AAMA 1503.1.

E. Submittals: As follows:

1 Product Data: For each type of sliding aluminum-framed glass door indicated, including construction details and fabrication methods; profiles and dimensions of individual components; data on hardware, accessories, and finishes; and recommendations for maintaining and cleaning exposed surfaces.

2 Shop Drawings: For each type of sliding aluminum-framed glass door indicated. Include information not fully detailed in manufacturer's standard Product Data. Include structural analysis data, signed and sealed by the qualified professional engineer responsible for their preparation, used to determine deflection limitations of glass framing systems.

3 Samples for Initial Selection: For typical frame members, one 12-inch-(300-mm-) long section in the specified finish. If finish involves color and texture variations, include sample sets consisting of two or more units showing the full range of variations expected.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4 Samples for Verification: Architect reserves the right to require additional Samples that show fabrication techniques, workmanship, and design of sliding glass door, hardware, and accessories.

5 Product Test Reports: From a qualified testing agency indicating that each type, grade, and size of sliding glass door complies with requirements, based on comprehensive testing of current products within the last four years. Test results based on use of downsized test doors will not be accepted.

F. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for determining wind loads and providing deflection calculations for sliding aluminum-framed glass door installations that are similar to those indicated for this Project in material, design, and extent.

G. Product Options: Drawings indicate size, profiles, dimensional requirements, and aesthetic effects of sliding aluminum-framed glass doors and are based on the specific doors indicated. Other manufacturers' products with equal performance characteristics may be considered provided deviations in size, profile, and dimensions are minor and do not alter the aesthetic effect. Refer to Division 1 Section "Substitutions."

H. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

I. Glazing Publications: Comply with written recommendations of glass manufacturers and GANA's "Glazing Manual," unless more stringent requirements are indicated.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. [Insert Name of Manufacturer].

B. Glass: Provide insulating-glass units that comply with safety glazing requirements and with Division 8 Section "Glazing."

C. Glazing System: Provide manufacturer's standard glazing system that produces weathertight seal.

D. Insect Screens: Manufacturer's standard screen complying with SMA 2006 and the following:

1 Glass-Fiber Mesh: 18-by-14 (1.4-by-1.8-mm) or 18-by-16 (1.4-by-1.6-mm) mesh of vinyl-coated glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; comply with ASTM D 3656. Charcoal gray color.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2 Wire Fabric: 18-by-16 (1.2-by-1.6-mm) mesh of 0.011-inch- (0.25-mm-) diameter, coated aluminum wire; complying with IWS 089, Type III. Charcoal gray finish.

E. Fabrication: Fabricate sliding aluminum-framed glass doors in sizes indicated that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring doors. Fabricate doors that are reglazable without dismantling panel framing, with weep holes and internal passages to conduct infiltrating water to exterior. Provide a tight-fitting, removable, framed insect screen, with a minimum of exposed fasteners and latches, for each operable sliding door panel.

F. Thermally Improved Construction: Fabricate sliding aluminum-framed glass doors with an integral, concealed, low-conductance thermal barrier; located between exterior materials and door members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

G. Factory-Glazed Fabrication: Glaze sliding aluminum-framed glass doors in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/NWWDA 101/I.S.2.

H. Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes and with applicable AAMA standard.

1 Class II, Clear Anodic Finish: AA-M12C22A31.
2 Class I, Clear Anodic Finish: AA-M12C22A41.
3 Class II, Color Anodic Finish: AA-M12C22A32/A34.
4. Class I, Color Anodic Finish: AA-M12C22A42/A44.
   a. Color: Light bronze.
   b. Color: Medium bronze.
   c. Color: Dark bronze.
   d. Color: Black.
   e. Color: Match Architect's sample.
   f. Color: As selected by Architect from the full range of industry colors and color densities.

5. Baked-Enamel Finish: AA-C12C42R1x. Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting. Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 603.8 except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss.

6. High-Performance Organic Finish: AA-C12C42R1x. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.
   a. Color: As indicated by manufacturer's designations.
   b. Color: Match Architect's sample.
   c. Color: As selected by Architect from manufacturer's full range.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.3 EXECUTION

A. Installation: Comply with manufacturer's written instructions. Set doors level, plumb, and true to line, without warp or rack of frames and panels. Provide proper support and anchor securely in place. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B to AAMA/NWWDA 101/I.S.2. Set sill members in bed of sealant or with gaskets.

B. Adjust operating panels, screens, and hardware to provide a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

C. Clean aluminum surfaces and glass immediately after installing sliding aluminum-framed glass doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, excess glazing and sealants, dirt, and other substances.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

E. Protect sliding aluminum-framed glass doors from damage or deterioration until time of Substantial Completion.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08211

FLUSH WOOD DOORS

1.1 GENERAL

A. Submittals: In addition to Product Data, submit the following:
Shop Drawings: Indicate location, size, and hand of each door; fire ratings; construction details; location and extent of hardware blocking, mortises, holes, and cutouts; requirements for veneer matching and factory finishing; and other pertinent data.

Samples of actual materials in small sections for each face material and finish.

B. NWWDA Quality Standard: NWWDA I.S.1-A, "Architectural Wood Flush Doors."

C. AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.

D. WIC Quality Standard: WIC's "Manual of Millwork" for grade of door, core, construction, finish, and other requirements.

E. Fire-Rated Wood Doors: Doors those are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [insert name of manufacturer].

B. Doors for Transparent Finish: As follows:
Grade: Premium (Grade A faces).
Grade: Custom (Grade A faces).
Grade: Economy (Grade B faces).
Faces: White birch, rotary cut.
Faces: Red oak, plain sliced.
Faces: White oak, rift cut.
Match between Veneer Leaves: Random match.
Match between Veneer Leaves: Pleasing match.
Match between Veneer Leaves: Slip match.
Match between Veneer Leaves: Book match.
Match within Door Faces: Running match.
Match within Door Faces: Balance match.
Match within Door Faces: Center balance match.
Pair and Set Match: Provide for pairs of doors and for doors hung in adjacent sets.

C. Doors for Opaque Finish: As follows:
Grade: Premium.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Grade: Custom.
Grade: Economy.
Faces: Medium-density overlay.
Faces: Medium-density overlay for exterior doors; any closed-grain hardwood for interior doors.
Faces: Medium-density overlay for exterior doors; hardboard for interior doors.
Faces: Any closed-grain hardwood.
Faces: Any closed-grain hardwood for exterior doors; hardboard for interior doors.
Faces: Hardboard.

D. Plastic-Laminate-Faced Doors: As follows:
Grade: Premium.
Grade: Custom.
Grade: Economy.
Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HSH.
Stiles: Plastic-laminate matching faces, applied before faces.
Stiles: Hardwood edges.

E. Exterior Doors: As follows:
Core: Particleboard core.
Core: Glued-block core.
Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
Construction: Seven plies.

F. Interior Solid-Core Veneer-Faced Doors: As follows:
Core: Particleboard core.
Core: Glued-block core.
Core: Nonglued- or glued-block core.
Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
Construction: Seven plies.

G. Interior Solid-Core Plastic-Laminate-Faced Doors: As follows:
Core: Particleboard core.
Core: Glued-block core.
Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before faces and crossbands are applied.
Construction: Three plies with stiles and rails bonded to core, then entire unit abrasive planed before faces are applied.

H. Interior Solid-Core Hardboard-Faced Doors: As follows:
Core: Particleboard core.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Core: Glued-block core.
Core: Nonglued- or glued-block core.
Construction: Hardboard faces glued directly to core with stiles and rails bonded to core, then entire unit abrasive planed before faces are applied.
Construction: Hardboard faces glued directly to core with either bonded or nonbonded core.

I. Fire-Rated Doors: As follows:
Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as required to provide fire rating indicated.
Edge Construction: Manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance.
Pairs: Furnish formed-steel edges and astragals for pairs of fire-rated doors, unless otherwise indicated.
Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

J. Hollow-Core Doors: As follows:
Core: Institutional hollow core.
Core: Standard hollow core.

K. Blocking: Provide blocking for particleboard-core, mineral-core, and hollow-core doors as necessary to eliminate need for through-bolting hardware. For mineral-core doors, provide composite blocking with improved screw-holding capability.

L. Fabricate flush wood doors in sizes indicated for Project site fitting.

M. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.

N. Factory machine doors for hardware that is not surface applied.

1. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

O. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
Light Openings: Trim openings with moldings of material and profile indicated.
Louvers: Factory install louvers in prepared openings.

P. Flash top of outswinging doors (with manufacturer's standard metal flashing).

Q. Shop prime exposed portions of doors for paint finish with one coat of wood primer specified in Division 9 Section "Painting."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

R. Shop seal faces and edges of doors for transparent finish with stain (if required), other required pretreatments, and first coat of finish as specified in Division 9 Section "Painting."

S. Factory Finishing: Finish wood doors at factory that are indicated to receive transparent finish. Field finish wood doors indicated to receive opaque finish.
Grade: Premium.
Grade: Custom.
Finish: AWI System TR-4 conversion varnish.
Finish: WIC System #2 conversion varnish.
Finish: AWI System TR-6 catalyzed polyurethane.
Finish: WIC System #3 catalyzed polyurethane.
Finish: Manufacturer's standard finish with performance requirements comparable to AWI System TR-4 conversion varnish.
Finish: Manufacturer's standard finish with performance requirements comparable to AWI System TR-6 catalyzed polyurethane.
Staining: None required.
Staining: Match approved sample for color.
Staining: As selected by Architect from manufacturer's full range of colors.
Effect: Open-grain finish.
Effect: Semifilled finish.
Effect: Filled finish.
Sheen: Satin.
Sheen: Semigloss.

1.3 EXECUTION

A. Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

B. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at Project site.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08212

STILE AND RAIL WOOD DOORS

1.1 GENERAL

A. Submittals: In addition to Product Data, submit the following:
Shop Drawings: Indicate location, size, and hand of each door; fire ratings; construction details for stiles, rails, panels, and moldings (sticking); mortises, holes, and cutouts; and other pertinent data.

Samples of actual materials in small sections for each face material and finish.

B. NWWDA Quality Standard: NWWDA I.S.6, "Industry Standard for Stile and Rail Doors."

C. AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.

D. WIC Quality Standard: WIC's "Manual of Millwork" for grade of door, core, construction, finish, and other requirements.

E. Fire-Rated Wood Doors: Doors that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

F. Safety Glass: Provide products complying with ANSI Z97.1 and testing requirements of 16 CFR, Part 1201, for Category II materials, unless those of Category-I are expressly indicated and permitted.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [insert name of manufacturer].

B. Exterior Stile and Rail Doors of Stock Design and Construction: Assemble with wet-use adhesives and comply with the following:
NWWDA Grade for Transparent Finish: Premium or Select.
NWWDA Grade for Opaque Finish: Standard.
Wood Species for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced.
Wood Species for Opaque Finish: Manufacturer's standard softwood species and cut for stiles and rails; with panels of same species or wood-base construction materials.
Glass for Openings: Uncoated, clear, fully tempered float glass, 5.0 mm thick.
Glass for Openings: Uncoated, insulating-glass units made from two lites of 3.0-mm-thick, clear, fully tempered glass with 1/4-inch (6.4-mm) airspace.
Design and Layout: Raised panel design as follows:

a. NWWDA Design Group: 1-3/4 Front Entrance Doors (Exterior).
1) Panel Design: As indicated.2) Panel Design: 2130-110.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. NWWDA Design Group: 1-3/4 and 1-3/8 Entrance Doors (Exterior).
1) Panel Design: As indicated.2) Panel Design: 944-562.

c. NWWDA Design Group: 1-3/4 Thermal (Insulated-Glass) Doors (Exterior).
1) Panel Design: As indicated.2) Panel Design: 5015.

d. NWWDA Design Group: Side Lights.
1) Panel Design: As indicated.2) Panel Design: 1703-677.

C. Interior Stile and Rail Doors of Stock Design and Construction: Comply with the following:
NWWDA Grade for Transparent Finish: Premium or Select.
NWWDA Grade for Opaque Finish: Standard.
Wood Species for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced.
Wood Species for Transparent Finish: Douglas fir or western hemlock, vertical sawed/sliced.
Wood Species for Transparent Finish: Red oak, quarter sawed/sliced.
Wood Species for Opaque Finish: Manufacturer's standard softwood species and cut for stiles and rails; with panels of same species or wood-base construction materials.
Panel Configuration: Raised.
Panel Configuration: Flat.
Design and Layout: As follows:

a. NWWDA Design Group: 1-3/8 Interior Panel Doors.
1) Panel Design: As indicated.2) Panel Design: 44-106.

b. NWWDA Design Group: Bifold Doors.
1) Panel Design: As indicated.2) Panel Design: 1423-1730.

c. NWWDA Design Group: Louver Doors.
1) Panel Design: As indicated.2) Panel Design: 1202-730.

D. Stile and Rail Doors of Special Design and Construction: Comply with the following:
Grade of Doors for Transparent Finish: Premium.
Grade of Doors for Transparent Finish: Custom.
Grade of Doors for Opaque Finish: Premium.
Grade of Doors for Opaque Finish: Custom.
Wood Species and Cut for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed.
Wood Species and Cut for Transparent Finish: Douglas fir or western hemlock, quarter sawed/sliced (vertical grain).
Wood Species and Cut for Transparent Finish: Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels.
Stile and Rail Construction for Transparent Finish: Veneered, finger-jointed softwood or laminated-strand lumber core with edges of species indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Stile and Rail Construction for Opaque Finish: Clear softwood, edge glued for width or finger jointed, or laminated-strand lumber with softwood edges and veneers.
Raised Panel Construction for Transparent Finish: Clear lumber, edge glued for width.
Raised Panel Construction for Transparent Finish: Wood-based panel product with veneer applied to both faces.
Raised Panel Construction for Opaque Finish: Clear softwood lumber, edge glued for width.
Raised Panel Construction for Opaque Finish: Shaped, medium-density fiberboard panels.
Flat Panel Construction for Transparent Finish: Veneered, wood-based panel product.
Flat Panel Construction for Opaque Finish: Medium-density fiberboard.

16. Exterior Doors: As follows:
    a. Stile, Top and Intermediate Rail Widths: 5-3/8 inches (137 mm).
    b. Bottom Rail Widths: 11-3/8 inches (289 mm).
    c. Raised Panel Thickness: 1-3/4 inches (44 mm).
    d. Raised Panel Thickness: 1-3/8 inches (35 mm).
    e. Raised Panel Thickness: 1-1/8 inches (29 mm).
    f. Glass for Openings: Uncoated, insulating-glass units made from two lites of 3.0-mm-thick, clear, fully tempered glass with 1/4-inch (6.4-mm) airspace.

17. Interior Doors: As follows:
    a. Stile, Top and Intermediate Rail Widths: 4-1/2 inches (114 mm).
    b. Bottom Rail Widths: 9 inches (229 mm).
    c. Raised Panel Thickness: 1-3/4 inches (44 mm).
    d. Raised Panel Thickness: 1-3/8 inches (35 mm).
    e. Raised Panel Thickness: 1-1/8 inches (29 mm).
    f. Raised Panel Thickness: 3/4 inch (19 mm).
    g. Flat Panel Thickness: 1/2 inch (13 mm).
    h. Flat Panel Thickness: 3/8 inch (10 mm).
    i. Flat Panel Thickness: 1/4 inch (6 mm).

    Interior Fire Doors: Fire-rated doors with 1-3/4-inch- (44-mm-) thick stiles and rails and 5/8-inch- (16-mm-) thick, veneered-particleboard, flat panels, complying with requirements indicated for interior doors.
    Interior Fire Doors: Fire-rated doors with 1-3/4-inch-(44-mm-) thick, edged and veneered mineral-core stiles and rails and 1-1/8-inch- (29-mm-) thick, rim-raised veneered mineral-core panels, complying with requirements indicated for interior doors.

E. Fabricate stile and rail wood doors in sizes indicated for Project site fitting.

F. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.

G. Factory machine doors for hardware that is not surface applied.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 8 Section "Glazing."

I. Glazed Openings: Trim openings indicated for glazing with solid wood moldings of profile indicated, with one side removable.

J. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

K. Exterior Doors: Factory treat exterior doors after fabrication with water repellent to comply with NWWDA I.S.4. Flash top of outswinging doors with manufacturer's standard metal flashing.

L. Shop prime exposed portions of doors for paint finish with one coat of wood primer specified in Division 9 Section "Painting."

M. Shop seal faces and edges of doors for transparent finish with stain (if required), other required pretreatments, and first coat of finish as specified in Division 9 Section "Painting."

1.3 EXECUTION

A. Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

B. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A08305

ACCESS DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract including General and Special Conditions apply to work of this Section.

1.2 SCOPE

This section covers the work of access doors as required by the Contract and includes aluminum access doors.

Extent of aluminum access doors is indicated on Drawings.

1.3 REFERENCE STANDARDS

Aluminum access doors work shall be performed in strict accordance with the stipulations of the latest edition of the British Specifications (BS) and/or the American Society for Testing and Materials (ASTM), as referenced to throughout this section, or other equivalent international standards and Sound Practice.

BRITISH STANDARD SPECIFICATIONS BS NO.:

BS 476	Part 8: Fire tests on building materials and structures. Test methods and criteria for the fire resistance of elements of building construction.
BS 641	Dimensions of small rivets for general purposes.
BS 693	General requirements for oxy-acetylene welding of mild steel.
BS 1224	Electroplated coatings of nickel and chromium
BS 1449	Parts 1 & 2 - Steel Plate, Sheet and Strip
BS 1449, 1470, 1471, 1472, 1473 & 1474	Wrought aluminum and aluminum. alloys for general purposes
BS 1615	Anodic Oxidation Coatings of Aluminum
BS 2569	Part 1: Aluminum or Zinc Sprayed Coatings.
BS 2981	Hot Dip Galvanizing
BS 2994	Cold Rolled Steel Sections
BS 3571	Part 1: Metal Welding

AMERICAN SOCIETY FOR TESTING AND MATERIALS ASTM NO.

123 Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products
209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
221 Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

509 Specification for Cellular Elastomeric Preformed Gasket and Sealing Material

1.4 SUBMITTALS

The Contractor shall submit the following for the approval of the Engineer:

1.4.1 **Product Data:** For each type of aluminum access door unit required, include the following:

- Manufacturer's standard construction details
- Profiles and dimensions of individual components
- Data on finishes, hardware and accessories
- Recommendations for maintenance and cleaning of exterior surfaces.

1.4.2 **Shop Drawings:** For each type of aluminum unit required. Include information not fully detailed in manufacturer's standard product data and the following:

- layout and installation details, including anchors
- Typical unit elevations
- Full-size details of typical composite members, including reinforcement
- Glazing details
- Hardware and accessories

1.4.3 **Samples for Initial Color Selection:** Samples of each specified finish on 300 mm long sections of frame members. Where finishes involve normal color variations, include sample sets showing the full range of variations expected.

1.5 QUALITY ASSURANCE

1.5.1 **Manufacturer Qualifications:** Engage an experienced manufacturer who has successfully manufactured aluminum access doors in design and extent to those required for this project.

1.5.2 **Installer Qualifications:** Engage an experienced installer of aluminum access doors similar in design and extent to those required for this project.

1.5.3 **Single-Source Responsibility:** Provide aluminum access doors produced by a single manufacturer who is capable of indicating prior successful production of units similar to those required.

1.5.4 **Field Measurements:** Check actual openings in construction work by accurate field measurement before fabrication. Show recorded measurements on final shop drawings.

1.5.5 **Coordination:** Coordinate fabrication schedule with construction progress to avoid delay.
Where necessary, proceed with fabrication without field measurements and co-ordinate fabrication tolerances to ensure proper fitting of entrance.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.6 DELIVERY, STORAGE AND HANDLING

Comply with manufacturer's recommendations for delivery, storage and handling of components of aluminum entrances.

PART 2- PRODUCTS

2.1 MATERIALS

2.1.1 **Aluminum Members:** Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.

Ultimate Tensile Strength: 1547 kg/cm^2

Aluminum Finish: Plastic Powder Coating as follows:

- Chemical Finish : Cleaning with compatible inhibiting chemicals
- Pretreatment : Thermosetting of chrome layer
- Plastic Powder : Epoxy polyester powder, with no additives, 60 microns minimum dry film thickness
- Application : Electrostatic, 10 minutes drying time at 200'C
- Color and Texture : As selected by the Engineer from manufacturer's standard colors

2.1.2 **Fasteners:** Provide fasteners of aluminum, nonmagnetic stainless steel or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.

2.1.3 **Reinforcement:** Where fasteners screw-anchor into aluminum less than 3.00 mm thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard non-corrosive pressed-in splined grommet nuts.

2.1.4 **Exposed Fasteners:** Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened. Provide Phillips flat-head machine screws for exposed fasteners.

2.1.5 **Concealed Flashing:** Provide 1.3 mm minimum dead-soft stainless steel or 0.70 mm minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

2.1.6 **Brackets and Reinforcements:** Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 123.

2.1.7 **Concrete/Masonry Inserts:** Provide concrete and masonry inserts fabricated from hot-dip galvanized steel complying with ASTM A 123.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.1.8 **Compression Weather-stripping:** Provide manufacturer's standard replace-able compressible weather-stripping gaskets of molded neoprene complying with ASTM C 509, Grade 4.

2.1.9 **Sliding Weather-stripping:** Provide manufacturer's standard replaceable weather-stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing.

2.1.10 **Glazing Panels:** Where indicated on Drawings, provide manufacturer's flush-laminated panels of thickness indicated, fabricated with rigid closed-cell urethane core, laminated with waterproof glue between two sheets of aluminum.

- Panel Thickness : 12.00 mm, minimum
- Aluminum Sheet Thickness : 1.60 mm

2.2 COMPONENTS

2.2.1 Aluminum Access Doors

Flush access doors with exposed trim consisting of frame with exposed trim, hardware and complying with the following requirements:

Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.
Design: Provide doors of manufacturer's standard design.

Glazing: Fabricate doors to facilitate replacement of glazing or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops with exterior stops anchored for non-removal.

2.3 HARDWARE

2.3.1 **General:** Provide manufacturer's heavy-duty hardware units as indicated, scheduled, or required for operation of each access door, including the following items of sizes, number and type recommended by manufacturer for service required; finish to match door.

2.3.2 **Ball-Bearinq Butts:** Provide 3-knuckle, 2-bearings, steel ball bearing butts sized to comply with door height.

2.3.3 **Keyed Cylinders:** Key operated cylinder locks.

2.3.4 **Pull Handles:** Provide standard aluminum pull handles of style from manufacturer's standard.

2.4 FABRICATION

2.4.1 **General:** Sizes of access door and frame units and profile requirements are indicated on Drawings.

2.4.2 **Prefabrication:** Before delivery to the project Site, complete fabrication, assembly, finishing, hardware application and other work to the greatest

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

extent possible. Disassemble components only as necessary for delivery and installation.

Pre-glaze door and frame units to greatest extent possible.

Do not drill and tap for surface-mounted hardware items until time of installation at project Site.

Perform fabrication operations, inc1uding cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

2.4.3 **Welding:** Comply with American Welding Society (AWS) recommendations; grind exposed welds smooth and restore mechanical finish.

2.4.4 **Reinforcing:** Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.

2.4.5 **Dissimilar metals:** Separate dissimilar metals with zinc chromate primer, bituminous paint or other separator that will prevent corrosion.

2.4.6 **Continuity:** Maintain accurate relation of planes and angles, with hairline fit of contacting members.

2.4.7 **Fasteners:** Conceal fasteners wherever possible.

2.4.8 **Weather-stripping:** Provide compression weather-stripping against fixed stops; at other edges provide sliding weather-stripping retained in adjustable strip mortised into door edge.

Provide EPDM or vinyl blade gasket weather-stripping in bottom door rail adjustable for contact with threshold.

PART 3 - EXECUTION

3.1 INSTALLATION

Comply with manufacturer's instructions and recommendations for installation.

Set units plumb, level and true to line, without warp or rack of framing members, doors or panels. Provide proper support and anchor securely in place.
Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements.

Set sill members and other members in bed of sealant or with joint fillers or gaskets to provide weather tight construction. Comply with requirements of Division-7, Section 07900 "Joint Sealers" for sealants, fillers and gaskets.

Install glazing panels, where required, as specified in Division-8, Section 08800 "Glass and Glazing".

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.2 ADJUSTING

Adjust operating hardware to function properly, for smooth operation without binding and for weather tight closure.

3.3 CLEANING

Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

3.4 PROTECTION

Institute protective measures required throughout the remainder of the construction period to ensure that aluminum access doors shall be without damage or deterioration, other than normal weathering, at time of substantial completion.

3.5 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08311

ALUMINUM SLIDING GLASS DOORS

1.1 GENERAL

A. This Section includes residential-grade aluminum sliding glass doors.

1. Glazing requirements, including those specified to be factory-glazed, are specified in Division 8 Section "Glazing."

B. Design Requirements: Comply with structural performance, air infiltration, and water penetration requirements indicated in AAMA 101 for each grade and performance class required.

1. Optional Performance Class Requirements: Where the required design pressure exceeds the minimum for the specified door grade, comply with AAMA 101, Section 3 "Optional Performance Classes" for higher than minimum performance class.

a. Design wind velocity at Project site is 70 mph.

C. Testing Requirements: Test each door grade and size, according to ASTM E 330 for structural performance, ASTM E 283 for air infiltration, and ASTM E 547 for water penetration. Comply with AAMA 101 for sample size.

1. Operating Force: Adjust each moving panel before testing so the maximum force to open the panel is 30 lbf and the maximum force required to maintain motion is 20 lbf.

D. Performance Requirements: Each door unit shall comply with the following performance requirements:

1. Structural Performance: Doors shall not show evidence of failure or permanent deflection of frame or panel after testing according to ASTM E 330 at a positive and negative test pressure of 22.5 lbf per sq. ft.

Air Infiltration: Not more than 0.37 cfm per sq. ft. of area at an inward test pressure of 1.57 lbf per sq. ft. when tested according to ASTM E 283.

Water Penetration: No water leakage at an inward test pressure of 2.86 lbf per sq. ft. when tested according to ASTM E 547.

Deglazing: No disengagement of glazing surround members of operable panels when tested according to ASTM E 987 at 70 lbf on vertical rails and 50 lbf for other rails.

E. Condensation Resistance: Provide thermal-break construction with condensation resistance factor (CRF) not less than 45 when tested according to AAMA 1502 at outside design temperature of zero deg F

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

with a wind velocity of 15 mph and an inside relative humidity of 25 percent at 68 deg F.

Thermal Transmittance: Provide a maximum U-value of 0.69 Btu/hour/sq. ft/deg F at 15 mph exterior wind velocity.

Forced-Entry Resistance: Performance Level 10 when tested according to ASTM F 842.

F. Submittals: Submit the following:

Product data for each type of door required. Include profiles and dimensions; construction details; data on finishes, hardware, and accessories; and recommendations for maintenance and cleaning of exterior surfaces.

Shop drawings for each type of door required. Include layout and installation details, including anchors; typical elevations; full-size details of members, including reinforcement; glazing details; and hardware and accessories.

Samples for Initial Color Selection: Samples of each finish on 12-inch-long sections of frame members. Where finishes involve normal variations, include sets showing full range of variations.

Samples for Verification Purposes: The Architect reserves the right to require additional samples that show fabrication and workmanship and design of hardware and accessories.

Certification: Provide certification by an independent testing agency showing that each type, grade, and size of door complies with performance requirements indicated.

Material Test Reports: Provide certified test results from a recognized independent testing agency showing that each required type, grade, and size of door complies with performance requirements indicated.

G. Safety Glass Standard: Where required, provide glass that complies with ANSI Z97.1 and 16 CFR for Category II materials.

H. Glazing Standards: Comply with recommendations of the Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual."

I. Insulating Glass Certification Program: Provide insulating glass units marked either on spacers or at least one component pane with the label of the Insulating Glass Certification Council (IGCC).

J. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements and are based on the specific type and model indicated. Units by other manufacturers may be considered provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.2 PRODUCTS

A. Aluminum Extrusions: Alloy and temper recommended for the strength, corrosion-resistance, and application of required finish; not less than 22,000-psi ultimate tensile strength; and not less than 0.062-inch thickness at any location for main frame and panel members.

1. Sill Cap (Track): Extruded aluminum track of profile indicated.

B. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive material, compatible with door members and other components.

Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in splined grommet nuts.

Exposed Fasteners: Use exposed fasteners (Phillips flat-head screws) only to apply hardware. Match the finish of the member or hardware being fastened.

C. Anchors, Clips, and Accessories: Fabricate anchors, clips, and sliding glass door accessories of aluminum, non-magnetic stainless steel or hot-dip, zinc-coated steel complying with ASTM A 123; provide strength sufficient to withstand design pressure indicated.

D. Compression Weatherstripping: Provide compressible weatherstripping of molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4, designed for permanent resilient sealing under bumper or wiper action, concealed when door is closed.

E. Sliding Weatherstripping: Provide woven-pile weatherstripping of wool, polypropylene, or nylon pile, with resin-impregnated backing fabric and an aluminum backing strip; comply with AAMA 701.2.

F. Insect Screens: Provide movable insect screen panel for each movable glazed panel. Comply with SMA 2005.

Screen Fabric: 18-by-14 or 18-by-16 mesh of plastic-coated glass-fiber threads, woven and fused to form a screen resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; black or dark grey. Comply with FS L-S-125.

Screen Fabric: 18-by-14 or 18-by-16 mesh of 0.013-inch-diameter aluminum wire; comply with FS RR-W-365, Type VII, except use black-anodized or gun metal coating on wire.

Insect Screens Frames: Formed or extruded aluminum frames and removable vinyl fabric-retainer spline. Comply with SMA 1004.

a. Finish: Anodized to match aluminum of door members.

G. Glass and Glazing Materials: Comply with ANSI Z97.1 and requirements of Division 8 Section "Glazing" of these specifications.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. Hardware: Provide hardware to properly operate, tightly close, and securely lock doors. Do not use aluminum in frictional contact with other metals. Where exposed, provide white bronze, cast or wrought aluminum, solid white metal with special-coating finish, or nonmagnetic stainless steel.

Roller Assemblies: Provide movable panels with rollers and roller assemblies that conform to AAMA 906.3.

Door Pulls: Provide wood pull grips.
Locks: Install standard pull and keyless locking device on each movable panel, lockable from the inside only.

I. Fabrication: Fabricate aluminum sliding glass door units to comply with indicated standards. Include a complete system to assemble components and anchorage of units.

Provide units that are reglazable without dismantling panel framing.

Thermal-Break Construction: Fabricate units with an integrally concealed, low-conductance thermal barrier, located between exterior materials and exposed interior members in a manner that eliminates direct metal-to-metal contact.

Weepholes: Provide weepholes and other internal water passages to conduct infiltrating water to the exterior.
Assembly: Assemble components into complete weathertight units with flush, rigid, and hairline joints. Mill, cope, butt, and miter joints; secure by mechanical devices or by other means to ensure permanently watertight joints. Provide at least two corrosion-resistant, pre-lubricated or self-lubricating rollers for each sliding panel of sufficient capacity to ensure easy, quiet, and smooth operation.

Weatherstripping: Provide operable panels with a double row of sliding weatherstripping in horizontal rails and single- or double-row weatherstripping in meeting or jamb stiles, as required, to meet specified performance requirements. Provide compression-type weatherstripping at the perimeter of each movable panel where sliding-type weatherstripping is not appropriate.

a. Provide weatherstripping locked in to extruded grooves in the panels.

1. Preglazed Fabrication: Glaze aluminum sliding glass door units in the factory where practical and possible for the applications indicated. Comply with Division 8 Section "Glazing" and AAMA

101. Glazing Stops: Provide snap-on glazing stops, coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match panel frames.

Screens: Provide insect screen unit for each operable panel. Design door units and hardware to accommodate screens in a tight-fitting removable arrangement on either inside or outside of door unit with a minimum of exposed fasteners and latches.

J. Finishes: Comply with NAAMM "Metal Finishes Manual."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Class II Clear-Anodized Finish: AA-M12C22A31.
Class I Clear-Anodized Finish: AA-M12C22A41, comply with AAMA 607.1.
Class II Color-Anodized Finish: AA-M12C22A32/A34.

1. Class I Color-Anodized Finish: AA-M21C22A42/A44, comply with AAMA 606.1 or AAMA
   a. Color: Light Bronze.
   b. Color: Medium Bronze.
   c. Color: Dark Bronze.
   d. Color: Black.
   e. Color: As selected by the Architect from within standard industry colors and color density range.

2. Baked Enamel Finish: AA-C12C42R1x. Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting.

   a. Organic Coating: Provide a thermosetting-modified acrylic enamel primer and topcoat system complying with AAMA 603.8, except provide a minimum dry film thickness of 1.5 mil, medium gloss.

   b. Color: As selected by the Architect from manufacturer's standard colors. High-Performance Organic Coating: AA-C12C42R1x; (Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's instructions.

608.1.
   a. Fluoropolymer Two-Coat Coating System: Two-coat, thermo-cured system, composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene resin by weight; complying with AAMA 605.2.

      1) Color and Gloss: As selected by the Architect from manufacturer's standard choices for color and gloss.

1.3 EXECUTION

A. Examination: Inspect openings before installation. Verify that rough opening is correct and the sill plate is level. Do not proceed until unsatisfactory conditions have been corrected.

Masonry surfaces shall be visibly dry and free of excess mortar, sand, or other construction debris. Wood frame walls shall be dry, clean, sound and well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in the opening and within 3 inches of the opening.

B. Installation: Comply with manufacturer's instructions.
Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at contact points with other materials.

1. Set sill and frame members in a bed of compound or with joint fillers or gaskets for a weathertight construction. Coordinate installation with wall flashing.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets installed concurrently with sliding glass door units.

Set units plumb, level, and true to line, without warp or rack of frames and panels. Provide support and anchor frames and fixed panels securely in place.

C. Adjust operating panels, screens, and hardware for a tight fit at contact points and weatherstripping for smooth operation and weathertight closure.

D. Cleaning: Clean aluminum after installation. Avoid damaging protective coatings and finishes. Remove excess glazing and sealing compounds, dirt, and other substances. Lubricate hardware and moving parts.

E. Clean glass promptly after installation. Wash and polish glass on both faces 4 days before final inspection. Comply with manufacturer's recommendations for final cleaning and maintenance.

F. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged during the construction period.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08410

ALUMINUM ENTRANCES AND STOREFRONTS

1.1 GENERAL

A. System Description: Provide aluminum entrance and storefront systems capable of withstand ding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes air infiltration and water penetration exceeding specified limits; and framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.

Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch (19 mm), whichever is smaller, unless otherwise indicated.

1. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

    a. Test Pressure: 150 percent of inward and outward wind-load design pressures.

    b. Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.

E. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load. Provide a minimum 1/8-inch (3.18-mm) clearance between members and top of glazing or other fixed part immediately below. Provide a minimum 1/16-inch (1.59-mm) clearance between members and operable windows and doors.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

F. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. (0.3 L/s/sq. m) of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75.2 Pa).

G. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. (299 Pa).

H. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

I. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.

J. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F (3.57 W/sq. m x K) when tested according to AAMA 1503.1.

K. Submittals: Product Data for each product specified and the following:

1. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

a. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

L. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.

M. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

N. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [insert name of manufacturer].

B. Materials: As follows:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

   a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
   b. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).
   c. Extruded Structural Pipe and Tubes: ASTM B 429.
   d. Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
   e. Welding Rods and Bare Electrodes: AWS A5.10.

   Steel Reinforcement: Complying with ASTM A 36 (ASTM A 36M) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 (ASTM A 570M) for hot-rolled sheet and strip.

   Glazing as specified in Division 8 Section "Glazing."
   Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

   Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

   Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."

   Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Components: As follows:
Doors: Provide manufacturer's standard 1-3/4-inch- (44.5-mm-) thick glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods. Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.

Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

1. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

    a. Reinforce members as required to retain fastener threads.

    b. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

    Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

    Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.

    Weather Stripping: Manufacturer's standard replaceable weather stripping.

D. Hardware: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.

E. Fabrication: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing. Prepare components to receive concealed fasteners and anchor and connection devices.

Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

1. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

   a. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.

   b. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.

F. Aluminum Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

1. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

2. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

3. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) co plying with AAMA 606.1 or AAMA 608.1.
   a. Color: Light bronze.
   b. Color: Medium bronze.
   c. Color: Dark bronze.
   d. Color: Black.
   e. Color: Match Architect's sample.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

f. Color: As selected by Architect from the full range of industry colors and color densities.

G. Steel Priming: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer. Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel. Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

1.3 EXECUTION

A. Installation, General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.

1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

G. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

H. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:

Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

J. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.

K. Remove excess sealant and glazing compounds, and dirt from surfaces.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08520

ALUMINUM WINDOWS

1.1 GENERAL

A. This Section includes Residential Grade aluminum windows of the performance class indicated.

B. Performance Requirements: Provide windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.

C. Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of windows required. Where required design pressure exceeds the minimum for the specified window grade, comply with AAMA 101, Section 3, "Optional Performance Classes."

D. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:

1. Design wind velocity at Project site is 70 mi./h (113 km/h).

2. Heights of window units above grade at window centerline are indicated on or can be determined from the Drawings. Consult with the Architect, if necessary, to confirm required loading and test pressures.

3. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance.

E. Submittals:

Submit the following:

1. Product Data for each type of window required, including construction details and fabrication methods; profiles and dimensions of individual components; data on hardware, accessories, and finishes. Include recommendations for maintaining and cleaning exterior surfaces.

2. Shop Drawings showing fabrication and installation of each type of window required. Include layout and installation details, elevations at 1/4 inch = 1 foot (1:50) scale, typical window unit elevations at 3/4 inch = 1 foot (1:20) scale, and full-size section details of typical composite members.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Samples for initial color selection on 12-inch- (300-mm-) long sections of window members. Where finishes involve normal color variations, include Sample sets showing the full range of variations expected.

4. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated. Test results based on use of down-sized test units will not be accepted.

F. Product Options:

The Drawings indicate sizes, profiles, dimensional requirements, and aesthetic effects of aluminum windows and are based on the specific window types and models indicated. Other aluminum window manufacturers whose products have equal performance characteristics may be considered provided deviations in size, profile, and dimensions are minor and do not alter the aesthetic effect. Refer to Division 1 Section "Substitutions."

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. [insert name of manufacturer].

B. Aluminum Extrusions: Alloy and temper recommended for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength and not less than 0.062 inch (1.6 mm) thick at any location for main frame and sash members.

C. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted to be noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, splined grommet nuts.

2. Except for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

D. Anchors, Clips, and Window Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel complying with ASTM B 633 and of sufficient strength to withstand design pressure indicated.

E. Hardware: Aluminum, stainless steel or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.

1. Four-Bar Friction Hinges: Comply with AAMA 904.1.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Friction Shoes: Nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

2. Gear-Type Rotary Operators: Comply with AAMA 901.1 for rotary operators. Comply with ASTM E 405, Method A, when subjected to operating moments and closing torques indicated in AAMA 101.

a. Operator shall operate all ventilators simultaneously, securely closing them at both jambs without using additional manually controlled locking devices.

3. Push-Bar-Type Operators: Telescoping-type push-bar operator designed to open and close ventilators with fixed screens.

4. Limit Device: Manufacturer's standard, concealed friction adjustor, adjustable stay bar, limit device designed to restrict ventilator opening.
5. Counterbalancing Mechanism: Comply with AAMA 902.2.

a. Sash-Balance Type: Concealed block-and-tackle type of size and capacity to hold sash stationary at any open position.

b. Sash-Balance Type: Concealed-spiral type of size and capacity to hold sash stationary at any open position.
c. Sash-Balance Type: Concealed-tape-spring type of size and capacity to hold sash stationary at any open position.

F. Accessories: Manufacturer's standard accessories that comply with indicated standards. Architectural Specifications 31 July 2008

1 Window Cleaner Anchor Bolts: Standard design, nonmagnetic stainless steel, complying with governing regulations and ANSI A39.1.

2. Insect Screens: For each operable exterior sash or ventilator. Locate on inside or outside of window, depending on window type.

a. Wire-Fabric Insect Screen: 18-by-18 (1.1-by-1.1-mm), 18-by-16 (1.1-by-1.3-mm), or 18-by-14 (1.1-by-1.5-mm) mesh of 0.013-inch- (0.3-mm-) diameter, coated aluminum wire, complying with FS RR-W-365, Type VII.

b. Wire-Fabric Insect Screen: 18-by-18 (1.2-by-1.2-mm), 18-by-16 (1.2-by-1.4-mm), or 18-by-14 (1.2-by-1.6-mm) mesh of 0.009-inch- (0.2-mm-) diameter, stainless-steel wire, complying with FS RR-W-365, Type VI.

c. Wickets: Sliding or hinged-type wickets, framed and trimmed for a tight fit and durability during handling.

d. Screen Frames: Tubular-shaped, extruded- or formed-aluminum members of 0.040-inch- (1-mm-) minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Finish frames to match window units.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1) Provide removable PVC spline-anchor concealing edge of screen frame.

3. Weatherstripping: Sliding-type weatherstripping where sash rails slide horizontally or vertically along unit frame. Provide compression-type weatherstripping at perimeter of each operating sash where sliding type is inappropriate.

   a. Provide weatherstripping locked into extruded grooves in sash.

4. Pole Operators: One pole operator and pole hanger for every room that has operable windows more than 72 inches (1800 mm) above floor. Fabricate pole of tubular-shaped anodized aluminum with rubber cap at lower end and standard push-pull hook at top. Provide sufficient length for window operation without reaching more than 60 inches (1500 mm) above floor.

G. Casement Windows: Comply with requirements of AAMA Grade and Performance Class C-R15. Window units shall successfully pass vertical deflection and hardware load test performance requirements specified in AAMA 101.

1. Hardware: Equipment and operating hardware as follows:

   a. Operating Device: Gear-type rotary operator located on jamb at sill.

   b. Operating Device: Combination lever handle and cam latch.

   c. Hinges: Concealed 4-bar friction hinges with adjustable slide shoe (2 per ventilator).

   d. Hinges: Heavy-duty, 3-knuckle butt hinges with nylon bushings (2 per ventilator).

   e. Hinges: Extension hinges or pivots, nonfriction type (2 per ventilator).

      1) Provide operation that provides access for cleaning.

   f. Lock: Lift-type, cam-action lock.

   g. Limit Device: Stay bar with adjustable hold-open device.

H. Double-Hung Windows: Comply with requirements of AAMA Grade and Performance Class DH-R15. Window units shall successfully pass operating force test performance requirements specified in AAMA 101.

1. Provide window units with tilt-in feature permitting both sides of sash to be cleaned from interior.

2. Hardware: Equipment and operating hardware as follows:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Sash Balances: Manufacturer's standard type (2 per sash).

b. Sash Lock: Cam-action sweep lock and keeper on meeting rail.

c. Sash Lock: Spring-loaded snap-type lock on bottom rail of lower sash (2 per sash).

d. Sash Lock: Pole-operated, cam-action locking device on meeting rail of windows with meeting rail more than 72 inches (1800 mm) above floor.

e. Tilt Lock: Tamperproof, key-operated tilt mechanism to permit sash to tilt inward for cleaning.

f. Lift Handle: Applied sash lifts on bottom rail of lower sash (2 per sash).

g. Pull-Down Handles: Applied handles on bottom rail of upper sash (2 per sash).

h. Pole Socket: Pole socket or groove on inside face of top rail of upper sash on window units with meeting rails more than 72 inches (1800 mm) above floor.

I. Horizontal-Sliding Windows: Comply with requirements of AAMA Grade and Performance Class HS-R15. Window units shall successfully pass operating force test performance requirements specified in AAMA 101.

1 Provide windows with sash that is removable from inside for cleaning.

2. Hardware: Operating hardware as follows:
   a. Sash Rollers: Steel, lubricated ball-bearing rollers with nylon tires.
   b. Sash Rollers: Nylon rollers.
   c. Lock: Cam-action sweep sash lock and keeper at meeting rails.
   d. Lock: Spring-loaded snap-type lock at jambs (2 per sash).
   e. Lock: Spring-loaded plunger lock on meeting rail (2 per sash).

J. Projected Windows: Comply with requirements of AAMA Grade and Performance Class P-R15. Window units shall successfully pass hardware load test requirements specified in AAMA 101.

1. Hardware: Equipment and operating hardware as follows:

   a. Operating Device: Crank-operated, pivot-shoe-type, under screen ventilator operator.

   b. Hinges: Concealed 4-bar friction hinges with adjustable slide shoe (2 per ventilator).

   c. Hinges: 5-knuckle butt hinges (2 per ventilator).

      1) Provide operation that permits cleaning of outside glass face from the interior.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

d. Lock: Cam-action, sweep lock handle with surface-mounted strike.

e. Lock: Custodial lock with removable handle.

f. Lock: Key-operated security lock and keeper.

g. Lock: Pole-operated, spring-catch lock.

h. Lock: Pole-operated, cam-action, sweep lock handle and keeper.

i. Limit Device: Stay bar with adjustable hold-open device.

K. Fixed Windows: Comply with requirements of AAMA Grade and Performance Class F-R15.

L. Fabrication: Window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units. Provide units that are reglazable without dismantling sash or ventilator framing.

M. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance, thermal barrier, between exterior materials and window members exposed on interior, in a manner that eliminates direct metal-to-metal contact.

1. Weep holes and internal passages to conduct infiltrating water to exterior.

2. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

3. Subframes with anchors for windows, of profile and dimensions indicated but not less than 0.062-inch-(1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match windows.

4. Mullions: Match window units. Provide anchors for support to structure and installation of windows. Allow for erection tolerances and provide for movement of windows due to thermal expansion and building deflections.

5. Glazing Stops: Screw-applied or snap-on glazing stops. Finish to match windows.

N. Preglazed Fabrication: Preglaze window units where possible and practical. Comply with glass and glazing requirements of Division 8 Section "Glazing" of these Specifications and AAMA 101.

O. Finishes: Comply with NAAMM "Metal Finishes Manual." Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

P. Class II, Clear Anodic Finish: AA-M12C22A31.

Q. Class I, Clear Anodic Finish: AA-M12C22A41.

R. Class II, Color Anodic Finish: AA-M12C22A32/A34.

S. Class I, Color Anodic Finish: AA-M12C22A42/A44.

1 Color: Light bronze.

2 Color: Medium bronze.

3 Color: Dark bronze.

4 Color: Black.

5 Color: As selected by Architect from the full range of industry colors and color densities.

T. Baked-Enamel Finish: AA-C12C42R1x. Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting, modified-acrylic enamel primer and topcoat system complying with AAMA 603.8 except with a minimum dry film thickness of 0.7 mils (0.02 mm), medium gloss.

a. Color: As selected by Architect from manufacturer's full range of colors.

U. High-Performance Organic Coating Finish: AA-C12C42R1x. (Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's instructions.

1. Fluoropolymer 2-Coat Coating System: 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

a. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

1.3 EXECUTION

A. Inspection: Inspect openings before installation. Verify that rough opening is correct and sill plate is level.

B. Installation: Comply with manufacturer's recommendations for installing window units, hardware, operators, and other components. Set windows plumb, level, and true to line, without warp or rack of frames or sash. Anchor securely in place.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action.

C. Set sill members and other members in a bed of sealant or with joint fillers or gaskets to provide weathertight construction. Coordinate installation with wall flashings and other components of the Work.

D. Field Quality Control: Conduct on-site tests with window manufacturer's representative present. The Architect will select units to be tested. Testing shall be performed by a qualified independent testing agency selected by the Architect.

1 Air-Infiltration Tests: Conduct according to requirements of ASTM E 783. Allowable infiltration shall not exceed 1.5 times the amount indicated.

2 Water-Resistance Tests: Conduct according to requirements of ASTM E 1105. No water leakage is permitted.

3 Window units not meeting specified requirements and units having similar deficiencies shall be corrected at no cost to the Owner.

E. Adjust operating sash and hardware to provide tight fit at contact points and weatherstripping for smooth operation and a weathertight closure.

F. Clean aluminum promptly after installing windows. Avoid damage to finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

G. Clean glass of preglazed units promptly after installing windows.

H. Protect installed aluminum windows to ensure that they are without damage or deterioration at the time of Substantial Completion.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08710

DOOR HARDWARE

1.1 GENERAL

A. Submit samples of hardware items, showing each required finish from each manufacturer (for acceptance of color and texture only).

B. Submit final hardware schedule organized by "hardware sets," to indicate specifically the product to be furnished for each item required on each door.

1. Furnish templates to each fabricator of doors and frames as required for hardware preparation.

C. For fire-rated openings provide hardware tested and listed by UL or FM (NFPA Standard 80). On panic exit devices provide UL or FM label indicating "Fire Exit Hardware."

D. Hardware Allowance: See Division 1 for amount and procedures for purchase and payment (overrun or underrun). The costs of handling and installation are not covered by the allowance.

1.2 PRODUCTS

A. Number Designations: Numbers indicating hardware items are ANSI/BHMA standard number designations.

B. Manufacturers: Subject to compliance with requirements, provide products by manufacturers for various products listed below. An asterisk (*) following manufacturer's name designates manufacturer whose products are indicated in Hardware Schedule. Such products are listed in the schedule by specific reference to manufacturer's catalog numbers. Except as otherwise indicated, products of equivalent quality, design, and function by other listed manufacturers may be used, subject to approval of Architect.

Butts and Hinges: Stanley*.
Pivots: Stanley.
Key Control System: Key Control Systems, Telkee.
Cylinders and Locks: Corbin & Russwin, Schlage*, Yale.
Bolts: Stanley.
Exit/Panic Devices: Yale.
Push/Pull Units: Baldwin*
Overhead Closers: Yale.
Smoke-Activated Closers: Yale.
Floor Closers: Dor-O-Matic.
Door Control Devices: Baldwin.
Door Trim Units: Baldwin*.
Kick, Mop, and Armor Plates:
Sliding, Sliding Pocket, and Bifold Door Hardware: Stanley.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Door Stripping and Seals: Zero.
Thresholds: Zero.
Automatic Drop Seals and Astragals: Zero.
Sound Stripping: Zero.

C. Finish and base material designations are indicated in accordance with ANSI BHMA A156.18 or the nearest traditional U.S. commercial finish.

1. Where base material and quality of finish are not otherwise indicated, provide at least the commercially recognized quality specified in ANSI/BHMA A156 series standards applicable to each particular type of hardware.

D. Hinges and Pivots: Provide full-mortise butt, size, weight, and quantity in accordance with requirements established for door size, weight, and frequency of use.

Pins: Stainless steel, except steel pins with steel hinges; nonremovable for exterior and public interior exposure; nonrising for nonsecurity exposure; flat button with matching plugs.

Ball-Bearing: Swaged, inner leaf beveled, square corners.

Plain-Bearing: Swaged, inner leaf beveled, rounded corners; except provide ball-bearing for doors equipped with closers.

E. Locks, Latches, and Bolts: Provide new masterkey system with properly sized key control system.

1. Strikes: Wrought box strikes with extended lip for latch bolts, except open strike plates may be used in wood frames. Provide dust-proof strikes for foot bolts.

F. Equip exit devices with dogging devices where door has closer, except when door is fire-rated.

G. Locks: Equip locks with 6-pin tumbler cylinders.

Bored: Extra heavy duty cylindrical with removable cores.

Mortise: Heavy duty locksets with latch bolt, lever handles, and UL listed and labeled.

H. Flush Bolts: Minimum of 1/2-inch-diameter brass, bronze, or stainless steel rods with minimum 12-inch-long rod.

I. Push/Pull Units: Manufacturer's standard type scheduled, through-bolted for matched pairs.

J. Overhead Closers: Where parallel-arm closers are indicated, provide units one size larger than recommended for standard-arm units.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

K. Floor Closers: Provide recessed plates to receive insert of resilient, stone, or terrazzo floor finish.

L. Combination Door Closers and Holders: Units designed to release and automatically close doors under fire conditions with integral electromagnetic holder mechanisms and UL listed fire detectors complying with UL 228.

M. Holders, Stops, and Bumpers: Provide grey rubber exposed resilient parts.

Finish exposed metal to match hardware, except finish floor plates to match finish of thresholds.
Size and mount units indicated or, if not indicated, to comply with manufacturer's recommendations for the exposure condition. Reinforce the substrate as recommended.

N. Silencers: Provide silencers in metal door frames, unless not permitted for fire rating, or weather-stripping is provided; 3 per single-door frame, 4 per double-door frame.

O. Coordinators: Provide device for pairs of doors with closers and astragal on active leaf or automatic flush bolts on inactive leaf.

P. Miscellaneous Door Hardware: Provide plates, trim, letter box, viewers, knockers, bells, and similar units as indicated.

Q. Edge Trim: Fabricate units 1/16 inch to 1/2 inch smaller than actual door dimension. Install with self-tapping screws.

1. Provide .050-inch-thick (18 gage) stainless steel with beveled edges and No. 4 polish for kick plates, armor plates, and edge protection stripping (regardless of finish or other hardware).

R. Armor, Kick, and Mop Plates: Fabricate protection plates not more than 1-1/2 inches less than door width on stop side and not more than 1/2 inch less than door width on pull side, x the height indicated.

Material: Stainless steel, 0.050 inch (U.S. 18 gage).
Material: Brass/bronze, 0.062 inch (U.S. 16 gage).
Material: Clear acrylic plastic, 1/8 inch thick.

S. Sliding Door Hardware Sets: Provide manufacturer's standard hardware for interior sliding doors that are not furnished as a "package" complete with hardware.

T. Bifold Door Hardware Sets: Provide manufacturer's standard hardware for interior bifold doors that are not furnished as a "package" complete with hardware.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

U. Weather-stripping: Provide type, size, and profile indicated, continuous at head and jamb edges of each exterior door opening. Provide non-corrosive fasteners.

Sponge Neoprene conforming to MIL R 6130, Class II (closed cell).
Expanded Neoprene: Cellular rubber conforming to ASTM D 1056, Type 2 (closed cell), Class B (low swell, oil resistant), Grade 2 (compression-deflection of 3 - 9 psi), and self-extinguishing.
Solid Neoprene conforming to MIL R 6855, Class II, Grade 40.
Flexible vinyl hollow bulb or loop insert.
Brush pile insert of polypropylene or nylon woven pile and aluminum strip backing, complying with AAMA 701.2.

V. Thresholds: Extruded aluminum of type, design, and profile indicated, complete with replaceable resilient vinyl wiper-type insert and noncorrosive fasteners.

1.3 EXECUTION

A. Hardware Mounting Locations: As recommended by the Door and Hardware Institute, unless indicated otherwise.

B. Install each hardware item to comply with manufacturer's instructions and recommendations.

C. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant. Remove excess sealant and clean adjacent surfaces.

D. Hardware Adjustment: Return to Project one month after Owner's occupancy, and adjust hardware to proper operation and function. Instruct Owner's personnel in proper maintenance and adjustment.

E. Hardware Schedule: Provide hardware for each door as in the following list of hardware sets:

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A08710

FINISH HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract including General and Special Conditions apply to work of this Section.

1.2 SCOPE

This section covers the work of finish hardware as required by the Contract and includes the following classifications:

- Hinges, Butts and Pivots
- Lock Cylinders and Keying
- Locks, Latches and Bolts
- Push/Pull Units
- Closers and Door Control Devices
- Push and Kick Plates
- Weather-stripping

Extent of finish hardware required is indicated on Drawings and in Door Schedule.

Hardware for aluminum works is not part of this section and is specified in relative Specification Sections.

1.3 REFERENCE STANDARDS

Unless otherwise more stringent requirements are specified throughout this section, employed finish hardware products shall comply with the requirements of the latest edition of the British Standard Specifications (BS) as mentioned here-in-below, or other approved equivalent International Standards.

BRITISH STANDARD SPECIFICATIONS BS NO.

1331 Builders' Hardware for Housing

1.4 SUBMITTALS

The Contractor shall submit the following for the approval of the Engineer:

1.4.1 **Product Data:** Manufacturer's technical product data for each item of hardware. Include whatever information may be necessary to show compliance with requirements and include instruction for installation and for maintenance or operating parts and finish.

1.4.2 **Final Hardware Schedule:** Final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Final hardware schedule content shall be based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

- Type, style, function, size and finish of each hardware item
- Name and manufacturer of each item
- Fastenings and other pertinent information
- Location of hardware set cross-referenced to indications on Drawings, both on floor plans and in door and window tables.
- Explanation of all abbreviations, symbols, codes, etc., contained in schedule
- Mounting locations for hardware
- Door and window sizes and materials
- Keying information

1.4.3 **Keying Schedule:** Separate detailed schedule indicating clearly how the Employer's final instructions on keying of locks has been fulfilled (master keying system shall be provided).

1.4.4 **Samples:** Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, the Contractor shall submit one sample of each type of exposed hardware unit, finished as required and tagged with full description for coordination with schedule.

1.4.5 **Templates:** Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work to confirm that adequate provisions are made for proper location and installation of hardware.

1.5 QUALITY ASSURANCE

1.5.1 **Manufacturer:** Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

1.5.2 **Supplier:** A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years.

1.5.3 **Submittal Sequence:** The Contractor shall submit final hardware schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware and other information essential to the coordinated review of hardware schedule.

1.6 DELIVERY AND STORAGE

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Tag each item or package separately, with identification related to final hardware schedule and include basic installations with each item or package.

Packing of hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

Deliver individually package hardware items at the proper times to the proper locations (shop or project Site) for installation.

Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable, so that completion of the work shall not be delayed by hardware losses, both before and after installation.

PART 2- PRODUCTS

2.1 MATERIALS AND FABRICATION, GENERAL

2.1.1 **Hand of Doors:** Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

2.1.2 **Manufacturer's Name Plate:** Do not use manufacturer's name or trade name displayed in a visible location. Omit removable nameplates. Manufacturer's identification will be permitted on trim of lock cylinders only.

2.1.3 **Base Metals:** Employ hardware units which are produced of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for the applicable hardware units by applicable standard for each type of hardware item and with standard for finish designations indicated.

Unless otherwise indicated elsewhere base metal for employed hardware shall be as follows:

- Ordinary carbon steel
- Stainless steel

2.1.4 **Fasteners:** Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

2.1.5 **Tools and Maintenance Instructions for Maintenance:** Furnish a complete set of specialized tools and maintenance instructions as needed for Employer's continued adjustment, maintenance, and removal and replacement of finish hardware.

2.2 HARDWARE FINISHES

2.2.1 **General:** Provide matching finishes for hardware units at each door, or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in colour and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch-lock sets) for colour and texture.

Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified for the applicable units of hardware by referenced standards.

Unless otherwise indicated elsewhere, hardware finishes shall be as follows:

- Hardware of Stainless Steel Base Metal: High luster finish.
- Hardware of Steel Base Metal:

  Y Chromium Plated Finish: Polished.
  Y Rust-Resistant Finish: For iron and steel base metal required for exterior work, provide

  50-micron thick copper coating on base metal before applying chromium plated finish.

2.3 HINGES, BUTTS AND PIVOTS

2.3.1 **Templates: Provide only template-produced units.**

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.3.2 **Screws:** Furnish Phillips flat-head or machine screws for installation of units. Finish screw heads to match surface of hinges or pivots.

2.3.3 **Hinge Pins:** Except as otherwise indicated, provide hinge pins as follows:

Steel Hinges	:	Steel pins.
Non-ferrous Hinges	:	Stainless steel pins.
Exterior Doors	:	Non-removable pins.
Interior Doors	:	Non-rising pins.

Tips shall be flat button and matching plug, finished to match leaves.

2.4 LOCK CYLINDERS AND KEYING

2.4.1 **General:** Final keying requirements shall be according to Employer's requirements.

2.4.2 **Locks:** Equip locks with manufacturer's special 6-pin tumbler cylinders with construction master key feature which permits voiding of construction keys without cylinder removal.

2.4.3 **Metals:** Construct lock cylinder parts from brass/bronze, stainless steel or nickel silver.

2.4.4 **Key Material:** Provide keys of nickel silver only.

2.4.5 **Key Quantity:** Furnish 3 change keys for each lock; 5 master keys for each master system; and 5 grandmaster keys for each grandmaster system.

Deliver keys to Employer's representative.

Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers and permanent markers.

2.5 LOCKS, LATCHES AND BOLTS

2.5.1 **Strikes:** Provide- manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.

Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolts.

Provide roller type strikes where recommended by manufacturer of the latch and lock units.

Lock Throw: Provide 16mm minimum throw of latch and dead bolt used on pairs of doors.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Comply with requirements for throw of bolts and latch bolts on rated fire openings.

Provide 12mm minimum throw on other latch and deadbolts.

2.5.2 **Flush Bolt Head:** Minimum of 12mm diameter rods of brass, bronze or stainless steel, with minimum 300mm long rod for doors up to 2.10 m in height. Provide longer rods as necessary for doors exceeding 2.10 m in height.

2.5.3 **Rebated Doors:** Where rebated stiles are indicated, provide special front on lock and latch units and bolts constructed of brass, complete with accessories and fasteners.

2.5.4 **Panic Exit Devices:** Panic bolts shall be surface mounted and operated by means of a horizontal push bar. Stock finish shall be epoxy powder coated silver.

2.6 PUSH/PULL UNITS

Push and pull units shall be heavy-duty types constructed of base metal as specified in Clause 2.1.3. Concealed fasteners shall be employed to the maximum possible extent.

Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation; through-bolted for matched pairs, but not for single units.

Exposed Fasteners: Provide manufacturer's standard exposed fasteners for installation; through-bolted for matched pairs, but not for single units.

2.7 CLOSERS AND DOOR CONTROL DEVICES

2.7.1 **Size of Units:** Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.

Provide parallel arms for all overhead closers, except as otherwise indicated.

2.8 PUSH AND KICK PLATES

Push and kick plates shall be 1.2mm thick plates fixed at both sides of the door leaf. Push and kick plates shall be constructed of stainless steel. Push plates size shall be as indicated on Drawings. Kick plates shall be 200mm high and shall be fabricated 30 mm less than the door width on stop side and equal to the door width on pull side.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.9 WEATHERSTRIPPING

2.9.1 **General:** Except as otherwise indicated, provide continuous weather-stripping at each edge of every exterior door leaf.

Provide non-corrosive fasteners as recommended by manufacturer for application indicated.

2.9.2 **Replaceable Seal Strips:** Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

2.9.3 **Weather-stripping at Jambs and Heads:** Provide bumper-type resilient insert and metal retainer strips, surface-applied unless shown as mortised or semi-mortised of following metal, finish and resilient bumper material:

For Steel and access Doors: Neoprene strip.

2.9.4 **Weather-stripping at Door Bottoms:** Provide threshold consisting of contact type resilient insert and metal housing of design and size shown; of following metal, finish, and resilient seal strip.

- Solid neoprene wiper or sweep seal.

2.10 ACCEPTABLE MANUFACTURERS

Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Works shall be approved by the Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

Mount hardware units at heights indicated or required to comply with governing regulations and except as may be otherwise directed by the Engineer.

Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in Division-9 Sections. Do not install surface-mounted items until finishes have been completed on substrates.

Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.1.1 Number of Hinges: Number of hinges shall be as indicated on Drawings but not less than 3 hinges per door leaf or shutter for doors 2.20m or less in height and one additional hinge for each 0.75m of additional height.

3.2 ADJUST AND CLEAN

Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

Clean adjacent surfaces soiled by hardware installation.

3.2.1 Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

Instruct Employer's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

3.2.2 Continued Maintenance Services: Approximately six months after the acceptance of hardware in each area, the installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to estore proper function of doors and hardware. Consult with and instruct Employer's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.2.3 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08800

GLAZING

1.1 GENERAL

A. Performance Requirements: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

1. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

a. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

1) Specified Design Wind Loads: As indicated.

2) Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, Section 6.4.2, based on mean roof heights above grade indicated on Drawings.

3) Specified Design Snow Loads: As indicated, but not less than snow loads applicable to Project, required by ASCE 7, Section 7.

4) Probability of Breakage for Vertical Glazing: 8 litres per 1000 for litres set vertically or not more than 15 degrees off vertical and under wind action.

5) Probability of Breakage for Sloped Glazing: 1 litre per 1000 for litres set more than 15 degrees off vertical and under wind and snow action, with a load duration of 30 days.

2. Thermal and Optical Performance Properties: As determined according to procedures indicated below:

a. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).

b. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.

c. Solar Optical Properties: NFRC 300.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Submittals: In addition to Product Data for each glass product and glazing material, submit the following:

Samples: In the form of 12-inch- (300-mm-) square Samples for each type of glass, other than clear products, and of 12-inch- (300-mm-) long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

D. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

E. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

F. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines," and SIGMA TB-3001, "Sloped Glazing Guidelines."

G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency: Insulating Glass Certification Council.
Associated Laboratories, Inc.
National Accreditation and Management Institute.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.2 PRODUCTS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in schedules.

B. Products: Subject to compliance with requirements, provide one of the products indicated in schedules.

C. Float Glass: ASTM C 1036, Type I, Quality q3; class as indicated in schedules.

D. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality q3; class, kind, and condition as indicated in schedules.

Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.

E. Ceramic-Coated Vision Glass: Float glass with ceramic coating applied by silk-screened process and complying with ASTM C 1048, Condition C, Type I, Quality q3; GTA 95-1-31; and with other requirements specified in schedules.

F. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality q3, and complying with other requirements specified in schedules.

1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.

G. Pyrolytic-Coated Float Glass: With solar-reflective metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, complying with requirements specified in schedules.

H. Sputter-Coated Float Glass: With metallic-oxide or metallic-nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), complying with requirements specified in schedules.

I. Coated Spandrel Float Glass: Comply with requirements specified in monolithic glass schedules and the following:

Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.

Factory applied manufacturer's standard opacifier to coated second surface of lites, with resulting product complying with GTA 89-1-6.

J. Wired Glass: ASTM C 1036, Type II, Class 1, Quality q8; 6.4 mm thick; of form and mesh pattern indicated below:
Polished Wired Glass: Form 1, Mesh m1.
Patterned Wired Glass: Form 2, Mesh m1.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

K. Patterned Glass: ASTM C 1036, Type II, Class 1, Form 3, Quality q8, Finish f1; of pattern indicated in the Patterned-Glass Schedule.

L. Tempered Patterned Glass: ASTM C 1048, Kind FT, Type II, Class 1, Form 3, Quality q8, Finish f1; of pattern indicated in the Patterned-Glass Schedule.

M. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Laminated-Glass Schedule.

1. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
   a. Interlayer Material: Polyvinyl butyral sheets.
   b. Interlayer Material: Cured resin.
   c. Interlayer Material: Polyvinyl butyral sheets or cured resin.

N. Insulating-Glass Units: Preassembled units consisting of dual-sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in the Insulating-Glass Schedule.

O. Fire-Rated Glazing Products: Provide products with fire-protection ratings indicated and that are permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Laminated Ceramic Glazing Material: Proprietary product in the form of two lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch (8-mm) nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft. (19.5 kg/sq. m); and as follows:

   a. Product: Subject to compliance with requirements, provide "FireLite Plus" manufactured by Nippon Electric Glass Co., Ltd. and distributed by Technical Glass Products.

2. Laminated Glass with Intumescent Interlayers: Proprietary product in the form of multiple lites of Condition A, Type I, Class 1, Kind FT float glass laminated with intumescent interlayers; and as follows:

   a. Product: Subject to compliance with requirements, provide "PyroStop" distributed by Technical Glass Products.

3. Gel-Filled, Dual-Glazed Units: Proprietary product in the form of two lites of Condition A, Type I, Class 1, Kind FT float glass; with a perimeter metal spacer separating lites and dual-edge seal enclosing a cavity completely filled with clear, fully transparent, heat-absorbing gel; and as follows:

   a. Product: Subject to compliance with requirements, provide "SuperLite II" by SAFTI Div., O'Keeffe's Inc.

P. Elastomeric Glazing Sealants: Products complying with ASTM C 920 and other requirements specified in the Glazing Sealant Schedule, in colors indicated, compatible with one another and with other materials they will contact.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Additional Movement Capability: Products with capability, when tested per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

Q. Glazing Sealant for Fire-Resistive Glazing Products: Identical to product used in test assembly to obtain fire-protection rating.

R. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; complying with ASTM C 1281 and AAMA 800 for products indicated below:
AAMA 804.3 tape, where indicated.
AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

S. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

T. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
Neoprene, ASTM C 864.
EPDM, ASTM C 864.
Silicone, ASTM C 1115.
Thermoplastic polyolefin rubber, ASTM C 1115.
Any material indicated above.

U. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
Neoprene.
EPDM.
Silicone.
Thermoplastic polyolefin rubber.
Any material indicated above.

V. Miscellaneous Glazing Materials: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

W. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

Grind smooth and polish exposed glass edges.

1.3 EXECUTION

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation.

C. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

D. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

E. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter.

F. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

G. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 08920

GLAZED ALUMINUM CURTAIN WALLS

1.1 GENERAL

A. System Description: Provide glazed aluminum curtain wall system capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes air infiltration and water penetration exceeding specified limits and framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

Glazing is physically and thermally isolated from framing members.
System is reglazable from the interior.
System is reglazable from the exterior.
System is reglazable from the interior, except spandrel glazing or panels are reglazable from the exterior.

B. Wind Loads: Provide glazed aluminum curtain wall system, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inches (19 mm), whichever is smaller, unless otherwise indicated.
Deflection of framing members in a direction normal to wall plane is limited to 1/360 of clear span, 3/4 inches (19 mm) maximum, where plaster or gypsum board surfaces are subject to bending.
Deflection of framing members overhanging an anchor point is limited to 2 times the length of the cantilevered member, divided by 175.

4. Test Performance: Provide glazed aluminum curtain wall system that does not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
   a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
   b. Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.

C. Seismic Loads: Provide glazed aluminum curtain wall system, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever are more stringent.

D. Dead Loads: Provide glazed aluminum curtain wall system members that do not deflect an amount which will reduce glazing bite below 75 percent

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

of design dimension when carrying full dead load. Provide a minimum 1/8-inch (3.18-mm) clearance between members and top of fixed panels, glazing, or other fixed part immediately below. Provide a minimum 1/16-inch (1.59-mm) clearance between members and operable windows and doors.

E. Live Loads: Provide glazed aluminum curtain wall system, including anchorage that accommodates supporting structure's deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.

F. Air Infiltration: Provide glazed aluminum curtain wall system with permanent resistance to air leakage through system of not more than 0.06 cfm/sq. ft. (0.3 L/s/sq. m) of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft. (299 Pa).

G. Water Penetration: Provide glazed aluminum curtain wall system that does not evidence water leakage when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 10 lbf/sq. ft. (479 Pa).

H. Thermal Movements: Provide glazed aluminum curtain wall system, including anchorage, that accommodates thermal movements of system and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, noise or vibration, and other detrimental effects.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

I. Structural Support Movement: Provide glazed aluminum curtain wall system that accommodates structural movements including, but not limited to, sway, twist, column shortening, long-term creep, and deflection.

J. Condensation Resistance: Provide glazed aluminum curtain wall system with condensation-resistance factor (CRF) of not less than 55 when tested according to AAMA 1503.1.

K. Average Thermal Conductance: Provide glazed aluminum curtain wall system with an average U-value of not more than 0.66 Btu/sq. ft. x h x deg F (3.75 W/sq. m x K) when tested according to AAMA 1503.1.

L. Dimensional Tolerances: Provide glazed aluminum curtain wall system, including anchorage that accommodates dimensional tolerances of building frame and other adjacent construction.

M. Submittals: Product Data for each product specified and the following:
Shop Drawings showing fabrication and installation of glazed aluminum curtain wall system including plans, elevations, sections, details of components, and attachments to other units of Work.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Samples for initial selection showing the full range of colors available for components with factory-applied color finishes.
Product test reports from a qualified independent testing agency evidencing compliance of glazed aluminum curtain wall system with requirements based on comprehensive testing of manufacturer's current system.
Field test reports from a qualified independent inspecting and testing agency indicating and interpreting test results relative to compliance with performance requirements of glazed aluminum curtain wall system.

N. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing glazed aluminum curtain wall systems similar to those required for this Project and who is acceptable to manufacturer.

1. Engineering Responsibility: Prepare data for glazed aluminum curtain wall systems, including drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

O. Source Limitations: Obtain each type of glazed aluminum curtain wall system from one source and by a single manufacturer.

P. Product Options: Drawings indicate size, profiles, and dimensional requirements of glazed aluminum curtain wall system and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

Q. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code-Aluminum."

1. Engage welders who have satisfactorily passed AWS qualification tests for welding processes involved and who are currently certified for these processes.

1.2 PRODUCTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [Insert Name of Manufacturer].

C. Materials: As follows:
1. Aluminum: As follows:
   a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
   b. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).
   c. Extruded Structural Pipe and Tubes: ASTM B 429.
   d. Welding Rods and Bare Electrodes: AWS A5.10.

Steel Reinforcement: ASTM A 36 (ASTM A 36M), ASTM A 611, or ASTM A 570 (ASTM A 570M).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Glazing as specified in Division 8 Section "Glazing."
Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system.
Glazing sealants and fillers as specified in Division 8 Section "Glazing."
Framing system gaskets and joint fillers as recommended by manufacturer for joint type.
Sealants and joint fillers for joints within glazed aluminum curtain wall system as specified in Division 7 Section "Joint Sealants."
Firesafing materials as specified in Division 7 Section "Building Insulation."
Insulating materials as specified in Division 7 Section "Building Insulation."

10. Bituminous Paint: SSPC-Paint 12, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

D. Insulated Spandrel Panels: Manufacturer's standard laminated aluminum-faced insulated panels of thickness indicated.

E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum brackets and reinforcements. Provide nonstaining, nonferrous shims for aligning system components.

F. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Finish exposed portions to match glazed aluminum curtain wall.

At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.

Use exposed fasteners with countersunk Phillips screw heads finished to match framing members, unless otherwise indicated.

G. Anchors: 3-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
1. Concrete and Masonry Inserts: Hot-dip galvanized complying with ASTM A 123 or ASTM A 153 requirements.

H. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.

I. Fabricate glazed aluminum curtain wall system according to Shop Drawings. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

J. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

K. Prepare components to receive concealed fasteners and anchor and connection devices.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

L. Fabricate components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

M. Welding: Weld components to comply with referenced standard and Shop Drawings, unless otherwise indicated. Weld before finishing components. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

N. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

O. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

P. Frame Units: Factory assemble frame units according to Shop Drawings to greatest extent possible. Rigidly secure non-movement joints. Seal joints watertight, unless otherwise indicated. Assemble components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

1. Install glazing according to Shop Drawings. Comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

Q. Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products." Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

R. Class I, Clear Anodic Finish: AA-M12C22A41, clear coating 0.018 mm or thicker, and complying with AAMA 607.1.

S. Class I, Color Anodic Finish: AA-M12C22A42/A44, integrally colored or electrolytically deposited color coating 0.018 mm or thicker, and complying with AAMA 606.1 or AAMA 608.1.
Color: Light bronze.
Color: Medium bronze.
Color: Dark bronze.
Color: Black.
Color: Match Architect's sample.
Color: As selected by Architect from the full range of industry colors and color densities.

T. High-Performance Organic Coating Finish: AA-C12C42R1x. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system complying with AAMA 605.2.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Color and Gloss: As indicated by manufacturer's color and gloss designations.
b. Color and Gloss: Match Architect's sample.
c. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

1.3 STEEL PRIMING

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.

B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

1.4 EXECUTION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing glazed aluminum curtain wall system. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight, unless otherwise indicated. Provide means to drain water to the exterior to produce a permanently weatherproof system.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

D. Install framing members plumb and true in alignment with established lines and grades.

E. Install factory-assembled frame units plumb and true in alignment with established lines and grades.

F. Install column covers plumb and true in alignment with established lines and grades.

G. Anchorage: After system components are positioned, fix connections to building structure as indicated on Shop Drawings.
1. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

H. Welding: Weld components to comply with referenced standard and Shop Drawings, unless otherwise indicated. Weld in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

I. Install glazing according to Shop Drawings. Comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

J. Install sealant according to Shop Drawings. Comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

K. Install insulation materials in locations indicated. Comply with requirements of Division 7 Section "Building Insulation," unless otherwise indicated.

L. Install firesafing in locations indicated. Comply with requirements of Division 7 Section "Building Insulation," unless otherwise indicated.

M. Erection Tolerances: Install glazed aluminum curtain wall system to comply with the following maximum tolerances:
Plumb: 1/8 inch in 10 feet (3 mm in 3 m); 1/4 inch in 40 feet (6 mm in 12 m).
Level: 1/8 inch in 20 feet (3 mm in 6 m); 1/4 inch in 40 feet (6 mm in 12 m).

Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm); where a reveal or protruding element separates aligned surfaces by less than 2 inches (50.8 mm), limit offset to 1/2 inch (12.7 mm).

Location: Limit variation from plane or location shown on Shop Drawings to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/2 inch (12.7 mm) over total length.

N. Field Testing: As follows:
Testing Agency: Owner will engage a qualified independent testing agency to perform testing indicated.
Testing Agency: Engage a qualified independent testing agency to perform testing indicated.

3. Water Spray Test: After completing the installation of 75-feet-(23-m-) by-2-story minimum area of glazed aluminum curtain wall system, test system for water penetration according to AAMA 501.2 in a 2-bay area directed by Architect.
   Repair or remove Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

O. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure glazed aluminum curtain wall system is without damage or deterioration at the time of Substantial Completion.

1.5 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A08975

STRUCTURAL SEALANT GLAZING SYSTEM

PART General

1.1 SUMMARY

1. Furnish all labour, materials, equipment and services necessary for complete design, fabrication, supply and installation of exterior and interior glazed aluminum wall assemblies as indicated on the drawings and as hereinafter specified.

    1. Design, engineer, test, fabricate, deliver, install, and guarantee all construction necessary to provide for the exterior and interior glazed aluminum wall assemblies, skylight, and entrances for the complete airtight and watertight enclosure of the building. Assemblies shall be complete in every respect, including all measures that may be required to that end, not withstanding any omissions or inadequacies of Drawings and/or Specifications.

    2. Incorporate a pressure-equalized dual-sealed system throughout exterior glazed aluminum wall assemblies, including all perimeter conditions and connections to adjacent construction.

    3. Incorporate a continuous vapor barrier system throughout, including all perimeter conditions and connections to adjacent construction.

2. The work of this section shall include, but shall not necessarily be limited to the design, engineering, fabrication, supply and installation of the following:

    1. All glass and glazing of exterior and interior glazed aluminum wall assemblies, skylights and entrances, including glass, gaskets, splines, setting blocks, weather stripping and sealants .

    2. All exterior and interior aluminum closures, parapet flashings, junction flashings and other flashings, and trim required in connection with the exterior glazed aluminum wall assemblies.

    3. Glass spandrel panels within exterior glazed aluminum wall assemblies, including sealed back-up insulated panels.

    4. All necessary reinforcing members, bracing, brackets, anchors, screws, bolts, etc. to ensure a first class installation and to ensure exterior glazed aluminum wall assemblies compliance with specified design and performance criteria.

    5. All embeds, inserts, anchors, connections, fastenings, anchor brackets, straps, etc. required to be attached to building structure

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

for the structural integrity of the exterior glazed aluminum wall assemblies and to ensure compliance with specified design and performance criteria. (Where anchors are required to be cast into the concrete structure, they shall be supplied under this section for setting and casting-in under Section 03103.)

6. All air/moisture barriers, gaskets, sealants and related appurtenances required to make the exterior glazed aluminum wall completely airtight assemblies.
7. Sealants or other approved method of sealing between all metal to metal contacts of curtain wall framing components to ensure air-tight, weather-tight and waterproof assemblies.

8. Sealants and/or air/moisture barrier at joints between exterior glazed aluminum wall framing and adjoining construction.

3. Include also the following as work of this section:

1. Supply and installation of framed aluminum doors within exterior and interior glazed aluminum wall assemblies as indicated, including preparation of aluminum doors to receive hardware and supply and installation of such hardware.

2 Checking of building lines and levels as required for the proper layout and installation of all work included in this section, including field measurement of adjacent and/or supporting construction and verification of existing conditions.

3. All drilling of building structure as required for fastening of all work included in this section.

4. Shop applied anti-corrosive painting of all steel shapes and ferrous metal used in attachment or reinforcing of curtain wall and field painting after steel shapes are installed, except that galvanized steel need not be painted.

5. Finish processes to aluminum.

6. Providing, assembling and setting up aluminum curtain wall test mock-up for testing in accordance with Part 4 - Testing, of this section.

7. Product engineering and testing of exterior glazed aluminum wall assemblies, structural silicone glazing testing as specified under Part 4 - Testing .

8. Supply and installation of fire stopping and smoke seal at slab edges between back of aluminum curtain wall spandrels and floor slabs.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

9. Supply and installation of thermal insulation within curtain wall assemblies.

10. Supply to the Owner of additional lights of vision glass and spandrel glass to be used for replacement purposes after construction.

11. All other requirements specified herein, including but not necessarily limited to shop drawings, samples, warranties, storage, handling, cleaning, etc.

12. Parapets, copings, soffits, canopies and back pans.

13. Louvers, grilles, gratings, and gutters occurring in the exterior glazed aluminum wall assemblies.

14. Operable hatches, vents, doors and other assemblies occurring in the exterior glazed aluminum wall assemblies.

15. Mullion wraps fire-rated insulation at all spandrel areas.

16. Sound deadening at all horizontal surfaces.

17. End closures at all horizontal and vertical caps and projections.

18. Finishes, protective coatings and treatments.

19. Provisions for electrical outlets and cutouts for lighting, conduits, heat tracing cable, and other electrical work.

20. Provisions for plumbing fixtures, including hose bibs.

21. Proposal drawings, data, and samples.

22. Design engineering, shop drawings, calculations, engineering data, and test reports.

23. Field measurements of adjacent and/or supporting construction and verification of existing conditions where feasible.

24. Scheduling and monitoring of the Work.

25. Material samples, trial installation mock-ups, and test assembly.

26. On site testing of embeds and field water testing.

27. Coordination with the work of other trades.

28. Mock-up drawings, test procedures, testing and verification of design, components, and total assembly.

29. Storage, handling, protection, and cleaning.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

30. Guarantees, warranties and indemnities.

31. All exterior and interior cleaning of the CWSE.

1.2 RELATED SECTIONS

1. Section 03103 - Casting-in of curtain wall anchors into concrete structure.

2. Section 03481 - Pre-cast architectural concrete for infill panels.

3. Section 05100 - Structural Steel support for exterior glazed aluminum wall assemblies.

4. Section 07840 - Fire Stopping: Fire stopping between glazed system and adjacent construction.

5. Section 07900 - Joint Sealers: System perimeter sealant and back-up materials.

6. Section 08342 - Safety Glass Doors: Entrance doors.

7. Section 08800 - Glazing.

8. Section 13705 - Intrusion Detection.
9. Section 13706 - Security Access.

10. Division 15 - Louvres for air intake and exhaust for mechanical systems.

1.3 REFERENCES

1. Aluminum Association Designation System For Aluminum Finishes (AA) - 1997

    1. OAF 45 1997, Designation System For Aluminum Finishes.

2. Architectural Aluminum Manufacturers Association (AAMA)

    1. AAMA CW DG-1-96, Aluminum Curtain Wall Design Guide Manual.

    2. AAMA CW-10-97, Curtain Wall Manual #10 Care and Handling of Architectural
    Aluminum from Shop to Site.

    3 AAMA CW-11-85, Curtain Wall Manual - Design Windloads for Buildings and
    Boundary Layer Wind Tunnel Testing.

    4. AAMA CW-13-85, Curtain Wall Manual - Structural Sealant Glazing Systems.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. AAMA T1R-A1-75, Sound Control for Aluminum Curtain Walls and Windows.

6. AAMA 501-94, Methods of Test for Metal Curtain Walls.

7. AArv1A 503-92, Voluntary Specification for Field Testing of Metal Storefronts,
Curtain Wall and Sloped Glazing Systems.

8. AAMA 606.1-76, Specifications and Inspection Methods for Integral Colour Anodic Finishes for Architectural Aluminum.

9. AAMA 607.1-77, Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

10. AAMA 608.1-77, Specification and Inspection Methods for Electrolytic ally Deposited Colour Anodic Finishes for Architectural Aluminum.

11. AAMA 2603-98, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels -Series: Components, Coatings and Finishes.

12. AAMA 2604-98, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.

13. AAMA 2605-98, Voluntary Specification, Performance Requirements and Test Procedures for Chrome Pretreatments.

3 American Society for Testing and Materials (ASTM)

1. ASTM A 36/A 36M-97ae1, Specification for Structural Steel.

2. ASTM A 123-97ae1, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3 ASTM A 167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

4. ASTM A 653/A 653M-99a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

5. ASTM B 209M-96, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

6. ASTM B 221 M-96, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

7. ASTfv1 C 794-93, Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

8. ASTM E 283-91, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

9. ASTM E 330-97e1, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

10. ASTM E 331-96, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

11. ASTM E 413-87(1999), Classification for Rating Sound Insulation.

12. ASTM E 1105-96, Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.

4. Canadian General Standards Board (CGSB)

   1. CAN/CGSB 1.1 08-M89, Bituminous Solvent Type Paint.

   2. CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

5. Canadian Standards Association (CSA)

   1. CSA G40.20/G40.21-98, General Requirements for Rolled or Welded Structural
   Quality Steel/Structural Quality Steels.

   2. CAN/CSA-G164-M92, Hot Dip Galvanizing or Irregularly Shaped Articles.

   3. CAN/CSA-S136-1'v195, Cold Formed Steel Structural Members.

   4. CAN/CSA-S 157 -M83, Strength Design in Aluminum.

   5. CSA W59.2-M 1991 (1998), Welded Aluminum Construction.

6. Steel Structures Painting Council (SSPC)

   1. SSPC - Paint 20 Zinc Rich Coating.

   2. SSPC - Paint 25 Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments).

7. Environmental Choice Program (ECP)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. ECP-45-92, Sealants and Caulking Compounds.
2. ECP-67 -95, Recycled Water-borne Surface Coatings.
3. ECP-76-1998, Surface Coatings.

1.4 SYSTEM DESCRIPTION

1. Exterior glazed aluminum curtain wall assembly: two-sided structural silicone glazing unitized curtain wall system with vertical cap and SSG horizontal. Mullion cap model profile as indicated. Pin caps to pressure plate with countersunk n 0.6 stainless steel Phillips screws) with 24 mm double glazed sealed vision units

2. Operable vents 2-sided SSG concealed vents with Type A and B vision units structurally glazed to clear anodized extruded aluminum framing that are hidden from view from the exterior.

3. Framed aluminum glass doors equal to Kawneer door series 190 Insulclad with Type A vision unit with Kawneer hardware package as indicated on the drawings.

4. Glazing as follows:

The contractor is required to propose their glass and be responsible to ensure their glass meets all technical, safety and authority requirements.

Type A Vision Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for particular assemblies. The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectro-photometrical values for thickness 8(16)8:

LT	LRo	LRi	SF	SC	CRI	U	RHG
42	10	17	31	0.36	84	1.8	212

Type B Fritted Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

be minimum heat strengthened. The external pane receives a silk-screen pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering precess, which must be located within the cavity of the IGU. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU.A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly.

The spacer tubes are permanently sealed to the glass by a primary sealant in PIB and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectro-photometrical values for thickness 8(16)8.

%SK	LT	LRo	LRi	SF	SC	U	RHG
25%	37	19	25	21	0.36	1.8	161

Type B2 Fritted Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. The external pane receives a silk-screen pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly. The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone.

The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectro-photometrical values for thickness 8(16)8 ,

%SK	LT	LRo	LRi	SF	SC	U	RHG
50%	29	23	31	17	0.20	1.3	136

Type B3 Fritted Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. The external pane receives a silk-screen pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU.A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly.

The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectra-photometrical values for thickness 8(16)8,

%SK	LT	LRo	LRi	SF	SC	U	RHG
25%	35	20	25	21	0.24	1.8	161

5. Glass and glazing system to meet DIFC minimum design standards. Visible light reflectivity from building materials in the facades should not exceed 20%.

6. Assembled system to permit re-glazing of individual glass (and infill panel) units without requiring removal of structural mullion sections.

1.5 PERFORMANCE REQUIREMENTS

1. Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of structural sealant glazing system as calculated in accordance with local building code requirements.

2. Design and size components to withstand seismic loads and sway displacement as calculated in accordance with local building code requirements.

3. Individual and aggregate components of the Work of this Section shall be designed, fabricated, assembled, transported, installed and protected so that no evidence of the following shall be apparent, visually or measurably, when Work of this Section is subject to the pressures, loads, temperatures, and conditions specified:

4. Conditions

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Damage of any kind.

2. Deflections as follows:

    1. Vertical Members spanning floor to floor or sill to head:
    Deflection normal to the plane of construction shall be limited to L/240 of the clear span between structural supports, or ¾ inch (19.1 mm), whichever is less. Wherever infill members combine to form a continuous member spanning floor to floor, the Deflection Criteria shall be as that for a monolithic member.

    2. Cantilevered Members:
    Deflection normal to the plane of construction shall be limited to L/360 of the span beyond the structural support, or 3/8 inch (9.5 mm), whichever is less. When cantilever members comprise a part of a continuous mullion system, the Deflection Criteria of the composite member shall not exceed limitations specified in Section 1.5.4.2.1 [Vertical Members], or Section 1.5.4.2.3 [Transverse Members].

    3 Transverse Members:
    Deflection normal to the plane of construction shall be limited to L/240 of the clear span. Deflection in the plane of construction shall be limited to L/360 of the span between supports, or 1/8 inch (3.2 mm), whichever is less.

    4. Framing members supporting multiple lites for spans greater than 4m
    (13'-6") but less than 12m (40'-0"):

    Deflection normal to the plane of construction shall be limited to U240+1/4 inch (6mm) of the clear span between structural supports.

    5. Deflection of Framing at edge of Insulating Glass:
    Deflection of Framing shall be limited to $Dg = 0.4 (L_g /100)^2$, (where L_g is the length, in inches, of the insulated glass edge being supported); or as required by the insulating glass manufacturer.

    6. Deflection of Framing at edge of Monolithic Glass:
    Deflection of framing shall be limited to $Dg = 0.6 (L_g /100)^2$, (where L_g is the length, in inches, of the monolithic glass edge being supported).

    7. Center Deflection of Glass Lites:
    Deflection of glass at the center of the lite shall not exceeded U254t for the loaded lite (where L is the short span

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

of the lite, in inches, and t is the thickness, in inches, of the loaded glass lite), or 3/4 inch [19.1 mm], whichever is less.

8. Edge Deflection of Glass Lites:
Deflection of glass at an unsupported edge shall be limited to U175 of the clear span between supports or 3/4 inch [19.1 mm], whichever is less.

9. Center Deflection of Metal Panels:
Center deflection of metal panels shall not exceed U175, where L is either the short dimension of the panel, or the clear span of the face material between supporting (stiffening) members, whichever is less.

10. Panel Flatness less than that specified herein.

11. Offset from true alignment between consecutive components in line in excess of 1/32 inch (0.78 mm).

3. Water infiltration in excess of that specified in Section 1.5.6 [Water Infiltration], below.

4. Air infiltration in excess of that specified in Section 1.5.7[Air Infiltration], below.

5. Condensation resistance less than that specified in Section 1.5.8 [Condensation], below.

5 Loads on Glass

1. Glass shall be of appropriate thickness to withstand the greater of the following pressures, or combinations thereof, acting normal to the surface without center point deflections in excess of those specified. Load combinations shall be as per the specific requirements of ASCE 7-02; Minimum Design Loads for Buildings and Other Structures.

1. The design wind pressures as specified on the Drawings but not less than that specified in the Building Code.

2. Human impact loads in accordance with CPSC 16 CFR 1201 Category II in those locations designated as hazardous locations by ASCE 7-02 Minimum Design Loads for Buildings and Other Structures

3. Human impact loads at all glazing for which a portion is less than 42 inches above finished floor, of 50 plf linear load and 200 lb concentrated load and/or as required by governing code for handrails. Loads shall not be applied concurrently.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Human impact loads at all glazing for which a portion is less than 36 inches above finished floor, of 400 ft lbs and/or as required by governing code.

5. Seismic loading as specified on the Drawings but not less than BC building Code.

6. Point live loads on sloped glazing (skylights) of 200 pounds acting over an area of 1.0 square feet.

7. Uniform snow loads on sloped glazing (skylights) of 79 pounds per square foot.

2. The pressures so determined are based upon the following design safety factors:

1	Fully-tempered Glass (Type FT)	1.4
2	Heat-strengthened Glass (Type HS)	1.6
3	Annealed Glass (Type AN)	2.5
4	Guardrail Glass (Impact loads)	4.0
5	Overhead Glass	4.4

6 These shall be based upon destructive testing in which glass, representative of that described in the Drawings and Specifications, is exposed to uniform static loads held for one minute per 1/8 inch increment of center point deflection until destruction. The statistical distribution of such test results shall be normal and the coefficient of variation shall not exceed 25 percent.

3. In no case shall glass thickness be less than that shown on the Drawings, or the minimum thickness specified herein.

6. Water Infiltration

1. Any leakage and I or condensation which might take place within the CWSE shall be drained within the CWSE and discharged to the exterior face of the CWSE.

2. Water infiltration shall be defined as any uncontrolled water, exclusive of condensation, that appears on the interior side of the CWSE.

3. Water temporarily contained within the CWSE without ill effect, and that does not penetrate to the interior side of the Work, will not be considered water infiltration.

4. Water infiltration shall not occur when the completed Work is subjected to the following inward pressures acting normal to the surface, for the specified time periods, using a water spray discharge rate of 5 gallons water per hour per square foot of surface frontal area:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Static Pressure of 12 pounds per square foot for a time of 15 minutes.
2. Dynamic pressure of 12 pounds per square foot for a time of 15 minutes.

7. Air Infiltration

1. Limit air infiltration through assembly to 0.0003 m3 /s/m2 of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with AAMA 501 and ASTM E 283.

8. Condensation Resistance

1. Condensation is defined as water, ice or frost occurring on more than 5 percent of the interior surface of anyone component or water that is not collected and positively drained to the exterior through the condensation drainage gutter.
2. The .exterior glazed aluminum wall assemblies shall be designed to prevent condensation on the interior under the following conditions:
    1. Outdoor ambient air temperature of 15° F, with a 11 MPH wind.
    2. Indoor ambient air temperature of 60° F, with 30% relative humidity.

9. Thermal Movement

1. The exterior glazed aluminum wall assemblies shall be designed for differential thermal movement (expansion and contraction) resulting from an exterior surface temperature range of -18° C to 60° C, and a building interior temperature range of 10° C to 29°C. Surface temperature range may be adjusted for specific conditions based on surface location and orientation, subject to approval by the Consultant.

2 System to provide for expansion and contraction within system components caused by a cycling temperature range of 95°C over a 12 hour period without causing detrimental affect to system components.

10. Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.

11. Provide system to accommodate, without damage to components or deterioration of seals:
    1. Movement within system.
    2. Movement between system and perimeter framing components.
    3. Dynamic loading and release of loads.
    4 Deflection of structural support framing,
    5. Shortening of building concrete structural columns.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

6. Creep of concrete structural members.
7. Building movement and deflection as indicated on the Drawings.

12. Thermal Resistance of:

    1. System (excluding vision areas): R-10 (spandrel panels)
    2. U=1.3 (overall).

13. Sound attenuation through structural sealant glazing system (exterior to interior): STC 35, measured in accordance with ASTM E 413.

14. Construction Tolerances of Building Structure:

    1. Provision shall be made in the design of the CVVSE for the erection tolerances of the building structure:
       Steel: AISC tolerances.
       Concrete: ACI tolerances.

    2 It is the responsibility of the Contractor to refer to the appropriate specifications of Cast-In-Place Concrete and Structural Steel, and to confirm building structural tolerances with the building Structural Engineer.

15. Vapour seal with interior atmospheric pressure of 25 mm sp, 22°C, 40% RH: No failure.

16. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

17. Maintain continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound. Position thermal insulation on exterior surface of air barrier and vapour retarder.

18. Ensure no vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

19. Analysis

    1. All requirements specified herein shall be analytically and mathematically proven, except for those requirements called for to be proven by physical testing methods. Calculations and related data, and their application in engineering, fabrication assembly and installation shall be the responsibility of the Contractor's registered Professional Engineer.

1.6 QUALITY ASSURANCE

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. The work of this section shall be installed, glazed and adjusted by experienced workmen in accordance with reviewed shop drawings.

2. The Curtain Wall Subcontractor producing and executing the work of this section shall be a member in good standing with the Glazing Contractors Association of British Columbia and have minimum of five (5) consecutive years experience in work of similar scope and nature to that specified. Contractor to document past experience on request.

3. The Curtain Wall Subcontractor shall be prepared to prove to the Owner's satisfaction, that he has adequate facilities and skilled personnel suitable for the design, detailing, fabricating and installation of the curtain wall assemblies.

4. The glass and glazing work to be done under this section shall be executed by a qualified glazing contractor with at least five (5) years of continual experience in the trade, who shall be prepared to prove to the Owner's satisfaction that he has adequate facilities and skilled personnel suitable for the supply and installation of all glass and glazing materials required by this section or work and shall have proven achievement and experience in custom-designed, four-sided structural silicone glazed unit system curtain walls.

5. Manufacturers and suppliers of all materials and components of the work of this section are subject to approval by the Consultant.

6. Welding of aluminum work to comply with CSA W59.2.

7. Energy performance calculations to be submitted under the seal of a qualified Registered Professional Engineer.

8. Engage a Registered Professional Engineer to:

    1. Design the glazed aluminum wall assemblies and skylight assembly, including glass and glazing, to meet the specified structural performance criteria and the requirements of the local building code.

    2. Supervise the preparation of shop and erection drawings.

    3. Supervise the preparation of laboratory test mock up drawings.

    4. Field review the fabrication and installation of the products to ensure they comply with those drawings and the specified performance criteria.

    5. The cost of the above engineering and field reviews to be included as part of the
    cost for work under this section.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

9. Field test representative areas of the glazed aluminum wall assemblies selected by the Consultant for air leakage and water penetration by a recognized independent testing agent.

    1. Test areas indicated on the architectural drawings, as described in Part 4 of this specification.

    2. Cost of testing included in the cost of the work of this section.

1.7 QUALITY CONTROL

1. Prior to the start of fabrication the Aluminum Curtain Wall Subcontractor shall submit a comprehensive Quality Control Program to the Consultant covering all phases of the aluminum curtain wall including, but not necessarily limited to the following:

    1. Procurement of materials including quality assurance programs of major suppliers
    2. Fabrication of components.
    3. Final assembly of components.
    4. Installation and site quality control.

2. The quality control programs submitted are subject to review by the Consultant.

3. All quality control programs shall allow for a sufficient sampling to ensure 95 percent statistical certainty of conformance with the Contract Documents.

4. The Consultant and Owner shall be allowed access to the curtain wall fabricator's facilities and those of the major suppliers to monitor quality control procedures. The Aluminum Curtain Wall Subcontractor shall make available all quality control program records upon request.

5. The Aluminum Curtain Wall Subcontractor shall submit all shop drawings to glass and sealant manufacturer for their review, and provide written confirmation that their products are being used in accordance with manufacturer's recommendations.

1.8 PRODUCT DATA

1. Submit product data in accordance with Section 01330 - Submittal Procedures.

2. Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details and water flow diagrams.

1.9 SUBMITTALS

1. General

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Submit shop drawings, samples and engineering calculations for the Consultant's review before proceeding with the Work of this Section. In addition to submission requirements as described in Sections 01330 and 01780, the Curtain Wall Subcontractor shall, within ten (10) days after date of written authorization to proceed, submit a completed copy of the shop drawing log and a list of major products proposed to be furnished, including manufacturer's data. Curtain Wall Subcontractor is hereby advised that submissions shall be made according to a schedule that allows for review and approval by the Owner and the Consultant as stated in the General Conditions. The Curtain Wall Subcontractor shall be considered solely liable for any delays resulting from failure to allow review time as stipulated by the Contract Documents.

2. Submissions shall be complete and comprehensive and include all shop drawings, samples, material data submissions, and engineering calculations for the part of the glazed aluminum wall assemblies and skylight assemblies addressed. All work shall be coordinated by the Curtain Wall Subcontractor prior to submission. Incomplete, non-conforming, or uncoordinated submissions shall be subject to rejection or return without action by the Consultant. Any work executed which deviates from the approved shop drawings and submittals shall be subject to rejection.

1.10 SHOP DRAWINGS

1. Submit shop drawings in accordance with Section 01330 - Submittal Procedures.

2. Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

3. Shop Drawings shall clearly illustrate all aspects of the Work including:

    1. The relationship of the Work to the building structure, mechanical systems, roofs, and other related work.
    2. The arrangement of components.
    3. The sequence and details of fabrication, assembly and erection.
    4. Full size details, including isometric drawings of sealing, flashing and jointing.
    5. All dimensions and thicknesses, materials and finishes.
    6. Material, type, size, location, and spacing of screws, bolts, welds, anchoring devices, and accessories.

4. Shop drawings shall include details of all connections to contiguous work as approved by the Subcontractor for the work adjacent.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. Provide isometric details or three dimensional graphics of any condition as requested by the Consultant.

6. Clearly indicate all revisions to shop drawings on resubmissions.

7. Shop drawing must be submitted concurrently with engineering calculations. Shop drawings submitted without calculations shall be returned un-reviewed.

8. All shop drawing sheets shall be of one size and shall bear the seal of a Professional Engineer.

9. Letters of Assurance: The Engineer who sealed the shop drawings shall submit to the Consultant, with the initial shop drawing submission, an Assurance of "Structural Design" and Commitment for "Field Review". The Engineer who sealed the shop drawings shall provide field review of the installation and shall provide sufficient reviews in order to provide a letter of professional assurance. Written inspection reports of field review shall be submitted to the Consultant promptly as field reviews are made. On completion of the installation the Engineer shall submit to the Consultant an Assurance of Field Review and Compliance.

1.11 SAMPLES

1. Submit samples in accordance with Section 01330 - Submittal Procedures.

2. Submit three samples 300 x 300 mm in size illustrating prefinished aluminum surface, specified glass units, insulated infill panels including concrete spandrel panel, glazing materials illustrating edge and corner. In addition, have available an adequate quantity of matching samples, approved by the Consultant, in order to coordinate the construction and finishes of other trades. Samples of production materials shall be the following sizes:

    1. Anchor Extrusion: Each Type.
    2. Color Samples: 12 inch x 12 inch, each color.
    3. Finish Samples: 12 inch x 12 inch, each type and finish.
    4. Finished Sheet or Plate: 12 inch x 12 inch, each type.
    5. Stud or Plug Welds to Sheet: 12 inch x 12 inch, each type.
    6. Finished Extrusions: 12 inches in length, each type.
    7. Glass: 12 inch x 12 inch, each type and edge finish.
    8. Fastening Devices: Each type.
    9. Flashing: 12 inches x 12 inches, each type. Include lap and splice joining.
    10. Gaskets: 12 inches long, each type, and12 inch x 12 inch at each corner.
    11. Sealants: Cured sample - 12 inches long, each type.
    12. Typical Joinery and Connections: Approx. 24 inch x 24 inch Typical 4-way stack joint I vertical joint intersection. Two (2) sample copies per each wall type.
    13. Finish Hardware: Each type.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Submit samples of all materials and finishes. Include:

    1. Samples matching the appearance, color, texture, and other characteristics of each finish required;

    2. Range samples showing the complete range of variation in color, texture, and other characteristics resulting from the carefully controlled manufacture, finishing, fabricating, delivery, assembly, installation and cleaning processes;

    3. Finished samples of major extrusions;

    4. Finished samples of each sheet in thickness and type required;

    5. Samples showing finishes over welds and over materials welded.

    6. Sample submissions shall include three identical pieces of each sample required.

1.12 DESIGN DATA

1. Submit design data in accordance with Section 01330 - Submittal Procedures.

2. Provide framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.

3. Submit engineering calculations as described hereinafter and in the General Conditions.

4. Engineering calculations shall be submitted concurrently with the corresponding shop drawings.

5. All calculations shall bear the stamp of a professional engineer registered in the Province of British Columbia.

1.13 TEST REPORTS

1. Submit test reports in accordance with Section 01330 - Submittal Procedures.

2. Submit test reports for all tests described herein.

3. Test reports shall be submitted in a timely manner and well before execution of any related component of the glazed aluminum wall and skylight assemblies.

4. All test reports are subject to acceptance by the Consultant and the Owner.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. Test Reports: Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data. Submit written confirmation verifying that the proposed unit wall SSG system is being used in accordance with their recommendations and system design will meet performance criteria specified herein.

1.14 MOCK-UPS

1. Construct mock-ups in accordance with Section 01450 - Quality Control.

2. Provide mock-up as specified here in and as shown on drawing including perimeter glazing members, intermediate glazed joints, intermediate exterior mullions, vision glass light and insulated infill panel. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

3. Locate where directed.

4. Allow 24hours for inspection of mock-up by Consultant before proceeding with work.

5. When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.15 INSPECTION AND TESTING PROGRAMS

1. Submit detailed description of inspection and production testing programs and inspection reports for:

    1. Structural qlazinq
    2. Organic coating of aluminum
    3. Anodized aluminum

1.16 RECORD SHOP DRAWINGS

1. At the completion of the Project, provide five (5) bound sets of reduced (half-size) photocopies of all final approved shop drawings.

1.17 MAINTENANCE MANUAL

1. At the completion of the Project, submit five (5) bound copies of a maintenance manual describing the various materials, equipment, and procedures for cleaning and maintaining the work of this Section. Include manufacturer's data for all components of the CWSE.

1.18 PRE-INSTALLATION MEETING

1. Convene one week prior to commencing work of this section.

1.19 DELIVERY, STORAGE, AND HANDLING

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Deliver, store, handle and protect materials in accordance with Section 01610 - Basic Product Requirements.

2. Handle work of this section in accordance with AAMA CW-10.

3. Package and store the materials in such a manner that shall prevent damage, contamination, distortion, breakage or structural weakening.

4. Pre-glazed units shall be stored upright or shall be crated and packaged with a rigid protection board top to prevent damage from ponding water, or by the work of other trades.

5. Units and related components shall not be staged more than one week in advance of installation in order to avoid damage by other trades. Units shall not be uncrated more than one day in advance of installation.

6. Protection material, such as plastic membrane tapes and adhesive sheeting, shall be suitable for the intended protection application and protection period.

7. Protection materials shall be installed in a manner that will not trap harmful moisture or otherwise contaminate the Work in any way.

8. The Contractor shall submit samples and manufacturer's performance data, as well as application and removal procedures, for all protection materials.

1.20 ENVIRONMENTAL REQUIREMENTS

1. Do not install sealants when ambient and surface temperature is less than 5°C.

2. Maintain this minimum temperature during and after installation of sealants.

1.21 SEQUENCING

1. Coordinate the work of this section with installation of fire stopping, air barrier placement, vapour retarder placement, flashing placement, installing duct work to rear of louvers, and components or materials.

1.22 WARRANTY

1. For the Work of this Section 08975 - Structural Sealant Glazing System the 12 months warranty period.

2. Contractor hereby warrants that Structural Sealant Glazing System will stay in place and remain leak-proof including coverage for complete system failure.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Indemnify the Owner and Consultant against any defects in the design, workmanship, quality of materials, water tightness or performance of the Work of this Section and to repair or replace defective design, workmanship or materials of the Work of this Section during the warranty period(s). Defective materials and workmanship include:

    1. Abnormal deterioration, aging and weathering of the glazed aluminum wall and skylight assemblies
    2. Leakage of water or air exceeding specified limits
    3. Structural failure of components resulting from exposure to pressures and forces within specified limits
    4. Failure of operating parts to function normally
    5. Deterioration/discoloration of finishes in excess of normal weathering and aging
    6. Glass breakage
    7. Edge separation or any other deterioration whatsoever of laminated glass
    8. Failure of the Work of this Section to meet any other specified performance requirements

4. The warranty does not cover damage caused by vandalism, or natural conditions exceeding the performance requirements.

5. Warranties for insulating glass, laminated glass, coating(s) on glass, coating(s) on aluminum shall each be for a period of ten (10) years after the date stipulated in the Certificate for Substantial Completion and cohesion/adhesion of structural silicone shall be for a period of twenty (20) years after the date stipulated in the Certificate for Substantial Completion.

1.23 EXTRA MATERIALS

1. Provide extra materials of glass units in accordance with Section 01780 - Closeout Submittals.

2. Provide a minimum of one percent, but not less than two lites of sealed glass units of each size required.

3. Provide a minimum of one percent, but not less than two extra insulated infill panels of each size required.

4. Provide protected and packaged in wood crates suitable for storage. Clearly identify each crate.

5. Deliver to Consultant, upon completion of the work of this section.

6. Store where directed by Consultant.

1.24 WASTE MANAGEMENT AND DISPOSAL

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. All packaging materials are to be removed from site and disposed of at appropriate recycling facilities.

2. All corrugated cardboard, polystyrene, plastic packaging material is to be disposed of in appropriate on-site bin for recycling in accordance with the site waste management program.

PART 2 – PRODUCTS

2.1 MATERIALS

1. Aluminum

    1 Plate and Sheet
        1. Painted Finish: AA 3003 H14, ASTM B 209
        2. Anodized Finish: AA5005 H34 (Anodizing Quality), ASTM 8 209
        3. All sheets shall be stretcher-leveled and stress-relieved.
        4. All aluminum alloy for anodizing shall be of anodizing quality and shall be specifically intended for anodized finishing.

    2 Extrusions
        1 AA 6063-T5 or T6; ASTM B 221

2. Carbon Steel
    1. Rolled shapes, plates and bars: CAN/CSA-G40.20 / ASTM A 36, ASTM A 108.

    2. Cold rolled sheet: CAN/CSA-S136M / ASTM A 611.

        1. Fasteners:
            1. Bolts and Screws: ASTM A 307 or A 325.
            2. Nuts: ASTM A 563.

3. Stainless Steel

    1. For shapes, plates, bars and strip (exposed): AISI Type 316, ASTM A 666.
    2. For shapes, plates, bars and strip (concealed): AISI Type 304, ASTM A 666.
    3. Fasteners: AISI Type 303, 304 or 316 non-magnetic.

        1. Bolts and screws: ASTM F 593, Alloy Groups 1 and 4.
        2. Nuts: ASTM F 594, Alloy Groups 1 and 4.
        3. Button and countersunk head screws: ASTM F 879, Alloy Groups 1 & 4.
        4. All stainless steel shall be cleaned and passivated after fabrication per the recommendations of ASTM A 380.

4. Zinc

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Electrolytic, 99.995 % pure zinc with alloying additives of titanium and copper. EN 988 minimum 1.21mm thick.

2. Prior to start of production, the Sub-Contractor shall submit samples of finished sheet indicating the anticipated range of color and tonality in the finished work.

3. In the event that zinc must be sourced from more than one batch, the Sub-Contractor shall fabricate components in such a way that components from different batches are not located contiguous to each other or in the same general area. Color variations shall be evenly distributed in the finished Work.

4 Acceptable products:
- 1 Rheinzink in preweathered finish
- 2 VWZinc in preweathered finish

5 Protective Treatment For Metals

1. Galvanizing Carbon Steel (Hot Dip)
   1. For shapes, plates, bars and strip: ASTM A 123 (2 oz I square foot minimum coating thickness).
   2. For fasteners and hardware: ASTM A 153.
   3. For sheet: ASTM A 653 (G90).
   4. For protection against hydrogen embrittlement: ASTM A 143.
   5. For repair of damage to HDG coatings: ASTM A 780.

2. Zinc-rich Coating
   1. Surface preparation: SSPC-SP6 Commercial Blast Cleaning.
   2. Painting system: SSPC-PS12 Zinc-Rich Coating System (2 coats).
   3. Primer: SSPC-Paint 20 Zinc-Rich Primer (Type II).
   4. Acceptable products are:
      1. 90-97 Tneme-Zinc as manufactured by Tnemec Company, Inc (2.5 - 3.5 mils DFT per coat) .
      2. Carboline 858 as manufactured by Carboline (2.0 - 4.0 mils DFT per coat).

3. Bituminous Paint
   1. SSPC-Paint 12,30 mil minimum thickness .

4. Surface Preparation:
   1. SSPC-SP6, as a minimum, and as required by the manufacturer of protection material.

5 Surface Protection Film
   1. Colored, clear, strippable PVC film specifically intended for the temporary protection of metal.

6. Film thickness shall be a minimum of 0.03 mil.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

6. Finishes of Aluminum: Clear Anodic Coating
    1. Extrusions: AA-M21 C22 A41, Class I, AAMA 611, AA 46 - 1 hour clear
    2. Panels: AA-C22 A41, Class I, AAMA 611, AA 46 - 1 hour clear
    3. For all anodized aluminum exposed in the finish work, the aluminum alloy consistency shall be carefully controlled from batch to batch. All aluminum shall be anodizing quality.
    4. Coating shall conform to the anodic coating standards described below:
    5. Workmanship and quality of extrusions and other aluminum materials proposed for finishing shall conform to the highest standards of the aluminum finishing industry. Such considerations shall include, but shall not be limited to: appearance, flatness, dimensional accuracy, soundness of welds, atmospheric corrosion, dents, scratches, abrasions, and other forms of damage, and overall quality of fabrication.
    6. All aluminum alloy shall be of anodizing quality as specified herein.
    7. Aluminum shall be finished in accordance with the standards and procedures developed and recommended by the alloy manufacturer.
    8. Finishing of aluminum shall be through a sulfuric acid anodizing process approved by the alloy manufacturer. Coating shall be a Type I clear anodic coating with a certified minimum coating thickness of 0.7 mil.
    9. Prior to start of production coating, the Contractor shall submit samples of finished extrusion and sheet indicating the anticipated range of color and tonality in the finished work .

7. Finishes of Stainless steel:

    1. Finish shall be uniform and free from blemishes, scratches, and other defects.

    2. If exposed to view, finish for stainless steel shall be as follows:

        1. Finish Type M1: AISI NO.4 satin directional finish.

    3. If concealed from view, finish for stainless steel shall be AISI No. 2D.

    4. All stainless steel shall be cleaned and passivated as per the recommendations of ASTM A 380.

    5. The grain of all stainless steel and brushed finishes shall run in the same (vertical) direction for contiguous or adjacent components except where noted on drawings.

    6. Touch-up finish in field as required.

8. Low Friction Materials
    1. Wherever materials are subject by design to relative movement, provide suitable low friction material(s), such as:
        1. Teflon strip, 0.03 inch thick; and Teflon tape, 0.005 inch thick.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. High-impact polystyrene or Nylatron equal to Eel-Slip pads as manufactured by Scan-Pac.

2. Low friction materials shall be impervious to moisture.

9. Sealants and Seal Backing Materials

1. Cellular Glazing Tapes
   1. All Cellular Glazing Tapes shall be open cell, semi-rigid, adhesive-backed foam backer tape.
   2 The following are acceptable Cellular Glazing Tape products:
      1. Norton Thermalbond V2100 for structural glazing applications.
      2. Norton Thermalbond V2200
      3. Norton Norseal V-780 for captured glazing applications.

2. Structural Silicone Compounds

   1. All Structural Silicone Compounds shall be neutral cure, medium or high modulus, non-staining, matte finish, color to match architects sample, and specifically intended for use specified.
   2. Multi-component: ASTM C 920, Type M.
   The following are acceptable Structural Silicone Compound products:
      1. Dow Corning 983.
      2. General Electric Ultraglaze 4400.

3. Weatherseal
   1. All Weatherseal shall be neutral cure, low or medium modulus, non-staining, matte finish, color to match architects sample, and specifically intended for use specified.
   2. Single-component: ASTM C 920, Type S, Grade NS, Class 25, Use A, G, and O .
   3. The following are acceptable Weatherseal products:
      1. Dow Corning 795.
      2. General Electric Silpruf.
4. Polyurethane Compounds
   1. All polyurethane compounds shall be neutral cure, low-modulus, non-staining, and compatible with stone and all other components to be sealed.
   2 All sealants shall conform to ASTM C 920, Type M.
   3 An acceptable product is Dymeric as manufactured by Tremco.

5. Sealant Backing Materials
   1. Preformed foam plastics and synthetic rubbers, compressible, non-gassing, non staining, and compatible with sealants and as recommended by sealant

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

manufacturers. Backing shall be of the sizes and shapes to suit the various conditions and shall be a color different than the sealant color. Backer rods shall be 25 percent wider than the joint width.

2. Open/closed cell extruded polyolefin backer rod: SOF-ROD by Nomaco Inc. or equal.
3. Extruded silicone rubber: same as 2.09, C
4. Cellular glazing tape shall conform to specifications laid out in Section 2.08, A (Cellular Glazing Tapes).

6. Expanding Foam Sealant
   1. Preformed, expanding, adhesive-backed, polyurethane foam impregnated with water repellant material. Acceptable products are:
      1. Greyflex as manufactured by Emseal Joint Systems, Ltd.
      2. Will seal as manufactured by illbruck, Inc.

7 Bond Breaker Tape
   1. Bond Breaker Tape: 3M Company Lithographer Tape.

8 Weep Hole Filter
   1. PVC-coated reticulated open cell polyurethane foam, 30 to 40 pores per linear inch sized for installation at 30-50 percent compression.

10. Preformed Synthetics
    1. The particular alloy, compound, etc. shall be appropriate to the intended function of the preformed synthetic and is subject to approval by the Consultant.
    2. Base gasket material manufacturers and gasket extruders are subject to approval by the Consultant.
    3. All material shall be non-staining, UV stabilized, and ozone-resistant.
    4. All corners of weather-stripping shall be vulcanized, heat-welded, or injection-molded to form a continuous seal around the panel.
    5. Glazing Gaskets and Accessories (NOT in contact with Silicone)
       1. Interior closed cell sponge gaskets: Neoprene (polychloroprene) or EPOM (ethylene propylene diene terpolymer) gaskets: ASTM C 509 (60 ±5 Shore A durometer) .
       2. Exterior non-cellular dense wedge gaskets: Non-cellular Neoprene (polychloroprene), EPDM (ethylene propylene diene terpolymer), or Santoprene (EPDM-polypropylene alloy) gaskets: ASTM C 864 (70 ±5 Shore A durometer) .
       3. Setting blocks: Non-cellular (dense) extruded Neoprene (polychloroprene) or EPDM (ethylene propylene-diene terpolymer): ASTM C 864 (90 ±5 Shore A durometer).
       4. Face spacers and jamb blocks: Non-cellular (dense) extruded Neoprene (polychloroprene) or EPOM: ASTM C 864 (60 ±5 Shore A durometer hardness) .

6. Glazing Gaskets and Accessories (in contact with silicone)

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Setting blocks:
   1. Non-cellular (dense) extruded silicone: ASTM C 1115 Type C (90 ± 5 Shore A durometer hardness).
   2. Non-cellular (dense) extruded Alcryn (silicone compatible rubber):
      ASTM C 864 (90 ±5 Shore A durometer hardness).
2. Face spacers and jamb blocks:
   1. Non-cellular (dense) extruded silicone: ASTM C 1115 (60 ±5 Shore A durometer hardness).
   2. Non-cellular (dense) extruded Alcryn (silicone compatible rubber):
      ASTM C 864 (60 ±5 Shore A durometer hardness).

3. Where structural silicone is to be gray in color, spacer shall be extruded silicone to match.

7. Expansion Joint Covers:
   1. Extruded dense silicone rubber: ASTM C 1115 Type T.

   2. Dense polychloroprene (neoprene): ASTM D 3542.

   3. Thermal Isolators:
      1 Rigid polyvinylchloride: ASTM 4216.

   4. Cover to be custom profile and incorporate primary and secondary seals.

   5. Color to be custom color as selected by the Architect.

   6. Acceptable manufacturers are:
      1. Balco Metallines
      2. CIS Group

11 Elastomeric Sheet Material
Section A08975 STRUCTURAL SEALANT GLAZING SYSTEM 16 August 2007

1 Elastomeric Sheet shall be a complete engineered membrane system, consisting
principally of:
   1. Cured Neoprene (polychloroprene) or EPDM (ethylene-propylene-cHene
      terpolymer) sheet: ASTM D 4637, Class SR(60 mil. thick) .
   2. Uncured Neoprene (polychloroprene) or EPDM (ethylene-propylene-diene terpolymer) sheet flashing: ASTM D 4811.
   3. Bonding and splicing adhesives, primers, putty, sealants and all other materials as recommended by the manufacturer.
   4. Sheet Neoprene (polychloroprene) or EPDM (ethylene-propylene-diene terpolymer) shall comply with ASTM D 4637, Class SR.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2 Acceptable elastomeric membrane and flashing systems are:
1. Rubbergard system as manufactured by Firestone.
2. Bituthene as manufactured by W.R. Grace.

12 Insulation, Firesafing and Sound Deadening
1. High-density Semi-rigid Mineral Fiber Board
1. Semi-rigid mineral wool fiberboard with water-resistant binders conforming to the following requirements:
1. ASTM C 612, Type III.
2. ASTM C 518, thermal conductivity of 'k' = 0.23 BTU-in/hr ft2 at 75°F.
3. Nominal density of 8 lbs / ft3.
4. ASTM E 84, flame spread 25, smoke developed 5.
5. Provide sizes to fit specific panel applications. Install foil tape around perimeter of foil-facing to adjacent metal framing to achieve positive vapor barrier. Thickness to be 2 inches minimum unless indicated otherwise.

2. An acceptable product is Thermafiber CW 90 (foil-faced).

2 Mineral Fiber Firesafing:
1. Mineral wool fiber blanket with water-resistant binders conforming to the following requirements:
1. ASTM C 612, Type III.
2. ASTM C 518, thermal conductivity k =0.23 BTU-in/hr ft2 at 75°F.
3. ASTM E 84; flame spread 25, smoke-developed 5.
4. Nominal density of 4 lbs/ft3.
5. Provide sizes to fit specific sating applications and galvanized steel impaling clips. Thickness to be 4 inches minimum unless indicated otherwise.

2. An acceptable product is Thermafiber Foil-faced Safing Insulation

3. Insulation
1. All insulation shall comply with ASTM E-84; E-119 (2 hours); E-136.

4. Smoke Seal Compound:
1. Caulking compound specifically intended for inhibiting the passage of smoke and conforming to the following requirements:
1. ASTM E 84; fiame spread 5, smoke-developed 0.

2 An acceptable products are:
1. Thermafiber Smoke Seal Compound.
2. 3M Firebarrier Spray.

5. Sound-deadening:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Acoustical board, thickness and density as required by design, non-combustible waterproof type, to Architect's approval.
2 Adhesive-backed, bitumen compound sheet membrane, thickness as required by design, to Architect's approval.

13 Glass units:

1. All glass of the same type shall be the manufactured product of one company.
2. Annealed Glass: ASTM C 1036; Type I, Class I, Glazing Select q3.
3. Heat Strengthened and Fully Tempered Safety Glass:
    1. ASTM C 1048; Type I, Class I, Glazing Select q3, Kind HS, Kind FT Coated and Uncoated Glass .
    2. All fully tempered glass shall be heat-soaked at a glass surface temperature of 400 °F minimum for eight hours, and shall meet CPSC 16-CFR, Part 1201, Category II. CWSE Contractor may propose alternate time / temperature ratio, provided it can be demonstrated that such alternative is as good as or better than that specified above.
    3. Roller distortion and/or ripples shall run in the same direction for the entire job. All glass shall be heat-treated through the horizontal tempering process.
    4. Heat strengthening shall be achieved by heat treating for a surface compressive stress of not less than 3500 psi nor more than 7000 psi. The level of pre-stress shall be such to resist wind and thermally induced forces. Throughout production, the manufacturer shall maintain a quality control program of destructive testing to ensure that allowable maximum stresses have not been exceeded. The CWSE Contractor shall submit this program for the Architect's and the Owner's approval.

4. Insulating Glass:
    1. Insulating glass units shall be fabricated using the dual-seal system, consisting of two lites of glass (primary seal of polyisobutylene specifically intended for primary insulating glass seals and secondary seal of silicone insulating glass sealant).

    2. Spacer frame shall be fabricated of aluminum, with sealed corners, welded, soldered or formed by bending. Care shall be taken to produce corners free from pinholes, gaps and other defects to ensure water vapor-tight construction. Desiccant used within spacer shall be of type and quantity to ensure proper performance of the unit. Spacer to be clear anodized unless indicated otherwise.

    3. Insulating Glass units shall be certified as CBA by the Insulating Glass Certification Council and shall comply with the following:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. ASTM E 773 Standard Test Method for Seal Durability of Insulating Glass Units.
2. ASTM E 774 Standard Specification for Sealed Insulating Glass Units, Class A or better.
3. Insulating glass shall meet these tests considering the climatic conditions of the location of manufacture as well as the location or the installation.

4. Insulating Glass units shall be covered by manufacturer's warranty for ten (10) years.

5. Low-e Coated Glass:
   1. Low-emissivity (low-e) coating(s) shall be neutral in transmitted and ret1ected color and otherwise exhibit the visual and performance characteristics of the products specified.
   2. The coating shall be as approved by the Consultant.
   3. Visual Quality Control acceptance criteria of the coating shall be consistent with industry guidelines, subject to approval by the Consultant and the Owner.
      1. Pinholes with diameters in excess of 1.5mm (1/16 inches) are not acceptable.
      2. Clusters of pinholes are not acceptable.

   4. Edge deletion of reflective and low-e coatings shall be provided at all insulating glass and structural glazing unless manufacturer submits test data acceptable to the Consultant indicating that edge deletion is not required.
   5 Manufacturer shall warrant that coating shall not peel, crack, fade or deteriorate for a period of ten (10) years. Manufacturer shall warrant that any glass that is not edge deleted will not develop loss of adhesion with insulating glass or structural glazing sealants for a period of ten (10) years.

6. Spandrel Glass:
   1. Polyester opacifier film.
   2. Edge deletion of opacifier film shall be provided at all structural glazing.
   3. Manufacturer shall warrant that opacifier film shall not peel, crack, delaminate, or otherwise compromise the requirements of the glass for a period of ten (10) years.

7. Laminated Glass:
   1. PVB interlayer:
      1. Two lites of glass bonded to a 1.52mm (.060 in.) clear plastic, puncture resistant, polyvinyl butyral (PVB) interlayer conforming to the requirements of ANSI Z97.1, ASTM C 1172, and CPSC standard 16 CFR 1201 Category II.
      2. For Large Missile Impact glazing, two lites of glass bonded to a 2.29mm (.090 in.) clear plastic, puncture

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

resistant, polyvinyl butyral (PVB) interlayer conforming to the requirements of ANSI Z97.1, ASTM C 1172, and CPSC standard 16 CFR 1201 Category II.

3. Interlayer shall be compatible with all glazing sealants.
4 Acceptable Products:
    1. Saflex as manufactured by Solutia Inc.
    2. Butacite as manufactured by E.I. Dupont de Nemours & Co., Inc.
5. Manufacturer shall warrant that laminated glass will not develop edge separation or other defects which may obstruct vision through the glass or otherwise compromise the requirements of the glass for a period of ten (10) years.

8. Ceramic Frit Coated Glass:
    1. All ceramic frit coated glass shall be heat-strengthened (Kind HS) and meet the minimum requirements of ASTM C 1048.

9. Glass Edges:
    1. Butt glass edges shall be ground and swiped.
    2. Structurally glazed glass edges shall be ground and polished.
    3. All other edges shall have a high quality factory cut edge.
    4. Exposed edges, such as at corners, shall be ground and polished.
    5. All glass edges shall conform to the following requirements:
        1. Shark teeth shall not penetrate more that half the glass thickness
        2. Serration hackle shall not penetrate more than 10 percent of the glass thickness.
        3. Flare shall not exceed 1/16 inch as measured perpendicular to the glass surface at edge.
        4. Bevel shall not exceed 1/16 inch.
        5. Flake chips shall not exceed 1/16 inch in length or 1/4 inch in diameter.
        6. Rough chips exceeding the dimensions listed in Item e above shall not be permitted.

10. Approved Glass Manufacturers:

11. Not used

12. The following are approved glass manufacturers. Alternate glass manufacturers are subject to approval:
    1. Ghani Glass
    2. Prince Glass

13. Glass Schedule:

The contractor is required to propose their glass and be responsible to ensure their glass meets all technical, safety and authority requirements.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Type A Vision Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for particular assemblies. The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectro-photometrical values for thickness 8(16)8:

LT	LRo	LRi	SF	SC	CRI	U	RHG
50	13	15	28	0.32	92	1.3	212

Type B Fritted Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. The external pane receives a silk-screen pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly. The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectro-photometrical values for thickness 8(16)8,

%SK	LT	LRo	LRi	SF	SC	U	RHG
25%	37	19	25	21	0.24	1.3	161

Type B2 Fritted Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. The external pane receives a silk-screen pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating, deposited under vacuum by the

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

magnetron sputtering process, which must be located within the cavity of the IGU. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly. The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone.

The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectro-photometrical values for thickness 8(16)8 ,

%SK	LT	LRo	LRi	SF	SC	U	RHG
50%	29	23	31	17	0.20	1.3	136

Type B3 Fritted Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. The external pane receives a silk-screen pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU.A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly.

The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectra-photometrical values for thickness 8(16)8,

%SK	LT	LRo	LRi	SF	SC	U	RHG
75%	21	27	37	14	0.16	1.3	111

Type B4 Fritted Glazing: To be same as type S3
Type B5 Fritted Glazing: To be same as type S3

Type C Structural Glass System: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. One of the panes received a low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for particular assemblies. The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

The unit responds to the following spectro-photometrical values for thickness 10(16)10:

Insulating Unit Performance Comparisons[1] 1-inch (25mm) units with ½ inch (13mm) airspace and two ¼-inch (6mm) lites: interior lite clear												
Glass type	Transmittance[2]			Reflectance[2]		U-Value[3]		K-Value[3]		Shading Coefficient[4]	Solar Heat Gain Coefficient[5]	Light to Solar Gain[5] (LSG)
	Ultraviolet %	Visible %	Total Solar Energy %	Visible Light %	Total Solar Energy %	Winter Night Time	Summer Day Time	Shading Coefficient[4]	Summer Day Time			
Solarban 60 (3) Optigray 23	3	18	9	5	6	0.29	0.28	1.65	1.55	0.22	0.19	1.00

Type D Fritted Glazing: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. The external pane receives a silk-screen pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. One of the panes received a double silver low-emissivity coating, deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU.A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly.

The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air. The inner pane is in un-coated clear tempered glass to meet lateral load and safety requirement.

Skylight/Skybridge: consisting of 2 panes of glass with thickness and strength meeting structural requirements, thermal assessments and safety designs as per local codes or referenced standards. The external pane to be minimum heat strengthened. The external pane receives a silk-screen

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

pattern on surface #2 prior to coating, on the same surface. The coating is a double silver low-emissivity coating , deposited under vacuum by the magnetron sputtering process, which must be located within the cavity of the IGU. A 16mm black or dark colored bent spacer tube, automatically filled with desiccant, separates the panes. Corner keys are only allowed for conditions requiring this particular assembly. The spacer tubes are permanently sealed to the glass by a primary sealant in PIS and the entire structure is provided with a secondary sealant in silicone. The cavity between the panes is filled with de-hydrated air.
The inner pane is in un-coated laminated clear float glass. Note: All skylight glass to be designed by the contractor to carry a minimum live load for maintenance purposes. In no case shall the supporting lite be less than 18mm fully tempered and laminated glass.

The unit responds to the following spectro-photometrical values for thickness 8(16)66.2:

%SK	LT	LRo	LRi	SF	SC	U	RHG
25%	35	20	25	21	0.24	1.3	161

2.2 COMPONENTS

1. General
    1. Components shall be manufactured from extruded or sheet aluminum, except where indicated otherwise. Substitutions for aluminum may be considered only for such components that are not finished or exposed to the weather.

2. Mullion profile: Minmum102 x 65 mm nominal dimension for vertical members; 102 x 65 mm nominal dimension for horizontal members; thermally broken with interior section insulated from exterior attachments; drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system; internal mullion baffles to eliminate "stack effect" air movement within internal spaces.

3. Reinforced mullion: Minimum 102 x 65 mm profile of extruded aluminum cladding with internal reinforcement of shaped steel structural section.

4. Architecturally Exposed Structural Steel
    1. All steel exposed to view shall be Architecturally Exposed Structural Steel.
    2. Lines shall be straight, surfaces flat and without surface imperfections, corners square and with uniform and sharp arris.
    3. All welds shall be ground smooth to match surrounding surfaces, flush welds shall blend with adjacent surfaces.
    4. Tolerances, as a minimum, shall be consistent with the AISC tolerances for Architecturally Exposed Structural Steel, Section 10 of the Code of Standard Practice, except where more stringent tolerances are required by the design.
    5. Tolerances for fabrication and installation shall be half those normally acceptable for structural steel.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

6. Surfaces shall be blast cleaned and receive the finish specified herein.

5. Embeds
   1. Embeds shall be hot-dipped galvanized steel and shall incorporate minimum embed extension of 12 inches, with hooked profile for securing to structure reinforcement.
   2. An acceptable manufacturer is Halfen.

6. Louvers
   1. Louvers shall be storm-proof profile, all blades and frames to be extruded aluminum construction.
   2. Louver assembly to incorporate 4" spacing, continuous blade, hidden frames and a minimum 50% free area.
   3. Finish of louvers to be Clear Anodic Coating.
   4. Louver assemblies shall be designed to be removable.
   5. Louver assemblies shall typically incorporate stainless steel bird-screen.
   6. Blank off panels to be painted aluminum with two-coat PVDF finish. Color to be Black.

7. Bird-Screen
   1. 300 series stainless steel woven wire mesh, ½ inch space, 16 gauge wire typical.
   2. Finish to be bright annealed finish or silicate hardened black oxide finish as indicated.

8. Skylights
   1. Skylights shall have a condensate/Leakage collection system capable of controlling water to prevent leaks to the interior or protected space. Joints in this system shall be sealed tight; cross members shall overlap and be designed for controlled water flow.
   2. Provide weep holes to the exterior for removal of condensate/leakage; weep holes shall be protected on the exterior by appropriate rain hoods or baffles against water infiltration.
   3. The perimeter elastomeric flashing shall start at the glass line and extend to and overlap the roof and / or fascia system. Fasteners penetrating the elastomeric flashing shall be sealed using uncured elastomeric boots or other approved seals. All joints shall be lapped at least ¾ ".

9. Operable Windows
   1. The materials, engineering and fabrication shall be of the highest quality, conforming as a minimum to AAMA specifications and testing guidelines for projected "custom" windows. System includes framing, glass and glazing, seals, weather stripping, reinforcements, anchorages, heavy-duty cam locks, 4-bar stainless steel friction stay hinges, limit stays and all other accessories required for a complete and serviceable installation.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Ventilator extrusions shall be tubular with a mitered, reinforced corners.
3. Operable windows shall typically incorporate a dual gasket weather seal for a double line of defense against air and water infiltration.

10. Glass Guardrails
    1. Cantilevered structural glass guardrails shall incorporate 3/4" (19.1 mm) minimum thickness heat strengthened laminated glass with liquid resin or ionoplast interlayer and a continuous top rail.
    2. Where guardrail contains multiple panels, top rail shall be continuous across a minimum of three panels.

11. Door Hardware
    1. Supply and install all finish hardware as required for the Work of this Section in accordance with the requirements of Section 08710 - Door Hardware and all other hardware required to make the Work of this Section complete.
    2. All cutouts and mortises fro finish hardware shall be made in the fabrication shop and to the extent possible shall be installed in the fabrication shop.
    3. Reinforce all work for the attachment of finish hardware.
    4. Indicate all hardware on shop drawings and submit manufacturer's data sheets and physical samples as specified.
    5. Propose the proper size, model, and weight suitable for all other miscellaneous hardware as may be required, to the approval of the Consultant. Finish hardware shall be modified or custom designed where necessary to meet special conditions.
    6. Provide cut-outs and interfacing as required for building security system.

23. FABRICATION

1. General
    1. Use no materials, equipment or practices that may adversely affect the functioning, appearance or durability of the completed glazed aluminum wall and skylight assemblies and related construction.
    2. The glazed aluminum wall and skylight assemblies shall be accomplished in compliance with the specified criteria without buckling, opening of joints, undue stress on fasteners, sealants and gaskets, opening of welds, cracking of glass, leakage, noises or other harmful effects .
    3. Conform strictly to the materials, finishes, shapes, profiles, sizes, thickness, and joint locations required by the Drawings and Specifications.
    4 Match all materials to produce continuity of line, texture and color.
    5. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All work shall be accomplished to the satisfaction of the Consultant and Owner.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

6. To the fullest extent practicable, fabrication and assembly shall be executed in the shop. All Work that is not shop-assembled shall be shop-fitted.
7. To the extent possible, all fabrication shall be done prior to finishing. Any exposed mill finish edges shall be finished to match adjacent construction.
8. All components exposed in the finished work shall be free from warping and oil-canning effects, the telegraphing of welds, studs, and other fasteners, and streaks, tool and die marks.
9. Exposed metal edges shall be finished to match typical finished surfaces.
10. The glazed aluminum wall and skylight assemblies' design shall typically incorporate an outside weather seal and an inside air-seal, and provide a pressure-equalized drainage system.

2. Fabrication and Assembly
   1. The design of the glazed aluminum wall and skylight assemblies shall endeavor to keep site operations to a minimum. Manufacturing, finishing, and assembly processes shall, wherever possible, be carried out off-site and under controlled environmental conditions.
   2. Assembly procedures to be carried out on site shall be simple to execute and capable of execution within the time(s) allowed in the Master Construction Schedule.
3. Manufacturer's Standards
   1. Materials, components and systems incorporated in the Work shall be mixed, applied, installed and otherwise used in strict accordance with the recommended standards and procedures of the respective manufacturers.

4. Storage and Handling
   1. Materials shall be stored in a dry, well ventilated location. Handling of materials shall be kept to a minimum, and all materials shall be carefully protected from soiling and from condensation and other harmful moisture.

5. Jointing and Reinforcing
   1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contacts.
   2. All fastenings shall be installed at an approved spacing. Fasteners shall not penetrate gutters and drainage systems.
   3. All screws and bolts up to and including 5/16 inch diameter, and all screws and bolts that are drilled and/or tapped into aluminum, shall be 300 series stainless steel.
   4. All bolts 3/8 inch diameter and heavier shall be stainless steel or hot-dip galvanized.
   5 No self-drilling fasteners shall be allowed outboard of the air-seal line.
   6 All jointing and splicing of members shall be concealed.
   7 Exposed fasteners shall occur only where expressly permitted by the Consultant.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Where exposed in finished surfaces, screw heads shall be Phillips oval-head countersunk type, finish to match adjacent surfaces.

8. Conceal all joint sealants except as noted on the drawings.
9. All work shall be properly reinforced to resist all loads imposed upon them by all doors, hardware, anchors, and other attachments.

6. Welding
   1. All welding of steel shall be in accordance with CSA W47 series.
   2. All welding shall be done by skilled mechanics qualified by test in the last 12 months as required by CSA W47 series and as applicable to the material thickness and type of welded joint on which the welders will be employed.
   3. All welding shall be done with electrodes and/or methods recommended by the suppliers of the metals being welded. The type, size, and spacing of welds shall be as shown on the approved shop drawings. Welding materials and methods shall be such as not to cause distortion, discoloration, or result in any other adverse effect on the required profiles and finishes of visible surfaces of the glazed aluminum wall and skylight assemblies.
   4. Welding of aluminum alloys and the qualifications of aluminum welders shall conform to the requirements of the Aluminum Association "Specifications for Structures of Aluminum Alloys, Aluminum Construction Manual".
   5. Welding of Stainless Steel shall be by TIG welding or other methods subject to approval. Use double bevel butt welds, backing bars to remove heat, jigging, tack welds and any other measures necessary to minimize distortion.
   6. Weld splatter and welding oxides on exposed surfaces shall be removed. All exposed welds shall be finished to match and blend with adjacent parent metal prior to final finish application.
   7. Stud welding shall be done by mechanics trained by the manufacturer of the stud setting system. The manufacturer shall develop specific programs and instructions in cooperation with the fabricator to suit the needs of the specific details. The fabricator shall exercise particular care that all recommendations of the manufacturer are closely followed.
   8. Visible marks (telegraphing) on finished surfaces due to welding of studs shall not be acceptable.
   9. Welded joints shall typically be confined to concealed locations. Any exposed joints shall be ground-off.

7. Sealant and Gasket Application
   1. Sealing mechanisms (sealants and gaskets) shall be provided where shown on the drawing, or required for a permanently weather-tight installation. The sealing mechanism for each location and use shall be as indicated on drawings. In those locations where a mechanism is necessary but is not indicated, it shall be of a type recommended by the Contractor and approved by the Consultant.
   2. The design of all sealed joints shall be in accordance with the recommendation of the sealant and/or gasket manufacturer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Specific alloys, compounds, etc. of gasket materials shall be appropriate for the function intended and are subject to approval by the Consultant. Gasket manufacturers/suppliers are subject to approval by the Consultant.
4. Submit test samples of all substrate materials to the sealant manufacturer for compatibility and peel adhesion testing.
5. Protect all adjoining surfaces not to receive sealants against staining by masking and/or other methods. Sealant joints shall be concealed from view to the extent possible.
6. Joints and joint surfaces shall be clean, dry, and free of any materials that may have an adverse effect on the performance of the sealant and gasket materials.
7. Apply sealants and gaskets under the climatic conditions recommended by the manufacturer(s). Sealant shall not be installed when substrates are wet or when ambient temperature is below 40°F. All surfaces to receive sealants shall be treated (cleaned, primed or unprimed) in accordance with the recommendations of the sealant manufacturer. Use no sealant that has started to set in its container, or any sealant that has exceeded the shelf life published by the manufacturer.
8. All glazing gaskets shall be vulcanized, injection molded or heat-welded at the corners to form a continuous closure.
9. Fill all joints continuously and completely with sealant, forming a neat, uniform, concave bead. Finish the material flush with adjoining surface unless otherwise shown on the Drawings. All sealant surfaces shall be tooled smooth. Upon completion of tooling, immediately remove masking tape from adjacent surfaces.
10. Color of sealant shall match the color approved by the Consultant.

8. Glass and Glazing
   1. Glazing shall be performed by skilled workmen in accordance with the best trade practices, and without springing or forcing. All instructions of the glass and glazing materials manufacturers shall be followed
   2. Tong marks shall be concealed within sill rabbet.
   3. Glass and glazing materials shall be compatible with each other and adequate for their intended purpose. Each material type shall be as per details and approved Shop Drawings.
   4. Prior to glazing, all structural silicone glazed glass shall receive a continuous 5mm wide skim coat of matte gray silicone at the perimeter of the lite to conceal sealant and glazing accessories.
   5. Protect all adjoining surfaces not to receive glazing materials against staining or damage of any kind.
   6. Glazing rabbets shall be clean, dry, and free of any materials that might adversely affect the bond and seal of the glazing materials or the drainage of the rabbet.
   7. Install glass and glazing materials under the climatic conditions recommended by the fabricator.
   8. Prime all surfaces to receive glazing materials, unless recommended otherwise, in writing, by the manufacturers and approved by the Consultant.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

9. Use no sealant that has started to set in its container, nor a sealant that has exceeded the shelf life published by the manufacturer.
10. Do not install sealant if the ambient temperature is below 40° F.
11. Sealant color shall be as selected by the Consultant.
12. Exposed sealants shall be installed so that the top surfaces of the sealant beads are sloped to drain water away from the glass. Exposed sealant surfaces shall be tooled smooth.
13. Setting blocks shall be extruded silicone rubber or Alcryn, at least 6mm in thickness, full width of the rabbet, and placed at the glass quarter points. They shall be of a length recommended by the glass manufacturer and be configured in such a way as not to impede water drainage of the glazing rabbet.
14. Jamb blocks shall be used on each glass unit supported on four sides. The blocks shall be extruded silicone rubber or Alcryn, and shall be placed at the top and bottom of the rabbet, 3mm clear of the glass edge.
15. Face spacers shall be extruded silicone rubber or Alcryn, applied around the perimeter of each glazed opening on both inside and outside faces.
16. Glass shall be centered in each opening to provide the purchases and clearances recommended by the glass manufacturer and approved by the Consultant.
17. Apply no tapes, ribbons or markings to the glass.

9. Structural Glazing

1. Structural glazing shall utilize medium or high modulus silicone sealant.
2. Sealant shall be of the configuration and dimensions necessary to provide the following allowable stresses and attendant safety factors when the glazed aluminum wall and skylight assemblies are subject to the requirements of Section 1.5 (Performance Criteria), above.

Stress Type	Allowable Stress (Maximum)	Safety Factor (Minimum)
Tension	20 psi	5
Compression	20 psi	5
Shear	20 psi	5
Dead Load Shear	1 psi	5

3. Structural glazing shall conform to the specific requirements of Section 2.3.8 (Glass and Glazing), above.
4. Structural silicone shall not be used for primary dead load support.
5. Wherever possible, silicone glazing design shall permit glazing to the major framing members in the factory.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

6. All substrate framing extrusions for structural glazing shall provide for an aluminum insert with a finish approved for adhesion of structural glazing sealant by the sealant manufacturer.
7. The Contractor shall provide test samples of all substrate materials to the sealant manufacturer for peel adhesion and accelerated weathering testing, and shall submit the results of all tests. All testing shall be with materials and finishes identical in every respect to approved production materials and finishes.
8. Completed glazed units shall be periodically de-glazed to confirm the homogeneity and integrity of the structural seal. De-glazing shall be performed at a rate of 1 out of the first 10 frames, followed by 1 out of the next 50 frames and 1 out of each 100 frames for the remainder of the project.
9. Prior to undertaking any structural glazing, the Contractor shall submit complete structural glazing procedures, including permissible conditions, temperatures, cure times, temporary restraint design, surface preparation and all other procedures, including quality control inspection program that may be employed to properly undertake the Work of this Section.

PART 3 - EXECUTION

3.1 EXAMINATION

1. Verify dimensions, tolerances, and method of attachment with other work, and compatibility of materials in the structural sealant glazing system.

2. Should any conditions be found that may prohibit proper execution of the Work, the Contractor shall immediately notify the Architect in writing of these conditions. Installation shall not proceed until remedial action, acceptable to the Consultant, has been executed.

3. Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this section.

3.2 INSTALLATION

1. General
   1 Care shall be exercised to properly brace and reinforce units against racking during hoisting and installation.

2. Glazed Aluminum Wall and Skylight Assemblies
   1. Glazed Aluminum Wall and Skylight Assemblies shall be erected plumb, square, level, and correctly aligned within the following limitations:
   2 Offset from true horizontal, vertical, and design location shall not exceed ± 3mm per 300mm (1/8 inch per 12 feet) nor ± 12mm (1/2 inch) over anyone length or part thereof the building.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Maximum offset from true alignment between abutting components or components separated by less than 75mm (3 inches) shall not exceed 0.8mm (1/32 inch).
4. All tolerances are non-cumulative.

3. Anchors and Connections
   1. Anchors and connections shall be provided to fully satisfy their required purpose of adjustability, movement and load transfer.
   2 Connections between different materials shall be designed to allow for the differential thermal movement of the respected materials.
   3. Anchors and connections that do not provide for movement shall prevent such movement by appropriate means.
   4. Anchors and connections that are designed for movement shall be of such construction that friction is low enough to allow for such movement without buckling and other damage and without causing binding and noises.
   5. Self-drilling, self-threading fasteners shall not be permitted for use into concrete or masonry.
   6. Metal surfaces shall be separated in such a manner that metal does not move on metal. Materials used for this purpose shall be low friction components, sealants or gaskets as applicable.
   7. Anchorages to Structural Steel shall not induce rotational forces in supporting members.
   8. All anchors, connections and fixings outboard of the air-seal shall be 300 series stainless steel.
   9. Adhere to manufacturer's recommendation for installation of anchors.
   10. Anchors shall be tested in accordance with the requirements of Part 4 - Testing.
   11. Avoid excess shimming that may induce additional stress on fasteners. The total thickness (t) of a shim pack shall not exceed a dimension equal to the diameter (d) of the fastener/anchor. Where t > d, the fastener/anchor shall be recalculated to take into account the additional stress from bending on the fastener with the assumption that the shim does not contribute to resistance to fastener bending. Additional stress due to bending shall be added to tension stress and the tension/ shear interaction analyzed.
   12 Shim packs that resist compressive forces only may be high-impact plastic, Korolath type or equal. Shim packs subject to shear forces shall be stainless steel or HDG steel plates pinned together to form a monolithic shim.

4. Corrosion Protection
   1. Ensure by design that no metals, including alloys of the same base metal, are placed together in a manner, combination or location likely to give rise to damage by electrolytic action or other corrosion. In particular avoid metal to metal contact between aluminum and metals other than an appropriate grade and composition of stainless steel as per the recommendations of the material manufacturer and to the approval of the Consultant. Ensure that dissimilar aluminum alloys in contact with each other

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

are compatible with each other or isolated. Any other dissimilar materials are to be treated or protected in such a manner as necessary to prevent corrosive action.

2. Isolation of dissimilar metal surfaces to prevent electrolytic action shall be accomplished by materials which are impervious to moisture and non-absorptive.
3. All steel parts shall receive a protective treatment commensurate with their respective functions and locations. The treatment shall be one or more of those described above, and as approved by the Consultant.
4. Where used to the exterior of air-seals, or in any location vulnerable to moisture, steel shall be hot-dip galvanized after fabrication.
5. Field welds on galvanized steel shall be treated with an approved field cold galvanizing process(e.g. ZRC). Remediation of finish of galvanized steel shall be as per the requirements of ASTM A 780.
6. Aluminum surfaces in contact with mortar, concrete, fireproofing, plaster, masonry, or absorptive materials of any kind shall be coated with an anti-galvanic material, impervious to moisture.

5. Lightning Protection

1 All metal cladding components, including panels, glazing frames, mullions, transoms, fixings and support structures shall be fully bonded electrically to ensure electrical continuity of the building envelope.

2. All metal cladding components, as above, shall be connected to building ground by earthing jumper cables and connections.
3. Provide for the installation of lightning arrestors, air terminals and the like by others without electrical bonding to the metal cladding components.

6. Installation of Insulation and Firesafing

1. Install thermal insulation and firesafing where indicated on the Contract Documents and as required to meet overall fire separation requirements.
2. Install insulation using welded or mechanically fixed impaling and/or retaining clips. Adhesive attachment of insulation is not permitted.
3. Install foil tape around perimeter of foil-face of insulation board to adjacent metal framing to achieve positive vapor barrier.

4 Install 4 inch thick (minimum) compacted foil-faced firesafing at perimeter of floor slab between back of curtain wall and edge of slab onto galvanized steel impaling clips. Seal firesafing to curtain wall and edge of slab with a continuous layer of smoke resistant sealant to provide a positive smoke barrier.

5. At all spandrel locations, wrap vertical mullions with thermal insulation from horizontal at top of vision glass to slab edge firesafing to maintain a minimum 3'-0" vertical separation.

7. Flashings

1. Where required or indicated on the Drawings, all copings parapets, sills, offsets and setbacks to have continuous through wall flashing

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

to direct water penetration and seepage back to the exterior, unless otherwise noted. Flashing shall be formed from appropriate thickness of stainless steel. Stainless steel flashing shall be no thinner than 22 gauge.

2. Where indicated on the Drawings and where required to accommodate movement, an elastomeric flashing system shall be used.
3. Elastomeric flashing connecting to work of other Sections shall be provided by the Contractor for the work of this Section, including the attachment to his Work and to other work, (except waterproofing or roofing).
4. Where elastomeric or other flashing connects to roofing and waterproofing work provide 8 inches of flashing beyond the point of attachment to the Work of this Section. The connection to roofing work shall be provided by the roofing/ waterproofing sub-contractor. Connections of such flashing to other than water-proofing work shall be provided by the Contractor for the Work of this Section.
5. Elaslomeric flashing exposed to view shall be carefully bonded to the substrates without blistering; joints shall be neat and as infrequent as possible.
6. Elastomeric flashing not supported by substrate material shall receive another layer of 60 mil flashing for reinforcement, fully bonded to the finish layer and the substrate and extending at least 1 inch beyond the unsupported area.

3.3 PROTECTION, CLEANING AND ACCEPTANCE

1. Protection
   1. Protect the Work of this Section from any material equipment or practices that may impair the functioning, appearance, or durability of the Work of this Section or any other construction.
   2 Package and store the materials in such a manner that shall prevent damage, contamination, distortion, breakage or structural weakening.
   3. Pre-glazed units shall be stored upright or shall be crated and packaged with a rigid protection board top to prevent damage from ponding water, or by the work of other trades.
   4. Units and related components shall not be staged more than one week in advance of installation in order to avoid damage by other trades. Units shall not be uncrated more than one day in advance of installation.
   5. Replace any material damaged during manufacture, shipping, storage or erection.
   6. Protect the installed Work of this Section from damage by other trades.
   7. Protection material, such as plastic membrane tapes and adhesive sheeting, shall be suitable for the intended protection application and protection period.
   8. Protection materials shall be installed in a manner that will not trap harmful moisture or otherwise contaminate the Work in any way.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

9. The Contractor shall submit samples and manufacturer's performance data, as well as application and removal procedures, for all protection materials.
10. Remove and replace any portion of the glazed aluminum wall and skylight assemblies that has been damaged by other trades. All rejected and damaged material shall be promptly removed from the site.

2. Cleaning
   1. Immediately prior to completion of the Work, completely clean the entire glazed aluminum wall and skylight assemblies as follows:
      1. Clean all components of the Work as per the recommendations of the specific product manufacturer.
      2. Clean the glazed aluminum wall and skylight assemblies from the topmost levels down in order to avoid staining of the cleaned surfaces from cleaning solution residue and run-off.
      3. Clean glass with approved glass cleaning solutions only, and ensure that said cleaning solution is completely removed from the surface after cleaning.
      4. Do not clean glass when it is exposed to direct sunlight.

3. Acceptance
   1. Acceptance of the completed installation of the CWSE requires the installation be sound, watertight and free from defects of material and workmanship.

PART 4 – TESTING

4.1 TRIAL INSTALLATIONS

1. Prior to general installation of any given typical portion or system of the work, the Curtain Wall Subcontractor shall install a representative trial installation for the Consultant and the Owner's review at designated locations on the building.

2. This Subcontractor shall propose the scope and location of trial installations for the Consultant and the Owner's review.

3. This Subcontractor shall notify the Consultant and the Owner well in advance of each such trial installation. If approved, this portion of the work may become part of the final installation.

4.2 FIELD TESTS

1. Representative portions of the constructed aluminum curtain wall shall be physically tested in accordance with the requirements or AAMA 503-92, AAMA 502-90, ASTM-E 783 and ASTM-E1105.

2. Testing shall be performed per AAMA 503-92 for the structural sealant glazing system and AAMA 502-90 for operable windows.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Air Infiltration Tests: Tests to be conducted in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.06 cfm/ft2, whichever is greater.

2 Water Infiltration Tests: Tests to be conducted in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure differential of 12 psf.

3. At least three (3) "initially successful" water tests shall be performed at different stages of installation on each system.

4. Tests shall be performed by this Subcontractor. Approval of all test areas, test procedures, remediation measures (if required) and test results rests with the Consultant and the Owner.

5. The amount and extent of retesting and remediation work required due to failure shall be in accordance with clause 4.6 - Acceptance.

4.3 PRODUCT ENGINEERING TESTS

1. All products and individual or aggregate components of the work for which acceptable engineering or test data is not available shall be physically tested.

2. Unless otherwise specified herein, the Subcontractor shall propose the specific test procedures for review by the Consultant and the Owner.

4.4 STRUCTURAL SILICONE TESTING

1. In addition to mock-up specified under clause 3.9.2 silicone joint(s) proposed for structural glazing application shall be tested for performance in tension, in shear, and tension and shear combined.

2. Test specimens shall be approximately 50 mm in length, full dimension in width and depth, and be composed of the specified materials, colours and finishes.

3. Ten specimens for each condition shall be tested and the values for elongation-to-failure vs. stress recorded for each specimen and the mean and standard deviation calculated for each condition.

4. Tests shall be performed by the sealant manufacturer(s) whose product(s) are being considered for the structural silicone joint(s).

5 In addition to the above, production testing shall be performed at regular intervals during assembly of the work, as specified hereinafter.

4.5 EMBEDED ANCHOR TESTING

1. Each anchor type to be embedded into concrete may be site tested by Owner's appointed testing agency at no cost to this Subcontractor.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Each anchor type shall be tested for shear, tension, and shear and tension combined to 2.0 times the design load.

3. Testing shall comply with ASTM E 488, Test Method for Strength of Anchors in Concrete and Masonry Elements.

4. A minimum of 5 percent (5%) but no less than five (5) anchors of each anchor type shall be tested.

5. There shall be no failure or permanent deformation to the anchor or the concrete or reinforced masonry.

4.6 ACCEPTANCE

1. The acceptability of the aluminum curtain wall mock-ups by the Consultant shall depend on satisfactory test performance of the mock-ups. This Subcontractor shall pay any costs for engineering and other services as may be required to modify and retest the aluminum curtain wall assemblies should this prove to be necessary due to the unsatisfactory results of the tests executed.

2. All tests shall be conducted before fabrication or production of the aluminum curtain wall.

4.7 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A09004

FLOOR FINISHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Particular Conditions and Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes all floor finishes:

B. Related Sections include the following:

1. Section 03001 - "Cast-in-Place Concrete" for concrete substrates to receive flooring.

2. Section 03005 - Concrete Toppings.

3. Section 03007 - Sand Cement Screeds.

1.3 SUBMITTALS

A. Product Data: For each type of product specified. Include manufacturer's technical data, installation instructions and recommendations for each epoxy flooring component required.

B. Samples: Of each flooring system required 150 mm square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated.

C. Maintenance Data: For epoxy flooring to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced applicator who has specialized in installing flooring similar in material, design, and extent to that indicated for this Project.

B. Source Limitations: Obtain primary epoxy flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

C. Field Samples: On floor area selected by Engineer, provide full-thickness flooring system samples that are at least 1200 mm square to demonstrate texture, color, thickness, chemical resistance, cleanness and other features of

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

each flooring system required. Simulate finished lighting conditions for review of in-place field samples.

1. If field samples are unacceptable, make adjustments to comply with requirements and apply additional samples until field samples are approved.

2. After field samples are approved these surfaces will be used to evaluate epoxy flooring.

3. Obtain Engineer's approval of field samples before applying flooring.

4. Final approval of colors will be from field samples, not samples submitted for verification.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with epoxy flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting epoxy flooring installation.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during epoxy flooring installation.

C. Close spaces to traffic during flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.7 GUARANTEE

A. The Contractor shall furnish written guarantees for not less than five (5) years against all defects in materials and workmanship covering all work under this section from the date of Substantial Completion of the Works. State in guarantees that the Contractor agrees to replace all failures in work, and to correct all defects in material or workmanship during this guarantee period.

B. Guarantees shall be in addition to and not in lieu of all other liabilities, which manufacturers and the Contractor may have by law or by other provisions of the Contract Documents.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hardener CFS-1: Consists of selected and graded dynagrip aggregate, Portland cement and special additive, which helps in easy trowel the wet concrete:

Concrete must give the following values

1. Aggregate abrasion valve: 1.9
2. Aggregate Impact valve: 8.0
3. Aggregate Prosing valve: 8.2

B. Epoxy Coating - EP

Two component solvent based epoxy resin coating applied by spray coating to be applied in two coat's with dry film thickness of 90 microns.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Prepare' and clean substrate according to flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for epoxy flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminates incompatible with epoxy flooring.

1. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
2. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.

C. Mix components and prepare materials according to flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through epoxy flooring according to manufacturer's written recommendations.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.2 APPLICATION

A. General: Apply components of flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface.

1. Coordinate application of components to provide optimum adhesion of flooring system to substrate and optimum inter-coat adhesion.

2. Cure flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

3. At substrate expansion and isolation joints (if any), provide joint in flooring to comply with flooring manufacturer's written recommendations.

a. Apply joint sealant to comply with manufacturer's written recommendations.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply toweled or screened body coats in thickness required. Hand or power trowel and grout to fill voids. When cured, sand to remove trowel marks and roughness.

D. Integral Cove Base: Apply cove base mix to wall surfaces. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, toweling, sanding, and top coating of cove base.

E. Apply sealing or finish coat(s), including grout coat, if any, of type recommended by flooring manufacturer to produce finish indicated. Apply in number of coats and at spreading rates recommended in writing by manufacturer.

3.3 CLEANING AND PROTECTING

A. Protect epoxy flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by epoxy flooring manufacturer.

B. Clean flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each Project area. Use cleaning materials and procedures recommended in writing by epoxy flooring manufacturer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09220

PORTLAND CEMENT PLASTER

1.1 GENERAL

A. Submittals: Product Data for each product specified and Samples for each type of finish indicated.

B. Fire-Test-Response Characteristics: Where indicated, provide materials and construction identical to those tested per ASTM E 119.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Metal Framing and Supports:
   a. [Insert Name of Manufacturer]

2. Expanded-Metal Lath:
   a. [Insert Name of Manufacturer]

3. Wire-Fabric Lath:
   a. [Insert Name of Manufacturer]

4. Metal Accessories:
   a. [Insert Name of Manufacturer]

5. Plastic Accessories:
   a. [Insert Name of Manufacturer].

6. Stucco:
   a. [Insert Name of Manufacturer].

7. Acrylic-Based Finishes:
   a. Insert Name of Manufacturer].

B. Ceiling Support Components: ASTM C 1063.

1. Concrete Anchors: Corrosion-resistant materials of type indicated below:
   a. Cast-in-place type designed for attachment to concrete forms.
   b. Chemical anchor.
   c. Expansion anchor.

   Wire for Hangers and Ties: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper.
   Rod Hangers: Mild steel, zinc coated.
   Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. Channels: Cold-rolled steel, minimum 0.0598-inch-(1.5-mm-) thick base (uncoated) metal and 7/16-inch- (11.1-mm-) wide flanges, and as follows:
   a. Carrying Channels: 1-1/2 inches (38 mm) deep, 475 lb/1000 feet (0.7 kg/m).
   b. Furring Channels: 3/4 inch (19 mm) deep, 300 lb/1000 feet (0.45 kg/m).
   c. Finish: ASTM A 653, G60 (ASTM A 653M, Z180) hot-dip galvanized.

C. Studs for Furring Channels: ASTM C 645, in depth indicated and with minimum 0.0179-inch- (0.455-mm-) thick base (uncoated) metal. Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) galvanized coating.
Protective Coating: Manufacturer's standard corrosion-resistant coating.

D. Steel Studs and Runners: Comply with the following, in sizes indicated:
Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) hot-dip galvanized coating.

Protective Coating: Manufacturer's standard corrosion-resistant coating.

3. Non-Load-Bearing Studs and Runners: ASTM C 645 with minimum 0.0179-inch- (0.455-mm-) thick base (uncoated) metal.
   a. Provide minimum 0.0329-inch- (0.836-mm-) thick base (uncoated) metal for head runners, sill runners, jambs, and cripple studs at openings.

4. Load-Bearing Studs and Runners: ASTM C 955 with the following characteristics:
   a. Grade 33 (Grade 230) for thickness of 0.0329 inch (0.836 mm) or less.
   b. Grade 50 (Grade 340) Class 1 for thickness of 0.0428 inch (1.087 mm) or more.

E. Vertical Metal Furring: Comply with the following:
Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) hot-dip galvanized coating.
Protective Coating: Manufacturer's standard corrosion-resistant coating.
Channel Furring and Braces: Cold-rolled steel, minimum 0.0598-inch- (1.5-mm-) thick base (uncoated) metal and 3/4-inch- (19-mm-) deep-by-7/16-inch- (11.1-mm-) wide flanges, 300 lb/1000 feet (0.45 kg/m).
Hat Channels: Hat-shaped screwable furring channels, 7/8 inch (22.2 mm) deep, formed from zinc-coated (galvanized) steel sheet, minimum 0.0179 inch (0.455 mm) thick, Grade 33.
Z-Furring Members: Screw-type Z-shaped furring members formed from minimum 0.0179-inch- (0.455-mm-) thick, zinc-coated (galvanized) steel sheet.
Furring Brackets: Serrated-arm type, minimum 0.0329-inch- (0.836-mm-) thick base (uncoated) metal, adjustable from 1/4- to 2-1/4-inch (6- to 57-mm) wall clearance for channel furring.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

F. Expanded-Metal Lath: ASTM C 847, diamond mesh, flat or self-furring configuration as indicated, and with minimum 3.4-lb/sq. yd. (1.8-kg/sq. m) weight.

G. Rib Lath: ASTM C 847, flat, rib depth of not over 1/8 inch (3 mm) with minimum 2.75-lb/sq. yd. (1.5-kg/sq. m) weight.

H. Woven-Wire Lath: ASTM C 1032, fabricated into 1-1/2-inch (38-mm) hexagonal-shaped mesh with minimum 0.0510-inch- (1.3-mm-) diameter, galvanized steel wire.

I. Welded-Wire Lath: ASTM C 933, fabricated into 2-by-2-inch (50-by-50-mm) openings with minimum 0.0625-inch- (1.6-mm-) diameter, galvanized steel wire.

J. Paper Backing: Asphalt-impregnated paper complying with FS UU-B-790, Type I, Grade D (vapor permeable), Style 2, factory bonded to back of lath.

K. Accessories: Comply with material provisions of ASTM C 1063 and the requirements indicated below; coordinate depth of accessories with thicknesses and number of plaster coats required.

Aluminum Components: ASTM B 221 (ASTM B 221M) for alloy and temper 6063-T5 or aluminum extrusions with similar properties.

Galvanized Steel Components: Fabricated from zinc-coated (galvanized) steel sheet complying with ASTM A 653, G40 (ASTM A 653M, Z90) minimum coating designation.
Zinc-Alloy Components: ASTM B 69, 99 percent pure zinc.
Plastic Components: ASTM D 4216, high-impact polyvinyl chloride (PVC) for building products.
Metal Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
Plastic Cornerbeads: Small nose cornerbeads, with perforated flanges, fabricated from high-impact PVC.

Strip Reinforcement: Smooth-edge strips of expanded-metal lath fabricated from uncoated or zinc-coated (galvanized) steel sheet. Provide cornerite or stripite form as required.

Casing Beads: Square-edged style, fabricated from aluminum coated with clear plastic, with short or expanded flanges to suit kinds of plaster bases indicated.
Curved Casing Beads: Square-edged style, fabricated from aluminum coated with clear plastic, preformed into curve of radius indicated.

Control Joints: Aluminum coated with clear plastic and adjustable for joint widths from 1/8 to 5/8 inch (3 to 16 mm).

Foundation Sill (Weep) Screed: Fabricated from zinc-coated (galvanized) steel sheet.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Steel Drill Screws: ASTM C 1002.

Steel Drill Screws: ASTM C 954.

L. Asphalt-Saturated Felt: ASTM D 226, Type I (No. 15), non-perforated.

M. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminates, manufactured for use in Portland cement plaster.

N. Acid-Etching Solution: Muriatic acid (10 percent solution of commercial hydrochloric acid) mixed 1 part to not less than 6 nor more than 10 parts water.

O. Insulation: ASTM C 665, Type I, un-faced mineral-fiber blanket.

P. Insulation: ASTM C 578, Type IV, extruded-polystyrene board.

Q. Water for Mixing and Finishing Plaster: Potable.

R. Lime: ASTM C 206, Type S; ASTM C 207, Type S.

S. Bonding Agent: ASTM C 932.

T. Base-Coat Cements: White or gray, as required.
Portland cement, ASTM C 150, Type I.
Masonry cement, ASTM C 91, Type N.

U. Base-Coat Aggregate: ASTM C 897, sand.

V. Finish Coat: Material and color as indicated below:
1. Job-Mixed Finish Coat: ASTM C 926.
   a. Portland cement, ASTM C 150, Type I.
   b. Masonry cement, ASTM C 91, Type N.
   c. Cement Color: Pigmented, factory-packaged standard product consisting of white or gray cement combined with colorfast mineral pigments to match Architect's sample.
   d. Finish-Coat Aggregate: ASTM C 897, manufactured or natural sand, in color matching Architect's sample.

Stucco Finish Coat: Factory-packaged stucco, including Portland cement, aggregate, coloring agent, and other proprietary ingredients.

Acrylic-Based Finish Coat: Factory-mixed formulation of acrylic emulsion, colorfast mineral pigments, and fine aggregates specifically recommended by acrylic-based finish manufacturer for use over Portland cement plaster base coats.

Factory-Prepared Finish Coat: Factory-packaged blend of Portland cement, lime, aggregate, and compatible with base coat and finish texture indicated. Provide color to match Architect's sample.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

W. Mixes and Compositions: Comply with ASTM C 926 for base- and finish-coat mixes as applicable.

Proportions: Proportion materials for base coats and job-mixed finish coat in parts by volume according to ASTM C 926.
Fiber Content: Add amount of fiber recommended by manufacturer to base-coat mixes after ingredients have mixed at least 2 minutes.

Factory-Prepared Finish Coat: Add water only; comply with finish coat manufacturer's written instructions.

Stucco Finish Coat: Add water only; comply with stucco manufacturer's written instructions.

Acrylic-Based Finish Coat: Apply material as factory packaged; do not add other ingredients; comply with manufacturer's written instructions.

X. Mixing: Mechanically mix proportioned cementitious and aggregate materials with water to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

1.3 EXECUTION

A. Lathing and Furring: Install lath and furring indicated to comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with ASTM C 1063.

B. Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, handrails, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable written instructions of lath and furring manufacturer.

C. Isolation: Where lathing and metal support systems abut building structure horizontally and where partition or wall abuts overhead structure, sufficiently isolate from structural movement to prevent transfer of loading from building structure. Install slip- or cushion-type joints to absorb deflections but maintain lateral support.

1. Frame both sides of control joints independently and do not bridge joints with furring and lath or accessories.

D. Ceiling Suspension Systems: Install ceiling suspension system components of sizes and spacings indicated, but not in smaller sizes or greater spacings than those indicated in ASTM C 1063. Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure inserts and other structural anchorage provisions have been installed to receive ceiling hangers in a manner that will develop their full strength and at spacings required to support ceiling.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Hanger Installation: Attach hangers to structure above ceiling to comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with referenced standards.

E. Steel Stud Walls and Partitions: Install components of systems to comply with written instructions of steel stud manufacturer for applications indicated and as follows:

For non-load-bearing stud systems, comply with ASTM C 754.
For load-bearing stud systems, comply with ASTM C 1007 and as indicated. Extend and attach partition support systems to structure above suspended ceilings, unless otherwise indicated.

F. Installation of Vertical Metal Furring: Install ceiling suspension system components of sizes and spacings indicated, but not in smaller sizes or greater spacings than those required to comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with referenced standards. For furring on interior side of exterior walls, provide furring brackets, unless otherwise indicated.

G. Z-Furring with Thermal Insulation: Erect thermal insulation vertically and hold in place with Z-furring members spaced 24 inches (609 mm) o.c.

H. Metal Lath: Install metal lath where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with ASTM C 1063.

Suspended and furred ceilings using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, diamond-mesh lath.
Vertical metal framing and furring using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, diamond-mesh lath and cold-rolled channel stud framing.
Ceramic-tile setting beds using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, diamond-mesh lath.
Exterior sheathed wall surfaces using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, self-furring, diamond-mesh lath.
Exterior sheathed wall surfaces using woven-wire lath with 1-1/2-inch (38-mm) hexagonal-shaped mesh with minimum 0.0510-inch- (1.3-mm-) diameter, galvanized steel wire.

6. Monolithic surfaces using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, self-furring, diamond-mesh lath or vertical metal framing and furring as required for plaster thickness.

I. Preparing Solid Surfaces for Plastering: Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work.

Etch concrete and concrete unit masonry surfaces indicated for direct plaster application to obtain adequate suction and mechanical bond of plaster (where dash coat, bonding agent, or additive is not used).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Apply bonding agent on concrete and concrete unit masonry surfaces indicated for direct plaster application; comply with manufacturer's written instructions for application.

Apply dash coat on concrete surfaces indicated for direct plaster application. Moist-cure dash coat for at-least 24 hours after application and before plastering.

Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

Surface Conditioning: Immediately before plastering, dampen surfaces indicated for direct plaster application, except where a bonding agent has been applied. Moisten to obtain optimum suction for plastering.

J. Installation of Plastering Accessories: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Install accessories of type indicated at following locations:

External Corners: Install corner reinforcement at external corners.
Terminations of Plaster: Install casing beads, unless otherwise indicated.

3. Control Joints: Install at locations indicated or, if not indicated, at locations complying with the following criteria and approved by Architect:

   a. Where an expansion or contraction joint occurs in surface of construction directly behind plaster membrane.

   b. Distance between Control Joints: Not to exceed 18 feet (5.4 m) in either direction or a length-to-width ratio of 2-1/2 to 1.

   c. Wall Areas: Not more than 144 sq. ft. (13 sq. m).

   d. Horizontal Surfaces: Not more than 100 sq. ft. (9 sq. m) in area.

   e. Where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.

K. Plaster Application: Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other. Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials. Do not use excessive water in mixing and applying plaster materials.

Plaster Application Standard: Apply plaster materials, composition, mixes, and finishes indicated to comply with ASTM C 926.

Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed at any location on surface.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches (152 mm) at each jamb anchor.

Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where plaster is not terminated at metal frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.

Thickness: As indicated or as required by ASTM C 926.
Number of Coats: Apply plaster in 2 or 3 coats as indicated below or as shown.

a. Three Coats: Over the following plaster base:

1) Metal lath.
b. Two Coats: Over the following bases:

1) Concrete unit masonry. 2) Monolithic concrete.

L. Finish Coats: As follows:

Float Finish: Apply finish coat to a minimum thickness of 1/8 inch (3 mm) to completely cover base coat, uniformly floated to a true even plane with fine-textured finish matching Architect's sample.

Trowel-Textured Finish: Apply finish coat with hand-troweled-textured finish matching Architect's sample.

Dash Finish: Machine-apply finish-coat plaster in 2 coats evenly and uniformly to produce textured finish matching Architect's sample.

Prepared Finish: Apply stucco finish coats, acrylic-based finish coats, and other factory-prepared finish coats according to manufacturer's written instructions.

M. Moist-cure plaster base and finish coats to comply with ASTM C 926, including written instructions for time between coats and curing in "Annex A2 Design Considerations."

N. Cutting and Patching: Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

O. Cleaning and Protecting: Remove plaster from other surfaces not to be plastered. When plastering is completed, remove unused materials, containers,

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

equipment, and plaster debris. Protect plaster work from damage or deterioration until Substantial Completion.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09255

GYPSUM BOARD ASSEMBLIES

1.1 GENERAL

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

B. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that are identical to assemblies tested for fire resistance according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Steel Framing and Furring:
   a. [Insert Name of Manufacturer].

2. Grid Suspension Assemblies:
   a. [Insert Name of Manufacturer].

3. Gypsum Board and Related Products:
   a. [Insert Name of Manufacturer].

B. Steel Framing Components for Suspended and Furred Ceilings: Provide components complying with ASTM C 754 for conditions indicated.

Cast-in-Place and Postinstalled Anchors in Concrete: Capable of sustaining a load equal to 5 times that imposed by ceiling construction, as determined by testing according to ASTM E 488.

Powder-Actuated Fasteners in Concrete: Corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190.

Wire Ties: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.062 inch (1.6 mm) thick.

Wire Hangers: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.162-inch (4.1-mm) diameter.

Hanger Rods: Mild steel and zinc coated or protected with rust-inhibitive paint.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive paint.

Channels: Cold-rolled steel, 0.0598-inch (1.5-mm) minimum thickness of base metal and 7/16-inch- (11.1-mm-) wide flanges, and as follows:

a. Carrying Channels: 2 inches (50.8 mm) deep, 590 lb/1000 feet (88 kg/100 m), unless otherwise indicated.

b. Carrying Channels: 1-1/2 inches (38.1 mm) deep, 475 lb/1000 feet (70 kg/100 m), unless otherwise indicated.

c. Furring Channels: 3/4 inch (19.1 mm) deep, 300 lb/1000 feet (45 kg/100 m), unless otherwise indicated.

d. Finish: Rust-inhibitive paint, unless otherwise indicated.
e. Finish: ASTM A 653, G 60 (ASTM A 653M, Z 180) hot-dip galvanized coating for framing for exterior soffits and where indicated.

8. Steel Studs for Furring Channels: ASTM C 645, in depth indicated and with 0.0179-inch (0.45-mm) minimum base metal thickness, unless otherwise indicated.

a. Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating for framing for exterior soffits and ceiling suspension members in areas within 10 feet (3 m) of exterior walls.

9. Steel Rigid Furring Channels: ASTM C 645, hat shaped, 0.0179-inch (0.45-mm) minimum base metal thickness, unless otherwise indicated.

a. Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating for framing for exterior soffits and ceiling suspension members in areas within 10 feet (3 m) of exterior walls.

10. Steel Resilient Furring Channels: Standard product fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) or ASTM A 568 (ASTM A 568M) to form 1/2-inch- (12.7-mm-) deep channel of the following configuration:

a. Single-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web).

b. Double-Leg Configuration: Hat-shaped channel with 1-1/2-inch- (38.1-mm-) wide face connected to flanges by double-slotted or expanded-metal legs (webs).

c. Single-or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- (38.1-mm-) wide face connected to flanges by double-slotted or expanded-metal legs (webs).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

11. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung system.

C. Steel Framing for Walls and Partitions: Provide steel framing members complying with the following requirements:

Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating for framing members attached to and within 10 feet (3 m) of exterior walls.

2. Steel Studs and Runners: ASTM C 645, in depth indicated and with 0.0179-inch (0.45-mm) minimum base metal thickness, unless otherwise indicated.

   a. Provide 0.0329-inch (0.84-mm) minimum base metal thickness for head runner, sill runner, jamb, and cripple studs at door and other openings.

   b. Provide 0.0329-inch (0.84-mm) minimum base metal thickness in locations to receive cementitious backer units.

   Steel Rigid Furring Channels: ASTM C 645, hat shaped, in depth indicated and with 0.0179-inch (0.45-mm) minimum base metal thickness, unless otherwise indicated.

   Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 0.0329 inch (0.84 mm), designed for screw attachment to steel studs and steel rigid furring channels used for furring.

5. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) or ASTM A 568 (ASTM A 568M) to form 1/2-inch- (12.7-mm-) deep channel of the following configuration:

   a. Single-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web).

   b. Double-Leg Configuration: Hat-shaped channel with 1-1/2-inch- (38.1-mm-) wide face connected to flanges by double-slotted or expanded-metal legs (webs).

   c. Single-or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- (38.1-mm-) wide face connected to flanges by double-slotted or expanded-metal legs (webs).

   Z-Furring Members: Manufacturer's standard Z-shaped furring members with slotted or nonslotted web, fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) or ASTM A 568 (ASTM A 568M); with a minimum base metal (uncoated) thickness of 0.0179 inch (0.45 mm), face flange of 1-1/4 inch (31.8 mm), wall-attachment flange of 7/8 inch (22.2 mm), and of depth required to fit insulation thickness indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

E. Gypsum Board Products: Types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. Gypsum Wallboard: ASTM C 36, in thickness indicated.
   a. Type: Regular for vertical surfaces, unless otherwise indicated.
   b. Type: Foil backed where indicated.
   c. Type: Type X where required for fire-resistance-rated assemblies.
   d. Type: Sag-resistant type for ceiling surfaces.
   e. Type: Proprietary type as required for specific fire-resistance-rated assemblies.
   f. Edges: Tapered.
   g. Edges: Tapered and featured (rounded or beveled) for pre-filling.
   h. Proprietary Gypsum Board Products: Subject to compliance with requirements, provide one of the following products where proprietary gypsum wallboard is indicated:

   1) Gyprock Fireguard C Gypsum Board; Domtar Gypsum.
   2) Firestop Type C; Georgia-Pacific Corp.
   3) Fire-Shield G; National Gypsum Co.; Gold Bond Building Products Division.
   4) SHEETROCK Brand Gypsum Panels, FIRECODE C Core; United States Gypsum Co.
   5) SHEETROCK Brand Gypsum Panels, ULTRACODE Core; United States Gypsum Co.

2. Gypsum Board Base Layer(s) for Multilayer Applications: ASTM C 36, in thickness indicated.
   a. Type: Regular for vertical surfaces, unless otherwise indicated.
   b. Type: Foil backed where indicated.
   c. Type: Type X where indicated or required for fire-resistance-rated assemblies.
   d. Type: Sag-resistant type for ceiling surfaces, unless otherwise indicated.
   e. Type: Proprietary type matching that indicated for face layer and as required for specific fire-resistance-rated assemblies.

3. Exterior Gypsum Soffit Board: ASTM C 931, with manufacturer's standard edges, in thickness indicated.
   a. Type: Regular, unless otherwise indicated.
   b. Type: Type X where required for fire-resistance-rated assemblies and where indicated.

4. Water-Resistant Gypsum Backing Board: ASTM C 630, in thickness indicated.
   a. Type: Regular, unless otherwise indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Type: Type X where required for fire-resistance-rated assemblies and where indicated.

5. Glass-Mat, Water-Resistant Gypsum Backing Board: ASTM C 1178, of thickness indicated.
   a. Type: Regular, unless otherwise indicated.
   b. Type: Type X, where required for fire-resistance-rated assemblies and where indicated.
   c. Product: Subject to compliance with requirements, provide "Dens-Shield Tile Backer" manufactured by Georgia-Pacific Corp.

F. Cementitious Backer Units: ANSI A118.9, in maximum lengths available to minimize end-to-end butt joints.

G. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047, formed metal or plastic, with metal complying with the following requirement:
Steel sheet zinc coated by hot-dip process or rolled zinc.
Steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum, or rolled zinc.

H. Accessories for Exterior Installations: Cornerbead, edge trim, and control joints formed from steel sheet zinc coated by hot-dip process or rolled zinc complying with ASTM C 1047.

I. Aluminum Accessories: Where indicated, provide manufacturer's standard extruded-aluminum accessories of profile indicated.

Primed Finish: Manufacturer's standard corrosion-resistant primer compatible with joint compound and finish materials specified.
Class II, Clear Anodic Finish: AA-C12C22A31.
Class II, Color Anodic Finish: AA-C12C22A32/A34 in color selected by Architect from manufacturer's standard colors.
Baked-Enamel Finish: AA-C12C42R1x with manufacturer's standard thermosetting organic coating system in color selected by Architect from manufacturer's standard colors.

J. Joint Treatment Materials: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

1. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
   a. Use pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

Joint Tape for Cementitious Backer Units: As recommended by cementitious backer unit manufacturer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

   a. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.

   b. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer.

   c. For topping compound, use sandable formulation.

3. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

   a. Ready-Mixed Formulation: Factory-mixed product.
   b. Job-Mixed Formulation: Powder product for mixing with water at Project site.

   1) Taping compound formulated for embedding tape and for first coat over fasteners
      and face flanges of trim accessories.
   2) Topping compound formulated for fill (second) and finish (third) coats.
   3) All-purpose compound formulated for both taping and topping compounds.
   5. Joint Compound for Cementitious Backer Units: Material recommended by cementitious backer unit manufacturer.

K. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, non-staining latex sealant complying with ASTM C 834 that is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

L. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

M. Miscellaneous Materials: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

1. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.

   Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.
   Fastening Adhesive for Wood: ASTM C 557.
   Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel raming.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

5. Steel drill screws complying with ASTM C 1002 for the following applications:
   a. Fastening gypsum board to steel members less than 0.033 inch (0.84 mm) thick.
   b. Fastening gypsum board to wood members.
   c. Fastening gypsum board to gypsum board.
   Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
   Steel drill screws of size and type recommended by unit manufacturer for fastening cementitious backer units.

   Gypsum Board Nails: ASTM C 514.

   Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

   Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit metal stud size indicated.

   Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation to comply with ASTM C 665 for Type I.

12. Thermal Insulation: Material indicated below, of thickness and width to fill voids formed by Z furring members:
    a. Un-faced mineral-fiber blanket insulation to comply with ASTM C 665 for Type I.
    b. Extruded-polystyrene board insulation to comply with ASTM C 578 for Type IV, and with flame-spread and smoke-developed ratings of 75 and 450, respectively, according to ASTM E 84.

13. Polyethylene Vapor Retarder: ASTM D 4397, thickness and maximum permeance rating as follows:
    a. 4 mils (0.1 mm), 0.19 perms (10.9 ng/Pa x s x sq. m).
    b. 6 mils (0.15 mm), 0.13 perms (7.5 ng/Pa x s x sq. m).
    Vapor Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

N. Texture Finish: As follows:
Primer: Of type recommended by texture finish manufacturer.
Polystyrene Aggregated Finish for Ceilings: Factory-packaged proprietary powder product formulated with polystyrene aggregates for mixing with water at Project site for spray application to produce texture selected by Architect from manufacturer's full range of textures, with flame-spread and smoke-developed ratings of not more than 25 according to ASTM E 84.

Aggregate Finish: Factory-packaged proprietary drying-type powder product formulated with aggregate for mixing with water at Project site for spray

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

application to produce texture selected by Architect from manufacturer's full range of textures.

Acoustical Finish: Factory-packaged chemical-hardening or drying-type powder product formulated for mixing with water at Project site for spray application to produce a 1/2-inch-(13mm-) thick, evenly textured, white-colored finish with a flame-spread rating of 15 and a smoke-developed rating of 25 according to ASTM E 84, and an NRC of 0.45 according to ASTM C 423.

a. Provide manufacturer's recommended bonding adhesive suitable for application to gypsum board panels.

1.3 EXECUTION

A. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

2. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
   a. Where building structure abuts ceiling perimeter or penetrates ceiling.
   b. Where partition framing and wall furring abut structure, except at floor.

   Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

B. Installing Steel Framing for Suspended and Furred Ceilings: As follows:
Sway-brace suspended steel framing with hangers used for support.
Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
For exterior soffits, install cross-bracing and additional framing to resist wind uplift according to details on Drawings.

C. Installing Steel Framing for Walls and Partitions: Install steel studs and furring at spacings indicated.
Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.
Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
Cut studs 1/2 inch (13 mm) short of full height to provide perimeter relief.
For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated.

Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

Install Z-furring members and thermal insulation as indicated and to comply with requirements of manufacturer's directions.

8. Install polyethylene vapor retarder where indicated to comply with the following requirements:
   a. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with mechanical fasteners or adhesives. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.
   b. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners 16 inches (400 mm) o.c.
   c. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor retarder tape.
   d. Repair any tears or punctures in vapor retarder immediately before concealing it with the installation of gypsum board or other construction.

D. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches (813 mm) wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum panels over wood framing, with floating internal corner construction.

Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies.

8. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

   a. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.

   Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

   Install cementitious backer units to comply with ANSI A108.11.

   Install glass-mat, water-resistant gypsum backing board panels to comply with manufacturer's installation instructions.

   Install water-resistant gypsum backing board panels at showers, tubs, and where indicated. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or penetrations.

   Acoustical Tile Base: Where gypsum panels form the base for adhesively applied acoustical tile, install gypsum wallboard panels with tapered edges taped and finished to produce a flat surface.

14. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
    a. Fasten with screws.
    b. Fasten to wood supports with single nailing.
    c. Fasten to wood supports with double nailing.
    d. Fasten to wood supports with adhesive and supplementary nails or screws.

15. Multilayer Fastening Methods: Apply base layers of gypsum panels and face layer to base layers as follows:
    a. Fasten both base layers and face layers separately to supports with screws.
    b. Fasten base layers with screws and face layer with adhesive and supplementary fasteners.
    c. Fasten base layers to wood supports with nails and face layer with adhesive and supplementary fasteners.

E. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

F. Exterior Soffits and Ceilings: Apply exterior gypsum soffit board panels perpendicular to supports, with end joints staggered over supports. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations. Fasten with corrosion-resistant screws.

G. Installing Trim Accessories: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
Install cornerbead at external corners.
2. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

a. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
b. Install L-bead where edge trim can only be installed after gypsum panels are installed.
c. Install U-bead where indicated.
d. Install aluminum trim and other accessories where indicated.
e. Install control joints at locations indicated.
f. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

H. Finishing Gypsum Board Assemblies: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.
Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.
4. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA 214.

a. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
b. Level 2 where panels form substrates for tile and where indicated.
c. Level 2 for gypsum board where indicated.
d. Level 3 for gypsum board where indicated.
e. Level 4 for gypsum board surfaces, unless otherwise indicated.
f. Level 5 for gypsum board surfaces where indicated.

Where Level 5 gypsum board finish is indicated, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories; and apply a thin, uniform skim coat of joint compound over entire surface. Touch up and sand between coats and after last

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

coat as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.
For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

Where Level 3 gypsum board finish is indicated, embed tape in joint compound and apply first and fill (second) coats of joint compound.

Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply first coat of joint compound.

Where Level 1 gypsum board finish is indicated, embed tape in joint compound.

10. Finish exterior gypsum soffit board using setting-type joint compounds to prefill joints and embed tape, and for first, fill (second), and finish (third) coats, with the last coat being a sandable product. Smooth each coat before joint compound hardens to minimize need for sanding. Sand between coats and after finish coat.

    a. Painting exterior gypsum soffit board after finish coat has dried is specified in another Division 9 Section.

    Base for Acoustical Tile: Where gypsum board is indicated as a base for adhesively applied acoustical tile, install joint tape and a 2-coat compound treatment, without sanding.

    Finish water-resistant gypsum backing board to comply with ASTM C 840 and gypsum board manufacturer's directions.

    Finish glass-mat, water-resistant gypsum backing board to comply with gypsum board manufacturer's directions.

    Finish cementitious backer units to comply with unit manufacturer's directions.

I. Applying Texture Finishes: As follows:

Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes according to texture finish manufacturer's instructions. Apply primer only to surfaces that are clean, dry, and smooth.

Texture Finish Application: Mix and apply finish to gypsum panels and other surfaces indicated to receive texture finish according to texture finish manufacturer's directions. Using powered spray equipment, produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray as recommended by texture finish manufacturer to prevent damage.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09310

CERAMIC TILE

1.1 GENERAL

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
Level Surfaces: Minimum 0.6.
Step Treads: Minimum 0.6.
Ramp Surfaces: Minimum 0.8.

B. Submittals: In addition to Product Data for each type of tile and setting material indicated, submit the following:

Samples of each type and composition of tile and for each color and texture required, at least 12 inches (300 mm) square, mounted on braced cementitious backer units, and with grouted joints.

Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Tile Products:
   a. [Insert Name of Manufacturer].

2. Tile-Setting and -Grouting Materials:
   a. [Insert Name of Manufacturer].

B. ANSI Ceramic Tile Standard: Provide tile that complies with Standard Grade requirements of ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

C. ANSI Standards for Tile Installation Materials: Provide materials complying with referenced ANSI standards.

D. Colors, Textures, and Patterns: For tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, comply with the following requirements:

Match colors, textures, and patterns indicated by referencing manufacturer's standard designations for these characteristics.

Provide Architect's selections from manufacturer's full range of colors, textures, and patterns for products of type indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Factory Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.

F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

G. Unglazed Ceramic Mosaic Tile: Provide factory-mounted flat tile complying with the following requirements:

Composition: Porcelain.
Composition: Porcelain with abrasive admixture.
Composition: Impervious natural clay.
Composition: Vitreous natural clay.
Composition: Impervious natural clay with abrasive admixture.
Composition: Vitreous natural clay with abrasive admixture.
Composition: Conductive.
Module Size: 1 by 1 inch (25.4 by 25.4 mm).
Module Size: 1 by 2 inches (25.4 by 50.8 mm).
Module Size: 2 by 2 inches (50.8 by 50.8 mm).
Nominal Thickness: 1/4 inch (6.35 mm).
Face: Plain with cushion edges.
Face: Pattern of design indicated, with cushion edges.

H. Glazed Ceramic Mosaic Tile: Provide factory-mounted flat tile complying with the following requirements:
Composition: Porcelain.
Composition: Impervious natural clay.
Composition: Vitreous natural clay.
Module Size: 1 by 1 inch (25.4 by 25.4 mm).
Module Size: 1 by 2 inches (25.4 by 50.8 mm).
Module Size: 2 by 2 inches (50.8 by 50.8 mm).
Thickness: 1/4 inch (6.35 mm).
Face: Plain with cushion edges.
Face: Pattern of design indicated, with cushion edges.

I. Unglazed Quarry Tile: Provide square-edged flat tile complying with the following requirements:
Wearing Surface: Nonabrasive.
Wearing Surface: Abrasive aggregate embedded in surface.
Facial Dimensions: 4 by 4 inches (102 by 102 mm).
Facial Dimensions: 6 by 6 inches (152 by 152 mm).
Facial Dimensions: 7-5/8 by 7-5/8 inches (194 by 194 mm).
Thickness: 3/8 inch (9.5 mm).
Thickness: 1/2 inch (12.7 mm).
Thickness: 3/4 inch (19 mm).
Face: Plain.
Face: Pattern of design indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

For furan-grouted quarry tile, precoat with temporary protective coating.

J. Glazed Quarry Tile: Provide square-edged flat tile complying with the following requirements:
Wearing Surface: Nonabrasive.
Wearing Surface: Abrasive aggregate embedded in surface.
Facial Dimensions: 4 by 4 inches (102 by 102 mm).
Facial Dimensions: 6 by 6 inches (152 by 152 mm).
Facial Dimensions: 8 by 8 inches (203 by 203 mm).
Thickness: 3/8 inch (9.5 mm).
Thickness: 1/2 inch (12.7 mm).
Thickness: 3/4 inch (19 mm).
Face: Plain.
Face: Pattern of design indicated.
Face: As indicated.

K. Unglazed Paver Tile: Provide flat tile complying with the following requirements:
Composition: Porcelain.
Composition: Natural clay.
Facial Dimensions: 7-3/4 by 3-7/8 inches (197 by 98 mm).
Facial Dimensions: 7-7/8 by 7-7/8 inches (200 by 200 mm).
Facial Dimensions: 11-13/16 by 11-13/16 inches (300 by 300 mm).
Thickness: 1/4 inch (6.35 mm).
Thickness: 3/8 inch (9.5 mm).
Thickness: 1/2 inch (12.7 mm).
Face: Plain with square or cushion edges.
Face: Plain with square edges.
Face: Plain with cushion edges.
Face: Pattern of design indicated, with square or cushion edges.
For latex-portland cement mortared and grouted paver tile, precoat with temporary protective coating.

L. Glazed Paver Tile: Provide flat tile complying with the following requirements:
Composition: Porcelain.
Composition: Impervious natural clay.
Composition: Semivitreous natural clay.
Composition: Vitreous natural clay.
Facial Dimensions: 4 by 4 inches (102 by 102 mm).
Facial Dimensions: 6 by 6 inches (152 by 152 mm).
Facial Dimensions: 11-13/16 by 11-13/16 inches (300 by 300 mm).
Thickness: 1/4 inch (6.35 mm).
Thickness: 3/8 inch (9.5 mm).
Thickness: 1/2 inch (12.7 mm).
Face: Plain with square or cushion edges.
Face: Plain with square edges.
Face: Plain with cushion edges.
Face: Pattern of design indicated, with square or cushion edges.
Face: As indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

M. Glazed Wall Tile: Provide flat tile complying with the following requirements:
Architectural Specifications 31 July 2008
Module Size: 4-1/4 by 4-1/4 inches (108 by 108 mm).
Module Size: 6 by 4-1/4 inches (152 by 108 mm).
Module Size: 6 by 6 inches (152 by 152 mm).
Thickness: 5/16 inch (8 mm).
Face: Plain with modified square edges or cushion edges.
Face: Plain with modified square edges.
Face: Plain with cushion edges.
Face: Pattern of design indicated, with manufacturer's standard edges.
Mounting: Factory back-mounted.
Mounting: Pregrouted sheets of tiles factory assembled and grouted with manufacturer's standard silicone rubber complying with ANSI A118.6.

N. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:

1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.

O. Stone Thresholds: Provide stone thresholds matching Architect's sample that are uniform in color and finish, fabricated to sizes and profiles indicated to provide transition between tile surfaces and adjoining finished floor surfaces.

Fabricate thresholds to heights indicated, but not more than 1/2 inch (12.7 mm) above adjoining finished floor surfaces, with transition edges beveled on a slope of no greater than 1:2.
Provide granite thresholds complying with ASTM C 615 requirements.
Provide white, honed marble thresholds complying with the Marble Institute of America's Group A requirements for soundness, with ASTM C 503 requirements for exterior use, and with a minimum abrasive-hardness value of 10 per ASTM C 241.
Provide nonfading slate thresholds with honed finish complying with ASTM C 629 requirements for interior use and abrasion resistance.

P. Waterproofing for Thin-Set Tile Installations: Provide products that comply with ANSI A118.10.

Q. Setting Materials: As follows:
1. Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.1A and as specified below:
   a. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15), or polyethylene sheeting ASTM D 4397, 4.0 mils (0.1 mm) thick.

   b. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82, except for minimum wire size.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

c. Expanded Metal Lath: Provide diamond-mesh lath complying with ASTM C 847 for requirements indicated below:

1) Base Metal and Finish for Interior Applications: Fabricate lath from uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.

2) Base Metal and Finish for Exterior Applications: Fabricate lath from zinc-coated (galvanized) steel sheet.

3) Configuration over Studs and Furring: Flat. 4) Configuration over Solid Surfaces: Self-furring. 5) Weight: 2.5 lb/sq. yd. (1.4 kg/sq. m). 6) Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

d. Latex additive (water emulsion) described below, serving as replacement for part or all of gaging water, of type specifically recommended by latex additive manufacturer for use with job-mixed Portland cement and aggregate mortar bed.

1) Latex Additive: Manufacturer's standard. 2) Latex Additive: Styrene butadiene rubber. 3) Latex Additive: Acrylic resin.
Dry-Set Portland Cement Mortar: ANSI A118.1.

3. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows:
a. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of Portland cement; dry, re-dispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

b. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of prepackaged dry-mortar mix and liquid-latex additive complying with the following requirements:

1) Latex Additive: Styrene butadiene rubber. 2) Latex Additive: Acrylic resin.

4. Chemical-Resistant, Water-Cleanable, Ceramic Tile-Setting and -Grouting Epoxy: ANSI A118.3.

a. Provide product capable of resisting continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, as certified by mortar manufacturer for intended use.
Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3.
Chemical-Resistant Furan Mortar: ANSI A118.5, with carbon filler, unless otherwise indicated.
Organic Adhesive: ANSI A136.1, Type I.

R. Grouting Materials: As follows:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.
Commercial Portland Cement Grout (Sanded Grout): ANSI A118.6, color as indicated, for joints 1/8 inch (3.2 mm) or wider.
Dry-Set Grout: ANSI A118.6, color as indicated.

4. Latex-Portland Cement Grout: ANSI A118.6 for materials described in Section H-2.4, composed as follows:
   a. Factory-Prepared, Dry-Grout Mixture: Factory-prepared mixture of portland cement; dry, re-dispersible, ethylene vinyl acetate additive; and other ingredients to produce the following:

   b. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factory-prepared, dry-grout mix and latex additive complying with the following requirements:

      1) Unsanded grout mixture for joints 1/8 inch (3.2 mm) and narrower. 2) Sanded grout mixture for joints 1/8 inch (3.2 mm) and wider.

      1) Unsanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6 for materials described in Section H-2.3, for joints 1/8 inch (3.2 mm) and narrower.

      2) Sanded Dry-Grout Mix: Commercial portland cement grout complying with ANSI A118.6 for materials described in Section H-2.1, for joints 1/8 inch (3.2 mm) and wider.

      3) Latex Additive: Styrene butadiene rubber. 4) Latex Additive: Acrylic resin.

      5. Chemical-Resistant Epoxy Grout: ANSI A118.3, color as indicated.
         a. Provide product capable of resisting continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, as certified by mortar manufacturer for intended use.
            Chemical-Resistant Furan Grout: ANSI A118.5.
            Grout for Pregrouted Tile Sheets: Same silicone rubber used in factory to pre-grout tile sheets.

S. Elastomeric Sealants: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements of Division 7 Section "Joint Sealants."

One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

Chemical-Resistant Sealants: For chemical-resistant floors, provide sealants compatible with chemical-resistant mortars and grouts, approved for use indicated by manufacturers of both mortar/grout and sealant and with chemical-resistance properties equivalent to mortar/grout.

T. Cementitious Backer Units: Provide products complying with ANSI A118.9, of thickness and width indicated, and in maximum lengths available to minimize end-to-end butt joints.

U. Miscellaneous Materials: As follows:
Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

Metal Edge Strips: White-zinc-alloy terrazzo strips, 1/8 inch (3.2 mm) wide at top edge with integral provision for anchorage to mortar bed or substrate, unless otherwise indicated.

Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; is compatible with tile, mortar, and grout products; and is easily removable after grouting is completed without damaging grout or tile.

a. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.

b. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

1.3 EXECUTION

A. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.

Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.

Remove protrusions, bumps, and ridges by sanding or grinding.

B. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
Petroleum paraffin wax, applied hot.
Grout release.
Petroleum paraffin wax or grout release.

D. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated.

E. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated.

F. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

G. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

H. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

I. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
Architectural Specifications 31 July 2008
Locate joints in tile surfaces directly above joints in concrete substrates.
Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."

J. Grout tile to comply with the requirements of the following tile installation standards:
For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
For chemical-resistant epoxy grouts, comply with ANSI A108.6.
For chemical-resistant furan grouts, comply with ANSI A108.8.

K. At showers, tubs, and where indicated, install cementitious backer units and treat joints to comply with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

L. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

M. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

N. Floor Tile Installation: Install tile to comply with requirements indicated, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.

1. Joint Widths: Install tile on floors with the following joint widths:
   a. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
   b. Quarry Tile: 1/4 inch (6.35 mm).
   c. Quarry Tile: 3/8 inch (9.5 mm).
   d. Paver Tile: 1/4 inch (6.35 mm).
   e. Paver Tile: 3/8 inch (9.5 mm).

Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards.

3. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

   a. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

   Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

O. Wall Tile Installation: Install types of tile designated for wall installations to comply with requirements indicated, including those referencing TCA installation methods and ANSI setting-bed standards.

Install metal lath and scratch coat to walls to comply with ANSI A108.1A, Section 4.1.

Joint Widths: Install tile on walls with the following joint widths:

a. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
b. Wall Tile: 1/16 inch (1.6 mm).

3. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards.

P. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. Use cleaning materials and methods that comply with tile and grout manufacturers' written instructions.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A09340

MARBLE AND GRANITE FINISHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract including General and Special Conditions apply to work of this Section.

1.2 SCOPE

This section covers marble/granite finish works as required by the Contract and includes the following items:

- Marble/Granite Claddings
- Marble/Granite Floorings
- Marble/Granite Bases
- Marble/Granite Thresholds
- Marble/Granite Counters for Lavatories
- Marble/Granite Cladding for Stair Steps

Extent of each item of marble/granite work is indicated on Drawings and in Finishing Tables.

1.3 REFERENCE STANDARDS

Unless otherwise more stringent requirements are specified throughout this section, marble/granite works shall be performed in strict accordance with the stipulations of the latest edition of the British Standard Specifications (BS) and the specifications of the American Society for Testing and Materials (ASTM), as referenced to throughout this section, or other equivalent international standards and Sound Practice.

BRITISH STANDARD SPECIFICATIONS BS NO.:

12	Ordinary and Rapid Hardening Portland Cement
890	Specifications for Building Limes
1014	Pigments for Portland Cement and Portland Cement Products
1199-1200	Building Sands from Natural Sources

AMERICAN SOCIETY FOR TESTING AND MATERIALS ASTM NO.:

C 97 Tests for Absorption and Bulk Specific Gravity of Natural Building Stone
C 241 Test for Abrasion Resistance of Stone Subjected to Foot Traffic.

1.4 SUBMITTALS

The Contractor shall submit the following for the approval of the Engineer:

- Materials list and manufacturer's data
- Shop drawings and layout plans showing all jointing and size of units for every surface requiring marble/granite
- Shop drawings showing details of mechanical system for installation of marble/granite wall cladding
- Shop drawings showing marble/granite counter dimensions and details

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Three samples approximately 300 x 300 mm of each type of marble/granite for each type of finish for flooring, bases and cladding
- Three representative samples for brass strips and anchors used in marble/granite installation
- Three representative samples of each component of the mechanical system for mechanically installed wall cladding.

1.5 QUALITY ASSURANCE

1.5.1 Fabricator Qualifications: Firm experienced in supplying granite/marble similar to those specified for this project with a record of successful in service performance.

1.5.2 Installer Qualifications: Engage an experience installer who has completed interior marble/ granite installations that are similar in the material, design, installation system and extent indicated for this project and that have performed successfully.

1.5.3 Single-Source Responsibility for Stone: Obtain each color, grade, finish, type and variety of marble/granite from a single source with resources to provide materials of consistent quality in appearance and physical properties, including capacity to cut and finish material without delaying the progress of the stone installation.

1.5.4 Single-Source Responsibility for Setting Materials: Obtain mortar, pointing and grout mix
Ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

1.5.5 Field-Constructed Mock-ups: Build mock-ups to comply with the following requirements:

Locate mock-ups on Site in a manner not to disturb production work.

Typical wall cladding approximately 3.00 long by 2.50 m high
Typical flooring (at corner) 3.0m long by 3.0m wide
Typical base (at corner), 3m long each side

Obtain Engineer's acceptance of mock-up visual qualities before proceeding with marble/granite installation.

Retain mock-up during construction as a standard for judging installed granite/marble facing. Do not alter, move or destroy mock-up until date of substantial completion.

Mock-up, in an undisturbed condition at date of substantial completion, shall become part of the completed unit of work.

1.5.6 Sequencing and Scheduling: Sequence marble/granite installations with adjoining and related work to minimize damage and soiling during construction.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.6 DELIVERY, STORAGE AND HANDLING

Comply with supplier's instructions and recommendations for delivery, storage and handling requirements.

Deliver materials to project Site in an undamaged condition.

Store and handle units and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping and cracking.

Do not use pinch or wrecking bars to move marble/granite units.

Lift units with wide belt-type slings where possible. Do not use wire rope or ropes containing tar or stain-causing substances. Use cushion-protected wood rollers and lifting devices when required to move units.

Store units on protected wood skids or pallets, covered with non-staining, water-protective membrane. Place skids and stack units to distribute weight evenly and to prevent marble/granite from breaking or cracking.

Cover and protect units on wood skids or pallets, covered with non-staining, water-protective membrane. Allow air to circulate around units.

Store cementitious materials off ground, under cover and in a dry location.

Store aggregate materials in a manner to prevent intermixing with foreign materials.

PART 2-PRODUCTS:

2.1 MARBLE/GRANITE

Marble/granite shall include natural stones that are sawed, cut, split or otherwise finished or shaped and shall specifically exclude molded, cast or other artificially aggregated units composed of fragments, crushed or broken stones.

Marble/granite shall be sound, durable and free from imperfections such as starts, spalls, cracks, pits, open seams or seams or other defects that would impair its strength, appearance and architectural or structural integrity.

Marble/granite shall be free from minerals that may cause object ional staining under normal environments of use.

Employed materials shall be the highest grade of types specified provided from matched blocks for each type, variety, color and quality of marble/granite required and shall be cut from blocks extracted from a single bed of quarry stratum which shall be selected to visually match samples approved by the Engineer.

Representative samples of marble/granite shall be tested for bulk specific gravity in accordance with ASTM C 97 and for foot traffic abrasion resistance in accordance with ASTM C 241. Abrasion resistance minimum hardness shall not be less than 10.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Unless otherwise indicated on Drawings, cut marble/granite to produce units of the following thicknesses:

- 20mm for floors, bases and horizontal and vertical cladding
- 20mm for Lavatory counters
- 20mm for stair risers and treads
- 20mm per bases
- 40mm for thresholds

Sizes and shapes of units shall be as indicated on Drawings.

Cut marble/granite to produce units fitting indicated patterns and to minimize field cutting.

Cut and drill sink ages and holes in marble/granite tiles for anchors as indicated and as specified to set vertical cladding securely in place.

Installed marble/granite units shall be free from checks, cracks, voids or scratches.

For stairs, treads and risers shall have male-and-female joints. All treads shall have an edge strip of hammered texture as shown on Drawings.

Lavatory counters shall be shop-erected to details shown on Drawings. Holes shall be pre-cut to a representative sample of selected lavatory type with allowance for dimensional tolerances as recommended by lavatories' manufacturer.

Urinal screens shall be wall-hung fixed to backing walls with concealed-type corrosion-resistant fastening system. Cut and shape screens to details shown on Drawings. Edges of screens shall be round smooth, unless otherwise indicated on Drawings.

Marble/Granite Shop-Finishing Schedule: Shop-finish surfaces of marble/granite installations as follows:

- Flooring : Honed
- Stair Treads : Honed with 50 mm wide strips, at location as indicated on Drawings, rubbed and sanded.
- Other Applications : Burnished to a glossy finish.

2.2 MATERIALS FOR MORTAR SETTING

2.2.1 Cement: Ordinary Portland cement to BS No. 12 for setting mortar and white Portland cement to BS No. 12 for grouting and pointing mortar.

2.2.2 Color Pigments: Shall be mineral based pigments to BS No. 1014.

2.2.3 Sand: Shall be clean, siliceous, sharp, properly graded sand conforming to BS No. 1199-1200.

2.2.4 Water: Potable and clean.

2.2.5 Lime: Hydrated lime to BS No. 890

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2.2.6 Steel Cramps: 3mm thick, 20mm wide, L-shaped, normal-mild steel cramps, with one end of dove-tail shape for pointing into back walls and other end bent for insertion into edge slots of marble/granite tiles. Length shall be as required. Fabricate and galvanize steel cramps after fabrications as per requirements of Division-5, Section 05500 "Metal Fabrications".

2.3 MATERIALS FOR MECHANICAL FIXING

2.3.1 General: All components of the system of mechanical fixing shall have hot-dip galvanized finish after fabrication as specified in Division 5, Section 05500 "Metal Fabrications".

2.3.2 Steel Strips: Normal-mild steel as specified in Division-5, Section 05500 "Metal Fabrications" of size as indicated on approved shop drawings.

2.3.3 Steel Angles: Normal-mild steel as specified in Division-5, Section 05500 "Metal Fabrications" of size as indicated on approved shop drawings. Provide angles with holes pre-drilled in locations to match spacing of steel dowels fixing marble/ granite tiles as indicated on approved shop drawings.

2.3.4 Bolts for Fixing to Walls: Drilled in expansion type as specified in Division-5, Section 05500
"Metal Fabrications" of size as indicated on approved shop drawings.

2.3.5 Steel Dowels for Fixing Marble/Granite Tiles: Normal-mild steel dowels of size and profile as indicated on approved shop drawings.

2.4 Steel Angles for Lavatories Counters

Shall be as specified in Division-5, Section 05500 "Metal Fabrications".

2.5 Strip Dividers

Shall be as specified in Division-5, Section 05500 "Metal Fabrications".

PART 3- EXECUTION

3.1 INSTALLATION OF MARBLE/GRANITE

3.1.1 General: No marble/granite shall be installed prior to the approval of the Engineer and all used marble/granite pieces shall match approved samples.

All marble/granite flooring shall be matched and approved on Site by the Engineer prior to installation.

Prior to setting marble/granite, inspect surfaces and arrange for the satisfactory correction of defects. Grounds, bucks, outlets and receptacle boxes, rough plumbing and other fixtures and fittings shall be in place and trenches, chases or other openings in floors and walls shall be properly closed.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Clean marble/granite surfaces prior to setting to remove soil, stains and foreign materials. Clean marble/granite surfaces by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or trash fillers or abrasives.

Do not use marble/granite units with chips, cracks, voids, stains or defects visible in finished work. Use power saws to cut marble/granite. Produce exposed edges that are cut straight and true.

Scribe and field-cut units if necessary to fit at obstruction. Produce tight and neat joints.

Locate and install expansion and control joints according to Drawings and final shop drawings. Joint sealant materials and installation shall be as specified in Division-7, Section 07900 "Joint Sealers".

Mortar used for setting marble/granite shall be composed of 350kg cement to 1 m3 sand.

Where a sand layer is indicated to underlay marble/granite flooring, sand shall be clean, siliceous and free from pebbles and stones larger than 25mm in any dimension and shall conform to ES No. 1108.

Illuminate areas of installation with permanent or temporary light or a combination of both.

3.1.2 Mortar-Set Wall Cladding: Vertical wall surfaces shall be thoroughly wetted with water and well cleaned by wire brush before spatter-dash coat is applied.

Spatter-dash coat shall be applied by forcibly throwing on a wet mix of Portland cement and coarse sand in the proportion of 450kg cement to 1 m3 sand and shall be allowed to thoroughly dry out before setting marble/granite. Spatter-dash shall be wet cured for 5 days.

Marble/granite shall be set straight and, unless otherwise indicated on Drawings, with close joints. External corners shall be quirk mitered. Anchor cramps shall be placed approximate to corners of tiles and shall not exceed 600mm spacing on centers provided always that minimum one cramp anchors each tile. Shorter wing of cramp shall be inserted and mortar set in 20mm deep holes drilled in bottom ends of marble/granite tiles, longer wing shall extend towards backing wall with a length of 40mm mortar-cemented into it. At anchor cramp location, chip back side of bottom end of tile so as to place lug flush with tile edge. Provide additional cramps at other locations as necessary to properly anchor the work.

Marble/granite tiles shall be set with a stiff mix of molding plaster and water, at top edges of tiles, leaving a cavity of 20mm between marble/granite tiles and backing wall. This grout space shall then be filled with a fluid mortar of 350kg cement to 1 m3 of sand. Care shall be taken to pour grout in layers so as not to exert unnecessary pressure on tiles

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

which may lead to misalignment. Succeeding layer shall be poured only when the previous layer has sufficiently hardened.

For outdoor installations, hydrated lime to BS No. 890 shall be added to the mortar. Mix proportions shall be 1: 1:3 by weight; cement: lime: sand respectively.

Marble/granite shall finish with flush surfaces, perfectly plumb and true to lines.

3.1.3 Bases: Shall be mortar set, true to lines.

3.1.4 Mechanical Setting of Wall Cladding: Steel strips shall be located on backing walls at intervals as indicated on approved shop drawings, but not more than 500mm. Steel strips shall be fixed to stretched cords at 500mm intervals along elevations to maintain alignment along widths and plumpness along heights.

Fix steel strips as indicated on approved shop drawings.

Steel angles shall be welded to steel strips at intervals matching heights of stone tiles and details of installation. Steel angles shall continue along full widths of portions of elevations to be finished with marble/granite. Before welding, alignment of strips shall be rechecked.

Bottom row of tiles shall be mortar set as specified herein before in Clause 3.1.2.

Marble/granite tiles shall be placed to stretched cords and steel dowels shall connect tiles under steel angles to the angles by insertion of dowels in the holes of the angle and the slots in the upper edge of tiles and shall project above the edge of the horizontal leg of the steel angle. Tiles above angles shall be fixed in place to the stretched cords by insertion of the projecting part of the steel dowels into slots of the bottom edges of the tiles.

Same method shall be maintained for the full height of cladding.
Mechanically installed marble/granite tiles for elevations shall be robust, of perfect, flush, plumb and true to lines installation with joints of uniform width, level and straight.

Type of corner joints shall be according to details shown on approved shop drawings.

3.1.5 Flooring and Thresholds: For marble/granite laid horizontally, tiles shall be set true and level on a mortar bed composed of 350kg cement to 1 m3 sand. Traces of setting mortars shall be wiped from faces of marble/granite before settings.

Marble/granite floor tiles shall be accurately set with neat cement grout, firmly pressed and beaten into full mortar beds with flush, well fitted joints in true planes, graded or leveled and neatly cut and fitted closely against abutting work. Floor tiles shall be set true to straight edge.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Grout joints with white or colored cement as required. Fill entire depth of joints with mortar of creamy consistency and approved color. Tool joints flat, uniform and smooth without visible voids.

Traces of grouting cement shall be wiped from faces of marble/granite before hardening.

Thresholds shall be mortar-set to details shown on Drawings.

3.1.6 Stair Cladding: Treads and risers shall be mortar set level and plumb.

3.1.7 Lavatory Counters: Unless otherwise indicated on Drawings, Lavatory counters shall be fixed at 800 mm height from finished floor level of toilets.

Counters shall be supported with steel angles projecting from back walls and acting as cantilevers. Length and size of angles shall be as indicated on Drawings. Unless otherwise indicated on Drawings, steel angles shall be arranged to have 750mm maximum intermediate spacing and 250 mm maximum margin clearance from side walls.

Steel angles shall be of one slotted end which shall be cemented into walls with cement sand mortar of 350kg cement to 1 m3 sand. Minimum length of angle penetration into wall shall be 70mm.

Marble/granite counters shall be loaded to the steel angles with their back, and side where possible, edges penetrating adjoining walls up to a minimum distance of 30 mm with cement sand mortar filling above and below counter along perimeter of penetration. Counters shall be rigidly and securely installed, level and true to lines.

Where a counter-top marble/granite base is indicated, it shall be mortar-set to produce facing flush with overlaying finishing materials.

Paint steel angles as per requirement of Division-9, Section 9900 "Painting".

3.2 INSTALLATION TOLERANCES

3.2.1 Variation in Linear Building Line: For portion shown on plans and related portions of columns and wall facings do not exceed + 6mm in 3m or maximum 10 mm in same building line.

3.2.2 Variation in Surface Plane of Flooring: Do not exceed 3mm in 3m from level or slope indicated when tested with 3m straightedge.

3.3 FIELD SURFACE FINISH

After grouting has set, marble/granite surfaces shall be cleaned with a non-acid ingredient and polished to match approved samples.

3.4 ADJUSTING, PROTECTION AND CLEANING

Remove marble/granite with the following defects:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Broken, chipped, stained or otherwise damaged units
- Defective joints
- Units and matching approved samples
- Units not complying with requirements specified

Replace rejected marble/granite work with new units to match approved samples.

Protection: Prohibit traffic from installed marble/granite for a minimum of 72 hours. Protect marble/granite flooring during construction with non-staining Kraft paper. Where adjoining construction works require access, cover marble/ granite flooring with a minimum of 12mm thick of suitable covering material over Kraft paper. Before inspection for substantial completion, remove protective covering and clean surfaces.

Cleaning: Clean-up of all masking materials, equipment and debris from the work area is the responsibility of the Contractor.

3.5 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A09350

INLAID CEMENT TILES (TERRAZZO)

PART 1 GENERAL

1.1 Related Documents

Drawings and general provisions of the Contract, including General Conditions, Conditions of Particular Application and Division-1 Specification Sections, apply to work of this section.

1.2 Description of Work

This section covers the work of inlaid cement tiles and terrazzo tiles for floors and bases as indicated on Drawings and required by the Contract.

- Sand cushion cementitious terrazzo
- Cement tiles for roof.

Extent of cement tiles or terrazzo tiles is shown on Drawings and schedule of finishing.

1.3 Reference Standards

Inlaid cement and terrazzo tiles work shall be performed in strict accordance with the corresponding Egyptian Standard Specifications (ES) as noted herein below or other equivalent International standards and sound practice.

BRITISH STANDARD SPECIFICATIONS
BS NO.

12 Portland Cement (Ordinary and Rapid-Hardening)
1200 Sand Plain and Reinforced Brick Work and Masonry
4131 Cement Tiles

1.4 Submittals

Submit the following in accordance with Conditions of the Contract and Division-1 Specification Sections:

1.4.1 Product Data: Materials list and manufacturer's data of each type of terrazzo components and material include details of precast terrazzo construction of materials, dimension and profiles.

1.4.2 Shop drawings including complete installation details and layout plans of dividers, layout of base and border-strips. Show large scale details of terrazzo patterns.

1.4.3 Samples in triplicate of all units in each manufacturer's colour, texture and pattern variation, prepare samples of the thickness and from the same material to be used.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.4.4 Maintenance Data: Installation and maintenance instructions of each terrazzo type.

1.5 Related Sections

The following section includes requirements which relate to his section:

Section 03300

1.6 Delivery, Storage and Handling

Handle tiles in a manner not to chip edges or cause cracking to surfaces. Stacking area should be clean and level. Tiles should be stocked under a covered area or be protected from the weather by means of a tarpaulin or other suitable waterproof covering.

Tiles should also be protected against penetration of water from the ground.

Tiles should always be stacked face to face.

Cement, packaged materials for mortar and grout shall be furnished in bags displaying the manufacturer's trademark and indicating type of material.

Cement shall be dry and free of lumps and shall be stored above ground in a dry and weathertight location.

Sand shall be natural stored and handled in such a manner as to prevent intermixing with foreign matter.

PART 2 PRODUCTS

2.1 Manufacturers

Subject to compliance with the specification requirements of this section, provide products by one of the attached list of manufacturers or approved equal shown in Section 01155.

2.2 General

Material shall be standard grade as specified hereinafter and shall conform to with the requirements of the Egyptian Standard Specifications.

Colour and pattern of tiles shall be selected by the Engineer.

Tiles shall be cast in strong metal moulds hydraulically pressed, made from cement and aggregates to the proportions and size required and shall be square, their edges and surfaces shall be at right angles to one another, all arises shall be sharp and true. Tiles shall be cured, ground, filled and polished before distribution to site.

2.3 Inlaid Cement Tiles

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Inlaid cement tiles shall be conforming to BS 4131. Tiles shall be composed of two layers. Concrete backing shall be composed of cement mortar 1:3 (by volume) cement to fine aggregate. Finish layer or facing layer shall provide a minimum wearing and shall have a thickness of 'I. the tile thickness but of a minimum thickness of 6 mm and a permissible deviation not exceeding ± 1 mm or 6% of the overall tile thickness and shall be composed of one part of stone powder and two parts of ordinary Portland or white or coloured cement as specified or requested by Engineer.

The dimension of cement tiles shall be 200 x 200 x 20 mm.

2.4 Cement

For manufacturing of tiles and for mortar beds cement shall be a standard brand of gray Portland cement conforming to BS 12. White cement for topping shall be a standard brand of Portland cement conforming with BS 12.

2.5 Sand

Shall be clean, sharp, properly graded for the purpose and shall conform to BS 1200. Clay, loam and silt content shall not exceed 3%.

2.6 Water

Only drinking water or water whose composition is acceptable for drinking except in respect to bacteriological requirements shall be used for mixing mortar.

2.7 Under Bed Bonding Mortar:

300 kg cement on 1 m3 of sand mortar shall be mixed with water.

2.8 Heavy Top Divider Strips

Straight of type indicated, of depth required and with anchoring device.

PART 3 EXECUTIONS

3.1 Preparation

Prior to setting all units, inspect surfaces and arrange for the satisfactory correction of defects. Grounds, bucks, outlet and receptacle boxes, rough plumbing and other fixtures and fittings shall be in place and trenches, chases or other openings in floors properly closed.

3.2 Workmanship

Work shall be carefully laid out, providing symmetry about center lines of the areas and avoiding small, unsightly cuts. Use of thin cuts and pieces, chipped, spalled or otherwise disfigured tiles, shall not be allowed.

3.3 Setting Beds for Tiles

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

The mortar for setting beds shall be composed of 350 kg cement per cu m of sand with sufficient mixing water. The mortar shall be spread at proper thickness of 20 mm over a bed of fine aggregate for the required levels, using screed strips. No more setting mortar shall be spread than can be covered with tile before the mortar reaches its initial set. Setting beds over membrane waterproofing shall have wire reinforcement with edges lapped at least 50 mm. Beds that have partially hardened shall not be retempered.

3.4 Setting of Tiles

The minimum period between pressing and laying should be 21 days to 28 days.

Tiles shall be thoroughly soaked in clean water for at least one hour prior to setting and shall be applied to setting beds while damp, but without free water on the back of tile.

Spread sand on surfaces to receive sand-cushion

Tiles shall be laid out from the center line of each space with square joints, alignment level, true to dimension and accurately set firmly pressed and tamped into full mortar beds with well fitted joints in true planes, graded or level and neatly cut and fitted closely against abutting work.

Straight edges shall be accurately set to the lines established and reset at suitable intervals to keep the joints parallel over the entire area.

When hit after setting tiles shall give a solid firm sound. If a hollow sound is produced tiles and motor layer shall be removed and replaced.

Intersections and returns shall be accurately formed and cuts rubbed smooth with fine stone. Tiles when cut shall not be less than half their original size. Cut edges shall be rubbed smooth set against fixtures or other tile with at least a 1 mm joint.

Mortar shall not be allowed through joints.

3.5 Grouting

Allow at least 48 hours before grouting.

All tiling shall be grouted up on completion with neat cement.

Thoroughly wash out floor tile joints and saturate with clean water before grouting. Grout joints after setting bed is dry with grey, white or coloured grouting cement mixed with water to a creamy consistency and thoroughly forced into all joints to fill entire depth.

Finish grout shall be uniform in color, smooth and without voids pin holes or depressions.

Any surplus grout shall be cleaned off the face of the tiling and surrounding surfaces immediately and all tiling shall be carefully cleaned off.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Cure grout and finish tile.

3.6 Cleaning

After grouting has sufficiently set or hardened, tile surface shall be cleaned and traces of cement or dust accumulations and foreign matter shall be completely removed.

A layer of clean sand shall be spread over tile floor and shall be kept wet with water for a period of ten days for curing and shall be left or replaced by a non-staining sawdust to protect tile floor surface while other works are being done till the Engineer's order to clear and clean the floor surface.

The floor should be thoroughly scrubbed with soap and water.

Large areas shall be wet polished by means of approved machines using carborudum wheel.

Any surface too small for convenient machine polishing may be polished by hand using carborundum stone and water.

On completion of final polishing, the paving should be thoroughly clean and left to dry naturally.

3.7 Protection

Provide tile protection whenever required. Material likely to stain or deface tile shall not be used. Close grouted floors and stairs to traffic completely for 24 hours after installation; thereafter, permit traffic on tiled floors only over protective covering of cardboard or equivalent.

PART-4 MEASUREMENT AND PAYMENT

4.0 Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09511

ACOUSTICAL PANEL CEILINGS

1.1 GENERAL

A. Submittals: In addition to Product Data for each type of acoustical panel and suspension system required, submit the following:

6-inch- (150-mm-) square samples of each acoustical panel type, pattern, and color.

Set of 12-inch- (300-mm-) long samples of exposed suspension system members, including moldings, for each color and system type required.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.

Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.

Fire-resistance-rated assemblies, which are indicated by design designations from UL's "Fire Resistance Directory," from ITS/Warnock Hersey's "Directory of Listed Products," or from the listings of another testing and inspecting agency, are identical in materials and construction to those tested per ASTM E 119.

Products are identified with appropriate markings of applicable testing and inspecting agency.

1.2 PRODUCTS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the Acoustical Panel Ceiling Schedule.

B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Acoustical Panel Ceiling Schedule.

C. Acoustical Panels: Manufacturer's standard panels complying with ASTM E 1264 classifications, unless otherwise indicated, and with requirements indicated in the Acoustical Panel Ceiling Schedule.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400 per ASTM E 795.

D. Metal Suspension System: Manufacturer's standard direct-hung suspension system complying with applicable ASTM C 635 requirements and with requirements indicated in the Acoustical Panel Ceiling Schedule.

E. Finishes and Colors for Metal Suspension System, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

F. Suspension System Attachment Devices: Fabricated from corrosion-resistant materials and sized for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

Cast-in-Place and Postinstalled Anchors in Concrete: Cast-in-place, or postinstalled expansion or chemical anchors with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488, conducted by a qualified testing and inspecting agency.

Postinstalled Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

G. Wire Hangers, Braces, and Ties: Zinc-coated, carbon-steel wire complying with ASTM A 641/A 641M, Class 1 zinc coating, soft temper. Size wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

H. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

1.3 EXECUTION

A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."

U.B.C.'s "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": U.B.C. Standard 25-2.

B. Secure ceiling hangers from suspension system members to building's structural members. Install hangers plumb and free from contact with other objects within ceiling plenum. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

Do not support ceilings directly from permanent metal forms, or floor or roof deck. Do not attach hangers to steel deck tabs.

Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09512

ACOUSTICAL TILE CEILINGS

1.1 GENERAL

A. Submittals: In addition to Product Data for each type acoustical tile and suspension system required, submit the following:

1. Full-size samples of each acoustical tile type, pattern, and color.

2. Set of 12-inch-(300-mm-) long samples of concealed suspension system members, including exposed moldings, for each color and system type required.

B. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:

1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.

2. Surface-burning characteristics of acoustical tiles comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.

3. Fire-resistance-rated assemblies, which are indicated by design designations from UL's "Fire Resistance Directory," from ITS/Warnock Hersey's "Directory of Listed Products," or from listings of another testing and inspecting agency, are identical in materials and construction to those tested per ASTM E 119.

4. Products are identified with appropriate markings of applicable testing and inspecting agency.

1.2 PRODUCTS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the Acoustical Tile Ceiling Schedule.

B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Acoustical Tile Ceiling Schedule.

C. Acoustical Tiles: Manufacturer's standard tiles complying with ASTM E 1264 classifications, unless otherwise indicated, and with requirements indicated in the Acoustical Tile Ceiling Schedule.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400 per ASTM E 795.

D. Metal Suspension System: Manufacturer's standard metal suspension system complying with applicable ASTM C 635 requirements, and with requirements indicated in the Acoustical Tile Ceiling Schedule.

E. Finishes and Colors for Metal Suspension System, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

F. Suspension System Attachment Devices: Fabricated from corrosion-resistant materials and sized for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

1. Cast-in-Place and Postinstalled Anchors in Concrete: Cast-in-place, or postinstalled expansion or chemical anchors with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488, conducted by a qualified testing and inspecting agency.

2. Postinstalled Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

G. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire complying with ASTM A 641/A 641M, Class 1 zinc coating, soft temper. Size wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

H. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

1.3 EXECUTION

A. General: Install acoustical tile ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

3. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

4. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."

5. U.B.C.'s "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": U.B.C. Standard 25-2.

B. Secure ceiling hangers from suspension system members to building's structural members. Install hangers plumb and free from contact with other objects within ceiling plenum. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

1. Do not support ceilings directly from permanent metal forms, or floor or roof deck. Do not attach hangers to steel deck tabs.

2. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.

2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.

3. Fabricate access units for special suspension system access members and tile units modified as required to allow for removal of access units.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09546

LINEAR METAL CEILINGS

1.1 GENERAL

A. Submittals: Submit the following:
Product Data: Include installation methods.

Coordination Drawings: Show joint pattern, suspension members, method of attaching hangers, light fixtures, air outlets and inlets, speakers, sprinkler heads, and access panels. Show moldings at juncture with adjoining construction.

Samples: 12 inches long of each finish. Include sets showing full range of variations expected.

B. Surface-Burning Characteristics: Determined per ASTM E 84.
Flame Spread: 25 or less.
Smoke Developed: 50 or less.

1.2 PRODUCTS

A. Aluminum: ASTM B 209, 0.025-inch-minimum nominal thickness, roll-formed sheet, alloy 3005-H26, free from surface blemishes.

1. Do not use material that exhibits pitting, seam marks, roller marks, stains, discolorations, or variations in flatness exceeding those permitted for stretcher-leveled metal sheet.

B. Sound-Absorptive Pads: Width and length to fill completely between carriers, joined at the center of a panel.

Plastic, Sheet-Wrapped, Mineral-Fiber Insulation: Pads of clear, nonrigid, 0.001-inch-thick vinyl chloride plastic sheet encapsulating 1-1/2-inch-thick unfaced glass-fiber insulation complying with ASTM C 553 for Class B-3 (1-pcf density).

Unwrapped, Glass-Fiber Insulation: 1-1/2-inch-thick black-coated, unfaced, glass-fiber insulation complying with ASTM C 553 for Class B-3 (1-pcf density), treated to be nondusting.

C. Suspension Systems: Comply with ASTM C 635.
1. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung.

a. Cast-In-Place and Postinstalled Anchors in Concrete: Corrosion-resistant, with holes or loops for attaching hangers. Capable of sustaining a load five times that imposed by ceiling construction, as determined by ASTM E 488.

1) Anchor Type: Cast-in-place. 2) Anchor Type: Chemical. 3) Anchor Type: Expansion. 4) Anchor Type: Undercut.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Powder-Actuated Fasteners in Concrete: Corrosion-resistant, with clips for attaching hangers. Capable of sustaining a load 10 times that imposed by ceiling construction, as determined by ASTM E 1190.

2. Wire for Carriers, Hangers, and Ties: ASTM A 641, Class 1, zinc coating, soft temper.
   a. Gage: Size wire so that stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress, but not less than 0.106-inch diameter (12-gage).
   Hanger Rods: Mild steel, zinc coated.
   Flat Hangers: Mild steel, zinc coated.
   Angle Hangers: Legs not less than 7/8 inch wide, formed with 0.0365-inch-thick galvanized steel sheet complying with ASTM A 446, Coating Designation G90, with bolted connections and 5/16-inch-diameter bolts.

D. Edge Moldings and Trim: Metal or extruded plastic molding that fits with type of edge detail and suspension system indicated.

E. Carriers: Comply with ASTM A 446, cold-rolled, electrogalvanized, 0.0209-inch (25-gage) minimum nominal thickness steel.

Adaptable Carriers for Existing Ceiling Grid: For direct attachment to existing suspended tees.

Radial Carrier: ASTM B 209, roll-formed sheet, 0.038-inch aluminum alloy 3005-H26, formed after painting.

Expansion carriers allowing for irregularities or other unusual space conditions.
Carrier splice same metal as indicated for panels.

F. Stabilizer Bars: Form after painting, 0.040-inch aluminum alloy.

G. Exposed Trim: Metal and finish matching ceiling system, as required, for edges of ceiling, fixture trim, beams, and fascias at changes in ceiling height and other conditions.

H. Access Panels: Provide hinge assembly, retainer clip, and retainer bar. Assemble with ceiling panels and carrier sections into access doors of required size, permitting upward or downward opening.

I. Panel Splices: Construction same as ceiling panels, 8-inch to 12-inch lengths.

J. Filler Strips: Construction same as ceiling panels.
Configuration: Recessed.
Configuration: Flush.
Configuration: Expansioned, for use with expansion carriers.
Finish of Exposed Portion: Matte black.
Finish of Exposed Portion: To match panel.

K. End Plugs: Construction same as ceiling panels.
Finish of Exposed Portion: Matte black.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Finish of Exposed Portion: To match panel.

L. Fabrication: Die-form panels into units finished to comply with requirements indicated. Form panels to snap on and be securely retained on carriers without separate fasteners.

M. Linear Metal Panel: Provide the following:
Panel Profile: 3-1/4-inch face width by 5/8-inch deep.
Panel Profile: 3-1/4-inch face width by 3/4-inch deep.
Panel Profile: 5-1/4-inch face width by 5/8-inch deep.

1. Panel Profile: 7-1/4-inch face width by 3/4-inch deep.
   a. Edge: Rounded.
   b. Edge: Square.
   c. Edge: Beveled.
   Pattern: Perforated.
   Pattern: Unperforated.
   Pattern: Textured.

8. Panel Performance: As follows:
   a. Light Reflectance Coefficient: LR 0.75.
   b. Light Reflectance Coefficient: LR 0.70.
   c. Noise Reduction Coefficient: NRC 0.75.
   d. Noise Reduction Coefficient: NRC 0.85.

N. Finishes: Comply with NAAMM "Metal Finishes Manual." Variations in appearance of abutting or adjacent units and noticeable variations in the same piece are not acceptable. Finish designations prefixed by AA conform to the system established by the Aluminum Association.

Class II, Clear, Satin-Anodized Finish: AA-M32C12A212; coating thickness: 0.2 mil minimum.
Class II, Clear, Mirror-Anodized Finish: AA-M21C12A212; coating thickness: 0.2 mil minimum.

3. Baked Enamel Finish: AA-C12C42R1x.
   a. Organic Coating: Thermosetting modified acrylic enamel primer/topcoat system, with two coats on exposed face and one coat on concealed surfaces.

   b. Color and Gloss: As indicated by reference to manufacturer's standard color and gloss designations.

1.3 EXECUTION

A. Environmental Conditions: Do not install ceiling system until work in plenum is complete. Do not install until space is enclosed and weatherproof and wet work in space is completed and dry.

B. Coordinate layout and installation with work supported by or penetrating through ceilings.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

C. Measure each area. Establish panel layout to balance border widths at opposite edges of ceiling. Avoid using units less than half wide at borders. Comply with reflected ceiling plans.

D. Standard for Ceiling Suspension System Installation: ASTM C 636.

E. Standards for Ceiling Suspension System Installation: ASTM C 636 and ASTM E 580.

F. Suspend ceiling hangers from building structural members as follows:
Install plumb and free from contact with objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay only to avoid obstructions and offset resulting horizontal forces by bracing, or other effective means.

Where width of ducts and other construction within plenum produces spacings that interfere with location of hangers at required spacings, install trapezes or equivalent devices.

Secure hangers to structure in a manner that will not cause them to deteriorate or fail because of age, corrosion, or elevated temperatures.

Space hangers not more than 4 feet on center along each member supported directly from hangers.

G. Install moldings at edge of each ceiling area and locations where edge of units would be exposed. Level moldings with ceiling suspension system to level tolerance of 1/8 inch in 12 feet.

Wood Construction: Fasten with wood screws.

Masonry and Concrete: Fasten with wood or machine screws into lead-shield-type anchors drilled into construction.

Hollow Masonry or Stud Construction: Fasten with toggle bolts.

H. Scribe and cut units for accurate fit at borders, interruptions, and penetrations by other work. Stiffen edges of cut units to eliminate evidence of buckling or variations in flatness.

I. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions.

J. Install panels with butt joints using internal panel splices.
Joint Configuration: Aligned.
Joint Configuration: Aligned, every other panel length.
Joint Configuration: Staggered a minimum of 12 inches.
Joint Configuration: Random.

K. Install acoustical blankets at right angles to panels.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09600

STONE PAVING AND FLOORING

1.1 GENERAL

A. Stone Abrasion Resistance: Minimum abrasive-hardness value of 12, as determined per ASTM C 241.

B. Static Coefficient of Friction: ASTM C 1028, values as follows:
Level Surfaces: A minimum of 0.6.
Ramp Surfaces: A minimum of 0.8.

C. Submittals: Submit the following:
Product Data: For each variety of stone, stone accessory, and other manufactured products specified.

Shop Drawings: Show details of fabrication and installation of stone paving and flooring, including dimensions and profiles of stone units; arrangement and details of jointing; and details showing relationship with, attachment to, and reception of related work.

Stone Samples: Sets for each color, grade, finish, and variety of stone required; not less than 12 inches (300 mm) square.

D. Mockups: Before installing stone paving and flooring, construct mockups, in locations and of sizes indicated, to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1.2 PRODUCTS

A. Provide stone from a single quarry for each variety of stone required.

Match Architect's samples for variety, color, finish, and other stone characteristics relating to aesthetic effects.

Match existing stone for variety, color, and finish where stone is indicated to match existing.

Provide stone that is free of cracks, seams, and starts impairing structural integrity or function.

Provide matched blocks extracted from contiguous locations in a single bed of quarry stratum unless stone from blocks randomly selected for aesthetic effect is approved by Architect.

B. Granite: ASTM C 615 and the National Building Granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."

C. Limestone: ASTM C 568.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. Marble: ASTM C 503.

E. Quartz-Based Stone: ASTM C 616.

F. Slate: ASTM C 629 with a fine, even grain and with uniform, unfading color from clear, sound stock.

G. Pattern: As follows:

Rectangular-grid pattern of 18 by 18 inches (457 by 457 mm).
Rectilinear pattern of 12-by-24-inch (305-by-610-mm) units, laid in brickwork pattern.
Random, rectangular pattern composed of units not less than 6 inches (152 mm) nor more than 24 inches (610 mm) in nominal dimension.

Random, polygonal pattern composed of units not less than 1 sq. ft. (0.09 sq. m) nor more than 5 sq. ft. (0.46 sq. m) in area.

H. Mortar Materials: As follows:

1. Portland Cement: ASTM C 150, Type I or II; natural color, white, or a blend to produce mortar color indicated.

a. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

Hydrated Lime: ASTM C 207, Type S.
3. Aggregate: ASTM C 144 and as indicated below:

a. For joints narrower than 1/4 inch (6 mm), use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

b. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

c. White-Mortar Aggregates: Natural, white sand or ground, white stone.

d. Colored-Mortar Aggregates: Natural, colored sand or ground marble, granite, or other sound stone, as required to match Architect's sample.

Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in stone mortars.

Latex-Portland Cement Mortar: ANSI A118.4, factory-packaged dry-mortar mix with water-emulsion latex additive added at Project site.

Water: Potable.

I. Grout Materials: As follows:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. Grout Colors: Provide Architect's selection from manufacturer's full range of colors.

J. Sand-Portland Cement Grout: ANSI A108.10.

K. Latex-Portland Cement Grout: ANSI A118.6 and as follows:

1. Factory-Prepared Dry-Grout Mixture: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to produce the following:

a. Un-sanded grout mixture for joints 1/8 inch (3 mm) and narrower.

b. Sanded grout mixture for joints 1/8 inch (3 mm) and wider.

2. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factory-prepared dry-grout mix and latex additive to comply with the following requirements:

a. Un-sanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6, for joints 1/8 inch (3 mm) and narrower.

b. Sanded Dry-Grout Mix: Commercial Portland Cement grout complying with ANSI A118.6, for joints 1/8 inch (3 mm) and wider.

c. Latex Additive: Styrene butadiene rubber.

d. Latex Additive: Acrylic resin.

L. Accessories: As follows:

Cleavage Membrane: Polyethylene sheeting, ASTM D 4397, 4 mils (0.1 mm) thick.
Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch- (1.6-mm-) diameter wire, complying with ASTM A 185 and ASTM A 82, except for minimum wire size.

Divider Strips and Edging: Metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications consisting of the following:

a. Exposed-Edge Material: As follows:

1) Material: Half-hard brass. 2) Material: Stainless steel; ASTM A 666, Type 302.

b. Cross-Section Profile and Size: As indicated; height to match stone thickness.

1) Width: 0.063 inch (1.6 mm). 2) Width: 1/8 inch (3.2 mm).3) Width: 1/4 inch (6.4 mm).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

c. Control-Joint Filler: Neoprene, in color selected by Architect from manufacturer's full range of colors.

Cork Joint Filler: Preformed strips complying with ASTM D 1752, Type II.

Cleaner: Specifically formulated for stone types, finishes, and applications indicated. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

Floor Sealer: Colorless, slip- and stain-resistant sealer not affecting color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

M. Stone Fabrication: Fabricate stone paving and flooring in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings. For granite, comply with recommendations of National Building Granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."

For marble, comply with recommendations of Marble Institute of America's (MIA) "Dimensional Stone-Design Manual IV."
For limestone, comply with recommendations of Indiana Limestone Institute of America's (ILI) "Indiana Limestone Handbook."

N. Pattern Arrangement: Fabricate stone from one block or contiguous, matched blocks, and arrange units with veining and other natural markings to comply with the following requirements:

Arrange units with veining horizontal.
Arrange units with veining vertical.

3. Arrange units with veining as indicated on Drawings.

O. Mortar and Grout Mixes: Comply with referenced standards and with manufacturers' written instructions. Do not use admixtures.

Mortar: Comply with ASTM C 270, Proportion Specification, Type N for interior applications and Type S for exterior applications.

La&ex-Modified-Portland Cement Mortar: Proportion and mix Portland cement, aggregate, and latex additive to comply with latex additive manufacturer's written instructions.

3. Cement-Paste Slush Coat: Mix to consistency of thick cream and consisting of either cement and water or cement, sand, and water.

a. For latex-modified-portland cement mortar, substitute latex admixture for part or all of water according to latex additive manufacturer's written instructions.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.

c. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with Portland cement of selected color.

Joint Grout: Comply with mixing requirements of referenced ANSI standards and manufacturer's written instructions.

1.3 EXECUTION

A. Vacuum clean substrates to remove dirt, dust, debris, and loose particles.

B. Remove substances from substrates that could impair mortar bond.

C. Clean stone surfaces before setting by thoroughly scrubbing with fiber brushes and then drenching with clear water.

D. Execute stone paving and flooring installation by skilled mechanics and employ skilled stone fitters at the site to do necessary field cutting as stone is set.
1. Use power saws to cut stone.

E. Set stone to comply with Drawings and Shop Drawings. Match for color and pattern by using units numbered in sequence as indicated on Shop Drawings.

F. Scribe and field-cut stone as necessary to fit at obstructions. Produce tight and neat joints.

G. Stone Paving over Waterproofing: Carefully place stone and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged.

1. Provide cork joint filler, where indicated, at waterproofing that is turned up on vertical surfaces or, if not indicated, provide temporary filler or protection until stone paving installation is complete.

H. Expansion- and Control-Joint Installation: Locate and install according to Drawings and Shop Drawings. Joint-sealant materials and installation are specified in Division 7 Section "Joint Sealants."

Architectural Specifications 31 July 2008

I. Installing Stone Directly over Concrete: Install as follows:
Saturate concrete with clean water before placing setting bed. Remove surface water before placing setting bed.

Apply cement-paste slush coat before placing setting bed. Limit area of slush coat to avoid its drying out. Do not exceed 1/16-inch (1.5-mm) thickness for cement-paste slush coat.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

Apply mortar setting bed over cement-paste slush coat. Spread and screed setting bed to uniform thickness at elevations required for accurate setting of stone.

Mix and place only as much mortar as can be covered with stone before initial set. Cut back, bevel edge, and discard setting-bed material that has reached initial set before placing stone.

Place stone before initial set of cement occurs. Apply uniform 1/16-inch-(1.5-mm-) thick, slurry bond coat to bed or to back of each stone unit.

Tamp and beat stone to obtain full contact with setting bed. Set each unit in a single operation before initial set of mortar; do not disturb stone for purposes of realigning.

Point joints after setting. Tool joints flat, uniform, and smooth, without visible voids.

J. Installing Stone over Cleavage Membrane or Waterproofing: Install as follows:
Place cleavage membrane over subfloor surfaces indicated to receive stone flooring, lapped at least 4 inches (100 mm) at joints.

Place reinforcing wire fabric, lapped at joints by at least one full mesh and supported so mesh becomes embedded in middle of setting bed. Do not butt edges against vertical surfaces.

Place mortar setting bed with reinforcing wire fabric fully embedded in middle of setting bed. Spread and screed setting bed to uniform thickness at elevations required for accurate setting of stone.

Mix and place only as much mortar as can be covered with stone before initial set. Cut back, bevel edge, and discard setting-bed material that has reached initial set before placing stone.

Place stone before initial set of cement occurs. Apply uniform 1/16-inch-(1.5-mm-) thick, slurry bond coat to bed or to back of each stone unit.

Tamp and beat stone to obtain full contact with setting bed. Set each unit in a single operation before initial set of mortar; do not disturb stone for purposes of realigning.

Point joints after setting. Tool joints flat, uniform, and smooth, without visible voids.

K. Grout stone joints to comply with ANSI A108.10 and manufacturer's written instructions. Do not use sanded grout for polished stone.

Grout joints as soon as possible after initial set of setting bed. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint.

Cure grout by maintaining in a damp condition for 7 days, except as otherwise recommended by latex additive manufacturer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

L. Remove and replace damaged and defective stone paving and flooring in a manner that results in stone paving and flooring's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

M. Clean stone paving and flooring after setting and grouting are complete. Use procedures recommended by stone fabricator for types of application.

N. Apply sealer to cleaned stone flooring according to sealer manufacturer's written instructions.

Architectural Specifications 31 July 2008

O. Prohibit traffic from installed stone for a minimum of 72 hours.

P. Protect stone paving and flooring during construction. Where adjoining areas require construction work access, cover stone paving and flooring with a minimum of 3/4-inch (19-mm) untreated plywood over nonstaining kraft paper.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A09651

RESILIENT FLOOR TILE

PART **1 GENERAL**

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1 This Section includes the following:

- Rubber floor tile

1.2.2 Related Sections include the following:

- Division 9 Section "Resilient Athletic Flooring" for resilient floor tile for use in athletic activity pr support areas.
- Division 9 Section "Static-Control Resilient Floor coverings" for resilient floor tile designed to control electrostatic discharge (ESD).

1.3 SUBMITTALS

Product Data : For each type of product indicated

Samples for Initial Selection: For each type of product indicated.

Samples for Verification : Full-size units of each color and pattern of resilient floor tile required.

Maintenance Data : For resilient products to include in maintenance manuals.

1.4 QUALITY ASSURANCE

1.4.1 Fire-Test-Response Characteristics: Provide products identical to those tested for fire exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.4.2 Technical Data

Material	Recycled rubber particles molded with a custom formulated solvent free pure MDI polyurethane binder
Properties ".	Water permeable, resilient, durable, slip

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

	proof, insulating, flexible, frost proof, non-flammable, non-toxic, sound deadening
Thickness	15mm, 20mm, 25mm, 45mm, and 60mm
Sound Absorption	Approx. 5Db
Flammability	DIN 51960 Class 1
Slip Resistance	95 (dry) 65 (wet)
Abrasion Resistance	- after air aging 0.10 (gr.) - after water aging 0.36 (gr.) - after artificial weathering 0.20 (gr.)
Residual Indentation	0.64mm after recovery
Fatigue Resistance	No cracking or fracture
Resistance to Ozone	No cracking or fracture
Infiltration Rate	25mm - approx. 180mm / hr 45mm - approx. 285mm / hr

1.5 DELIVERY, STORAGE. AND HANDLING

1.5.1 Store resilient products and installation materials in dry spaces protected from the Weather, with ambient temperature maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store files on flat surfaces.

1.6 PROJECT CONDITIONS

1.6.1 Maintain temperatures within range recommended by manufacturer, but not less than
70'F, or more than 95'F, in spaces to receive floor tile during the following time periods.

- 48 hours before installation
- During installation
- 48 hours after installation

1.6.2 After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 55' F, or more than 95'F.

1.6.3 Close spaces to traffic during floor covering installation.

1.6.4 Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIAL

1.7.1 Furnish extra materials described below that match products installed and that are
packaged with protective covering for storage and identified with labels describing contents.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

- Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2PRODUCTS

2.1 MANUFACTURERS

2.1.1 Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products listed in other Part 2 articles.

2.1.2 Products: Subject to compliance with requirements, provide one of the products listed in other part articles.

2.2 COLORS AND PATTERNS

2.2.1 Colors and Patterns: As selected by Architect from manufacturer's full range.

2.3 INSTALLATION MATERIALS

2.3.1 Trowel able leveling and Patching Compounds: Latex modified, Portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.

2.3.2 Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

2.3.3 Metal Edge Strips: Extruded aluminum with mill Finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Examine substrates with Installer present, for compliance with requirements for installation tolerances, moisture control, and other conditions affecting performance.

3.1.1.1 Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products

3.1.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.2 PREPARATION

3.2.1 Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

3.2.2 Concrete Substrates: Prepare according to ASTM F 710.

3.2.2.1 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

3.2.2.2 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
Proceed with installation only after substrates pass testing.

3.2.2.3 Moisture Testing:

- Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs of water/1000 sq. ft. in 24-hours.

- Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3.2.3 Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

3.2.4 Access Flooring Panels: Remove film of oil or other coating using method recommended by access flooring manufacturer.

3.2.5 Use trowel able leveling and patching compound to fill cracks, holes, and depressions in substrates.

3.2.6 Move resilient products and installation materials into spaces where they will be installed at least 48-hours in advance of installation.

- Do not install resilient products until they are same temperature as space where they are to be installed.

3.2.7 Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline sales, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

3.3.1 Layout tiles from center marks established with principal walls, discounting minor offsets, so
tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

- Lay tiles in pattern indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.3.2 Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped or deformed tiles.
Lay tiles in pattern of colors and sizes indicated.

3.3.3 Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets edgings, door frames, thresholds, and nosing.

3.3.4 Extend tiles into toe spaces, door reveals, closets, and similar openings.

3.3.5 Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other non-permanent, constraining marking, device.

3.3.6 Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

3.3.7 Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open racks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

3.4.1 Perform the following operations immediately after completing resilient product installation:

3.4.1.1 Remove adhesive and other blemishes from exposed surfaces.

3.4.1.2 Sweep and vacuum surfaces thoroughly.

3.4.1.3 Damp-mop surfaces to remove marks and soil.

- Do not wash surfaces until after time period recommended by manufacturer.

3.4.2 Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

3.4.3 Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive and surface blemishes if recommended in writing by manufacturer.

3.4.3.1 Use commercially available product acceptable to manufacturer.

3.4.3.2 Coordinate selection of floor polish with Owner's maintenance service.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.4.4 Cover products installed on horizontal surfaces with un-dyed, untreated building paper until Substantial Completion.

3.4.5 Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

PART 4 MEASUREMENTS AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09680

CARPET

1.1 GENERAL

A. Submittals: Submit Product Data for each type of carpet, carpet cushion, and the following:

1. Shop Drawings showing carpet type, color, and dye lot; seam locations, types, and methods; type of subfloor; and type of installation. Samples of each type of carpet material required.

2. Schedule of carpet using same room designations indicated on Drawings.

3. Maintenance data for carpet and cushion to include in the operation and maintenance manual.

B. Carpet Surface Flammability: Passes CPSC 16 CFR, Part 1630.

1. Flame Spread: 25 or less per ASTM E 84.
2. Smoke Developed: 450 or less per ASTM E 84.

C. Carpet Cushion Surface Flammability: Passes CPSC 16 CFR, Part 1630.
1. Flame Spread: 25 or less per ASTM E 84.
2. Smoke Developed: 450 or less per ASTM E 84.

D. Project Conditions: Comply with CRI 104, Section 6: "Site Conditions."

E. Subfloor Moisture Conditions: Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours (14.6 kg/1000 sq. m/24 hours) when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F (12.7 deg C).

F. Subfloor Alkalinity Conditions: A pH range of 5 to 9 when subfloor is wetted with potable water and hydroid paper is applied.

G. Furnish full-width carpet equal to 5 percent of amount installed, packaged with protective covering for storage, and identified with labels clearly describing contents, before installation begins.

1.2 PRODUCTS

A. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in each carpet Product Data sheet at end of this Section.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Products: Subject to compliance with requirements, provide one of the products specified in each carpet Product Data sheet at end of this Section.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in each carpet cushion Product Data sheet at end of this Section.

1. Products: Subject to compliance with requirements, provide one of the products specified in each carpet cushion Product Data sheet at end of this Section.

D. Concrete-Slab Primer: No staining type as recommended by the following:

2. Carpet manufacturer.
3. Carpet cushion manufacturer.

E. Trowelable Underpayments and Patching Compounds: As recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

F. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor
conditions indicated and to comply with flammability requirements for installed carpet as recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

G. Tackless Carpet Stripping: Water-resistant plywood in strips as required to match cushion
thickness and in compliance with CRI 104, 11.3.

H. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet
manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

1.3 EXECUTION

A. Verify that subfloors and conditions are satisfactory for carpet installation and comply with
requirements specified in this Section and those of the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

B. Level subfloor within 1/4 inch in 10 feet (6 mm in 3 m), noncumulative, in all directions.

1. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

recommended by the following:

a. Carpet manufacturer.
b. Carpet cushion manufacturer.

C. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.

D. Broom or vacuum clean subfloors to be covered with carpet. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.

E. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

F. Wood-Subfloor Preparation: Apply wood-floor sealer, according to manufacturer's directions, where recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

G. Resilient-Flooring Substrate Preparation: Replace missing pieces of existing resilient flooring or patch to level as recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

H. Terrazzo-Subfloor Preparation: Patch grout lines and cracks to level with latex underlayment as recommended by the following:

1. Carpet manufacturer.
2. Carpet cushion manufacturer.

I. Direct Glue-Down Installation: Comply with CRI 104, Section 8: "Direct Glue-Down."

J. Double Glue-Down Installation: Comply with CRI 104, Section 9: "Double Glue-Down."

K. Carpet with Attached-Cushion Installation: Comply with CRI 104, Section 10: "Attached Cushion."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

L. Stretch-in Installation: Comply with CRI 104, Section 11: "Stretch-in Utilizing Tackless Strip."

M. Stair Installation: Comply with CRI 104, Section 12: "Carpet on Stairs."

N. Comply with carpet manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.

O. Install pattern parallel to walls and borders.

P. Install carpet cushion seams at 90-degree angle with carpet seams.

Q. Vacuum carpet using commercial machine with face-beater element.

R. Protection: Comply with CRI 104, Section 15: "Protection of Indoor Installation."

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09690

CARPET TILE

1.1 GENERAL

A. Submittals: Submit Product Data for each type of carpet tile material and the following:

1. Shop Drawings showing carpet tile type, color, and dye lot; type of subfloor; pile direction; and type, color, and location of insets and borders.

2. Samples of each type of carpet tile required.

3. Schedule of carpet tile using same room designations indicated on Drawings.

4. Maintenance data for carpet tile to include in the operation and maintenance manual.

B. Carpet Tile Surface Flammability: Passes CPSC 16 CFR, Part 1630.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.
2. Critical Radiant Flux Classification: Class II, not less than 0.22 W/sq. cm per ASTM E 648.
3. Flame Spread: 25 or less per ASTM E 84.
4. Smoke Developed: 450 or less per ASTM E 84.

C. Project Conditions: Comply with CRI 104, Section 6: "Site Conditions."

D. Subfloor Moisture Conditions: Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours (14.6 kg/1000 sq. m/24 hours) when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F (12.7 deg C).

E. Subfloor Alkalinity Conditions: A pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.

F. Furnish full-size carpet tile units equal to 5 percent of amount installed, packaged with protective covering for storage, and identified with labels clearly describing contents, before installation begins.

1.2 PRODUCTS

A. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in each carpet tile Product Data sheet at end of this Section.

B. Products: Subject to compliance with requirements, provide one of the

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

products specified in each carpet tile Product Data sheet at end of this Section.

C. Concrete-Slab Primer: Nonstaining type as recommended by carpet tile manufacturer.

D. Trowelable Underlayments and Patching Compounds: As recommended by carpet tile manufacturer.

E. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet tile as recommended by carpet tile manufacturer.

1.3 EXECUTION

A. Verify that subfloors and conditions are satisfactory for carpet tile installation and comply with requirements specified in this Section and those of carpet tile manufacturer.

B. Level subfloor within 1/4 inch in 10 feet (6 mm in 3 m), noncumulative, in all directions.

1. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by carpet tile manufacturer.

C. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.

D. Broom or vacuum clean subfloors to be covered with carpet tile. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.

E. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by carpet tile manufacturer.

F. Wood-Subfloor Preparation: Apply wood-floor sealer, according to manufacturer's directions, where recommended by carpet tile manufacturer.

G. Resilient-Flooring Substrate Preparation: Replace missing pieces of existing resilient flooring or patch to level as recommended by carpet tile manufacturer.

H. Terrazzo-Subfloor Preparation: Patch grout lines and cracks to level with latex underpayment as recommended by carpet tile manufacturer.

I. Installation: Comply with CRI 104, Section 13: "Carpet Modules (Tiles)."

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

J. Install borders parallel to walls.

K. Protection: Comply with CRI 104, Section 15: "Protection of Indoor Installation."

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SECTION 09800

SPECIAL COATINGS

1.1 GENERAL

A. Submittals: Submit the following according to Conditions of the Contract and Division 1 Specification Sections:

1. Product data for each coating system specified, including block fillers and primers.

    a. Provide the manufacturer's technical information including label analysis and instructions for handling, storing, and applying each material proposed for use.

    b. List each material and cross-reference the specific coating and finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

    c. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

2. Samples for initial color selection in the form of manufacturer's color charts. After color selection, the Architect will furnish color chips for surfaces to be coated.

3. Samples for Verification Purposes: Provide samples of each color and material to be applied with texture to simulate actual conditions on representative samples of the actual substrate. Provide stepped samples defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until the required sheen, color, and texture are achieved.

    a. Provide a list of materials and applications for each coat of each sample. Label each sample as to location and application.

    b. Submit samples on the following substrates for the Architect's review of color and texture only.
        1. Concrete: Provide two 4-inch-square samples for each color and finish.
        2. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

B. Applicator Qualifications: Engage an experienced applicator who has successfully completed coating system applications similar in material and extent to those indicated for the Project.

C. Single-Source Responsibility: Provide primers and undercoat material produced by the same manufacturer as the finish coats.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

D. Field Samples: On wall surfaces and other interior and exterior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface.

1. Final acceptance of colors will be from job-applied samples.

2. The Architect will select one room, area, or surface to represent surfaces and conditions for each type of coating and substrate to be coated. Apply coatings in this room, area, or surface according to the schedule, or as specified.

E. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label.

F. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials, and residue.

G. Project Conditions: Apply coatings only when the temperature of surfaces to be coated and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C). Do not apply coatings in snow, rain, fog, or mist; when the relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.2 PRODUCTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

C. Special Coating Materials, General: Provide block fillers, primers, finish coat material, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

D. Material Quality: Provide the highest quality grade of the various coatings as regularly manufactured by acceptable coating manufacturers. Materials not displaying manufacturer's identification as a best-grade product will not be acceptable.

1. Proprietary Names: Using manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

E. Colors: Provide color selections made by the Architect from the manufacturer's full range of standard colors.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.3 EXECUTION

A. Examination: Examine substrates and conditions under which coatings will be applied for compliance with requirements on applying coatings. Surfaces to receive coatings must be thoroughly dry before coatings are applied.

1. Do not proceed with coating application until unsatisfactory conditions have been corrected.

2. Start of application will be construed as the Applicator's acceptance of surfaces within that particular area.

B. Coordinating Work: Review Sections in which other coatings are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on the characteristics of specified finish materials, to ensure use of compatible primers.

1. Notify the Architect of problems anticipated using the coatings specified over substrates primed by others.

C. Preparation: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already in place that are not to be coated, or provide surface-applied protection prior to surface preparation and coating. Remove these items, if necessary, to completely coat the items and adjacent surfaces. Following coating operations in each space or area, have items reinstalled by workers skilled in the trades involved.

D. Cleaning: Clean substrates of substances that could impair bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and coating application so dust and other contaminates from the cleaning process will not fall on wet, newly coated surfaces.

E. Surface Preparation: Clean and prepare surfaces to be coated according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

2. Cementations Surfaces: Prepare cementations surfaces to receive special coatings. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surface.
   a. Use abrasive blast-cleaning methods, if recommended by the coating system manufacturer.

   b. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. Do not apply coatings over surfaces where the moisture content exceeds that permitted in the manufacturer's printed directions.

3. Wood: Clean surfaces of dirt, oil, or other foreign substances, using scrapers, mineral spirits, and sandpaper, as required. Sand surfaces

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

exposed to view smooth, and dust off.

a. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before applying priming coat.

4. Ferrous Metal: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the recommendations of the Steel Structures Painting Council.

   a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, solvent clean, and touch up with the same primer as the shop coat.

5. Nonferrous Metal Surfaces: Clean nonferrous and galvanized surfaces according to the manufacturer's instructions for the type of service, metal substrate, and application required.

F.M Material Preparation: Carefully mix and prepare materials according to the coating manufacturer's directions.

1. Stir materials before application to produce a mixture of uniform density, as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain the coating material before using.
   a. Use only thinners approved by the manufacturer, and only within recommended limits.

G. Application: Apply special coatings by brush, roller, spray, squeegee, or other applicators according to the manufacturer's directions. Use brushes best suited for the material being applied. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

1. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to the formation of a durable coating film.

   a. Coating colors, surface treatments, and finishes are indicated in the Schedules.
   b. Provide finish coats compatible with the primers used.
   c. The number of coats and the film thicknesses required are the same regardless of the application method. Do not apply succeeding coats until previous coat has cured. Sand between applications where sanding is required to produce a smooth, even surface.
   d. Where undercoats or other conditions show through the final coat, apply additional coats until the cured film has a uniform coating finish, color, and appearance.
   e. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

protection.

f. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces.

H. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable and before subsequent surface deterioration. Allow sufficient drying time between successive coats. Do not recoat until the coating has dried.

I. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

1. Brushes: Use brushes best suited for the material applied.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use spray equipment with orifice size as recommended for the material and texture required.

J. Minimum Coating Thickness: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.

K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

L. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material required to be coated or finished that has not been prime-coated by others. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

N. Cleaning: At the end of each work day, remove rubbish, empty cans, rags, and other discarded materials from the site.

1. Upon completion of work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

O. Protection: Protect work of other trades, whether to be coated or not, against damage from coating. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to the Architect. Leave in an undamaged condition.

P. Signs: Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others for protection of their work, after completing coating operations.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

Q. Special Coating Schedule: Provide the following coating systems for substrates indicated.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09900

PAINTING

1.1 GENERAL

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

C. Do not paint refinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Submittals: For each paint system specified, provide the following:

1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application.

2. Identify each material by manufacturer's catalog number and general classification.

3. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated. After color selection, the Architect will furnish color chips for surfaces to be coated.

F. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Provide a list of materials and applications for each coat o> each sample. Label each sample for location and application.

3. Submit Samples on the following substrates for the Architect's review of color and texture only:
   a. Concrete: Provide two 4-inch- (100-mm-) square samples for each color and finish.
   b. Concrete Masonry: Provide two 4-by-8-inch (100-by-200-mm) samples of masonry for each finish and color.

   c. Painted Wood: Provide two 12-inch- (300-mm-) square samples of each color and material on hardboard.

   d. Stained or Natural Wood: Provide two 4-by-8-inch (100-by-200-mm) samples of natural- or stained-wood finish on actual wood surfaces.

   e. Ferrous Metal: Provide two 4-inch- (100-mm-) square samples of flat metal and two 8-inch- (200-mm-) long samples of solid metal for each color and finish.

G. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

H. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.

1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface as specified.

   a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.

I. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.

J. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers in clean condition, free of foreign materials and residue. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

K. Project Conditions: Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PRODUCTS

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.

C. Colors: Provide custom colors of the finished paint systems to match the Architect's samples.

D. Colors: Match colors indicated by reference to manufacturer's color designations.

E. Colors: Provide color selections made by the Architect.

1.3 EXECUTION

A. Examine substrates, areas, and conditions under which painting will be performed for compliance with paint application requirements. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates.

C. Preparation: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

E. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

1. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

a. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

c. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with no petroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

F. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

2. Use only thinners approved by paint manufacturer and only within recommended limits.

G. Application: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

3. Provide finish coats that are compatible with primers used

4. The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

6. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

7. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.

8. Sand lightly between each succeeding enamel or varnish coat.

H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturers recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

L. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

N. Field Quality Control: The Owner reserves the right to engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.

1. The testing agency will perform appropriate tests as required by the Owner.
2. If tests show material being used does not comply with specified requirements, the Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

O. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

P. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

Q. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

R. Paint Schedules: Provide the following paint systems for the various substrates indicated:

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3.5 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 09950

WALL COVERINGS

1.1 GENERAL

A. Submittals: Submit the following:

1. Product Data: Include physical characteristics, durability, fade resistance, and flame-resistance characteristics.

2. Shop Drawings: Show location and extent of wall covering. Indicate seams and termination points.

3. Samples for each color, texture, and pattern specified.

4. Schedule of wall coverings using same room designations indicated on Drawings.

B. Fire-Test-Response Characteristics: Provide the following surface-burning characteristics as determined by testing per ASTM E 84.

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

C. Space Enclosure and Environmental Limitations: Do not install wall covering until space is enclosed and weatherproof, wet-work in space is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

D. Lighting: Do not install wall covering until a lighting level of not less than 15 foot-candles (160 lux) is provided on the surfaces to receive wall covering.

E. Ventilation: Provide continuous ventilation during installation and for the time recommended by the manufacturer for full drying or curing.

1.2 PRODUCTS

A. Products: Subject to compliance with requirements, provide products specified in wall covering Product Data sheets at end of this Section.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

B. Adhesives: Mildew-resistant, nonstaining adhesive, as recommended by wall covering
manufacturer.

C. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall
covering manufacturer.

1.3 EXECUTION

A. Examine substrates for compliance with requirements for moisture content and other conditions affecting performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Preparation: Comply with manufacturer's instructions.

1 Clean substrates of substances that could impair bond, including mold, mildew,
oil, grease, incompatible primers, and dirt.

2. Prepare substrates to achieve a smooth, dry, clean surface free of flaking,
unsound coatings, cracks, and defects.

a. Painted Surfaces: Treat areas susceptible to pigment bleeding.

b. Moisture Content: Maximum of 5 percent on new plaster, concrete, and
concrete masonry units.

c. Prime gypsum board with primer recommended by manufacturer. Allow
plaster to cure. Treat areas of high alkalinity.

C. Install wall liner, with no gaps or overlaps. Form smooth wrinkle-free surface. Do not begin wall covering installation until wall liner has dried.

D. Acclimatize wall covering materials by removing them from packaging in the installation areas 24 hours before installation.

E. Installation: Comply with manufacturers' instructions, except where more stringent requirements apply.

1 Cut panels in roll number sequence. Change run numbers at partition breaks and
corners only.

2 Install wall covering with no gaps or overlaps. Install seams vertical and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

plumb.

Horizontal seams are not permitted.

3 Match pattern 72 inches (1830 mm) above finish floor.

4 Remove air bubbles, wrinkles, blisters, and other defects.

5 Trim edges for color uniformity, pattern match, and tight closure at seams and edges. Butt seams.

F. Cleaning: Remove excess adhesive. Replace strips that cannot be cleaned.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION A10001

WALL AND CORNER GUARDS

PART 1 - GENERAL

1.1 SCOPE

This Section includes corner guards for columns.

1.2 SUBMITTALS

A. Product Data: Include physical characteristics, such as durability, resistance to fading, and flame resistance, for corner guard's system component indicated.

B. Shop Drawings: Show locations, extent, and installation details of corner guard's system component. Show methods of attachment to adjoining construction.

C. Samples: Samples of type of corner guard component required, showing the full range of color and texture variations expected for corner guard's system component. Prepare Samples from the same material to be used for the Work.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installation of impact-resistant wall protection system components similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing impact-resistant wall protection system components similar to those required for this Project and with a record of successful in-service performance.

C. Source Limitations: Obtain color, grade, finish, and type of corner guard's system component from a single source with resources to provide components of consistent quality in appearance and physical properties.

1.4 DELIVERY, STORAGE, AND HANDLING

Store wall surface-protection materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

PART 2 - PRODUCTS

2.1 WALL GUARDS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. Surface-Mounted, Rubber Corner Guards: Manufactured from impact resistant rubber and fixed to the substrate using epoxy adhesives or proprietary fastenings recommended by the manufacturer.

1. Shore A Hardness
2. Tensile Strength

2.2 FABRICATION

A. General: Fabricate corner guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including thickness of components.

B. Pre-assembled components in the shop to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors for interconnecting members to other construction.

D. Provide inserts and other anchoring devices for connecting components to concrete or masonry. Fabricate anchoring devices to withstand imposed loads. Coordinate anchoring devices with the supporting structure.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions in which corner guards components are fixed.

1. Complete finishing operations, including painting, before installing corner guards' system components.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

General: Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Install system components level, plumb, and true to line without distortions.

1. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

3.4 CLEANING

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

A. General: Immediately on completion of installation, clean components according to the manufacturer's written instructions.

B. Remove excess adhesive using methods and materials recommended by the manufacturer.

C. Remove surplus materials, rubbish, and debris, resulting from installation, on completion of work and leave installation areas in neat, clean condition.

PART 4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 10155

TOILET COMPARTMENTS

1.1 GENERAL

A. Submittals: Include the following:
   1. Product Data: For each type of toilet compartment and screen specified.
   2. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies.
   3. Samples: Manufacturer's color charts consisting of sections of actual units showing the full range of colors, textures, and patterns available for each type of compartment or screen indicated.

1.2 PRODUCTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. [Insert Name of Manufacturer]

C. Steel Sheets for Color-Coated Finish: Provide mill-phosphatized steel sheet, in manufacturer's standard baked finish and thicknesses, that is leveled to stretcher-leveled flatness and that complies with the requirements of ASTM A 591 (ASTM A 591M), Class C; or ASTM A 653 (ASTM A 653M), in manufacturer's standard coating designation.

D. Stainless-Steel Sheet: ASTM A 666, Type 302 or 304, that is leveled to stretcher-leveled flatness, in manufacturer's standard directional-polish finish and thicknesses.

E. Core Material for Metal-Faced Units: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) minimum for doors, panels, and screens and 1-1/4 inches (32 mm) minimum for pilasters.

F. Plastic Laminate: NEMA LD 3, GP-50, 0.050-inch (1.27-mm) nominal thickness, in color and pattern as selected by Architect from manufacturer's full range of colors and patterns.

G. Core Material for Plastic Laminate: ANSI 208.1, Type M-2 particleboard with 45-lb (20.4-kg) density in thicknesses required to provide nominal thicknesses of 1 inch (25 mm) minimum for doors, panels, and screens and 1-1/4 inches (32 mm) minimum for pilasters.

H. Solid-Plastic, Phenolic Core: Solid phenolic core with melamine facing on both sides, fused to substrate without visible glue line or seam. Provide units with eased edges and with minimum 3/4-inch- (19-mm-) thick doors and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

pilasters and minimum 1/2-inch- (13-mm-) thick panels and screens. Provide melamine color as selected by Architect from manufacturer's full range of colors.

I. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch (25 mm) thick with seamless construction and eased edges in color and pattern as selected by Architect from manufacturer's full range of colors and patterns.

J. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

K. Stirrup Brackets: Manufacturer's standard ear or U-brackets for attaching panels and screens to walls and pilasters of chrome-plated, nonferrous, cast zinc alloy (zamac) or clear-anodized aluminum.

L. Solid-Plastic, Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters.

M. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of chrome-plated, nonferrous, cast zinc alloy (zamac) or clear-anodized aluminum.

N. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile in manufacturer's standard finish.

O. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.

P. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

Q. Fabrication: As follows:
   1. Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.
      a. Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab bars, as indicated.

   2. Solid-Plastic, Polymer-Resin Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

   3. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4. Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.

5. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.
   a. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
   b. Latch and Keeper: Recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
   c. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
   d. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
   e. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
   f. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

1.3 EXECUTION

A. Installation: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.

1. Secure panels to walls and panels with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Wall-Hung Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

D. Hardware Adjustment: Adjust and lubricate hardware according to

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 10200

LOUVERS AND VENTS

1.1 GENERAL

A. Structural Performance: Provide louvers capable of withstanding the effects of wind and normal thermal movement without evidencing permanent deformation of blades, frames, and supports; noise or metal fatigue caused by louver blade rattle or flutter; or permanent damage to fasteners and anchors.

1 Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward or outward.

2 Thermal Movements: Movements resulting from 120 deg F (67 deg C) change (range) in ambient and 180 deg F (100 deg C) change in surface temperatures.

B. Maximum Standard Airflow Rating: Provide louvers with specified airflow at point of beginning water penetration through a louver 48 inches (1220 mm) wide by 48 inches (1220 mm) high (maximum standard airflow), as demonstrated by testing according to AMCA 500.

C. Submittals: In addition to Product Data, submit the following:
1. Shop Drawings: For louver units and accessories not completely described in Product Data.
2 Samples of each type of metal finish.
3 Product test reports indicating compliance of products with requirements.

D. Field Measurements: Verify louver openings by field measurements before fabrication.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. [Insert Name of Manufacturer]

B. Materials: As follows:

1 Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.

2 Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy 3003 or 5005 with temper as required for forming.

3 Galvanized Steel Sheet: ASTM A 653/A 653M, 0G90 (Z275) zinc coating, mill phosphatized.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

4 Stainless-Steel Sheet: ASTM A 666, Type 302 or 304.

5 Fasteners: Of same basic metal and alloy as fastened metal or 300 series stainless steel. Do not use metals that are incompatible with joined materials.

6 Bituminous Paint: Asphalt mastic complying with SSPC-Paint 12 but containing no asbestos fibers, or asphalt emulsion complying with ASTM D 1187.

C. Fabrication, General: Fabricate louvers to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining materials' tolerances, and perimeter sealant joints.

1. Join frame members to one another and to fixed louver blades with fillet welds concealed from view.

2. Join frame members to one another and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer.

D. Fixed, Extruded-Aluminum, Horizontal Louvers: Provide louvers with extruded-aluminum frames and blades.

1 Frame and Blade Thickness: 0.081 inch (2.06 mm).

2 Frame and Blade Thickness: 0.125 inch (3.18 mm).

3 Performance Requirements: Either drainable- or nondrainable-blade type with maximum standard airflow not less than 7500 cfm (3540 L/s) with not more than 0.18-inch wg (45-Pa) static-pressure loss.

4. Descriptive Requirements: As follows:

a. Blade Profile: Drainable blade.

b. Blade Profile: Plain blade with no center baffle.

c. Blade Profile: Blade with center baffle.

d. Blade Angle and Spacing: 30 degrees and 3 inches (75 mm) o.c. for 4-inch- (100-mm-) deep louvers.

e. Blade Angle and Spacing: 35 degrees and 3-1/2 inches (89 mm) o.c. for 4-inch- (100-mm-) deep louvers.

f. Blade Angle and Spacing: 45 degrees and 4 inches (100 mm) o.c. for 4-inch- (100-mm-) deep louvers.

g. Blade Angle and Spacing: 45 degrees and 6 inches (150 mm) o.c. for 6-inch- (150-mm-) deep louvers.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Fixed, Formed-Metal, Horizontal Louvers: Provide louvers with frames and blades formed from metal sheet of metal indicated.

1. Frame and Blade Material: Galvanized steel sheet, 0.052 inch (1.3 mm) for frames and 0.040 inch (1.0 mm) for blades.

1 Frame and Blade Material: Galvanized steel sheet, 0.052 inch (1.3 mm).

2 Frame and Blade Material: Galvanized steel sheet, 0.064 inch (1.6 mm).

3 Frame and Blade Material: Stainless-steel sheet, 0.0500 inch (1.3 mm).

4 Frame and Blade Material: Stainless-steel sheet, 0.0625 inch (1.6 mm).

5 Performance Requirements: Either drainable- or nondrainable-blade type with maximum standard airflow not less than 7300 cfm (3440 L/s) with not more than 0.12-inch wg (30-Pa) static-pressure loss.

7. Descriptive Requirements: As follows:

a. Blade Profile: Drainable blade.
b. Blade Profile: Plain blade with no center baffle.
c. Blade Profile: Blade with center baffle.
d. Blade Angle and Spacing: 30 degrees and 3 inches (75 mm) o.c. for 4-inch- (100-mm-) deep louvers.
e. Blade Angle and Spacing: 35 degrees and 3-1/2 inches (89 mm) o.c. for 4-inch- (100-mm-) deep louvers.
f. Blade Angle and Spacing: 45 degrees and 4 inches (100 mm) o.c. for 4-inch- (100-mm-) deep louvers.

F. Louver Screens: Provide screens on interior faces of exterior louvers.

1 Frames: Same kind and form of metal as indicated for louvers to which screens are attached.

2. Louver Screening: As follows:

a. Bird Screening: Aluminum, 1/2-inch-(12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire.

b. Bird Screening: Stainless steel, 1/2-inch- (12.7-mm-) square mesh, 0.047-inch (1.19-mm) wire.

c. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

d. Bird Screening: Galvanized steel, 1/2-inch- (12.7-mm-) square mesh, 0.041-inch (1.04-mm) wire.

G. Wall Vents (Brick Vents): Load-bearing type, complete with 18-by-14- (1.4-by-1.8-mm-) mesh aluminum insect screening on inside face, and as follows:

1 Extruded-Aluminum: Blade and frames not less than 0.125 inch (3.18 mm) thick and assembled by welding.

2 Cast-Aluminum: One-piece, cast-aluminum louvers and frames.

H. Finishes, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish louvers after assembly.

I. Aluminum Finishes: Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.

1 Class I, Clear Anodic Finish: AA-M12C22A41 complying with AAMA 607.1.

2. Class I, Color Anodic Finish: AA-M12C22A42/A44 complying with AAMA 606.1 or AAMA 608.1.
   a. Color: Match Architect's sample.
   b. Color: As selected by Architect from the full range of industry colors and color densities.

3. Conversion-Coated and Factory-Primed Finish: AA-C12C42R1x.
   a. Organic Coating: Air-dried primer of not less than 2.0-mil (0.05-mm) dry film thickness.

4 Baked-Enamel Finish: AA-C12C42R1x. Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting.

a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 603.8, except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss.
   1) Color: As indicated by manufacturer's color designations. 2) Color: As selected by Architect from manufacturer's full range of colors.

5. High-Performance Organic Coating Finish: AA-C12C42R1x. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

1) Color and Gloss: As indicated by manufacturer's color and gloss designations.

2) Color and Gloss: As selected by Architect from manufacturer's full range of colors and glosses.

J. Galvanized Steel Sheet Finishes: As follows:

1 Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating of type suited to organic coating applied over it.

2 Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.

3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with not less than 1.0-mil (0.025-mm) dry film thickness for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2.0 mils (0.05 mm).

a. Color and Gloss: As indicated by manufacturer's color and gloss designations.

b. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

K. Stainless-Steel Sheet Finishes: As follows:

1 Grind and polish surfaces to remove irregularities, weld spatter, scratches, and forming marks, leaving a surface matching a No. 4 finish.

2 Passivate and rinse surfaces, remove embedded foreign matter, and leave surfaces chemically clean.

1.3 EXECUTION

A. Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 10350

FLAGPOLES

1.1 GENERAL

A. Submit Product Data for each type of flagpole required. Include installation instructions.

1.2 PRODUCTS

A. Manufacturers: Provide flagpoles by one of the following:
1. [Insert Name of Manufacturer].

B. Pole Construction, General: Construct poles and ship to Project site in one piece, if possible. If more than one piece is necessary, provide snug-fitting, weathertight, hairline joints.

C. Aluminum Flagpoles: Fabricate from seamless, extruded tubing complying with ASTM B 241 (ASTM B 241M), alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, temper T6.
1 Provide cone-tapered aluminum flagpoles.
2 Finish: Class I, clear anodic finish (AA-M32C22A41).

D. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.0635-inch (1.6-mm) minimum wall thickness with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together and galvanized after assembly.

E. Baseplate: Cast-metal shoe base for anchor-bolt mounting, of same metal and finish as flagpole. Provide with anchor bolts.

F. Wall Mount: Metal mounting units complete with through-wall anchorage, mounting plates, and lateral-bracing accessories, as recommended by manufacturer, to suit size of flagpole and type of installation.

G. Fittings: Provide manufacturer's standard fittings to suit the size and type of flagpole indicated, including finial and halyard system with swivel snaps for attaching flag.
1 Internal Halyard, Winch System: Manually operated winch with control stop device andremovable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
2 Internal Halyard, Cam Cleat System: 5/16-inch- (8-mm-) diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
3 External Halyard: Ball-bearing, nonfouling, revolving truck assemblies of

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

cast metal with continuous 5/16-inch- (8-mm-) diameter, braided polypropylene halyards and 9 inch (225-mm) cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

1.3 EXECUTION

A. General: Install flagpoles where shown and according to manufacturer's written instructions.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SECTION 10425

SIGNS

1.1 GENERAL

A. Submittals: Submit the following:
   1. Shop Drawings: Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Include the following:
      a. Message list for each sign with wording and letter layout.
      b. Setting drawings, templates, and directions for installing anchors.
      c. Full-size spacing templates for dimensional letters.
      d. Furnish full-size rubbings for metal plaques.
   2. Wiring diagrams for illuminated sign units.
   3. Samples: For initial selection of color, pattern, and surface texture, and for verification of compliance with requirements indicated.
      a. Cast Acrylic Sheet and Plastic Laminate: 8-1/2-by-11-inch sample panel for each material, color, texture, and pattern. Show graphic image process showing style, colors and finishes.
      b. Aluminum: 6-inch-long sections of extrusions and 4-inch squares of sheet or plate. Show full range of colors.
      c. Dimensional Letters: Full-size sample of each letter type.

B. UL and NEMA Compliance: Provide electrical components that are labeled and listed by UL and comply with applicable NEMA standards.

1.2 PRODUCTS

A. Acrylic Sheet: Cast methyl methacrylate monomer plastic sheet with 16,000-psi minimum flexural strength, and minimum allowable continuous service temperature of 176 deg F (80 deg C).
   1 Transparent Sheet: Matte finish, clear colorless sheet with 92 percent light transmittance. White Translucent Sheet: Density required to produce uniform brightness and minimum halation.
   2 Opaque Sheet: Colored opaque acrylic sheet in colors and finishes indicated.

B. Plastic Laminate: High-pressure plastic laminate engraving stock with face and core plies in contrasting colors.

C. Aluminum Sheet: Alloy and temper with properties specified in ASTM B 209 for 5005-H15.

D. Aluminum Extrusions: Alloy and temper with properties specified in ASTM B 221 for 6063-T5.

E. Aluminum Castings: Alloy and temper recommended for the casting process used and for the use and finish indicated.

F. Bronze Plate: Copper alloy UNS C28000, Muntz metal, 60 percent copper.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

G. Bronze Castings: Copper alloy UNS C83600, comply with ASTM B 584.

H. Stainless Steel: AISI Type 302, comply with ASTM A 167.

I. Vinyl Film: Opaque nonreflective vinyl film, 0.0035-inch minimum, pressure-sensitive adhesive backing, suitable for exterior use.

J. ABS Plastic: Provide high-impact thermoplastic composed of copolymers of acrylonitrile, butadiene, and styrene.

K. Fasteners: Concealed noncorrosive metal.

L. Anchors and Inserts: Nonferrous metal or hot-dipped galvanized. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts for concrete or masonry work.

M. Colored Coatings for Acrylic Plastic Sheet: Nonfading colored coatings, including inks and paints for copy and background colors.

N. Panel Signs: Comply with requirements for materials, thicknesses, finishes, colors, designs, shapes, sizes, and construction details. Produce smooth, even, level sign panel surfaces.

1. Unframed Panel Signs: Fabricate edges mechanically and smoothly finished.
    a. Edge Condition: Square cut.
    b. Edge Condition: Beveled.
    c. Edge Condition: Bull nose.
    d. Edge Color for Plastic Laminate: Same as copy.
    e. Edge Color for Plastic Laminate: Same as background.
    f. Corner Condition: Square corners.
    g. Corner Condition: Corners rounded to radius indicated.
2. Framed Panel Signs: Fabricate frames to profile indicated.
    a. Material: Aluminum, extruded or cast.
    b. Material: Acrylic plastic.
    c. Material: Injection molded ABS plastic.
    d. Corner Condition: Square corners.
    e. Corner Condition: Corners rounded to radius indicated.
3. Laminated Sign Panels: Permanently laminate face panels to backing sheets.

O. Brackets: Fabricate brackets and fittings from extruded aluminum to suit panel construction and mounting conditions. Factory-paint brackets color matching background color of sign panel.

P. Graphic Content and Style: Provide sign copy that complies with size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

Q. Engraved Copy: Engrave characters into panel on face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1 Engraved Plastic Laminate: Engrave through the exposed face ply of the plastic laminate
sheet to expose the contrasting core ply.
2 Engraved Metal: Fill copy with enamel.
3 Engraved Opaque Acrylic Sheet: Fill copy with enamel.
4. Face-Engraved Clear Acrylic Sheet: Fill copy with enamel. Apply opaque color coating to the back face of acrylic sheet.
a. Engrave copy to minimum indentation depth of 1/32 inch and minimum stroke width of 1/4 inch.
5. Subsurface-Engraved Acrylic Sheet: Reverse-engrave back face of clear acrylic sheet.
Fill copy with enamel. Apply opaque background color coating over enamel-filled copy.

R. Subsurface Copy: Apply copy to back face of clear acrylic sheet forming the panel face by process indicated.
1 Use reverse silk-screen process to print copy; overspray copy with opaque background
color coating.
2 Use Dupont Chromalin heat- and pressure-laminated photopolymer film system to form
copy and background color.

S. Raised Copy: Machine-cut copy characters from matte-finished opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face.
1 Panel Material: Matte-finished opaque acrylic sheet.
2 Panel Material: Matte-finished clear acrylic with opaque color coating subsurface
applied.
3 Raised Copy Thickness: Not less than 1/32 inch.
4 Raised Copy Thickness: 1/16 inch.
5 Raised Copy Thickness: 1/8 inch.

T. Applied Copy: Die-cut characters from vinyl film with pressure-sensitive adhesive backing. Apply to exposed face of sign panel.
1 Panel Material: Matte-finished opaque acrylic sheet.
2 Panel Material: Matte-finished clear acrylic sheet with opaque color coating
subsurface applied.

U. Cast Letters and Numbers: Provide smooth flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back and tap to receive threaded mounting studs.
1 Metal: Aluminum.
2 Metal: Bronze.

V. Cutout Letters and Numbers: Cut characters from solid plate with square cut, smooth edges.
1 Metal: Aluminum.
2 Metal: Bronze.
3 Metal: Stainless steel.
4 Metal: Brass.
5 Metal: Chrome plated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

W. Fabricated Letters and Numbers: Fabricate characters to required sizes and styles. Form exposed faces and sides to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories.

1 Aluminum Sheet: 0.090 inch thick. Fabricate by the heliarc welding process.
2 Bronze Plate: 20 gage.
3 Stainless Steel Sheet: 18 gage for face and 22 gage for returns.
4 Letter Height: 2 inches.
5 Letter Height: 4 inches.
6 Letter Height: 6 inches.
7 Letter Height: 8 inches.
8 Letter Height: 12 inches.
9 Letter Height: 18 inches.
10 Letter Style: Helvetica.
11 Letter Style: Gothic.
12 Letter Style: Roman.
13 Letter Style: Futura.
14. Illuminated Units: Illuminate characters using standard lighting components. Provide for servicing and concealed connection.
    a. Backlighted Units: Provide concealed white neon tubes.
    b. Facelighted Units: Fabricate letter faces from translucent plastic sheet. Attach letters to sheet metal back channels. Provide neon tubes to illuminate letter faces evenly.

X. Plaques: Castings shall be free from pits, scale, sand holes, or other defects. Comply with requirements shown for thickness, size, shape, and copy. Hand-tool and buff borders and raised copy to produce satin polished finish.

1 Metal: Aluminum.
2 Metal: Bronze.
3 Border Style: None (straight), polished edge.
4 Border Style: Plain bevel.
5 Border Style: Projected bevel.
6 Border Style: Raised flat band.
7 Border Style: Double raised line border.
8 Border Style: As indicated.
9 Background Texture: Manufacturer's standard pebble texture.
10 Background Texture: Manufacturer's standard leatherette finish.
11 Background Texture: Manufacturer's standard matte finish.
12 Background Texture: Manufacturer's standard stipple finish.
13 Background Finish: Baked-enamel finish.
14 Background Finish: Dark statuary finish.

Y. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.

1. Aluminum Finishes: Finish designations prefixed by "AA" conform to the system established by the Aluminum Association.
    a. Class II Clear Anodized Fine Satin Finish: AA-M31C21A31.
    b. Class II Clear Anodized Medium Satin Finish: AA-M31C22A31.
    c. Baked-Enamel Finish: AA-M4xC12C42R1x. Comply with paint manufacturer's specifications for cleaning, conversion coating, and

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

painting.

1) Organic Coating: Thermosetting-modified acrylic enamel primer/topcoat system. Comply with AAMA 603.8 except with a minimum dry film thickness of 1.5 mils, medium gloss.

a) Color: Match the Architect's sample.

b) Color: As selected by the Architect.

Z. Bronze Finishes: Finish designations prefixed by "CDA" conform to the system established by the Copper Development Association.

1 Natural Satin Finish: CDA-M31O6x.

2. Statuary Finish: CDA-M31C55O6x.

a. Clear Organic Coating: Air-dried acrylic coating Incralac, 1.0-mil minimum dry thickness.

b. Clear Organic Coating: Manufacturer's standard clear coating.

c. Color: Uniform, matching color of the Architect's sample.

Stainless Steel Finishes: Finish designations prefixed by "AISI" conform to the system established by the American Iron and Steel Institute.

1. Bright, Directional Polish Finish: AISI No. 4 finish.

a. Grain Direction: Horizontal.

b. Grain Direction: Vertical.

1.3 EXECUTION

A. Installation: Locate signs where indicated, using mounting methods specified. Install level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Wall-Mounted Panel Signs: Attach using methods indicated below:

1 Vinyl-Tape Mounting: Double-sided foam tape for smooth, nonporous surfaces.

2 Silicone-Adhesive Mounting: Liquid silicone adhesive for porous, irregular, or vinyl-covered surfaces. Use double-sided vinyl tape to hold sign in place until adhesive has fully cured.

3 Shim Plate Mounting: Provide 1/8-inch-thick concealed aluminum shim plates with predrilled and countersunk holes. Attach plate to substrate with fasteners and anchors. Attach sign to the plate using the method specified above.

B. Bracket-Mounted Units: Provide brackets, fittings, and hardware as appropriate for signs that project at right angles from walls and ceilings. Attach brackets and fittings securely with concealed fasteners and anchoring devices.

D. Dimensional Letters and Numbers: Mount characters using methods recommended for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

1 Flush Mounting: Backs in contact with wall surface.

2 Projected Mounting: At distance from wall surface indicated.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

E. Cast Metal Plaques: Use method recommended for wall surface.
   1 Concealed Mounting: Use threaded studs into tapped lugs on the back of the plaque. Set
   in predrilled holes filled with quick-setting cement.
   2 Face Mounting: Use exposed fasteners with rosettes attached through plaque face into the
   wall surface.

F. Cleaning: After installation, clean soiled surfaces. Protect units from damage until acceptance by the Owner.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 10505

METAL LOCKERS

1.1 GENERAL

A. Submittals: Submit the following:

1. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of locker and bench.

2. Shop Drawings: Include plans, elevations, sections, details, attachments to other Work, and locker-numbering sequence.

   a. Samples: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

3. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals specified in Division-I.

B. Deliver master keys, control keys, and combination control charts to Owner.

C. Coordinate size and location of concrete bases.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. [Insert Name of Manufacturer].

B. Wardrobe Lockers: Fabricate lockers as follows:

1. Body: Form backs, tops, bottoms, sides, and intermediate partitions from steel sheet; flanged for double thickness at back vertical corners. Comply with the following:

   a. Back-Material Sheet Thickness: 0.0239 inch (0.60 mm).
   b. Side-Material Sheet Thickness: 0.0239 inch (0.60 mm).
   c. Exposed Ends: Form exposed ends of nonrecessed lockers from minimum 0.0598-inch- (1.50-mm-) thick steel sheet.

2. Frames: Form channel frames from minimum 0.0598-inch- (1.50-mm-) thick steel sheet.

   Form continuous integral door strike on vertical frame members, with latch hooks welded or riveted to door frames. Provide resilient bumpers to cushion door closing.

3. Doors: One-piece steel sheet, formed into channel shape at vertical

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

edges and flanged at
right angles at top and bottom edges. Fabricate to prevent springing when opening or closing, and to swing 180 degrees. Comply with the following:

a. Sheet Thickness: 0.0598 inch (1.50 mm) minimum.
b. Reinforcement: Brace or reinforce inner face of doors more than 15 inches (381 mm) wide.
c. Acoustical Treatment: Fabricate lockers for quiet operation with manufacturer's standard rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact.
d. Louvered Vents: Manufacturer's standard arrangement of stamped, louvered vents in door face.
e. Security Vents: Manufacturer's standard arrangement of stamped horizontal or vertical security vents in door face.
f. Perforated Vents: Manufacturer's standard arrangement of perforated vents in door face.
g. Concealed Vents: Provide slotted perforations in top and bottom horizontal return flanges of doors.

4. Shelves: Provide hat shelf in single-tier units; fabricated from minimum 0.0239-inch- (0.60-mm-) thick, formed steel sheet; flanged on all edges.

5. Hinges: Steel, full loop, five or seven knuckle; tight pin; minimum 2 inches (51 mm) high. Weld to inside of door frame and attach to door with factory-installed, tamper-resistant fasteners.
   a. Provide at least three hinges for each door more than 42 inches (1067 mm) high and at least two hinges for each door 42 inches (1067 mm) high or less.

6. Projecting Handle and Latch: Manufacturer's standard, positive automatic, prelocking, pry-resistant latch and pull; chromium-plated, heavy-duty, vandal-resistant, lift-up handle, as follows:

7. Recessed Handle and Latch: Manufacturer's standard nickel-plated steel or stainless-steel housing, with integral door pull, recessed for latch lifter and locking devices; nonprotruding latch lifter; and automatic, prelocking, pry-resistant latch, as follows:

   a. Provide minimum three-point latching for each door more than 42 inches (1067 mm) high; minimum two-point latching for each door 42 inches (1067 mm) high or less.
   b. Provide single-point gravity or spring-actuated latch with padlock lug.

C. Athletic Lockers: Fabricate lockers as follows:

1. Body: Form tops and bottoms from minimum 0.0598-inch- (1.50-mm-) thick steel sheet.

a. Solid Backs: Form from minimum 0.0478-inch- (1.20-mm-) thick, solid steel sheet; flanged for double thickness at back vertical corners.
b. Expanded-Metal Backs: Form from minimum 0.0897-inch- (2.3-mm-) thick expanded metal; welded to minimum 0.1046-inch- (2.70-mm-) thick

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

steel angle or minimum 0.0598-inch- (1.50-mm-) thick, steel channel frame.

c. Perforated Sides and Intermediate Partitions: Form from minimum 0.0598-inch-(1.50-mm-) thick steel sheet, with manufacturer's standard perforations.

d. Expanded-Metal Sides and Intermediate Partitions: Form from minimum 0.0897-inch- (2.3-mm-) thick expanded metal; welded to minimum 0.1046-inch- (2.70-mm-) thick steel angle or minimum 0.0598-inch- (1.50-mm-) thick, steel channel frame.

2. Frames: Form from minimum 0.0598-inch- (1.50-mm-) thick, steel sheet channels or

   minimum 0.1046-inch- (2.70-mm-) thick steel angles, with latch hooks welded or riveted to door frames.

3. Perforated Steel Doors: One-piece perforated steel sheet with flanged edges, complying

   with the following:

   a. Sheet Thickness: 0.0598 inch (1.50 mm) minimum.

   b. Reinforcement: Brace or reinforce inner face of doors more than 15 inches (381 mm) wide.

   c. Perforations: Provide manufacturer's standard perforations.

4. Expanded-Metal Doors: Form from minimum 0.0897-inch- (2.3-mm-) thick expanded metal; welded to minimum 0.1046-inch- (2.70-mm-) thick steel angle frame, with manufacturer's standard, steel sheet lock panel welded to each side of door.

   a. Reinforcement: Brace inner face of 24-inch- (610-mm-) wide single-tier doors.

5. Reinforcement: Brace inner face of 24-inch- (610-mm-) wide single-tier doors.

6. Shelves: Provide hat shelf in single-tier units, fabricated from minimum 0.0598-inch-

   (1.50-mm-) thick formed-steel sheet; flanged on all edges.

7. Hinges: Heavy-duty, minimum 0.0500-inch- (1.27-mm-) thick steel, full loop, five or

   seven knuckle; tight pin; minimum 2 inches (51 mm) high. Weld to inside of door frame and attach to door with factory-installed, tamper-resistant fasteners.

8. Continuous Hinges: Manufacturer's standard, steel continuous hinge, side or top

   mounted to door and frame.

9. Recessed Handle and Latch: Manufacturer's standard nickel-plated steel or stainless-steel housing, with integral door pull, recessed for latch lifter and locking devices; nonprotruding latch lifter; and automatic,

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

prelocking, pry-resistant latch, as follows:

a. Provide minimum three-point latching for each door more than 42 inches (1067 mm) high; minimum two-point latching for each door 42 inches (1067 mm) high or less.
b. Provide single-point gravity or spring-actuated latch with padlock lug.

10. Projecting Turn-Handle and Latch: Manufacturer's standard three-point cremone-type latch with provisions for padlock.

D. Locks: Fabricate lockers to receive manufacturer's standard locking devices, installed on lockers using security-type fasteners:

1. Combination Padlocks: Key-controlled, three-number dialing combination locks.
2. Key Locks: Built-in flush locks with five-pin tumbler keyway, keyed separately and master keyed for grooved key. Furnish two cut keys for each lock and five cut master keys.
   a. Bolt Operation: Manually locking dead bolt.
   b. Bolt Operation: Automatically locking spring bolt.

3. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; combination changes made automatically with a control key.
   a. Bolt Operation: Manually locking dead bolt.
   b. Bolt Operation: Automatically locking spring bolt.

4. Built-in Coin-Operated Locks: Self-contained units mounted to interior of door with replaceable lock cylinders keyed separately and master keyed. Furnish one user key for each lock, one penalty key, and one master key. Comply with the following:
   a. Bolt Operation: Manually locking dead bolt.
   b. Bolt Operation: Automatically locking spring bolt.
   c. Lock Type: Fee return/deposit.
   d. Lock Type: Fee collect/pay.
   e. Fee Type: Token.
   f. Fee Type: Coin, one quarter.
   g. Fee Type: Coin, two quarters.
   h. Coin Box: Manufacturer's standard housing or cash box. Furnish with removable cylinder and key.

E. Locker Accessories: Provide the following accessories, finished to match lockers, unless otherwise indicated:

1. Built-in Coin-Operated Locks: Self-contained units mounted to interior of door with

Interior Equipment: Furnish each locker with manufacturer's standard zinc-plated, ball-pointed, double-prong steel hooks.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

2. Number Plates: Manufacturer's standard aluminum number plates. Number lockers in sequence indicated. Attach plates to each locker door with rivets.

3. Legs: Provide nominal 6-inch- (152-mm-) long legs by extending vertical frame members, or by attaching gusset-type legs to locker body. Fabricate legs from at least 0.0598 inch- (1.50-mm-thick steel sheet, with provision for fastening to floor.
a. Closed Front/End Bases: Minimum 0.0359-inch- (0.90-mm-) thick steel sheet.

4. Continuous Metal Base: Minimum 0.0598-inch- (1.50-mm-) thick steel sheet, channel or zee profiled; 4 inches (102 mm) high.

5. Continuously Sloping Tops: Manufacturer's standard, fabricated from minimum 0.0359-inch- (0.90-mm-) thick steel sheet.

6. Individually Sloping Tops: Manufacturer's standard, fabricated from minimum 0.0239-inch- (0.60-mm-) thick steel sheet.

7. Recess Trim: Manufacturer's standard; fabricated from minimum 0.0478-inch-(1.20 -mm-) thick steel sheet, minimum 2-1/2-inch (64-mm) face width.

8. Filler Panels: Manufacturer's standard; fabricated from minimum 0.0478-inch-(1.20-mm-) thick steel sheet in an unequal leg angle shape.

9. Boxed End Panels: Manufacturer's standard; fabricated from minimum 0.0598-inch- (1.50-mm-) thick steel sheet, with 1-inch- (25-mm-) wide edge dimension.

10. Finished End Panels: Manufacturer's standard; fabricated from minimum 0.0239-inch- (0.60-mm-) thick steel sheet.

F. Locker Benches: Provide manufacturer's standard units, as follows:
1. Bench Tops: One-piece units of laminated maple, minimum 9-1/2 inches (240 mm) wide by 1-1/4 inches (32 mm) thick, with rounded corners and edges; and one coat of clear sealer on all surfaces, and one coat of clear lacquer on top and sides.

2. Pedestals: Tubular-steel pedestal supports, with baked-enamel finish; with fasteners for floor anchorage.

G. Fabrication: Fabricate each locker with an individual door and frame; individual top, bottom, back, and shelves; and common intermediate uprights separating compartments.
1. Knocked-Down Construction: Fabricate lockers for nominal assembly at Project site.

2. All-Welded Construction: Preassemble lockers by welding all joints, seams, and connections, with no bolts, screws, or rivets used in assembly.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Weld frame members together to form a rigid, one-piece assembly. Form locker-body panels, doors, shelves and accessories from one-piece steel sheet.

H. Finish all steel surfaces and accessories, except prefinished stainless-steel and chrome-plated surfaces.

1. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-enamel finish consisting of a thermosetting topcoat; with a minimum dry film thickness of 1.4 mils (0.036 mm) on doors, frames, and legs, and 1.1 mils (0.028 mm) elsewhere.

1.3 EXECUTION

A. Install metal lockers and accessories level, plumb, rigid, and flush according to manufacturer's written instructions.

B. Assemble knocked-down lockers with standard fasteners, with no exposed fasteners on door faces and face frames.

C. Connect groups of all-welded lockers together with standard fasteners, with no exposed fasteners on face frames.

D. Anchor lockers to floors and walls at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c.

E. Anchor locker benches to floors. Uniformly space pedestals not more than 72 inches (1830 mm) apart and securely fasten to bench top and anchor to floor.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 10801

TOILET AND BATH ACCESSORIES

1.1 GENERAL

A. Submittals: Manufacturer's Product Data. Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.

1 Products of other manufacturers with equal characteristics, as judged solely by Architect, may be provided.
2 Products of other listed manufacturers with equal characteristics, as judged solely by Architect, may be provided.
3 Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Substitutions."
4 Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the

Following:

1. Toilet and Bath Accessories:
   a. [Insert Name of Manufacturer]
2. Warm-Air Dryers:
   a. [Insert Name of Manufacturer]
3. Infant-Care Products:
   a. [Insert Name of Manufacturer]
4. Underlavatory Guards:
   a. [Insert Name of Manufacturer]

B. Materials: As follows:

1. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8 mm) minimum nominal thickness, unless otherwise indicated.

1 Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.

2 Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch (0.9 mm) minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

3 Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).

4 Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.

5 Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

6 Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

7 Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

8 Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

9 Keys: Provide universal keys for internal access to accessories for servicing andresupplying. Provide minimum of six keys to Owner's representative.

1.3 EXECUTION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1 Secure mirrors to walls in concealed, tamper-resistant manner with special hangers,toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

2 Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

C. Remove temporary labels and protective coatings.

D. Clean and polish exposed surfaces according to manufacturer's written recommendations.

1.4 MEASUREMENT AND PAYMENT

A. Payment for all the items under this section shall be made at the Unit rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

MISC SECTIONS
INDEX

1. FL-05 - Laminated Wood Flooring - Premium
2. FL-07 - EPDM Rubber Flooring - Premium
3. WL-03-05-20 - WPC Fluted Decorative Wall Panels - Premium
4. WL-08 - Wooden Rafters - Ash Wood - Premium
5. WL-15-17 - Book-Match Marble Pattern Porcelain Tile with Cement Board & Backlight - Premium Composite System
6. WL-16-27 - Carbon Fibre Veneer - Premium
7. WL-21 - MDF Laser-Cut Decorative Panels - Premium
8. WL-22 - Mirror Cladding System - Premium
9. WL-23 - MS Mesh Wall with Lettering & Backlight - Premium
10. WL-30 - Travertine Dry Cladding - Premium SS316 System
11. WL-32 - Powder-Coated CNC-Cut MS Screen - Premium
12. CL-07 - Bayrisol Fabric Ceiling - Stretch Ceiling Premium
13. CL-08 - MDF Round Ceiling Modules - Premium
14. SS-01 - External Sill Batta Stone Coping & Cladding - Premium
15. MS-01 - MS Fence 6' High - Premium Structural
16. MS-02 - MS Gates - Sliding Main + Pedestrian - Premium
17. MS-03 - MS Louvered Fixed Panels - Premium
18. SS-02 - Steel Structure Shade with Polycarbonate Roofing - Premium Design-Build
19. CC-01 - Foam Concrete - Lightweight - Premium
20. JC-01 - 10mm Neoprene Rubber Board Below Foam Concrete - Premium
21. RD-01 - Reflective Rubber Speed Hump - Premium

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

SECTION 1: FL-05 - LAMINATED WOOD FLOORING 48" x 8" (1220x200mm x 8mm)

1.01 SCOPE:
Providing and laying laminated wood flooring system.

1.02 MATERIAL:
a) Panel: 8mm thick laminated wood panel, size 1220mm x 200mm (48" x 8"), HDF core with decorative wood veneer surface, factory finished polish (matt/satin/gloss) UV resistant. Conforming to EN 13329.
b) Underlay: Approved foam or acoustic underlay layer as per manufacturer's recommendation for impact absorption and sound reduction.
c) Accessories: Trims, transition profiles, end caps, spacers, adhesives, expansion joint covers as required.

1.03 EXECUTION:
a) Subfloor shall be clean, dry, levelled.
b) Lay underlay as per manufacturer.
c) Install panels using click-lock or tongue-and-groove system with staggered joints. Maintain expansion gap using spacers as per manufacturer.
d) Cutting, edge finishing, cleaning to be done. No damage to finish.
e) Protection till handover.

1.04 MEASUREMENT: Per Sft.

SECTION 2: FL-07 - EPDM RUBBERIZED FLOOR 8MM THICK IN ROLL FORM

1.01 SCOPE:
Providing and laying EPDM rubber floor in roll form 8mm thick.

1.02 MATERIAL:
a) Top Layer: 8mm thick EPDM rubber roll, approved make, size and color, through-colour, for tensile strength, impact resistance and shock absorption.
b) Underlay: Not less than 6mm thick approved underlay.
c) Adhesive: Approved bonding agent / adhesive suitable for EPDM on screed.
d) Accessories: Edge trims, accessories as required.

1.03 EXECUTION:
a) Substrate PCC / screed shall be clean, dry, levelled and primed if required.
b) Apply approved adhesive with notched trowel.
c) Lay underlay and top roll with staggered joints, butt jointed, roller pressed 50kg.
d) Edge trims fixed with approved method.
e) No traffic for 24 hours.

1.04 PERFORMANCE: Tensile, impact resistant, shock absorption as per manufacturer data sheet.

SECTION 3: WL-03 / WL-04 / WL-05 / WL-20 - WPC FLUTED DECORATIVE WALL PANELS

1.01 SCOPE:
Providing and fixing high-density WPC fluted panels in matt finish on walls.

1.02 MATERIAL:
a) Panel: High-density WPC panel, matt finish, profile as approved:
WL-03: Up to 122mm x 21mm thick Dark finish
WL-04: Up to 122mm x 21mm thick White finish
WL-05: Up to 122mm x 12mm thick
WL-20: Up to 122mm x 12mm thick

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

b) Framing: GI frame / approved section or masonry wall with cement board partition as per site condition.
c) Fixing: Approved fixing anchors, screws, clips, concealed fixing as per manufacturer.

1.03 EXECUTION:
a) Framing shall be true to line, level and plumb.
b) Panels shall be pasted / fixed over cement board partition / GI frame / masonry wall as per drawing.
c) Joints aligned, mitred corners with colour matched caps.
d) Cutting, cleaning, protection included.
e) Execution at any height / floor.

1.04 SAMPLE: Submit 300mm long sample of each profile for approval.

SECTION 4: WL-08 - WOODEN RAFTERS 1-1/2" x 3" ASH WOOD POLISH FINISH

1.01 SCOPE:
Providing and fixing wooden rafters.

1.02 MATERIAL:
a) Wood: Grade-A seasoned Ash wood, section 1-1/2" x 3" (38x75mm), free from decay, knots, sapwood, planed 4 sides.
b) Brackets: MS brackets, powder colour coated, approved colour.
c) Hardware: Anchor bolts, screws, star head screws, SS or galvanized as approved.
d) Finish: Approved wood stain (Polish) + sealer, matt/satin as approved.

1.03 EXECUTION:
a) MS brackets fixed to wall / soffit with anchor bolts at max 600mm c/c or as per drawing.
b) Rafters installed level, aligned, no sag, expansion gap 2mm at ends.
c) No visible front screws. All fixing concealed.
d) Polish applied as per manufacturer: stain + sealer coats.
e) Anti-termite treatment applied.

1.04 TOLERANCE: Level ±2mm in 3m.

SECTION 5: WL-15 / WL-17 - BOOK MATCH MARBLE PATTERN PORCELAIN TILE 8'x4' (2400x1200mm) WITH CEMENT BOARD BACKING

1.01 SCOPE:
Providing and fixing book-match marble pattern porcelain tile cladding with cement board backing, with and without backlight provision.

1.02 MATERIAL:
a) Tile: Porcelain tile 2400x1200mm (8'x4') marble pattern, approved colour / shade, A-grade.
b) Backup: 12mm (1/2") thick fibre cement board, moisture-resistant grade, on GI framing (C-studs and U-tracks, 0.55-0.75mm thick, G90 galvanized) as per BOQ.
c) Adhesive: 1/4" thick slurry of polymer-modified stone adhesive C2TES1/C2TES2 or equivalent approved.
d) Grout: Approved epoxy based grouting material, colour matched, 2-3mm joint.
e) Trim: Approved metal trim for edges.
f) Backlight (for WL-17): Provision for backlit system - LED strip behind tile with cavity as per detail, diffused.

1.03 EXECUTION:
a) GI framing plumb, level, @600mm c/c with noggins.
b) Cement board fixed with self-drilling screws, joints taped with alkaline mesh tape and compound.
c) Tile fixed over adhesive slurry with proper suction cups, no lippage >1mm.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

d) Jointing, washing, grouting, cleaning, curing.
e) For backlit, cavity clean, LED provision tested.
f) Protection till handover.

1.04 MEASUREMENT: Per Sft of finished wall area.

SECTION 6: WL-16 / WL-27 - CARBON FIBRE VENEER 5MM THICK

1.01 SCOPE:
Providing and fixing carbon fibre veneer sheets on walls, columns and ceiling.

1.02 MATERIAL:
a) Veneer: 5mm thick approved colour carbon fibre veneer sheet, approved pattern, 3D depth appearance.
b) Adhesive: Silicone adhesive / high-tack adhesive suitable for carbon fibre on plastered surface as per manufacturer.
c) Substrate: Plastered surface levelled, primed.

1.03 EXECUTION:
a) Substrate shall be sound, clean, dry, levelled.
b) Veneer sheets cut as per shop drawing, book-matched where required.
c) Bonded with silicone adhesive, roller pressed, no bubbles, no wrinkles.
d) Edges sealed, joints seamless with approved filler.
e) Ceiling application (WL-27) with additional mechanical support if required.
f) Protection.

1.04 SAMPLE: Submit A4 size sample with approved colour.

SECTION 7: WL-21 - MDF LASER CUT PANEL 25MM THICK WITH PAINT FINISH

1.01 SCOPE:
Providing and fixing 25mm thick MDF laser cut decorative panels.

1.02 MATERIAL:
a) Board: 25mm (1") thick MDF formaldehyde sheet, density 700 kg/m3, MR grade, both sides sanded.
b) Cutting: Laser cut of approved letter / design as per CAD drawing, no burn marks, edges sealed.
c) Paint: Approved colour acrylic paint over one coat of primer, approved shade (RAL).
d) Fixing: Approved anchors, screws, concealed fixing as per detail - French cleat or MS frame.

1.03 EXECUTION:
a) MDF panel CNC laser cut with accuracy ±0.5mm, deburred, no sharp edges.
b) Primer + acrylic paint coats applied, uniform finish.
c) Fixed on wall with approved anchors at any floor / height, true line level plumb.
d) Touch-up kit provided.

1.04 MEASUREMENT: Per Sft.

SECTION 8: WL-22 - MIRROR PASTED OVER FRAMING SYSTEM

1.01 SCOPE:
Providing and fixing mirror cladding system.

1.02 MATERIAL:
a) Mirror: 6mm thick copper-free silver mirror with safety backing film (CAT II), distortion-free, reflectivity >90%.
b) Backup: 12mm thick cement board cladding on GI framing system (C-studs, U-tracks).

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

c) Frame: Surrounding black colour SS304 frame 1-1/2" x 2", stain finished, hairline No.4.
d) Adhesive: Approved mirror adhesive neutral cure silicone + double sided tape.
e) Safety: Mechanical J-channel top/bottom for safety.

1.03 EXECUTION:
a) GI framing fixed plumb, level.
b) Cement board fixed, levelled.
c) Mirror fixed with neutral cure silicone, no black edge bleeding, alignment ±0.5mm.
d) SS304 frame mitred, TIG welded, fixed around mirror.
e) Cleaning, protection.

1.04 STANDARD: EN 1036 for mirror.

SECTION 9: WL-23 - MS MESH WALL WITH LETTERING & BACKLIT

1.01 SCOPE:
Providing and making MS mesh wall with lettering and backlight.

1.02 MATERIAL:
a) Mesh: MS mesh panels, approved colour powder coating.
b) Frame: MS tube framing 1" x 1" x 1/8" thick (25x25x3mm) as per BOQ, welded.
c) Lettering: MS sheet lettering as per drawing, approved font / size.
d) Base Plate: MS sheet base plate 4" x 4" x 1/4" thick with approved anchoring system.
e) Finish: Powder coating approved colour, primer + top coat.

1.03 EXECUTION:
a) MS tube frame welded, ground smooth, fabricated as per shop drawing.
b) Mesh panels welded over tube frame, powder coated.
c) Base plate anchored to wall / floor with approved anchors.
d) MS lettering fixed as per drawing with proper spacing.
e) Backlight provision (if shown) - LED behind mesh with wiring provision.
f) Alignment, spacing, joint detailing as per drawing.

1.04 WELDING: AWS D1.1.

SECTION 10: WL-30 - TRAVERTINE DRY CLADDING 20MM THICK

1.01 SCOPE:
Providing, fabricating and installing dry-clad travertine stone panels.

1.02 MATERIAL:
a) Stone: Travertine stone panels, upto 10 Sft each, thickness 3/4" / 20mm, approved shade (Turkish / Iranian / approved), honed + filled + brushed, conforming to ASTM/EN standards.
b) Fixing System: Mechanical dry cladding system comprising stainless steel anchors, kerfs, dowels, brackets, L-angles and supported hardware, stainless steel grade as per BOQ (SS).
c) Cavity: 40-60mm ventilated cavity as per detail.
d) Accessories: EPDM gaskets, sealant, expansion joints, anti-stain treatment.

1.03 EXECUTION:
a) Structural design for wind, seismic, thermal movement as per approved shop drawing.
b) SS anchors - minimum 4 per panel, kerf / undercut as per manufacturer.
c) Brackets fixed to RCC / masonry with SS anchor bolts.
d) Stone panels installed true to line, level, plumb, open joints 6-8mm.
e) Cutting, edge finishing, sealing, cleaning, curing, protection.
f) Mockup 10m2 mandatory for approval.
g) Scaffolding included.

1.04 TESTING: Flexural, water absorption, anchor pullout as per manufacturer / Engineer

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

requirement.

1.05 STANDARD: ASTM C1527, EN 1469.

SECTION 11: WL-32 - POWDER COATED CNC CUT MS SCREEN

1.01 SCOPE:
Providing and fixing powder coated CNC cut MS screen.

1.02 MATERIAL:
a) Screen: MS sheet CNC cut panels with approved pattern as per CAD, MS sheet thickness as per BOQ (2"x" x 1/8" framing).
b) Frame: MS framing 2" x " x 1/8" thick with approved anchoring.
c) Finish: Powder coating approved colour, over zinc-phosphate epoxy primer.
d) Fixing: Anchors, screws, accessories.

1.03 EXECUTION:
a) MS sheet CNC cut with tolerance ±0.5mm, deburred, no sharp edges.
b) Frame welded, ground smooth.
c) Powder coating applied after blast / surface preparation.
d) Screen fixed on wall with approved anchors, true line level plumb, expansion provision.
e) Spacing, joint detailing as per drawing.

1.04 PROTECTION: Cover till handover.

SECTION 12: CL-07 - BAYRISOL FABRIC CEILING - STRETCH CEILING

1.01 SCOPE:
Providing, fabricating and installing Bayrisol PVC/Polyester stretch fabric ceiling system.

1.02 MATERIAL:
a) Membrane: Non-flammable vinyl membrane, approved thickness and finish, conforming to EN 13501-1 fire, EN ISO standards.
b) Profiles: Proprietary perimeter rails in aluminium / PVC profiles.
c) Installation Method: Tensioned and installed by heating and stretching method with minimum plenum depth.
d) Accessories: Acoustic backing, luminous integration, light fixtures, diffusers, suspension hardware, stainless steel fasteners, hangers, fixing arrangements.

1.03 EXECUTION:
a) Perimeter rails fixed level, true.
b) Membrane tensioned by heating as per manufacturer method.
c) Cut-outs for light fixtures, ducts, sprinklers, design features as per drawing.
d) Finished to true line, level, plumb.
e) Execution at any floor level / height.

1.04 SAMPLE: Submit sample and shop drawing.

SECTION 13: CL-08 - MDF ROUND CEILING MODULES 24", 18", 12" DIA

1.01 SCOPE:
Providing, fabricating and installing modular MDF round ceiling panels.

1.02 MATERIAL:
a) Panels: Modular MDF ceiling panels of approved make and finish.
b) Support: MS pipe support framework comprising main runners, cross tees, perimeter angles, hangers, suspension system, minimum steel thickness duly galvanized, conforming to ASTM/BS/EN.
c) Hardware: All required hardware, fixing arrangements.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

d) Finish: Surface preparation with putty, primer and finishing coats of approved paint and colour shade.

1.03 EXECUTION:
a) MS pipe framework installed level, suspension at approved spacing.
b) MDF round modules (24", 18", 12" dia) fixed as per pattern drawing.
c) Cutting and forming openings for light fixtures, ducts, sprinklers.
d) Putty, primer, paint finishing.
e) True line, level, plumb, complete.

1.04 MEASUREMENT: Per Sft of ceiling area.

SECTION 14: SS-01 - EXTERNAL SILL BATTA STONE COPING & CLADDING

1.01 SCOPE:
Providing and fixing Sill Batta stone coping and cladding on boundary wall and where required.

1.02 MATERIAL:
a) Stone: Pre-polished / honed Sill Batta stone, approved shade, sizes as per drawing:
Coping: 1-1/2" thick Half D-Shape gola with drip course
Cladding: 24" x 12" x 3/4" thick
b) Mortar: 3/4" thick cement-sand mortar 1:2 using grey cement and screened sand.
c) Adhesive: 1/4" thick slurry of polymer-modified stone adhesive C2TES1/C2TES2 or equivalent.
d) Grout: Approved epoxy based grouting material.

1.03 EXECUTION:
a) Substrate cleaned, roughened, levelled.
b) Stone laid over 3/4" mortar + 1/4" adhesive slurry in approved pattern, spacers 2mm.
c) Jointing, washing, grouting with epoxy grout, cleaning, curing.
d) Cutting, edge finishing, drip course alignment.
e) Complete at any floor / height.

1.04 SAMPLE: Submit stone sample for approval.

SECTION 15: MS-01 - MS FENCE 6' HIGH

1.01 SCOPE:
Providing, fabricating, welding, erecting and fixing MS fence 6' high.

1.02 MATERIAL:
a) Steel: Structural steel conforming to ASTM A36 for solid sections and ASTM A500 Grade B/C for hollow sections or equivalent BS EN 10025 / EN 10219.
Posts: 25x25mm (1"x1") solid square bar ASTM A36
Horizontal: 50x50x3.2mm (2"x2"x1/8") hollow tubes ASTM A500 Grade B/C
Base Plates: 200x200x10mm thick ASTM A36
Anchor Bolts: ASTM F1554 Grade 36/55, M16 minimum, embedded 200mm in RCC foundation.
b) Finish: 1 coat zinc-phosphate epoxy primer + 2 coats industrial synthetic enamel paint approved colour.
c) Foundation: Reinforced concrete foundations / pedestals / plinth beams with steel reinforcement.

1.03 EXECUTION:
a) Excavation, RCC foundation, base plate fixing with J-bolts / anchor bolts.
b) Fence fabricated, welded as per AWS D1.1 / BS EN ISO 3834 / EN 1090, grinding, weld finishing.
c) Posts true vertical, alignment, spacing as per drawing.

d) Bitumen coating for embedded portions.
e) Painting after surface preparation.

1.04 MEASUREMENT: Per Rft.

SECTION 16: MS-02 - MS GATES - SLIDING MAIN + PEDESTRIAN

1.01 SCOPE:
Providing, fabricating, welding, erecting and fixing MS gates.

1.02 MATERIAL:
a) Outer Frame: 50x50x3.2mm (2"x2"x1/8") square hollow section ASTM A500 Grade B/C.
b) Infill: 25x25mm (1"x1") solid square bar ASTM A36 @175mm (7") c/c horizontally.
c) Vertical Posts: 150x150x5mm (6"x6") hollow section ASTM A500 Grade C.
d) Hardware: Hinges, L-drops (2 nos), drop bolts / floor bolts (2 nos), heavy-duty bearing wheels, wheel track 75x75x6mm MS angle, hold-fasts @600mm c/c.
e) Finish: 1 coat zinc-phosphate epoxy primer + 2 coats industrial synthetic enamel paint.
f) Lock: Approved lockset.

1.03 EXECUTION:
a) Types:
Main Gate with wheel & wheel track (17'-0" x 7'-0") - 500 Sft
Gate without wheel & track (6'-0" x 7'-0") - 150 Sft
b) Fabrication as per AWS D1.1, grinding, finishing.
c) Wheel track embedded in RCC foundation level ±1mm.
d) Gate installed true line, level, plumb, smooth operation.
e) Hold-fasts grouted, alignment checked.

1.04 MEASUREMENT: Per Sft.

SECTION 17: MS-03 - MS LOUVERED FIXED PANELS

1.01 SCOPE:
Providing, welding, fabricating and fixing MS louvered fixed panels.

1.02 MATERIAL:
a) Frame: MS tube 2"x2"x12 Swg (50x50x2.77mm) main frame horizontal & vertical.
b) Louvers: 14 Swg (2mm) thick MS sheet louvers @1-1/4" centre to centre as per drawing & design.
c) Fixing: Hold fast MS flat 40x5mm 300mm long @600mm c/c welded, 9" long hold fast 4 Nos each side, hinges 4 Nos each side on frame.
d) Finish: 1 coat zinc-phosphate epoxy primer + 3 coats industrial synthetic enamel paint approved colour.

1.03 EXECUTION:
a) Frame fabricated mitred, welded, ground.
b) Louvers welded to frame at approved pitch, angle.
c) Frame fixed to wall with hold fasts, cutting holes, grouting, alignment.
d) All accessories for complete fixing.
e) Execution at any floor / height.

1.04 MEASUREMENT: Per Sft.

SECTION 18: SS-02 - STEEL STRUCTURE SHADE WITH POLYCARBONATE ROOFING

1.01 SCOPE:
Design, drawing, providing, fabricating, welding, erecting and installing steel structure shade with polycarbonate roofing over ramp.

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

1.02 MATERIAL:
a) Steel: MS steel columns, beams, bracing:
Solid members: ASTM A36 min yield ≥250 MPa
Hollow sections: ASTM A500 Grade B/C min yield ≥290-345 MPa
Minimum thickness 4mm, connections bolted M16 Grade 8.8 hot dip galv + welded.
b) Foundation: Base plate 12mm with stiffeners, anchor bolts M20 Grade 8.8 Hilti, RCC footing M30 as per design, non-shrink grout.
c) Finish: 1 coat zinc-phosphate epoxy primer + 2 coats industrial synthetic enamel paint (or PU top coat) as required.
d) Roofing: Polycarbonate sheet panels over ramp, thickness as approved, UV-resistant, fire-retardant, conforming to EN 16153 or ASTM D3935, fixed with self-drilling screws and aluminium flashing profiles, EPDM gaskets, end closures.
e) Drainage: Internal gutter 1.2mm SS304, downpipe 75mm as per detail.

1.03 EXECUTION:
a) Contractor to submit shop drawings, design calculations for approval (Design-Build).
b) Fabrication and welding as per AWS D1.1, NDT 10% UT, bolt torque, water tightness test.
c) Erection, anchoring, alignment, level.
d) Polycarbonate sheets fixed with glazing bars, gaskets, flashings, water tight.
e) Complete in all respects as per drawings and Engineer.

1.04 DESIGN: Wind as per ASCE 7, seismic Zone 2B, deflection L/200, as per approved design.

1.05 MEASUREMENT: Per Sft.

SECTION 19: CC-01 - FOAM CONCRETE - LIGHTWEIGHT (DENSITY ≤12kN/m3, 7 MPa)

1.01 SCOPE:
Providing and laying foam concrete over RCC slab or where required.

1.02 MATERIAL:
a) Foam Concrete: Cement OPC 53 grade, fine sand, protein-based foam agent.
b) Density: Fresh density ≤1200 kg/m3 (12 kN/m3), dry density ~1100 kg/m3.
c) Strength: Minimum compressive strength 7.0 MPa at 28 days, flexural ≥1.5 MPa.
d) Thermal Conductivity: ≤0.32 W/mK (as per manufacturer).

1.03 EXECUTION:
a) Substrate cleaned, bonding slurry applied.
b) Foam concrete batched by automatic foam generator (no site hand mixing), mixed, pumped, placed in bays, thickness as per BOQ (75-150mm average).
c) Levelled, finished, cured 3 days.
d) Cut joints at 3m intervals.
e) Testing: 3 cubes per 50m3, density check per batch, slump flow 500-600mm.
f) No traffic 24 hours, light traffic after 3 days.

1.04 STANDARD: ACI 523.3R, ASTM C796, ASTM C869.

1.05 MEASUREMENT: Per Cft.

SECTION 20: JC-01 - 10MM NEOPRENE RUBBER BOARD BELOW FOAM CONCRETE

1.01 SCOPE:
Providing and pasting / fixing 10mm thick Neoprene Rubber Board as separation layer below foam concrete.

1.02 MATERIAL:
a) Board: Closed cell neoprene rubber board, thickness 10mm ±1mm, density 110-130 kg/m3.
b) Properties: Shore A 40±5, compression set ≤20% ASTM D395, water absorption ≤2%, tensile

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

≥0.8 MPa, elongation ≥200%, temp -20 to +80°C, self-extinguishing.

1.03 EXECUTION:
a) Application: Separation layer between foam concrete and RCC slab / wall to allow movement and prevent cracking.
b) Laid loose, butt jointed, joints taped, no adhesive attacking neoprene.
c) Protected from UV before pour.

1.04 STANDARD: ASTM D1056, ASTM D395, BS 2499.

1.05 MEASUREMENT: Per Rft.

SECTION 21: RD-01 - REFLECTIVE RUBBER SPEED HUMP / BREAKER

1.01 SCOPE:
Providing and fixing reflective rubber speed hump / road breaker.

1.02 MATERIAL:
a) Material: High-strength recycled or virgin rubber, vulcanized EPDM+SBR, hardness 70±5 Shore A, load bearing ≥20 Ton, anti-skid pattern, UV, oil, grease, water, abrasion, vehicular impact resistant.
b) Size: Modular interlocking middle section 20" x 15" x 2" high and end cap 7" x 15" x 2" high (500x350x50mm modules yellow+black).
c) Reflective: High intensity micro-prismatic reflective tape / cat-eye inserts 3M Diamond Grade yellow visibility 200m night.
d) Fixing: M12x120mm expansion bolts Hilti HSA-R, EPDM washer, 4 per module countersunk.

1.03 EXECUTION:
a) Road surface cleaned, marking, drilling 14mm, anchored.
b) Torque 25Nm, PU sealant at edges, alignment straight ±3mm.
c) Temperature resistance -20 to +70°C, UV stable.
d) Warranty 3 years as per manufacturer.

1.04 STANDARD: IRC 99:2018, ASTM D2000.

1.05 MEASUREMENT: Per Rft

e-Pak Acquisition and Disposal System (EPADS) generated document | © 2026

S.No	ITEMS	Manufacturer & Supplier		
	CEMENT			
1	SR Cement	DG Cement	Fuji Cement	Bestway
2	OP Cement			
3	White Cement	Anwarzeb	Maple Leaf	Kohat cement
4	Sand	Local Supplier	Local Supplier	Local Supplier
5	Crushed Stone	Local Supplier	Local Supplier	Local Supplier
6	Stone for soling	Local Supplier	Local Supplier	Local Supplier
7	Earth fill material	Local Supplier	Local Supplier	Local Supplier
8	Bitumen 80/100	Local Supplier	Local Supplier	Local Supplier
9	Bitumen 10/20	Local Supplier	Local Supplier	Local Supplier
10	CC Blocks 1000 psi	Envicrete (Pvt) Ltd	Izhar Concrete (Pvt) Ltd,	T.F Block Factory
11	Flexible polymer modified cementitious waterproofing	Sika Pakistan (Pvt) Ltd	AQUAFIN Pakistan (Pvt) Ltd	Ressichem (Pvt) Ltd
12	MS Hollow flush door shutter including frame	MEK industrial Steel Furniture	MECHATRONIX	FireX Engineering Solution
13	MS Louvered door	MEK industrial Steel Furniture	MECHATRONIX	FireX Engineering Solution
14	Galvanized steel fire rated doors (3 hours fire rating)	UNIVERSAL FIRE PROTECTION PVT LTD	MEK industrial Steel Furniture	FireX Engineering Solution/ NAFFCO
15	Anti-Termite Treatment	Ali Akbar Group	Termite Control	International Pest Management Services
16	Laminated board with MDF back	Zark-MDF & Practical Board	AL-Noor Lasani, IBRA Treaders	Aman MDF Manufacturer
17	Clear tampered glass	Tariq glass industries	Ghani Glass	Pakistan Safety Glass
18	Aluminium door with frame	Pakistan Cable/ PAK Al Tech	Chawla Aluminum	ALCOP
19	ARMANI GREY Marble Slab & tiles	Best Quality as approved by the Engineer/Employer		
20	Granite tiles	Best Quality as approved by the Engineer/Employer		
21	Raised Access 600mm x 600mm x 32mm thick	SLEEK DESIGNS PRIVATE LIMITED	Interior Designer in Karachi	The Protector
22	Porcelain Tile & ceramic tiles	Shabbir (Stile) Pvt Ltd	S.Abdullah, H verse	Master/ RAK
23	Self levelling epoxy flooring 3mm thick	Sika Pakistan (Pvt) Ltd	AQUAFIN Pakistan (Pvt) Ltd	Ressichem (Pvt) Ltd/ Berger
24	SS pipe for Railing, & MS hollow sections	IIL Pakistan	SUMWIN	
25	Vinyl sheet 3" high	Ultimade Build Mart	HH Brothers	Studio 27
26	Gypsum board for false ceiling 4'-0" x 8'-0" x 1/2" thick	Elephant Gypsum Board	Lodhia Gypsum Industries (PVT) Ltd	ARISH/Knauf Pakistan
27	Roof Insulation 75mm thick	Jumbolon-Board	Master chemical	
28	Bituminous membrane	Roof Line	HY-GRIP	Roof Grip
29	Decorative Plaster 1/2" thick	Ressichem (Pvt) Ltd	Nippon	EzyMix Industries
30	Water Repellent	Ressichem (Pvt) Ltd	Sika	
31	MS Pipes	IIL Pakistan	Huffaz pipe industries	Bashir industries
32	Rubber molded wheel stopper 48"x 6" x 4" high	POLYCRAFT (Pvt) Limited	Hi Tech Rubber Industries	
33	Rubber speed breaker 20" x 15" x 2" with end cap	POLYCRAFT (Pvt) Limited	Hi Tech Rubber Industries	
34	Convex Mirror 24" dia	POLYCRAFT (Pvt) Limited	Eastern Highway Company	
35	Paint and Varnishes	Burger Pvt (Ltd)	ICI Pvt (Ltd)	Nippon/Jotun
36	Reflective thermoplastic paint	Burger Pvt (Ltd)	ICI Pvt (Ltd)	Nippon
37	Sill Batta stone	Progrssive marble	Shbbir Marble	Stone Burry
38	Solid square bar	Bashir industries	Kohenoor industries	Ithad steel industries
39	MS Moulded steel door frame	Local Supplier	Local Supplier	Local Supplier
40	Urban Furniture	Local Supplier	Local Supplier	Local Supplier
41	Ply Wood	Patex Practical Board industries	Sadiq Wood Industries	Aman MDF Manufacturer
42	Tactile Laminated Sheet	AL-Noor Lasani	Zark-MDF & Practical Board	Aman MDF Manufacturer
43	WPC Fluted Panel	Ultimade Build Mart	HH Brothers	Studio 27
44	Laminated MDF Sheet	AL-Noor Lasani	Zark-MDF & Practical Board	Aman MDF Manufacturer
45	Cement Board	DADEX Pvt (Ltd)		

46	Acrylics Sheet for Signage	Decorex		
47	Marble Runner	Progrssive marble	Shbbir Marble	Stone Burry
48	Wall Paper	Wall Master Home	Studio 27	Broque inc
49	Modular Carpet Tiles	Pak Carpet/ DEESO	Modular Art & Co/ IDEAL CARPETS	HA Collection Carpet Tile
50	Hardware/Ironmongery	JB Saeed	Building Hardware	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

ANNEXURE 3.1 (i) - Completed Projects
BIDDER'S EVALUATION PROFORMA (PACKAGE-2a)

Priority Ranking	Name of Project *(05 Top Priority Projects will be considered for evaluation, Bidder is required to arrange projects accordingly)*	Financial Value of Project *(in Rs. Million)*	Start Year	Completion Year	Scope of Work *(Structure, Architecture, Electrical & Plumbing, HVAC, Finishing, etc.)*	No. of Floors	Name of Consultant *(with Contact No., Email & Address)*	Name of Client *(with Contact No., Email & Address)*	Contract Duration		Delays *(No. of Days)*	Reasons of Delays	List of Projects Descoped/ Terminated (Completely/Partially) during last 10 years/ Suspension of Work >6 Months *(if Yes, provide details; Name of Project, Employer, with Reasons)*		
									Original	Revised					
		Attach Contract Agreement /Letter of Commencement/Work Order	Attach Contract Agreement /Letter of Commencement/Work Order	Attach Completion Certificate	Attach BOQ (Priced or unpriced)	Attach Drawings	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	Attach Contract Agreement /Letter of Commencement/Work Order	Attach EOT Proof	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	*Attach proof on the duly signed and stamp letterhead of the bidder*		
1															
2															
3															
4															
5															

(**Declaration:** I solemnly declare that the information provided in this proforma is true to the best of my knowledge & if at any stage any information found to be false/misleading/incorrect, the Employer may declare my bid as non-responsive & disqualify my bid). Bidder is required to submit this declaration on the stamp paper duly notarized.

Signature & Name of Bidder: _____

ANNEXURE 3.1 (ii) -Projects in Hand
BIDDER'S EVALUATION PROFORMA (PACKAGE-2a)

Priority Ranking	Name of Project *(05 Top Priority Projects will be considered for evaluation, Bidder is required to arrange projects accordingly)*	Financial Value of Project *(in Rs. Million)*	Start Year	%Completion as on August 31, 2026	Scope of Work *(Structure, Architecture, Electrical & Plumbing, HVAC, Finishing, etc.)*	No. of Floors	Name of Consultant *(with Contact No., Email & Address)*	Name of Client *(with Contact No., Email & Address)*	Contract Duration		Delays *(No. of Days)*	Reasons of Delays	List of Projects Descoped/ Terminated (Completely/Partially) during last 10 years/ Suspension of Work (>6 Months) *(if Yes, provide details; Name of Project, Employer, with Reasons)*		
									Original	Revised					
		Attach Contract Agreement /Letter of Commencement/Work Order	Attach Contract Agreement /Letter of Commencement/Work Order	Attach % completion Evidence by Employer/ Engineer	Attach BOQ (Priced or unpriced)	Attach Drawings	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	Attach Contract Agreement /Letter of Commencement/Work Order	Attach EOT Proof	Attach proof on the duly signed and stamp letterhead of the bidder	Attach proof on the duly signed and stamp letterhead of the bidder	*Attach proof on the duly signed and stamp letterhead of the bidder*		
1															
2															
3															
4															
5															

(**Declaration:** I solemnly declare that the information provided in this proforma is true to the best of my knowledge & if at any stage any information found to be false/misleading/incorrect, the Employer may declare my bid as non-responsive & disqualify my bid). Bidder is required to submit this declaration on the stamp paper duly notarized.

Signature & Name of Bidder: _____

CONSTRUCTION EXPERIENCE

Form EXP - 4.1
General Construction Experience

Bidder's Name: _____
Date: _____
JV Member's Name_____
Bid Reference No. (if any) and title: _____
Page _____of _____pages

Starting Year	Ending Year	Contract Identification	Role of Bidder
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of EMPLOYER: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of EMPLOYER: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of EMPLOYER: _____ Address: _____	

Form EXP - 4.2(a)

Specific Construction and Contract Management Experience

Bidder's Name: _____
Date: _____
JV Member's Name_____
Bid Reference No. (if any) and title: _____
Page _____of _____pages

Similar Contract No.	**Information**			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			PKR equivalent	
If member in a JV or sub-contractor, specify participation in total Contract amount				
EMPLOYER's Name:				
Address: Telephone/fax number E-mail:				

Form EXP - 4.2(a) (cont.)
Specific Construction and Contract Management Experience (cont.)

Similar Contract No.	**Information**
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Form EXP - 4.2(b)
Construction Experience in Key Activities

Bidder's Name: _____
Date: _____
Bidder's JV Member Name: _____
Sub-contractor's Name (if any): _____
Bid Reference No. (if any) and title: _____

Page _____of _____pages

All Sub-contractors for key activities must complete the information and Qualification Criteria and Requirements, Sub-Factor 4.2.

1. Key Activity No One: _____

	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			PKR equivalent	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year 1				
Year 2				
Year 3				
Year 4				
EMPLOYER's Name:				
Address: Telephone/fax number				

	Information
E-mail:	

2. Activity No. Two

3. ……

	Information
Description of the key activities in accordance with Section III:	

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Form EXP - 4.2 (c)
Specific Experience in Managing ES aspects

[The following table shall be filled in for contracts performed by the Bidder, and each member of a Joint Venture]

Bidder's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insertfull name]*
Bid Reference No. (if any) and title: *[insert ICB/NCB number and title]*
Page *[insert page number]* of *[insert total number]* pages

1. Key Requirement no 1 in accordance with 4.2 (c): _____

Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Subcontractor ☐
Total Contract Amount			PKR	
Details of relevant experience				

2. Key Requirement no 2 in accordance with 4.2 (c): _____

3. Key Requirement no 3 in accordance with 4.2 (c): _____

4. [PA define key requirements]

Contractor's Representative and Key Personnel Schedule

Bidders should provide the names and details of the suitably qualified Contractor's Representative and Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

Contractor' Representative and Key Personnel

1.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
2.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
3.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
4.	**Title of position:**	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]

	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
5.	**Title of position:**	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
6.	**Title of position:** *[insert title]*	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]

Form PER-2:
Resume and Declaration
Contractor's Representative and Key Personnel

Name of Bidder

Position [*#1*]: [*title of position from Form PER-1*]		
Personnel information	**Name:**	**Date of birth:**
	Address:	**E-mail:**
	Professional qualifications:	
	Academic qualifications:	
	Language proficiency: *[language and levels of speaking, reading and writing skills]*	
details		
	Address of Employer:	
	Telephone:	**Contact (manager / personnel officer):**
	Fax:	
	Job title:	**Years with present Employer:**

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

Project	**Role**	**Duration of involvement**	**Relevant experience**
[main project details]	*[role and responsibilities on the project]*	*[time in role]*	*[describe the experience relevant to this position]*

Declaration

I, the undersigned *[insert either "Contractor's Representative" or "Key Personnel" as applicable]* , certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Bid:

Commitment	**Details**
Commitment to duration of contract:	*[insert period (start and end dates) for which this Contractor's Representative orKey Personnel is available to work on this contract]*
Time commitment:	*[insert period (start and end dates) for which this Contractor's Representative orKey Personnel is available to work on this contract]*

I understand that any misrepresentation or omission in this Form may:

(a) be taken into consideration during Bid evaluation;

(b) result in my disqualification from participating in the Bid;

(c) result in my dismissal from the contract.

Name of Contractor's Representative or **Key Personnel: [*insert name*]**

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Bidder:

Signature: _____

Date: (day/month/year): _____

Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Eligibility and Qualification Criteria.

No.	**Source of financing**	**Amount (Eq. PKR)**
1		
2		
3		

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Past Experience / Contracts

Contracts over *[insert amount]* during the last three years:				
Procuring Agency	Value	Year	Goods/Services Supplied	Country of Destination

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Historical Contract Non-Performance, and Pending Litigation and Litigation History

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
IFP No. and title: *[insert IFP number and title]*
Page *[insert page number]* of *[insert total number]* pages

☐ Not debarred due to deviation from commitment of Bid Securing Declaration-☐ Not debarred due to non-performance			
Year	**Non-performed portion of contract**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and PKR equivalent)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Reason(s) for nonperformance: *[indicate main reason(s)]*	*[insert amount]*
Pending Litigation, in accordance with Section III, Qualification Criteria and Requirements			
☐ Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3 as indicated below.			

Year of dispute	**Amount in dispute (currency)**	**Contract Identification**	**Total Contract Amount (currency), ~~US$~~ PKR Equivalent (exchange rate)**

[insert year]	*[insert amount]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Procuring Agency" or "Supplier"]* Status of dispute: *[Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]*	*[insert amount]*

☐ No consistent history of court/arbitral award decisions in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4.

☐ Consistent history of court/arbitral award decisions in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4 as indicated below.

Year of award	**Outcome as percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (currency), PKR Equivalent (exchange rate)**
[insert year]	*[insert percentage]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Procuring Agency" or "Supplier"]* Court/ arbitral award decision: *[Indicate if the award decision was against the Applicant or any member of a joint venture.]y]*	*[insert amount]*

Current Contract Commitments / Works in Progress

Bidders and each member to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
No.	Name of Contract	**Employer's Contact Address, Tel, Fax**	**Value of Outstanding Work [Current Eq. PKR]**	**Estimated Completion Date**	**Average Monthly Invoicing Over Last Six Months [Eq. PKR/month)]**
1					
2					
3					
4					
5					

Financial Situation and Performance

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
IFP No. and title: *[insert IFP number and title]*
Page *[insert page number]* of *[insert total number]* pages

1. Financial data

Type of Financial information in (currency)	**Historic information for previous _[insert number] years, [insert in words] (amount in currency, currency, exchange rate*, PKR equivalent)**				
	Year 1	Year 2	Year 3		
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

* Refer ITA 14 for the exchange rate

3. Financial documents

The Applicant and in case of JV, members of JV shall provide copies of financial statements for *[number]* years pursuant Section III, Qualifications Criteria and Requirements. The financial statements shall:

(a) reflect the financial situation of the Applicant or in case of JV member, and not an affiliated entity (such as parent company or group member).

(b) be independently audited or certified in accordance with local legislation.

(c) be complete, including all notes to the financial statements.

(d) correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements[1] for the *[number]* years required above; and complying with the requirements.

[1] If the most recent set of financial statements is for a period earlier than 12 months from the date of Application, the reason for this should be justified.

Average Annual Turnover (Annual Sales Value)

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
IFP No. and title: *[insert IFP number and title]*
Page *[insert page number]* of *[insert total number]* pages

Annual Turnover Data			
Year	**Amount** **Currency**	**Exchange rate*** **(If applicable)**	**PKR equivalent**
[indicate calendar year]	*[insert amount and indicate currency]*		
		Average Annual Turnover **	

* Refer ITA for date and source of exchange rate.

** Total PKR equivalent for all years divided by the total number of years. See Section III, Qualification Criteria and Requirements, ITA.