

# **Dow University of Health Sciences**



## **Bidding Documents**

### **Single Stage – Two Envelope Procedure**

**As per Rule 46 (2) of SPPRA, 2010 (Amended up to date)**

**IFB / NIT No: DUHS/P&D/2024/11745 Dated 23 Feb, 2024**

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**SUPPLY / FIXING / INSTALLATION /  
TESTING & COMMISSIONING OF HVAC  
SYSTEM AT WAREHOUSE, OJHA CAMPUS,  
DUHS, KARACHI.**

**(REF. NO. DUHS / W&S-NIT /142)**

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**OFFICE OF THE DIRECTOR PLANNING & DEVELOPMENT,  
DOW UNIVERSITY OF HEALTH SCIENCES (DMC CAMPUS)  
BABA-E-URDU ROAD, BESIDES CIVIL HOSPITAL, KARACHI.  
Phone No. 021-38771000, Extension 5820.**

## NOTICE INVITING TENDER (NIT)



### OFFICE OF THE DIRECTOR PLANNING & DEVELOPMENT DOW UNIVERSITY OF HEALTH SCIENCES

Baba-e-Urdu Road, Karachi-74200 Pakistan. Tel: 9215754-57 Ext:5811 Website: [www.duhs.edu.pk](http://www.duhs.edu.pk)

No. DUHS/P&D/2024/11745

## TENDER NOTICE

Dated: February 23, 2024

Dow University of Health Sciences (DUHS), Karachi is a Public Sector University invites the sealed bids for following Services from well-reputed Companies / Bidders available on List of Active Tax Payers of FBR websites (for Income Tax) & SRB (For Sales Tax).

S. No	NAME OF WORK	METHOD OF PROCUREMENT
1.	SUPPLY / FIXING / INSTALLATION / TESTING & COMMISSIONING OF HVAC SYSTEM AT WAREHOUSE, OJHA CAMPUS, DUHS, KARACHI. (REF NO: DUHS/W&S-NIT/142)	Single Stage – Two Envelope Procedure as per rule 46 sub rule-2 of SPP Rules 2010 (Amended upto date)
2.	REPAIR AND MAINTENANCE SERVICES FOR UNINTERRUPTED POWER SUPPLIES (UPS). (REF NO: DUHS/W&S-NIT/143)	Single Stage – Single Envelope Procedure as per rule 46 sub rule-1 of SPP Rules 2010 (Amended upto date)
3.	REPAIR & MAINTENANCE SERVICES FOR PASSENGER LIFTS AND PATIENT / BED LIFTS. (Ref No: DUHS/W&S-NIT/144)	Single Stage – Single Envelope Procedure as per rule 46 sub rule-1 of SPP Rules 2010 (Amended upto date)

<b>Tender Fee</b>	<b>Rs. 5,000/- (Rupees Five Thousand Only)</b> Non-Refundable in shape of Pay Order / Demand Draft in favor of Dow University of Health Sciences, Karachi.
<b>Security</b>	Bid Security and Performance Security as mentioned in the bidding document.
<b>Purchasing Date &amp; Time</b>	<b>From the date of publishing to 16-03-2024 (8:30 a.m to 02:30 p.m)</b>
<b>Bids Delivery &amp; Opening Date &amp; Time</b>	<b>Ramzan Timing (8:30 a.m to 12:00 p.m) 18-03-2024 at 10:30 a.m &amp; 11:00 a.m.</b>

Detailed Specification are mentioned in the prescribed tender documents alongwith terms and conditions. Bidding documents can be download from SPPRA website or Dow University of Health Sciences, website. Conditional Bids, Telegraphic Bids, Bids not accompanied by Bid Security of required amount and form, bids received after specific date and time and bids of Black Listed firms will be rejected.

In case of any unforeseen situation or government holiday resulting in closure of office on the date of opening, bids shall be submitted / opened on next working day at the given time. The Dow University of Health Sciences, Karachi (DUHS) reserves the right to reject any or all the bids subject to the relevant provisions of SPP Rules 2010 (Amended upto date).

#### **ADDRESS FOR PURCHASING OF BIDDING DOCUMENTS, SUBMISSION AND OPENING OF BIDS:**

Office of the Director Planning & Development, Dow University of Health Sciences (DMC Campus), 5<sup>th</sup> Floor Administration Block, Baba-e-Urdu Road near Civil Hospital Karachi.

## DIRECTOR

**Planning & Development**  
Dow University of Health Sciences, Karachi

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**Part One - Section I**  
**Instructions to Bidders**

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# Instructions to Bidders

## A. Introduction

### 1. Source of Funds

- 1.1 The Procuring agency has allocated funds / received / applied for loan / grant / federal / provincial / local government funds from the source(s) indicated in the bidding data in various currencies towards the cost of the project / schemes specified in the bidding data and it is intended that part of the proceeds of this loan / grant / funds / will be applied to eligible payments under the contract for which these bidding documents are issued.
- 1.2 Payment by the Fund will be made by procuring agency from university funds or only at the request of the Procuring agency and upon approval by the Government of Sindh., and in case of a project will be subject in all respect to the terms and conditions of the agreement. The Project Agreement prohibits a withdrawal from the allocated fund account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Federal Government / Sindh Government, is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Procuring agency shall derive any rights from the Project Agreement or have any claim to the allocated fund proceeds.

### 2. Eligible Bidders

- 2.1 This Invitation for Bids is open to all suppliers from eligible source as defined in the SPPRA Rules, 2010 (Amended up to date) and its Bidding Documents except as provided hereinafter.
- 2.2 Bidders should not be 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 to provide consulting services for the preparation of the design, specifications, and other documents to be used for the procurement of the goods to be purchased under this Invitation for Bids.
- 2.3 Government-owned enterprises in the Province of Sindh may participate only if they are legally and financially autonomous, if they operate under commercial law, and if they are not a dependent agency of the Government of Sindh.
- 2.4 Bidders intend to enter into an agreement or under an existing agreement in the form of a **Joint Venture (JV) or Consortium Alternative Bids shall not be eligible.**
- 2.5 Bidders shall not be eligible to bid if they are under a declaration of ineligibility for corrupt and fraudulent practices issued by any government organization in accordance with sub-clause 34.1.

### 3. Eligible Goods and Services

- 3.1 All goods and related services to be supplied under the contract shall have their origin in eligible source countries, defined in the SPPRA Rules, 2010 (Amended up to date) and its Bidding Documents, and all expenditures made under the contract will be limited to such goods and services.
- 3.2 For purposes of this clause, “origin” means the place where the goods are mined, grown, or produced, or the place from which the related services are supplied. Goods are produced when, through manufacturing, processing, or substantial and major assembly of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.
- 3.3 The origin of goods and services is distinct from the nationality of the Bidder.

#### **4. Cost of Bidding**

- 4.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Procuring agency named in the Bid Data Sheet, hereinafter referred to as “the Procuring agency,” will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

### **B. The Bidding Documents**

#### **5. Content of Bidding Documents**

- 5.1 The bidding documents include:
- (a) Instructions to Bidders (ITB)
  - (b) Bid Data Sheet
  - (c) General Conditions of Contract (GCC)
  - (d) Special Conditions of Contract (SCC)
  - (e) Schedule of Requirements
  - (f) Technical Specifications
  - (g) Bid Form and Price Schedules
  - (h) Bid Security Form
  - (i) Contract Form
  - (j) Performance Security Form
  - (k) Manufacturer’s Authorization Form
- .2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding documents. Failure to furnish all information required by the bidding documents or to submit a bid not substantially responsive to the bidding documents in every respect will be at the Bidder’s risk and may result in the rejection of its bid.

#### **6. Clarification of Bidding Documents SPPRA RULE 23(1):**

- 6.1 An interested Bidder, who has obtained bidding documents, requiring any clarification of the bidding documents may notify the Procuring agency in writing. The Procuring agency will respond in writing to any request for clarification of the bidding documents which it receives no later than five working days prior to the deadline for the submission of bids prescribed in the Bid Data Sheet. Written copies of the Procuring agency’s response (including an explanation of the query but without identifying the source of inquiry) will be sent to all interested bidders that have received the bidding documents.

#### **7. Amendment of Bidding Documents**

- 7.1 At any time prior to the deadline for submission of bids, the Procuring agency, for any reason, whether at its own initiative or in response to a clarification requested by a interested Bidder, may modify the bidding documents by amendment.
- 7.2 All interested bidders that have received the bidding documents will be notified of the amendment in writing, and will be binding on them.
- 7.3 In order to allow interested bidders reasonable time in which to take the amendment into account in preparing their bids, the Procuring agency, at its discretion, may extend the deadline for the submission of bids.

### **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 shall be written in the language specified in the Bid Data Sheet. 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 passages in the language specified in the Bid Data Sheet, in which case, for purposes of interpretation of the Bid, the translation shall govern.

## **9. Documents Comprising the Bid**

- 9.1 The bid prepared by the Bidder shall comprise the following components:
- a) a Bid Form and a Price Schedule completed in accordance with ITB Clauses 10, 11, and 12;
  - b) documentary evidence established in accordance with ITB Clause 13 that the Bidder is eligible to bid and is qualified to perform the contract if its bid is accepted;
  - c) documentary evidence established in accordance with ITB Clause 14 that the goods and ancillary services to be supplied by the Bidder are eligible goods and services and conform to the bidding documents; and
  - d) Bid security furnished in accordance with ITB Clause 15.

## **10. Bid Form**

- 10.1 The Bidder shall complete the Bid Form and the appropriate Price Schedule furnished in the bidding documents, indicating the goods to be supplied, a brief description of the goods, their country of origin, quantity, and prices.

## **11. Bid Prices**

- 11.1 The Bidder shall indicate on the appropriate Price Schedule the unit prices (where applicable) and total bid price of the goods it proposes to supply under the contract.
- 11.2 **For goods / services offered within the purchaser's country**, prices indicated on the relevant Price Schedule shall be on delivered duty paid (DDP) and/or **For goods offered from outside the purchaser's country**, prices indicated on the relevant Price Schedule shall be on CFR / CNF / C&F / CPT – Karachi basis. The price of other (incidental) services, if any, listed in the Bid Data Sheet will be entered separately
- 11.3 The Bidder's separation of price components in accordance with ITB Clause 11.2 above will be solely for the purpose of facilitating the comparison of bids by the Procuring agency and will not in any way limit the Procuring agency's right to contract on any of the terms offered.
- 11.4 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account, unless otherwise specified in the Bid Data Sheet. A bid submitted with an adjustable price quotation will be treated as nonresponsive and will be rejected, pursuant to ITB Clause 24. If, however, in accordance with the Bid Data Sheet, prices quoted by the Bidder shall be subject to adjustment during the performance of the contract, a bid submitted with a fixed price quotation will not be rejected, but the price adjustment would be treated as zero.



## **12. Bid Currencies**

12.1 Prices shall be quoted in Pak Rupees unless otherwise specified in the Bid Data Sheet.

## **13. Documents Establishing Bidder's Eligibility and Qualification**

13.1 Pursuant to ITB Clause 9, the Bidder shall furnish, as part of its bid, documents establishing the Bidder's eligibility to bid and its qualifications to perform the contract if its bid is accepted.

13.2 The documentary evidence of the Bidder's eligibility to bid shall establish to the Procuring agency's satisfaction that the Bidder, at the time of submission of its bid, is from an eligible country as defined under ITB Clause 2.

13.3 The documentary evidence of the Bidder's qualifications to perform the contract if its bid is accepted shall establish to the Procuring agency's satisfaction:

- (a) that, in the case of a Bidder offering to supply goods under the contract which the Bidder did not manufacture or otherwise produce, the Bidder has been duly authorized by the goods' Manufacturer or producer to supply the goods in the Procuring agency's country;
- (b) that the Bidder has the financial and technical capability necessary to perform the contract;
- (c) that, in the case of a Bidder not doing business within the Procuring agency's country, the Bidder is or will be (if awarded the contract) represented by an Agent in that country equipped, and able to carry out the Supplier's maintenance, repair, and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications; and
- (d) That the Bidder meets the qualification criteria listed in the Bid Data Sheet.

## **14. Documents Establishing Goods' Eligibility and Conformity to Bidding Documents**

14.1 Pursuant to ITB Clause 9, the Bidder shall furnish, as part of its bid, documents establishing the eligibility and conformity to the bidding documents of all goods and services which the Bidder proposes to supply under the contract.

14.2 The documentary evidence of the eligibility of the goods and services shall consist of a statement in the Price Schedule of the country of origin of the goods and services offered which shall be confirmed by a certificate of origin issued at the time of shipment.

14.3 The documentary evidence of conformity of the goods and services to the bidding documents may be in the form of literature, drawings, and data, and shall consist of:

- a. a detailed description of the essential technical and performance characteristics of the goods;
- b. a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the goods for a period to be specified in the Bid Data Sheet, following commencement of the use of the goods by the Procuring agency; and

- c. An item-by-item commentary on the Procuring agency's Technical Specifications demonstrating substantial responsiveness of the goods and services to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications.

14.4 For purposes of the commentary to be furnished pursuant to ITB Clause 14.3(c) above, the Bidder shall note that standards for workmanship, material, and equipment, as well as references to brand names or catalogue numbers designated by the Procuring agency in its Technical Specifications, are intended to be descriptive only and not restrictive. The Bidder may substitute alternative standards, brand names, and/or catalogue numbers in its bid, provided that it demonstrates to the Procuring agency's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications.

## **15 Bid Security**

15.1 Pursuant to ITB Clause 9, the Bidder shall furnish, as part of its bid, a bid security in the amount specified in the Bid Data Sheet.

15.2 The bid security is required to protect the Procuring agency against the risk of Bidder's conduct which would warrant the security's forfeiture, pursuant to ITB Clause 15.7.

15.3 The bid security shall be in Pak. Rupees and shall be in one of the following forms:

- (a) a bank guarantee or an irrevocable letter of credit issued by a reputable bank located in the Procuring agency's country, in the form provided in the bidding documents or another form acceptable to the Procuring agency and valid for thirty (30) days beyond the validity of the bid; or
- (b) Irrevocable encashable on-demand Bank call-deposit.

15.4 Any bid not secured in accordance with ITB Clauses 15.1 and 15.3 will be rejected by the Procuring agency as nonresponsive, pursuant to ITB Clause 24.

15.5 Unsuccessful bidders' bid security will be discharged or returned as promptly as possible but not later than thirty (30) days after the expiration of the period of bid validity prescribed by the Procuring agency pursuant to ITB Clause 16.

15.6 The successful Bidder's bid security will be discharged upon the Bidder signing the contract, pursuant to ITB Clause 32, and furnishing the performance security, pursuant to ITB Clause 33.

15.7 The bid security may be forfeited:

- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Bid Form; or
- (b) in the case of a successful Bidder, if the Bidder fails:
  - (i) To sign the contract in accordance with ITB Clause 32;
  - or**
  - (ii) To furnish performance security in accordance with ITB Clause 33.

## **16 Period of Validity of Bids**

16.1 Bids shall remain valid for the period specified in the Bid Data Sheet after the date of bid opening prescribed by the Procuring agency, pursuant to ITB Clause 19. A bid valid for a shorter period shall be rejected by the Procuring agency as nonresponsive.

16.2 In exceptional circumstances, the Procuring agency may solicit the Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in

writing. The bid security provided under ITB Clause 15 shall also be suitably extended. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request will not be required nor permitted to modify its bid, except as provided in the bidding document.

## **17 Format and Signing of Bid**

- 17.1 The Bidder shall prepare an original and the number of copies of the bid indicated in the Bid Data Sheet, clearly marking “ORIGINAL BID” and “COPY OF BID,” as appropriate. In the event of any discrepancy between them, the original shall govern.
- 17.2 The original and the copy of the bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the contract. All pages of the bid, except for un-amended printed literature, shall be initialed by the person or persons signing the bid.
- 17.3 Any interlineations, erasures, or overwriting shall be valid only if they are initialed by the person or persons signing the bid.
- 17.4 The Bidder shall furnish information as described in the Form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

## **D. Submission of Bids**

## **18 Sealing and Marking of Bids**

- 18.1 The Bidder shall seal the original and copy of the bid in separate envelopes, duly marking the envelopes as “ORIGINAL” and “COPY.” The envelopes shall then be sealed in an outer envelope.
- 18.2 The inner and outer envelopes shall:
  - (a) be addressed to the Procuring agency at the address given in the Bid Data Sheet; and
  - (b) bear the Project name indicated in the Bid Data Sheet, the Invitation for Bids (IFB) title and number indicated in the Bid Data Sheet, and a statement: “DO NOT OPEN BEFORE,” to be completed with the time and the date specified in the Bid Data Sheet, pursuant to ITB Clause 2.2.
- 18.3 The inner envelopes shall also indicate the name and address of the Bidder to enable the bid to be returned unopened in case it is declared “late”.
- 18.4 If the outer envelope is not sealed and marked as required by ITB Clause 18.2, the Procuring agency will assume no responsibility for the bid’s misplacement or premature opening.

## **19 Deadline for Submission of Bids**

- 19.1 Bids must be received by the Procuring agency at the address specified under ITB Clause 18.2 no later than the time and date specified in the Bid Data Sheet.
- 19.2 The Procuring agency may, at its discretion, extend this deadline for the submission of bids by amending the bidding documents in accordance with ITB Clause 7, in which case all rights and obligations of the Procuring agency and bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

**20 Late Bids**

20.1 Any bid received by the Procuring agency after the deadline for submission of bids prescribed by the Procuring agency pursuant to ITB Clause 19 will be rejected and returned unopened to the Bidder.

**21 Modification and Withdrawal of Bids**

21.1 The Bidder may modify or withdraw its bid after the bid's submission, provided that written notice of the modification, including substitution or withdrawal of the bids, is received by the Procuring agency prior to the deadline prescribed for submission of bids.

21.2 The Bidder's modification or withdrawal notice shall be prepared, sealed, marked, and dispatched in accordance with the provisions of ITB Clause 18. by a signed confirmation copy, postmarked no later than the deadline for submission of bids.

21.3 No bid may be modified after the deadline for submission of bids.

21.4 No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid Form. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its bid security, pursuant to the ITB Clause 15.7.

**E. Opening and Evaluation of Bids**

**22 Opening of Bids by the Procuring agency**

22.1 The Procuring agency will open all bids in the presence of bidders' representatives who choose to attend, at the time, on the date, and at the place specified in the Bid Data Sheet. The bidders' representatives who are present shall sign a register evidencing their attendance.

22.2 The bidders' names, bid modifications or withdrawals, bid prices, discounts, and the presence or absence of requisite bid security and such other details as the Procuring agency, at its discretion, may consider appropriate, will be announced at the opening. No bid shall be rejected a bid opening, except for late bids, which shall be returned unopened to the Bidder pursuant to ITB Clause 20.

22.3 Bids (and modifications sent pursuant to ITB Clause 21.2) that are not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances. Withdrawn bids will be returned unopened to the bidders.

22.4 The Procuring agency will prepare minutes of the bid opening.

**23 Clarification of Bids**

23.1 During evaluation of the bids, the Procuring agency may, at its discretion, ask the Bidder for a clarification of its bid. The request for clarification and the response shall be in writing, and no change in the prices or substance of the bid shall be sought, offered, or permitted.

## 24 Preliminary Examination

- 24.1 The Procuring agency will examine the bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.
- 24.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the total price shall be corrected. If the Supplier does not accept the correction of the errors, its bid will be rejected, and its bid security may be forfeited. If there is a discrepancy between words and figures, the amount in words will prevail.
- 24.3 Prior to the detailed evaluation, pursuant to ITB Clause 25 the Procuring agency will determine the substantial responsiveness of each bid to the bidding documents. For purposes of these Clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the bidding documents without material deviations. Deviations from, or objections or reservations to critical provisions, **such as** those concerning Bid Security (ITB Clause 15), Applicable Law (GCC Clause 30), and Taxes and Duties (GCC Clause 32), will be deemed to be a material deviation. The Procuring agency's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.
- 24.4 If a bid is not substantially responsive, it will be rejected by the Procuring agency and may not subsequently be made responsive by the Bidder by correction of the nonconformity.

## 25 Evaluation and Comparison of Bids

- 25.1 The Procuring agency will evaluate and compare the bids which have been determined to be substantially responsive, pursuant to ITB Clause 24.
- 25.2 The Procuring agency's evaluation of a bid will be on delivered duty paid (DDP) price inclusive of prevailing taxes and duties and/or on CFR / CNF / C&F / CPT – Karachi basis and will exclude any allowance for price adjustment during the period of execution of the contract, if provided in the bid.
- 25.3 The Procuring agency's evaluation of a bid will take into account, in addition to the bid price quoted in accordance with ITB Clause 11.2, one or more of the following factors as specified in the Bid Data Sheet, and quantified in ITB Clause 25.4:
- (a) incidental costs
  - (b) delivery schedule offered in the bid;
  - (c) deviations in payment schedule from that specified in the Special Conditions of Contract;
  - (d) the cost of components, mandatory spare parts, and service;
  - (e) the availability Procuring agency of spare parts and after- sales services for the equipment offered in the bid;
  - (f) the projected operating and maintenance costs during the life of the equipment;
  - (g) the performance and productivity of the equipment offered; and/or
  - (h) Other specific criteria indicated in the Bid Data Sheet and/or in the Technical Specifications.

25.4 For factors retained in the Bid Data Sheet pursuant to ITB 25.3, one or more of the following quantification methods will be applied, as detailed in the Bid Data Sheet:

(a) Incidental costs provided by the bidder will be added by Procuring agency to the delivered duty paid (DDP) price at the final destination.

(b) *Delivery schedule.*

(i) The Procuring agency requires that the goods under the Invitation for Bids shall be delivered at the time specified in the Schedule of Requirements which will be treated as the base, a delivery “adjustment” will be calculated for bids by applying a percentage, specified in the Bid Data Sheet, of the DDP price for each week of delay beyond the base, and this will be added to the bid price for evaluation. No credit shall be given to early delivery.

**or**

(ii) The goods covered under this invitation are required to be delivered (shipped) within an acceptable range of weeks specified in the Schedule of Requirement. No credit will be given to earlier deliveries, and bids offering delivery beyond this range will be treated as nonresponsive. Within this acceptable range, an adjustment per week, as specified in the Bid Data Sheet, will be added for evaluation to the bid price of bids offering deliveries later than the earliest delivery period specified in the Schedule of Requirements.

**or**

(iii) The goods covered under this invitation are required to be delivered in partial shipments, as specified in the Schedule of Requirements. Bids offering deliveries earlier or later than the specified deliveries will be adjusted in the evaluation by adding to the bid price a factor equal to a percentage, specified in the Bid Data Sheet, of DDP price per week of variation from the specified delivery schedule.

(c) *Deviation in payment schedule.*

(i) Bidders shall state their bid price for the payment schedule outlined in the SCC. Bids will be evaluated on the basis of this base price. Bidders are, however, permitted to state an alternative payment schedule and indicate the reduction in bid price they wish to offer for such alternative payment schedule. The Procuring agency may consider the alternative payment schedule offered by the selected Bidder.

**or**

(ii) The SCC stipulates the payment schedule offered by the Procuring agency. If a bid deviates from the schedule and if such deviation is considered acceptable to the Procuring agency, the bid will be evaluated by calculating interest earned for any earlier payments involved in the terms outlined in the bid as compared with those stipulated in this invitation, at the rate per annum specified in the Bid Data Sheet.

(d) *Cost of spare parts.*

(i) The list of items and quantities of major assemblies, components, and selected spare parts, likely to be required during the initial period of operation specified in the Bid Data Sheet, is annexed to the Technical Specifications. The total cost of these items, at the unit prices quoted in each bid, will be added to the bid price.

**or**

(ii) The Procuring agency will draw up a list of high-usage and high-value items of components and spare parts, along with estimated quantities of usage in the initial period of operation specified in the Bid Data Sheet. The total cost of these items and quantities will be computed from spare parts unit prices submitted by the Bidder and added to the bid price.

**or**

(iii) The Procuring agency will estimate the cost of spare parts usage in the initial period of operation specified in the Bid Data Sheet, based on information furnished by each Bidder, as well as on past experience of the Procuring agency or other procuring agencies in similar situations. Such costs shall be added to the bid price for evaluation.

(e) *Spare parts and after sales service facilities in the Procuring agency's country.*  
The cost to the Procuring agency of establishing the minimum service facilities and parts inventories, as outlined in the Bid Data Sheet or elsewhere in the bidding documents, if quoted separately, shall be added to the bid price.

(f) *Operating and maintenance costs.*  
Since the operating and maintenance costs of the goods under procurement form a major part of the life cycle cost of the equipment, these costs will be evaluated in accordance with the criteria specified in the Bid Data Sheet or in the Technical Specifications.

(g) *Performance and productivity of the equipment.*

(i) Bidders shall state the guaranteed performance or efficiency in response to the Technical Specification. For each drop in the performance or efficiency below the norm of 100, an adjustment for an amount specified in the Bid Data Sheet will be added to the bid price, representing the capitalized cost of additional operating costs over the life of the plant, using the methodology specified in the Bid Data Sheet or in the Technical Specifications.

**or**

(ii) Goods offered shall have a minimum productivity specified under the relevant provision in the Technical Specifications to be considered responsive. Evaluation shall be based on the cost per unit of the actual productivity of goods offered in the bid, and adjustment will be added to the bid price using the methodology specified in the Bid Data Sheet or in the Technical Specifications.

(h) *Specific additional criteria indicated in the Bid Data Sheet and/or in the Technical Specifications.*

The relevant evaluation method shall be detailed in the Bid Data Sheet and/or in the Technical Specifications.

### **Alternative**

#### 25.4 Merit Point System:

The following merit point system for weighing evaluation factors can be applied if none of the evaluation methods listed in 25.4 above has been retained in the Bid Data Sheet. The number of points allocated to each factor shall be specified in the Bid Data Sheet.

*[In the Bid Data Sheet, choose from the range of]*

Evaluated price of the goods	60 to 90
Cost of common list spare parts	0 to 20
Technical features, and maintenance and operating costs	0 to 20
Availability of service and spare parts	0 to 20
Standardization	0 to 20
Total	100

The bid scoring the highest number of points will be deemed to be the lowest evaluated bid.

**26 Contacting the Procuring agency**

- 26.1 Subject to ITB Clause 23, no Bidder shall contact the Procuring agency on any matter relating to its bid, from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Procuring agency, it should do so in writing.
- 26.2 Any effort by a Bidder to influence the Procuring agency in its decisions on bid evaluation, bid comparison, or contract award may result in the rejection of the Bidder's bid.

**F. Award of Contract**

**27 Post-qualification**

- 27.1 In the absence of prequalification, the Procuring agency will determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated responsive bid is qualified to perform the contract satisfactorily, in accordance with the criteria listed in ITB Clause 13.3.
- 27.2 The determination will take into account the Bidder's financial, technical, and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB Clause 13.3, as well as such other information as the Procuring agency deems necessary and appropriate.
- 27.3 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 will proceed to the next lowest evaluated bid to make a similar determination of that Bidder's capabilities to perform satisfactorily.

**28 Award Criteria**

- 28.1 Subject to ITB Clause 30, the Procuring agency will award the contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined to be the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the contract satisfactorily.

**29 Procuring agency's Right to Vary Quantities at Time of Award**

- 29.1 The Procuring agency reserves the right at the time of contract award to increase or decrease, the quantity of goods and services originally specified in the Schedule of Requirements without any change in unit price or other terms and conditions.

**30 Procuring agency's Right to Accept any Bid and to Reject any or All Bids**

- 30.1 The Procuring agency reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Procuring agency's action.

**31 Notification of Award**

- 31.1 Prior to the expiration of the period of bid validity, the Procuring agency will notify the successful Bidder in writing by registered letter or by cable, to be confirmed in writing by registered letter, that its bid has been accepted.
- 31.2 The notification of award will constitute the formation of the Contract.
- 31.3 Upon the successful Bidder's furnishing of the performance security pursuant to ITB Clause



33, the Procuring agency will promptly notify each unsuccessful Bidder and will discharge its bid security, pursuant to ITB Clause 15.

### **32 Signing of Contract**

- 32.1 At the same time as the Procuring agency notifies the successful Bidder that its bid has been accepted, the Procuring agency will send the Bidder the Contract Form provided in the bidding documents, incorporating all agreements between the parties.
- 32.2 Within thirty (30) days of receipt of the Contract Form, the successful Bidder shall sign and date the contract and return it to the Procuring agency.

### **33 Performance Security**

- 33.1 Within twenty (20) days of the receipt of notification of award from the Procuring agency, the successful Bidder shall furnish the performance security in accordance with the Conditions of Contract, in the Performance Security Form provided in the bidding documents, or in another form acceptable to the Procuring agency.
- 33.2 Failure of the successful Bidder to comply with the requirement of ITB Clause 32 or ITB Clause 33.1 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security, in which event the Procuring agency may make the award to the next lowest evaluated Bidder or call for new bids.

### **34 Corrupt or Fraudulent Practices**

- 34.1 The Government of Sindh requires that Procuring agency's (including beneficiaries of donor agencies' loans), as well as Bidders/Suppliers/Contractors under Government-financed or Procuring Agency-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the SPPRA, in accordance with the SPPRA Act, 2009 (Amended up to date) and Rules made thereunder:
- (a) defines, for the purposes of this provision, the terms set forth below as follows:
    - (i) "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and
    - (ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Procuring agency, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non- competitive levels and to deprive the Procuring agency of the benefits of free and open competition;
  - (b) will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;
  - (c) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a Government-financed contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a Government-financed contract.
- 34.2 Furthermore, Bidders shall be aware of the provision stated in sub-clause 5.4 and sub-clause 24.1 of the General Conditions of Contract.

**Part One - Section II**  
**General Conditions of Contract**

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# General Conditions of Contract

## 1. Definitions

1.1 In this Contract, the following terms shall be interpreted as indicated:

- (a) “The Contract” means the agreement entered into between the Procuring agency and the Supplier, as recorded in the Contract Form signed by the parties, including all attachments and appendices there to and all documents incorporated by reference therein.
- (b) “The Contract Price” means the price payable to the Supplier under the Contract for the full and proper performance of its contractual obligations.
- (c) “The Goods” means all of the equipment, machinery, and/or other materials which the Supplier is required to supply to the Procuring agency under the Contract.
- (d) “The Services” means those services ancillary to the supply of the Goods, such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training, and other such obligations of the Supplier covered under the Contract.
- (e) “GCC” means the General Conditions of Contract contained in this section.
- (f) “SCC” means the Special Conditions of Contract.
- (g) “The Procuring agency” means the organization purchasing the Goods, as named in SCC.
- (h) “The Procuring agency’s country” is the country named in SCC.
- (i) “The Supplier” means the individual or firm supplying the Goods and Services under this Contract.
- (j) “The Project Site,” where applicable, means the place or places named in SCC.
- (k) “Day” means calendar day.

## 2. Application

2.1 These General Conditions shall apply to the extent that they are not superseded by provisions of other parts of the Contract.

## 3. Country of Origin

3.1 All Goods and Services supplied under the Contract shall have their origin in the countries and territories eligible under the rules and further elaborated in the SCC or Technical Specifications.

3.2 For purposes of this Clause, “origin” means the place where the Goods were mined, grown, or produced, or from which the Services are supplied. Goods are produced when, through manufacturing, processing, or substantial and major assembly of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.

3.3 The origin of Goods and Services is distinct from the nationality of the Manufacturer / Supplier.

#### **4. Technical Specifications**

4.1 The Goods supplied under this Contract shall conform to the standards mentioned in the Technical Specifications, and, when no applicable standard is mentioned, to the authoritative standards appropriate to the Goods' country of origin. Such standards shall be the latest issued by the concerned institution.

#### **5. Use of Contract Documents and Information; Inspection and Audit by the Government**

5.1 The Supplier shall not, without the Procuring agency's prior written consent, disclose the Contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Procuring agency in connection therewith, to any person other than a person employed by the Supplier in the performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

5.2 The Supplier shall not, without the Procuring agency's prior written consent, make use of any document or information enumerated in GCC Clause 5.1 except for purposes of performing the Contract.

5.3 Any document, other than the Contract itself, enumerated in GCC Clause 5.1 shall remain the property of the Procuring agency and shall be returned (all copies) to the Procuring agency on completion of the Supplier's performance under the Contract if so required by the Procuring agency.

5.4 The Supplier shall permit the Procuring agency to inspect the Supplier's accounts and records relating to the performance of the Supplier and to have them audited by auditors appointed by the procuring agency, if so required.

#### **6. Patent Rights**

6.1 The Supplier shall indemnify the Procuring agency against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof in the Procuring agency's country.

#### **7. Performance Security**

7.1 Within twenty (20) days of receipt of the notification of Contract award, the successful Bidder shall furnish to the Procuring agency the performance security in the amount specified in SCC.

7.2 The proceeds of the performance security shall be payable to the Procuring agency as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

7.3 The performance security shall be denominated in the currency of the Contract acceptable to the Procuring agency and shall be in one of the following forms:

- (a) a bank guarantee or an irrevocable letter of credit issued by a reputable bank located in the Procuring agency's country, in the form provided in the bidding documents or another form acceptable to the Procuring agency; or
- (b) a cashier's or certified check.

- 7.4 The performance security will be discharged by the Procuring agency and returned to the Supplier not later than thirty (30) days following the date of completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless specified otherwise in SCC.

## **8. Inspections and Tests**

- 8.1 The Procuring agency or its representative shall have the right to inspect and/or to test the Goods to confirm their conformity to the Contract specifications at no extra cost to the Procuring agency. SCC and the Technical Specifications shall specify what inspections and tests the Procuring agency requires and where they are to be conducted. The Procuring agency shall notify the Supplier in writing, in a timely manner, of the identity of any representatives retained for these purposes.
- 8.2 The inspections and tests may be conducted on the premises of the Supplier or its subcontractor(s), at point of delivery, and/or at the Goods' final destination. If conducted on the premises of the Supplier or its subcontractor(s), all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Procuring agency
- 8.3 Should any inspected or tested Goods fail to conform to the Specifications, the Procuring agency may reject the Goods, and the Supplier shall either replace the rejected Goods or make alterations necessary to meet specification requirements free of cost to the Procuring agency.
- 8.4 The Procuring agency's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival in the Procuring agency's country shall in no way be limited or waived by reason of the Goods having previously been inspected, tested, and passed by the Procuring agency or its representative prior to the Goods' shipment from the country of origin.
- 8.5 Nothing in GCC Clause 8 shall in any way release the Supplier from any warranty or other obligations under this Contract.

## **9. Packing**

- 9.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit.
- 9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in SCC, and in any subsequent instructions ordered by the Procuring agency.

## **10. Delivery and Documents**

- 10.1 Delivery of the Goods shall be made by the Supplier in accordance with the terms specified in the Schedule of Requirements. The details of shipping and/or other documents to be furnished by the Supplier are specified in SCC.

10.2 Documents to be submitted by the Supplier are specified in SCC.

## **11. Insurance**

11.1 The Goods supplied under the Contract shall be delivered duty paid (DDP) / CFR / CNF / C&F / CPT – Karachi under which risk is transferred to the buyer after having been delivered at consignees end or Karachi Port, hence insurance coverage is seller's responsibility.

## **12. Transportation**

12.1 The Supplier is required under the Contract to transport the Goods to a specified place of destination outside and within the Procuring agency's country, transport to such place of destination in the Procuring agency's country, including insurance and storage, as shall be specified in the Contract, shall be arranged by the Supplier, and related costs shall be included in the Contract Price.

## **13. Incidental Services**

13.1 The Supplier may be required to provide any or all of the following services, including additional services, if any, specified in SCC:

- (a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;
- (b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;
- (c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;
- (d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and
- (e) Training of the Procuring agency's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods.

13.2 Prices charged by the Supplier for incidental services, if not included in the Contract Price for the Goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged for other parties by the Supplier for similar services.

## **14. Spare Parts**

14.1 As specified in SCC, the Supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier:

- (a) such spare parts as the Procuring agency may elect to purchase from the Supplier, provided that this election shall not relieve the Supplier of any warranty obligations under the Contract; and
- (b) in the event of termination of production of the spare parts:
  - (i) advance notification to the Procuring agency of the pending termination, in sufficient time to permit the Procuring agency to procure needed requirements; and
  - (ii) Following such termination, furnishing at no cost to the Procuring agency, the blueprints, drawings, and specifications of the spare parts, if requested.

## 15. Warranty

- 15.1 The Supplier warrants that the Goods supplied under the Contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The Supplier further warrants that all Goods supplied under this Contract shall have no defect, arising from design, materials, or workmanship (except when the design and/or material is required by the Procuring agency's specifications) or from any act or omission of the Supplier, that may develop under normal use of the supplied Goods in the conditions prevailing in the country of final destination.
- 15.2 This warranty shall remain valid for twelve (12) months or according to the requirement of extended warranty period after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the Contract. In any case this period shall not exceed six (06) months beyond the warranty expiration period from the date of taking over of goods by the procuring agency, unless specified otherwise in SCC.
- 15.3 The Procuring agency shall promptly notify the Supplier in writing of any claims arising under this warranty.
- 15.4 Upon receipt of such notice, the Supplier shall, within the period specified in SCC and with all reasonable speed, repair or replace the defective Goods or parts thereof, without costs to the Procuring agency.
- 15.5 If the Supplier, having been notified, fails to remedy the defect(s) within the period specified in SCC, within a reasonable period, the Procuring agency may proceed to take such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Procuring agency may have against the Supplier under the Contract.
- 15.6 The provisions of this Clause include all the expenses that the bidder may have to incur for delivery and installation of such replacement parts, material and equipment as are needed for satisfactory operation of the goods at the consignees end.
- 15.7 During the period of warranty, the bidder shall remedy, at his / her expense all defects in design, material and workmanship that may develop or are revealed under normal use of the goods upon receiving writing notice from the procuring agency; the notice shall indicate in what respect the goods are faulty.
- 15.8 The bidder shall remain responsible for providing after sale services even after expiry of warranty / guarantee period and sign a Service Contract including parts or without parts with Procuring Agency for 05 years (minimum). Bidder shall separately quote the price of service contract (in terms of percentage) inclusive of parts and without parts, separately.
- 15.9 The Procuring Agency shall promptly notify the Bidder in writing of any claims arising out of this warranty.



15.10 The bidder shall be responsible to ensure the 95% uptime of the machinery / equipment during the warranty period.

## **16. Payment**

16.1 The method and conditions of payment to be made to the Supplier under this Contract shall be specified in SCC.

16.2 The Supplier's request(s) for payment shall be made to the Procuring agency in writing, accompanied by an invoice describing, as appropriate, the Goods delivered and Services performed, and by documents submitted pursuant to GCC Clause 10, and upon fulfillment of other obligations stipulated in the Contract.

16.3 Payments shall be made promptly by the Procuring agency, but in no case later than sixty (60) days after submission of an invoice or claim by the Supplier.

16.4 The currency of payment shall be in Pak. Rupees for Goods supplied from within the Procuring Agency's country on DDP basis and payment shall be made in Foreign Currency. Trough irrevocable letter of credit for Goods supplied from outside the Procuring Agency's country on CFR / CNF/ C&F / CPT Karachi Basis.

## **17. Prices**

17.1 Prices charged by the Supplier for Goods delivered and Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any price adjustments authorized in SCC or in the Procuring agency's request for bid validity extension, as the case may be.

## **18. Change Orders**

18.1 The Procuring agency may at any time, by a written order given to the Supplier pursuant to GCC Clause 31, make changes within the general scope of the Contract in any one or more of the following:

- (a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Procuring agency;
- (b) the method of shipment or packing;
- (c) the place of delivery; and/or
- (d) The Services to be provided by the Supplier.

## **19. Contract Amendments**

19.1 Subject to GCC Clause 18, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

## **20. Assignment**

20.1 The Supplier shall not assign, in whole or in part, its obligations to perform under this Contract, except with the Procuring agency's prior written consent.

## **21. Subcontracts**

- 21.1 The Supplier shall notify the Procuring agency in writing of all subcontracts awarded under this Contract if not already specified in the bid. Such notification, in the original bid or later, shall not relieve the Supplier from any liability or obligation under the Contract.
- 21.2 Subcontracts must comply with the provisions of GCC Clause 3.

## **22. Delay in the Supplier's Performance**

- 22.1 Delivery of the Goods and performance of Services shall be made by the Supplier in accordance with the time schedule prescribed by the Procuring agency in the Schedule of Requirements / Contract Award.
- 22.2 If at any time during performance of the Contract, the Supplier or its subcontractor(s) should encounter conditions impeding timely delivery of the Goods and performance of Services, the Supplier shall promptly notify the Procuring agency in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Supplier's notice, the Procuring agency shall evaluate the situation and may at its discretion extend the Supplier's time for performance, with or without liquidated damages, in which case the extension shall be ratified by the parties by amendment of Contract.
- 22.3 Except as provided under GCC Clause 25, a delay by the Supplier in the performance of its delivery obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 23, unless an extension of time is agreed upon pursuant to GCC Clause 22.2 without the application of liquidated damages.

## **23. Liquidated Damages**

- 23.1 Subject to GCC Clause 25, if the Supplier fails to deliver any or all of the Goods or to perform the Services within the period(s) specified in the Contract, the Procuring agency shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in SCC of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in SCC. Once the maximum is reached, the Procuring agency may consider termination of the Contract pursuant to GCC Clause 24.

## **24. Termination for Default**

- 24.1 The Procuring agency, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate this Contract in whole or in part:
- (a) If the Supplier fails to deliver any or all of the Goods within the period(s) specified in the Contract, or within any extension thereof granted by the Procuring agency pursuant to GCC Clause 22; or
  - (b) If the Supplier fails to perform any other obligation(s) under the Contract.
  - (c) If the Supplier, in the judgment of the Procuring agency has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this clause:

“Corrupt practice” means the offering, giving, receiving or soliciting of anything of value to

influence the action of a public official in the procurement process or in contract execution.

“fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition.

- 24.2 In the event the Procuring agency terminates the Contract in whole or in part, pursuant to GCC Clause 24.1, the Procuring agency may procure, upon such terms and in such manner as it deems appropriate, Goods or Services similar to those undelivered, and the Supplier shall be liable to the Procuring agency for any excess costs for such similar Goods or Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

## **25. Force Majeure**

- 25.1 Notwithstanding the provisions of GCC Clauses 22, 23, and 24, the Supplier shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- 25.2 For purposes of this clause, “Force Majeure” means an event beyond the control of the Supplier and not involving the Supplier’s fault or negligence and not foreseeable. Such events may include, but are not restricted to, acts of the Procuring agency in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.
- 25.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Procuring agency in writing of such condition and the cause thereof. Unless otherwise directed by the Procuring agency in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

## **26. Termination for Insolvency**

- 26.1 The Procuring agency may at any time terminate the Contract by giving written notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Procuring agency.

## **27. Termination for Convenience**

- 27.1 The Procuring agency, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Procuring agency’s convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.
- 27.2 The Goods that are complete and ready for shipment within thirty (30) days after the Supplier’s receipt of notice of termination shall be accepted by the Procuring agency at the Contract terms and prices. For the remaining Goods, the Procuring agency may elect:

- (a) To have any portion completed and delivered at the Contract terms and prices; and/or
- (b) To cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Services and for materials and parts previously procured by the Supplier.

**28. Resolution of disputes**

- 28.1 The Procuring agency and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.
- 28.2 If, after thirty (30) days from the commencement of such informal negotiations, the Procuring agency and the Supplier have been unable to resolve amicably a Contract dispute, either party may require that the dispute be referred for resolution to the formal mechanisms specified in SCC. These mechanisms may include, but are not restricted to, conciliation mediated by a third party, adjudication in an agreed manner and/or arbitration.

**29. Governing Language**

- 29.1 The Contract shall be written in the language specified in SCC. Subject to GCC Clause 30, the version of the Contract written in the specified language shall govern its interpretation. All correspondence and other documents pertaining to the Contract which are exchanged by the parties shall be written in the same language.

**30. Applicable Law**

- 30.1 The Contract shall be interpreted in accordance with the laws of the Procuring agency's country (Islamic Republic of Pakistan), unless otherwise specified in SCC.

**31. Notices**

- 31.1 Any notice given by one party to the other pursuant to this Contract shall be sent to the other party in writing or by cable, telex, or facsimile and confirmed in writing to the other party's address specified in SCC.
- 31.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

**32. Taxes and Duties**

- 32.1 Supplier shall be entirely responsible for all taxes, duties, license fees, etc. (excluding GST), incurred until delivery of the contracted Goods to the Procuring agency in case of Delivered Duty Paid (DDP) basis.

## **PART TWO (PROCUREMENT SPECIFIC PROVISIONS)**

- Invitation for Bids (IFB)
- Bid Data Sheet (BDS)
- List of Mandatory Documents
- Technical Evaluation Criteria
- Criteria for Bid Evaluation
- Special Conditions of Contract (SCC)
- Schedule of Requirements
- Technical Specifications
- Bill of Quantities (BOQ)
- Sample Form

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**Part Two - Section I.**

**Invitation for Bids**

## Invitation for Bids (IFB) / Notice Inviting Tender (NIT)

IFB / NIT No: DUHS/P&D/2024/11745 Dated 23 Feb, 2024

(REF. NO. DUHS/W&S-NIT/142)

Dow University of Health Sciences (DUHS), Karachi invites following sealed bids on CNF basis and/or DDP Basis (Excluding GST), from the Manufacturers or authorized Agents / Distributors of Manufacturers available on 'List of Active Taxpayers' of FBR for Income Tax & Sales Tax.

Name of Bid	
<b>SUPPLY / FIXING / INSTALLATION / TESTING &amp; COMMISSIONING OF HVAC SYSTEM AT WAREHOUSE, OJHA CAMPUS, DUHS, KARACHI.</b>	

Tender fee	Rs. 5,000/- (Rupees Five Thousand Only) Non-Refundable in shape of Pay Order / Demand Draft in favor of Dow University of Health Sciences, Karachi.
Bidding Procedure	Single Stage – Two Envelopes
Bid security	Two percent (2.5%) of the total bid value.
Tender purchasing date & time	From the date of publishing to 16-03-2024 ( 08:30 am to 02:30 pm & Ramzan Timing 08:30 to 12:00 pm )
Deadline for submission of bids	18-03-2024 at 10:30 a.m
Bid Opening Date & Time	18-03-2024 at 11:00 a.m

.Bidding Document containing detailed terms & conditions can be obtained against non-refundable pay Order / Demand Draft of Rs. 5,000/- being tender fee in favor of Dow University of Health Sciences during office hours. No tender shall be sold on the date of opening of bid. Tender Notice and bidding documents are also available on the websites of Dow University of Health Sciences ([www.duhs.edu.pk](http://www.duhs.edu.pk)) and Sindh Public Procurement Regulatory Authority (<http://ppms.pprasindh.gov.pk>), in this situation, bidder is required to enclose Pay Order / Demand Draft of tender fee (Rs. 5,000/-) with their bid, which must be issued by a scheduled bank within the tender purchasing dates, otherwise bid will not be entertained. DUHS may issue the clarifications or amendments in respect of the bidding documents which will be uploaded on both websites, DUHS will not be responsible of any confusion or misunderstanding in this regard.

**The Bidder shall submit an original and one copy of the Complete Technical bid in separate sealed envelopes, clearly marking each “ORIGINAL BID” and “COPY OF BID,” as appropriate.**

The Dow University of Health Sciences, Karachi (DUHS) reserves the right to reject any or all the bids subject to the relevant provisions of SPPRA Rules 2010 (Amended up to date).

**Address for Purchasing of bidding documents, submission and opening of bids:**

Office of Director Planning & Development, Dow University of Health Sciences (DMC Campus),  
Baba-E-Urdu Road, besides Civil Hospital, Karachi.  
Phone No. 021-38771000 Extension 5820

**DIRECTOR PLANNING & DEVELOPMENT  
DOW UNIVERSITY OF HEALTH SCIENCES, KARACHI**



**Section II.**  
**Bid Data Sheet**

## Bid Data Sheet

The following specific data for the goods to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB) Part One. Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

<b>Introduction</b>	
<b>ITB 1.1</b>	<b>Name of Procuring Agency:</b> Dow University of Health Sciences, Karachi (DUHS)
<b>ITB 1.1</b>	<b>Name of Contract:</b> <b>SUPPLY / FIXING / INSTALLATION / TESTING &amp; COMMISSIONING OF HVAC SYSTEM AT WAREHOUSE, OJHA CAMPUS, DUHS, KARACHI.</b>
<b>ITB 1.1</b>	IFB / NIT No: DUHS/P&D/2024/11745 Dated 23 Feb, 2024 <b>(REF. NO. DUHS/W&amp;S-NIT/142)</b>
<b>ITB 6.1</b>	<b>Postal Address:</b> Office of the Director Planning & Development, Dow University of Health Sciences, (DMC Campus) Baba-e-Urdu road, besides Civil Hospital, Karachi. Phone No. 021-38771000 Extension 5820
<b>ITB 8.1</b>	Language of the bid shall be ENGLISH.
<b>Joint Venture (JV)/ Consortium Bid:</b>	<b>Not Allowed</b>
<b>Alternate Bid:</b>	<b>Not Allowed</b>
<b>Bid Price and Currency</b>	
<b>ITB 11.2</b>	<ul style="list-style-type: none"> <li>• The price quoted shall be in <b>Pakistani Rupee</b> for the Goods offered within the Procuring Agency's Country on delivered duty paid (DDP) Price (excluding GST).</li> <li>• The price quoted shall be in <b>foreign Currency</b> for the Goods offered from Outside the Procuring Agency's Country on CFR / CNF/ C&amp;F / CPT Karachi Basis.</li> <li>• Price of incidental services, if any, must be included in price of goods</li> </ul>
<b>ITB 11.4</b>	The price shall be fixed during the contract period.
<b>ITB 12.1</b>	<ul style="list-style-type: none"> <li>• <b>For the Goods offered within the Procuring Agency's Country:</b> the price quoted shall be in <b>Pak Rupees on delivered duty paid (DDP) basis (Excluding GST).</b></li> <li>• <b>For the Goods offered from Outside the Procuring Agency's Country:</b> the price quoted shall be in <b>Foreign Currency on CFR / CNF/ C&amp;F / CPT- Karachi Basis.</b></li> </ul>

**Preparation and Submission of Bids “MANDATORY DOCUMENTS”**

<b>ITB 13.3 (d)</b>	<p>Qualification requirements</p> <p>Please review the following list of all documents to be enclosed with the Technical Proposal. These are the “MANDATORY DOCUMENTS” Non submission of any one of the mandatory documents will lead to disqualification and further assessment of tender will not be done hence “TECHNICALLY REJECTED”.</p> <p><b>The Procuring Agency (DUHS) is a Non-Profit organization (NPO), hence DDP Rates shall be quoted (if applicable) excluding GST.</b></p>
---------------------	--

S#	Document of Participating Firm (Mandatory)	Attached / Not Attached
1.	Tender Purchase Receipt (Original) / Pay order of Tender Fee	
2.	The Bidders must be accompanied by an original Bid Security (amount mentioned) in the form of a Pay Order / Demand Draft, Call Deposit or a Bank Guarantee issued by a scheduled Bank in favour of Dow University of Health Sciences. (Copy with value hidden in Technical Proposal; Original in Financial Proposal)	
3.	The bidder must have done at least (02) projects in the public sector departments either government / semi-government / autonomous bodies / reputable private sector project, during the last 05 years with similar nature of works. Submit proper evidences e.g. work orders, agreements, and performance certificates etc, with client list <b>(as per sample Form-B)</b>	
4.	Bidding Documents (Duly filled, Signed & Stamped by Bidder).	
5.	Undertaking on stamp paper of Rs. 100/- duly notarized to the effect that: i. The bidder is neither blacklisted nor suspended by any National / International, including Provincial and Federal Government. ii. Any director or owner of the bidding company is not awarded any punishment from any Court of Law. iii. Bidder has submitted the correct and complete information along with the bid/offer. If any document / information is found forged / engineered / fake / bogus at any stage, the bidder may be declared as Blacklisted in accordance with law and the performance guarantee and payment, if any may be forfeited.	
6.	Compliance to bid validity, terms and conditions and delivery schedule.	
7.	Copy of NTN / Income Tax Registration Certificate, Sales Tax Registration Certificate, Companies must be available on ‘List of Active Taxpayers’ of FBR (for Income Tax & GST) and SRB (For Sales Tax) websites.	
8.	PEC Registration Certificate valid upto <b>June-2024</b>	
9.	PEC license in Category “C-3 & above” along with the fields of specialization codes mentioned below: <b>ME-01</b>	
10.	Average Income Tax returns Minimum for Last three (03) years should not be less than <b>200 Million</b> submit copies of Income Tax Returns with Audited Statements.	
11.	Human Resource including detail of Technical Team (Technical Staff Bio data with Training Certificates <b>(as per sample Form-A)</b> )	
12.	The Bid Form & Price Schedule(s) shall be inserted in the Financial Proposal. However, a copy of the same shall be inserted in the Technical Proposal after hiding the amount.	
13.	Authorized distributor certificate with contact details of (Original Equipment Manufacturer) OEM / authorized dealer, including authorization letter.	

14.	Complete set of Bidding Documents including Tender Documents should be submitted in One Original Set and One Photo Copy Set, must be stamped and signed by the owner / representative of each page.	
15.	The Manufacturer should have documentary evidence to the effect that they are the original Manufacturer of the quoted product with indication of manufacturing site and its location. Third party certification must be provided.	
16.	Local agent capacity for technical services in reference to the product. The bidder must provide a certificate from foreign principal stating that there team is trained by OEM for troubleshooting services and also the bidder has at least three (03) spare units available in stock of complete controller sets including motherboards, auxiliary boards, calling cards, display cards and inspection boards etc.	
17.	Catalogue / Brochures / technical data sheet (having complete technical specifications of the offered good) (original)	
18.	Bidder must have secured a minimum of 70 qualification marks in Technical Evaluation Criteria.	

**Note:**

Bidder must provide necessary supporting documents as proof in respect of the selection criteria mentioned above.

### TECHNICAL EVALUATION CRITERIA

The following criterion will be followed for evaluation of the contractors who participate in the bidding process. Firms obtaining overall less than 70% marks and / or less than 50% marks in any section of the evaluation criteria shall not be approved.

#### A. PRODUCT EVALUATION

S#	PARAMETERS / SUB-PARAMETERS	Total Marks
<b>1</b>	<b>Conformity to the Purchaser's Specifications (MANDATORY)</b>	<b>10</b>
1.1	Fully compliant with the required specifications	10
1.2	Compliant with minor deviation (up to 10% subject to main function is not affected)	05
1.3	Non-compliant to required specifications	Disqualify
<b>2</b>	<b>Product Certification (MANDATORY) with documentary proof</b>	<b>35</b>
2.1	Eurovent Certificate for Air Handling Units	7
2.2	AHRI Certificate for Air Handling Units	5
2.3	TB1 Thermal Bridging for Air Handling Units	5
2.4	Built-in Hydronic Kit with at least 12 m pressure head for Chillers	7
2.5	Direct driven AMCA certified Fans for Air Handling Units	5
2.6	Inverter Air Cooled Scroll Chillers Capacity Modulation (15% ~ 120%)	3
2.7	Modular Design Lead/Lag operation for at least 04 chillers per Remote Controller	3
<b>TOTAL MARKS PRODUCT EVALUATION (A)</b>		<b>45</b>

#### B. BIDDER EVALUATION

S#	PARAMETERS / SUB-PARAMETERS	Total Marks
<b>3.</b>	<b>Technical Staff with documentary proof evidences in the form of pay slips. Bank statements etc</b>	<b>03</b>
3.1	PEC Registration Certificate Category C-3 or above.	03
<b>4.</b>	<b>Networking and Training</b>	<b>04</b>
4.1	Networking setup across Pakistan (1 mark for each setup)	03
4.2	Certificate to affect that the firm will provide training in the use of equipment to the relevant technical staff. Training plan must be attached with certificate.	01
<b>5.</b>	<b>Delivery Schedule at consignees' end</b>	<b>20</b>
5.1	Inverter Chiller Delivery from Stock within 16 week from the date of order	15
5.2	Air Handling Units delivery within 16 weeks from the date of LC opening at KHI port	05
5.3	After passing above deadlines	00
<b>6.</b>	<b>Past Experience / Performance of Last 5 years (Public Sector / Private Sector)</b>	<b>20</b>
6.1	At least one similar nature work having minimum cost of 80% of the estimate cost of the work or at least two similar nature each having minimum cost 50% of the estimated cost for last Five years duly supported with Submit proper evidences e.g. work orders, agreements, and performance certificates with client list <b>(as per sample Form-B)</b>	20
<b>7.</b>	<b>Average Annual Turnover during the last three (03) years financial year (supported with Income Tax Returns)</b>	<b>08</b>
7.1	Turnover of 250 million PKR or higher	08
7.2	Turnover above 225 million but less than 250 million PKR	05
7.3	Turnover above 200 million PKR but less than 225 million PKR	03
7.4	Turnover below 200 million PKR	0
<b>TOTAL BIDDER EVALUATION (B)</b>		<b>55</b>
<b>GRAND TOTAL (A + B)</b>		<b>100</b>

<b>ITB 15.1</b>	Amount of bid security <b>shall not be less than 2.5% of the total bid price</b> of the bidder in the form of a Call Deposit, Bank Draft or a Bank Guarantee issued by a scheduled bank of Pakistan, in favour of the Dow University of Health Sciences, Karachi.
<b>ITB 16.1</b>	Bid validity period shall be <b>90 days</b>
<b>ITB 17.1</b>	The Bidder shall submit an original and one copy of the complete technical bid, clearly marking each“ORIGINAL BID” and “COPY OF BID,” as appropriate.
<b>ITB 19.1</b>	<b>Deadline for bid submission:</b> 18-03-2024 at 10:30 a.m
<b>ITB 22.1</b>	<b>Date, Time and Place of Bid Opening</b> 18-03-2024 at 11:00 a.m Place: Office of the Director Planning & Development, Dow University of Health Sciences, (DMC Campus) Baba-e-Urdu road, besides Civil Hospital, Karachi. Phone No. 021-38771000 Extension 5820

<b>Bid Evaluation</b>	
<b>ITB 25.4</b>	Criteria for bid Evaluation

**i. Technical Bids / Proposals Evaluation:**

- (a) The bids not responsive to the MANDATORY QUALIFICATION CRITERIA provided at ITB Clause 13.3(d) shall not be eligible for further Technical Evaluation.
- (b) Joint Venture’s / Consortium’s Bids, Conditional Bids, Telegraphic Bids, Bids not accompanied by Bid Security of required amount and form, bids received after specific date and time and bids of Black Listed firms **shall be treated as rejected / non-responsive**.
- (c) **Joint Venture (JV) / or Consortium’s and** Alternative bids shall not be allowed.
- (d) The Bids shall be evaluated on a complete Package / Lot. All items basis reflected in Section-V (Technical Specifications). Bids for individual / partial / limited items(s) shall not be considered and rejected.
- (e) **Bids are invited as per the Single Stage – Two Envelope Procedure** in accordance with sub-rule 2 of rule 46 of the Sindh Public Procurement Rules, 2010 (Amended up to date). In case, any bidder encloses the financial bid within the technical bid, the same shall be rejected summarily.
- (f) Soft Copy (USB) containing all documents and forms (in Excel/DOC format and searchable).

**ii. Financial Bids / Proposal Evaluation:**

- a. Technically qualified / responsive / successful bidder(s) shall be eligible for Financial Proposal(s). The Financial bids shall be opened in the presence of the Bidders at the scheduled date, time and venue communicated in advance.
- b. Only those Financial Proposals will be announced / considered which were technically qualified by the Committee. Therefore, bidders are advised to give separate sealed envelope (s) of every quoted item and should mention the name of the item and tender serial number on the front of the sealed envelope in **BOLD and legible letters** to avoid confusion, otherwise, the Financial Proposal Envelope will be opened on qualified item basis and it will not be challenged by the bidder that procuring agency has opened the Financial Proposal of the disqualified items besides qualified items.
- c. Financial Bids / Proposals of Technically disqualified / rejected bidders will not be opened and sealed envelope shall be returned to the bidder.
- d. Bids not accompanied by the Bid Security of required amount and form shall be rejected.
- e. Procuring Agency shall not be responsible for any erroneous calculation of taxes and all differences arising out shall be fully borne by the Successful Bidder.
- f. For the purpose of comparison of bids quoted in different currencies, price shall be converted into Pakistani Rupees. The rate of exchange shall be the selling rate prevailing seven working days before the date of opening of the bids, as notified by the National Bank of Pakistan (NBP) / State Bank of Pakistan (SBP).
- g. The bidders must quote the rate in figures with maximum two decimals placing only third decimal place shall not be considered.

<b>Contract Award</b>	
<b>ITB 29.1</b>	Procuring Agency reserves the right to drop any item and increase or decrease the quantity of goods originally specified in Schedule of Requirements / Technical Specifications without any change in unit price and other terms & conditions.
<b>ITM 32.1</b>	Successful Bidder and the Procuring Agency will sign the Contract Agreement on the stamp paper with stamp duties as per the article 22-A (Contract) of the schedule of Stamp Act 1899. The expenditure involved on the said contract agreement will be borne by the bidder.

**Section III.**  
**Special Conditions of Contract**



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## Special Conditions of Contract

The following Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract. The corresponding clause number of the GCC is indicated in parentheses.

### 1. Definitions (GCC Clause 1)

GCC 1.1 (g)—The Procuring agency is: Dow University of Health Sciences, Karachi.

GCC 1.1 (h)—The Procuring agency's country is: Islamic Republic of Pakistan

GCC 1.1 (i)—The Supplier is: \_\_\_\_\_  
[Name and Address of the Bidder]

### 2. Country of Origin (GCC Clause 3)

All countries and territories as indicated in Part Two Section VI of the bidding documents, "Eligibility for the Provisions of Goods, Works, and Services in Government-Financed Procurement".

### 3. Technical Specifications (GCC Clause 4)

The technical specifications of the goods provided in these bidding document are only for widest possible competition and not for favor any single contractor or supplier nor put others at a disadvantage. However, the brand name, catalogue No. / Name etc., if any, has only been used for the reference purpose. Equipment offered **"ATLEAST EQUIVALENT OR HAVING BETTER TECHNICAL SPECIFICATIONS"** shall also be considered.

### 4. Performance Security (GCC Clause 7)

GCC 7.1—The amount of performance security, as a percentage of the Contract Price, shall be **Five (5%) percent** of the Contract Price in favor of Dow University of Health Sciences, Karachi.

### 5. Packing (GCC Clause 9)

GCC 9.2—The following SCC shall supplement GCC Clause 9.2:

The packing, marking and documentation within and outside the packages shall be as per manufacturer standards meeting the safety requirements of the goods.

### 6. Delivery and Documents (GCC Clause 10)

GCC 10.2—*For Goods supplied from within the Procuring Agency's country:* The Bidder shall provide the following documents at the time of delivery of goods to the Store / Warehouse of the Dow University of Health Sciences, Karachi for verification duly completed in all respects:

- i. Original copies of Delivery Note (Delivery Challan) (in duplicate) showing item's description, make, model, quantity as well as Lot Number, Batch Number, Registration Number, manufacturing and expiry dates (if applicable).
- ii. Original copies of the Bidder's invoices (in duplicate) showing warranty, item's description, make, model as well as Lot Number, Batch Number, Registration Number, manufacturing and expiry dates (if applicable) per unit cost, and total amount.
- iii. Original copies of the Sales Tax Invoices (where applicable) in duplicate showing item's description, quantity, per unit cost without Sales Tax, amount of Sales Tax and total amount with Sales Tax.
- iv. Manufacturer's or Bidder's warranty certificate.
- v. Inspection certificate issued by the nominated inspection committee / Bidder's factory inspection report.
- vi. Certificate of origin.

- vii. Operator manual, technical and service manual, software, spare parts catalogue and price list must be provided with the equipment.

**GCC 10.2—*For Goods supplied from abroad as per INCOTERM CFR / CNF/ C&F / CPT Karachi:*** Upon shipment, the Supplier shall notify the Procuring agency the full details of the shipment, including Contract number, description of Goods, quantity and usual transport document. The Supplier shall mail / submit the following documents to the Procuring agency at least one week prior to arrival of the Goods at the port or place of arrival and, if not received, the Bidder will be responsible for any consequent expenses.

- (i) copies of the Supplier's invoice showing Goods' description, quantity, unit price, and total amount;
- (ii) Original and One copy of the usual transport document (for example, a negotiable bill of lading, a non-negotiable sea waybill, an inland waterway document, an air waybill, a railway consignment note, a road consignment note, or a multimodal transport document) which the buyer may require to take the goods;
- (iii) copies of the packing list identifying contents of each package;
- (iv) insurance certificate;
- (v) Manufacturer's or Supplier's warranty certificate;
- (vi) inspection certificate, issued by the nominated inspection agency, and the Supplier's factory inspection report; and
- (vii) Certificate of origin.

#### **7. Insurance (GCC Clause 11)**

**GCC 11.1— *For Goods supplied from within the Procuring Agency's country:*** The Goods supplied under the Contract shall be delivered duty paid (DDP) under which risk is transferred to the buyer after having been delivered, hence insurance coverage is seller's responsibility. Since the Insurance is seller's responsibility they may arrange appropriate coverage.

**GCC 11.1— *For Goods supplied from abroad as per INCOTERM CFR / CNF/ C&F / CPT Karachi:*** The Goods supplied under the Contract shall be ***INCOTERM CFR / CNF/ C&F / CPT Karachi*** under which risk is transferred to the buyer after the goods reached at Karachi port, hence insurance coverage / marine cover note is seller's responsibility. Since the Insurance / marine cover is seller's responsibility they may arrange appropriate coverage.

#### **8. Spare Parts (GCC Clause 14)**

**GCC 14.1—**Supplier shall carry sufficient inventories to assure ex-stock supply of consumable, spares parts for the Goods. Other spare parts and components if not in stock shall be supplied as promptly as possible, but in any case, within 4 weeks of placing the order on DDP basis and in case of import of part within 6 weeks after opening the letter of credit. All spares during warranty period must be supplied from stock, and if part is not in stock and requires import, that a loner equipment must be provided. Spare parts/accessories/consumables must be supplied for at least 10 years after successful installation, and if the product is discounted before 10 years, upgrade latest equipment must be provided at 50% of the market value.

#### **9. Warranty (GCC Clause 15)**

**GCC 15.2—**In partial modification of the provisions, the warranty period shall be twelve (12) months or as per the extended warranty period from the date of acceptance of the Goods with 95% uptime during warranty and contract period covering service and spare parts. The Supplier shall, in addition, comply with the performance and/or consumption guarantees specified under the Contract. During warranty/contract period, preventative maintenance, Installation qualification, operational qualification, QA/QC must be done as per manufactures checklist and guideline by trained personal. Response time during warranty and contract period would be 4 hours of less, and resolution time

should not increase 7 days for any instance. If, for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the Supplier shall, at its discretion, either:

(a) make such changes, modifications, and/or additions to the Goods or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract at its own cost and expense and to carry out further performance tests in accordance with GCC 8,

or

(b) pay liquidated damages to the Procuring agency with respect to the failure to meet the contractual guarantees. The rate of these liquidated damages shall be 0.5% per week or part thereof the total amount of contract.

or

(c) Increase the warranty, minimum five (05) years extended warranty required.

GCC 15.4 & 15.5—The period for correction of defects in the warranty period is 7 days or earlier.

**GCC 15.9— The bidder shall separately quote the price of service contract without parts for the period defined in the bid data sheet at clause ITB 14.3(b)**

#### **10. Payment (GCC Clause 16)**

GCC 16.1—The method and conditions of payment to be made to the Supplier under this Contract shall be as follows:

(a) Payment shall be made in Pak Rupees.

(b) 100% of the Contract Price on complete delivery of store within sixty (60) days on submission of claim supported by acceptance certificate from procuring agency declaring Goods have been delivered and that all contracted services have been performed.

#### **11. Prices (GCC Clause 17)**

GCC 17.1—No prices adjustment shall be allowed.

#### **12. Liquidated Damages (GCC Clause 23)**

GCC 23.1—In case deliveries are not completed within the time frame specified in the schedule of requirements / contract award, a Show Cause Notice will be served on the Bidder which will be following by cancellation of the Contract to the extent of non-delivered portion of installments. No supplies will be accepted and the amount of Performance Guarantee / Security to the extent of non-delivered portion of supplies of relevant installments will be forfeited. If the firm fails to supply the whole installments, maintenance the entire amount of Performance Guarantee/Security will be forfeited and the firm will be blacklisted at least for two years for future participation in bids:

The liquidated damage shall be 0.5 % per week or part thereof. The maximum amount of liquidated damages shall be 10% of the amount of contract. Once the cumulative amount of liquidated damages reaches ten percent (10%) of the amount of the contract, the Procuring Agency shall rescind the contract, without prejudice to other courses of action and remedies open to it.

#### **13. Resolution of Disputes (GCC Clause 28)**

GCC 28.1—The dispute resolution mechanism to be applied pursuant to GCC Clause 28.2 shall be as follows:

In the case of a dispute between the Procuring agency and the Supplier, the dispute shall be referred to the dispute resolution mechanism as defined in rule 31, 32 and 34 of the SPPRA Rules, 2010 (Amended up to date).

#### **14. Governing Language (GCC Clause 29)**

GCC 29.1—The Governing Language shall be ENGLISH.

**15. Applicable Law (GCC Clause 30)**

GCC 30.1-The Contract shall be interpreted in accordance with the laws of Islamic Republic of Pakistan which includes the following legislation:

**The Employment of Children (ECA) Act 1991**

**The Bonded Labour System (Abolition) Act of 1992**

**The Factories Act 1934**

**16. Notices (GCC Clause 31)**

GCC 31.1—*procuring agency's address for notice purposes:*

Director Planning & Development  
Dow University of Health Sciences (DMC Campus)  
Office of the Director Planning & Development, at Admin Block,  
Baba-e-Urdu Road, besides Civil Dow  
Hospital, Karachi.  
Phone No. 021-38771000 Extension 5820

*Supplier's address for notice purposes:*

Name of Bidder: \_\_\_\_\_

Name of Contact Person & Designation: \_\_\_\_\_

Phone No. \_\_\_\_\_

Fax No. \_\_\_\_\_

Mobile Phone No: \_\_\_\_\_

Email Address \_\_\_\_\_

**17. Taxes and Duties**

GCC 24.1 The Procuring Agency (DUHS) is a Non-Profit organization (NPO), hence rates shall be quoted excluding GST.

**Section IV.**  
**Schedule of Requirements**

## Schedule of Requirements

S#	Description of Goods	Required Delivery Schedule	Location
01.	As per the details of items attached in <b>Section V – Technical Specifications</b>	Delivery & Installation within Three (03) Month or earlier from the date of Contact Award or Establishment of LC.	Warehouse, Ojha Campus

**Section V.**  
**Technical Specifications**



# Technical Specifications

## PACKAGE / LOT -01

S. No	DESCRIPTION	Units	QTY
	<b>GROUP-A</b>		
<b>1)</b>	<b>AIR HANDLING UNITS</b>		
	<p><b>(i) <u>SUPPLY ONLY OF AHU-01 Capacity (17.3 TON)</u></b>            Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor, access doors, G4 Air Filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1
	<p><b>(ii) <u>SUPPLY ONLY OF AHU-02 Capacity (42.6 TON)</u></b>            Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor (One fan and motor extra set fitted within the AHU cabinet as a standby arrangement), access doors, G4 Air Filters, and F6 filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1
	<p><b>(iii) <u>SUPPLY ONLY OF AHU-03 Capacity (13.6 TON)</u></b>            Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor, access doors, G4 Air Filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1

S. No	DESCRIPTION	Units	QTY
	<p><b>(iv) SUPPLY ONLY OF AHU-04 Capacity (22.6 TON)</b>  Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor, VFD, access doors, G4 Air Filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1
2)	<b>DUCTED FAN COIL A/C UNITS (CHILLED WATER)</b>		
	<p><b>(i) SUPPLY ONLY FAU-01&amp;02 (CAPACITY 5.1TON)</b>  Chilled Water-Ducted Fresh Air Fan Coil Unit, Eurovent Certified, Double Skin PU Insulated 25mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 0.8 mm. SS316L drain pan. Ceiling suspended arrangement, direct drive fan, fan motor, speed controller, G4 filter with filter section. The operating conditions are mentioned in the schedule of Fan Coil Units.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	Nos.	2
3)	<b>CASSETTE TYPE A/C UNITS</b>		
	<p><b>Supply Only</b> of following types of Chilled Water Cassette type FCUs complete with fan, fan motor, terminal box, thermostat, two-way on/off control valves, universal type remote and wired controller with display, drain assembly, cleanable air filter, condensate lift pump, supports, hangers, accessories and appurtenances complete in all respect as per drawing and given schedule.<b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>		
	i) 1.0 Ton	Nos.	13
	ii) 1.5 Ton	Nos.	8
4)	<b>CHILLERS AIR -COOLED MODULAR TYPE</b>		
	<p><b>Supply Only</b> Air Cooled Modular Type Water Chillers of minimum chilling capacity of 32kWth (9.1 Ton) per module. The Condensing Units to have factory applied protection coating against corrosion, complete with automatic &amp; safety controls, modbus/BACKNET Connectivity, temperature and pressure measuring instruments at in and out, all accessories, 410A/134a refrigerant charge, oil charge, interconnecting power cabling, control integration, built-in hydronic pump, heat exchanger, interconnecting piping, gate valves, check valves, strainers, complete in all respect as per given schedule and specifications. Outdoor dry bulb temperature of 48 degree centigrade.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>		

<b>S. No</b>	<b>DESCRIPTION</b>	<b>Units</b>	<b>QTY</b>
	<b>i)</b> Chiller-01 for AHU-01, Capacity (17.3 TON), Two modules	No.	1
	<b>ii)</b> Chiller-02 for AHU-02, Capacity (42.6 TON), Six modules (five running and one standby)	No.	1
	<b>iii)</b> Chiller-03 for AHU-03, Capacity (13.6 TON), Two modules	No.	1
	<b>iv)</b> Chiller-04 for AHU-04, Capacity (22.6 TON), Three modules	No.	1
	<b>v)</b> Chiller-05 for for Cassette Units (Entrance offices first floor), Capacity (12.6 TON), Two modules.	No.	1
	<b>vi)</b> Chiller-06 for for Cassette Units (Director's room and offices first floor), Capacity (22.6 TON), Three modules	No.	1

**PACKAGE / LOT -02**

<b>S. No</b>	<b>DESCRIPTION</b>	<b>Units</b>	<b>QTY</b>
	<b>GROUP-B</b>		
<b>1)</b>	<b>AIR HANDLING UNITS</b>		
	<p><b>(i) INSTALLATION ONLY OF AHU-01 Capacity (17.3 TON)</b>            Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor, access doors, G4 Air Filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1
	<p><b>(ii) INSTALLATION ONLY OF AHU-02 Capacity (42.6 TON)</b>            Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor (One fan and motor extra set fitted within the AHU cabinet as a standby arrangement), access doors, G4 Air Filters, and F6 filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1
	<p><b>(iii) INSTALLATION ONLY OF AHU-03 Capacity (13.6 TON)</b>            Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor, access doors, G4 Air Filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1

S. No	DESCRIPTION	Units	QTY
	<p><b>(iv) INSTALLATION ONLY OF AHU-04 Capacity (22.6 TON)</b>  Chilled Water-Horizontal Blow Thru Air Handling Unit, Eurovent Certified, TB1, Double Skin PU Insulated 50mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 1.2 mm. SS316L drain pan. Motor to be of 4 pole. Complete with common base, plug/direct drive fan, fan motor, VFD, access doors, G4 Air Filters with filter sections, all three air dampers. All interconnecting internal power cables, lamps, site glass, The operating conditions are mentioned in the schedule of air-handling unit.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	No.	1
2)	<b>DUCTED FAN COIL A/C UNITS (CHILLED WATER)</b>		
	<p><b>(i) INSTALLATION ONLY FAU-01&amp;02 (CAPACITY 5.1TON)</b>  Chilled Water-Ducted Fresh Air Fan Coil Unit, Eurovent Certified, Double Skin PU Insulated 25mm thick panel, inner sheet thickness 0.6 mm and outer sheet thickness 0.8 mm. SS316L drain pan. Ceiling suspended arrangement, direct drive fan, fan motor, speed controller, G4 filter with filter section. The operating conditions are mentioned in the schedule of Fan Coil Units.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>	Nos.	2
3)	<b>CASSETTE TYPE A/C UNITS</b>		
	<p><b>INSTALLATION ONLY</b> of following types of Chilled Water Cassette type FCUs complete with fan, fan motor, terminal box, thermostat, two-way on/off control valves, universal type remote and wired controller with display, drain assembly, cleanable air filter, condensate lift pump, supports, hangers, accessories and appurtenances complete in all respect as per drawing and given schedule.  <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b>  <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b></p>		
	i) 1.0 Ton	Nos.	13
	ii) 1.5 Ton	Nos.	8

S. No	DESCRIPTION	Units	QTY
4)	<b>CHILLERS AIR -COOLED MODULAR TYPE</b>		
	<b>INSTALLATION ONLY</b> Air Cooled Modular Type Water Chillers of minimum chilling capacity of 32kWth (9.1 Ton) per module. The Condensing Units to have factory applied protection coating against corrosion, complete with automatic & safety controls, modbus/BACKNET Connectivity, temperature and pressure measuring instruments at in and out, all accessories, 410A/134a refrigerant charge, oil charge, interconnecting power cabling, control integration, built-in hydronic pump, heat exchanger, interconnecting piping, gate valves, check valves, strainers, complete in all respect as per given schedule and specifications. Outdoor dry bulb temperature of 48 degree centigrade. <b>Preferred Brands: YORK/CARRIER/TRANE OR APPROVED EQUAL,</b> <b>Origin: USA/EUROPE/JAPAN/SOUTH EAST ASIA/ CHINA</b>		
	i) Chiller-01 for AHU-01, Capacity (17.3 TON), Two modules	No.	1
	ii) Chiller-02 for AHU-02, Capacity (42.6 TON), Six modules (five running and one standby)	No.	1
	iii) Chiller-03 for AHU-03, Capacity (13.6 TON), Two modules	No.	1
	iv) Chiller-04 for AHU-04, Capacity (22.6 TON), Three modules	No.	1
	v) Chiller-05 for for Cassette Units (Entrance offices first floor), Capacity (12.6 TON), Two modules.	No.	1
	vi) Chiller-06 for for Cassette Units (Director's room and offices first floor), Capacity (22.6 TON), Three modules	No.	1
5)	<b>CHILLED WATER PIPES AND INSULATION</b>		
	(a) Providing Sch.40 seamless black carbon steel piping for chilled water supply and return system, complete with fittings, flanges, union, gasket specialties etc., including all cutting, fixing, fitting, laying cleaning, making connections with equipment, hangers, supports, painting, finishing, pressure testing and making good. Recommended Pipe Brand: Huffaz/Pakistan of approved equal		
i.	Ø 3/4" NB	Rft	170
ii.	Ø 1" NB	Rft	370
iii.	Ø 1-1/4" NB	Rft	280
iv.	Ø 1-1/2" NB	Rft	75
v.	Ø 2" NB	Rft	300
vi.	Ø 2-1/2" NB	Rft	260
vii.	Ø 3" NB	Rft	125
	(b) Installation of Cross-linked Polyolefin PIPE Insulation (density 25-30 kg/m <sup>3</sup> , Class "O" in Fire, Thermal Conductivity 0.035 W/(m.k) and Zero Permeability) for duct with alupet foil and self-adhesive tape. Approved Brand: Aerfoam/UAE or approved equal		

S. No	DESCRIPTION	Units	QTY
	<b>1" Thick</b>		
	i) Ø 3/4" NB	Rft	170
	ii) Ø 1" NB	Rft	370
	iii) Ø 1-1/4" NB	Rft	280
	iv) Ø 1-1/2" NB	Rft	75
	v) Ø 2" NB	Rft	300
	<b>2" Thick</b>		
	i) Ø 2-1/2" NB	Rft	260
	ii) Ø 3" NB	Rft	125
<b>6)</b>	<b>VALVES AND SPECIALITIES (CHILLED WATER SERVICES)</b>		
	Valves and specialties with matching flanges, nuts, bolts and gaskets for all chilled water piping as per specifications. Valves for all services 2 inch and above shall be flanged type with matching flanges, nuts, bolts and gaskets. The valves and specialties shall be of Econosto/Hattersley or approved equal:		
	(a) Gate Valves (Chilled Water)	Nos.	
	i) Ø 3/4"	Nos.	26
	ii) φ1"	Nos.	16
	iii) φ1-1/4"	Nos.	4
	iv) φ1-1/2"	Nos.	42
	v) φ2"	Nos.	4
	vi) φ2-1/2"	Nos.	2
	vii) φ3"	Nos.	26
	(b) Combination Flow Regulating Valves with flow measuring nipples etc. (Chilled water)		
	i) Ø 3/4"	Nos.	13
	ii) φ1"	Nos.	8
	iii) φ1-1/4"	Nos.	2
	iv) φ1-1/2"	Nos.	6
	v) φ2"	Nos.	3
	vi) φ2-1/2"	Nos.	2
	vii) φ3"	Nos.	1
	(c) Y-Type Strainers (Chilled Water).		
	i) Ø 3/4"	Nos.	13
	ii) φ1"	Nos.	8
	iii) φ1-1/4"	Nos.	2
	iv) φ1-1/2"	Nos.	6
	v) φ2"	Nos.	21
	vi) φ2-1/2"	Nos.	2
	vii) φ3"	Nos.	1

S. No	DESCRIPTION	Units	QTY
	(d) Ball Valves (Chilled Water)		
	<b>i)</b> $\phi$ 3/4" NB	Nos.	30
	(e) Check Valves		
	<b>i)</b> $\phi$ 2" NB	Nos.	18
	(f) Auto Air Vents make Econosto or approved equal (Chilled Water)		
	<b>i)</b> 1" NB	Nos.	6
<b>7)</b>	a) Provide Chilled Water Pump Motor Sets as per given schedule in drawing, complete with all accessories. Recommended Brands: KSB/Pakistan, Grundfoss/Europe, Wilo/Europe or approved equal. VFD Recommended Brand: Danfoss, ABB or approved equal.		
	<b>i)</b> Pump-01 (With VFD)	Set.	1
	<b>ii)</b> Pump-02	Set.	1
	<b>iii)</b> Pump-03 (With VFD)	Set.	1
<b>8)</b>	Sets of chemical dosing & testing equipment & chemicals for two years operation for treatment for condenser Water, chilled and hot water circuits.		
	<b>i)</b> Chilled Water Chemical Testing Equipment	Set.	1
	<b>ii)</b> Chemical Dosing Sets	Set.	1
<b>9)</b>	Expansion tank, bladder/diaphragm type with air separator, make water valve, pressure relief valve.	Set.	6
<b>10)</b>	Supply, installation, mini split air conditioner complete with gas charging, refrigerant piping, insulation, drain piping, electric and control wiring for following capacities for tropical region. (Brands: Mitsubishi/Toshiba/Hitachi/LG/Samsung/Daikin/Daikool		
	<b>i)</b> Wall Mounted Type (1.5 Ton)	Nos.	5
<b>11)</b>	<b>CONDENSATE DRAIN PIPING</b>		
	Supply and installation of uPVC Class D condensate drain piping for VRF AC equipments upto drain points 1/4" closed cell synthetic elastomeric foam insulation such as Aero flex-Europe or equivalent. & 8 oz. canvas jacketing, painting & finishing.		
	<b>i)</b> 3/4" dia	Rft	550
	<b>ii)</b> 1" dia	Rft	210
<b>12)</b>	<b>(a) RECTANGULAR DUCTING.</b>		
	G.I sheet metal medium pressure flange type ducting including splitter dampers, take offs, elbows and other necessary fittings, wall/slab sleeves, connections with air-handling units including flexible duct connector, ventilation and exhaust fans including neoprene coated flexible duct connectors, air devices and other equipment complete with all bracings, hangers, supports, access doors, etc and ready for operation in all respect. The duct to qualify EUROVENT classifications B and tested for leakage at site at 4" WC test pressure.		
	<b>i)</b> 24 Gauge	Sq.ft	8718
	<b>ii)</b> 22 Gauge	Sq.ft	21836
	<b>iii)</b> 20 Gauge	Sq.ft	3315



	<b>iv) 18 Gauge</b>	Sq.ft	500
<b>13)</b>	a) Installation of Cross-linked Polyolefin duct Insulation (density 25-30 kg/m <sup>3</sup> , Class "O" in Fire, Thermal Conductivity 0.035 W/(m.k) and Zero Permeability) for duct with alupet foil and self adhesive as specified in technical specification including all labour, material and accessories, complete in all respect and to the satisfaction of Engineer Incharge. Recommended Brand: Aerofoam/UAE or approved equal.		
	<b>i) 12 mm Thick (For Indoor Environment) ON ALL EXHAUST DUCTS</b>	Sq.ft	30068
	<b>ii) 40 mm Thick ( For outdoor Environment) ON ALL SUPPLY AND RETURN AIR DUCTS</b>	Sq.ft	4301
	<b>iii) 28 gauge G.I Sheet metal Cladding on air ducts at roof (exposed).</b>	Sq.ft	4301
<b>14)</b>	Supply and Fixing of following types and sizes of Air Devices including connections with air ducts and support arrangements. Recommended Manufacturer: Shan Industries/Karachi or approved equal.		
	a) Supply Air Jet Nozzle Trox TJN or approved equal Ø16" Nominal Size with face cover ring, adjustable end position. The diffusers to be with round dampers with acoustic lined 3mm rubber sheet.	Nos.	76
	b) Low pickup return grills, and M7 Damper		
	<b>i) 18" x 36"</b>	Nos.	4
	<b>ii) 18"x48"</b>	Nos.	8
	c) Fresh Intake louver with G4 filter of following sizes.		
	<b>i) 18"x12"</b>	Nos.	2
	d) Exhaust Air Louvers of following sizes.		
	<b>i) 12"x12"</b>	Nos.	9
	e) Tuttle and Baiey Diffusers AM Series with M7 Dampers of following neck sizes.		
	<b>i) 12"x12"</b>	Nos.	58
	<b>ii) 15"x15"</b>	Nos.	12
	f) Return/Exhaust Air Grills		
	<b>i) 12"x12"</b>	Nos.	31
	<b>ii) 6"x6"</b>	Nos.	10
<b>15)</b>	Installation, testing and commissioning of VAV BOXES with thermostat electrical and control wiring.		
	<b>i) 2400 CFM</b>	Nos.	6
	<b>ii) 3000 CFM</b>	Nos.	2
<b>16)</b>	<b>EXHAUST/FRESH AIR FANS</b>		
	CABINET TYPE DOUBLE SKIN EXHAUST AIR FAN SINGLE PHASE MOTOR WITH VFD/INDUSTRIAL DIMMER. Recommended Brands: Sasa Industries/Karachi, Shan Industries/Karachi.		
	<b>i) 150 cfm, 0.25 ESP</b>	Set.	5
	<b>ii) 300 CFM, 0.25 ESP</b>	Set.	3

S. No	DESCRIPTION	Units	QTY
<b>17)</b>	<b>ELECTRICAL AND CONTROL WORKS</b>		
	a) Supply and installation of all electrical wiring in conduit/cable tray from A/C and Exhaust fans to respective electrical DBs. Or Sub DB to DBs. Recommended Brands: Pakistan Cables, Fast Cables, Pioneer Cable or approved equal.		
	<b>i)</b> 1x3C-1.0 sq.mm	Rft	2610
	<b>ii)</b> 1x3C-1.5 sq.mm	Rft	315
	<b>iii)</b> 1x3C-2.5 sq.mm	Rft	325
	<b>iv)</b> 1x3C-4.0 sq.mm <b>(UNIT RATE ONLY)</b>	Rft	-
	<b>v)</b> 1x3C-6.0sq.mm	Rft	70
	<b>vi)</b> 1x3C-10 sq.mm	Rft	110
	b) Supply and installation of all electrical POWER cabling from main to MCCs, and MCC to Chillers/AHUs/DBs and all infrastructures cabling including burried in ground, riser with cable ladder. Recommended Manufacturers: Pakistan Cables, Fast Cables, Pioneer Cable or approved equal.		
	<b>i)</b> 1x4C-70sqmm CU/PVC/PVC CABLE	Rft	420
	<b>ii)</b> 1C-35sqmm CU/PVC EARTH CABLE	Rft	420
	<b>iii)</b> 1x4C-50sqmm CU/PVC/PVC CABLE	Rft	75
	<b>iv)</b> 1C-25sqmm CU/PVC EARTH CABLE	Rft	75
	<b>v)</b> 1x4C-35sqmm CU/PVC/PVC CABLE	Rft	110
	<b>vi)</b> 1C-16sqmm CU/PVC EARTH CABLE	Rft	110
	<b>vii)</b> 1x4C-25sqmm CU/PVC/PVC CABLE	Rft	50
	<b>viii)</b> 1C-16sqmm CU/PVC EARTH CABLE	Rft	50
	<b>ix)</b> 1x4C-16sqmm CU/PVC/PVC CABLE	Rft	130
	<b>x)</b> 1C-10sqmm CU/PVC EARTH CABLE	Rft	130
	<b>xi)</b> 1x4C-10sqmm CU/PVC/PVC CABLE	Rft	685
	<b>xii)</b> 1C-6sqmm CU/PVC EARTH CABLE	Rft	685
	<b>xiii)</b> 1x4C-2.5sqmm CU/PVC/PVC CABLE	Rft	125
	<b>xiv)</b> 1x4C-2.5sqmm CU/PVC/PVC CABLE	Rft	125
	Incoming Power Cable to Main HVAC DB		
	<b>xv)</b> 1x4C-300sqmm CU/PVC/PVC CABLE <b>(UNIT RATE ONLY)</b>	Rft	-
	<b>xvi)</b> 1C-150sqmm CU/PVC EARTH CABLE <b>(UNIT RATE ONLY)</b>	Rft	-
<b>18)</b>	Supply, installation & connection of the following MCCs and DBs with all mounting accessories and as per specifications & drawings, complete in all respect/wall mounted/weather exposed. Recommended Manufacturer: Karimi/Karachi, Taj/Karachi, Sunbeam Engineers/Karachi.		
	<b>i)</b> MCC-01	Set	1
	<b>ii)</b> MCC-02	Set	1
	<b>iii)</b> MCC-03	Set	1
	<b>iv)</b> MCC-04	Set	1
	<b>v)</b> MAIN DB HVAC	Set	1

S. No	DESCRIPTION	Units	QTY
	vi) DB-A/C-01	Set	1
	vii) DB-A/C-02	Set	1
	viii) DB-A/C-03	Set	1
	ix) DB-A/C-04	Set	1
	x) DB-A/C-05	Set	1
<b>19)</b>	<b>CABLE CONTAINMENT</b>		
	a) Cable Tray Perforated covered, exposed to outdoor environment. Recommended Manufacturer: Karimi/Karachi, Taj/Karachi, Sunbeam Engineers/Karachi		
	i) 0'-6" X 0'-4" G.I PERFORATED CABLE TRAY 16 S.W.G WITH COVER	Rft	232
	b) Laying UPVC Class-D Conduit, Excavation and back filling. Buried in Ground		
	i) $\phi 6"$	Rft	45
	ii) $\phi 3"$	Rft	400
	Clip on wall and ceiling		
	i) $\phi 1-1/4"$	Rft	395
	c) Electrical Manholes 36"x36"x36"	Nos.	5
<b>20)</b>	<b>DIRECT DIGITAL CONTROLS</b>		
	Direct Digital Control System and Building Management Systems including programming. The transmitter, switches, etc. to be complete with all accessories, control valves with actuators, with communication and display facility, complete in all respects. Recommended Brands: Honeywell/Johnson Controls, Origin: USA/UK/EUROPE/CANADA		
<b>20A)</b>	<b>AHU-01/02/03/04/ all chillers and pumps.</b>		
	i) Temperature sensors/transmitter (Balco Type).	Nos.	8
	ii) Humidity sensors/transmitter.	Nos.	4
	iii) Smoke Detector.	Nos.	4
	iv) Pressure differential switches (Filter).	Nos.	5
	v) Arrangement for Indications From VFD for AHU'S Fan	Lot	1
	Pressure Transmitters for Fan and Pumps		
	i) For AHU-04	No	1
	ii) For Pumps	Nos.	2
	iii) Relays for AHU fan start/stop	Nos.	4
	iv) Controlling for standby fan motor set of AHU -02	Set	1
	Chilled water control and bypass valves		
	i) $\phi 1-1/2"$	Nos.	2
	ii) $\phi 2"$	Nos.	2
	iii) $\phi 2-1/2"$	No	1
	iv) $\phi 3"$	No	1
	v) Local controllers with Display. (ModBus/BACKNET)	Nos.	10
	vi) Panel/Enclosure for above	Nos.	10
	vii) Power supply assembly	Nos.	10
	viii) Engineering/Design	Nos.	10
	ix) Electrical Control Wiring for above	Nos.	10

<b>S. No</b>	<b>DESCRIPTION</b>	<b>Units</b>	<b>QTY</b>
<b>20B)</b>	Controlling for chiller modules and sequencing.	Lot	6
<b>21)</b>	All HVAC related civil works including equipment foundation, cutting patching in wall.	Job	1
<b>22)</b>	Air Curtains for following width for door height of 7 feet. Recommended Brand: Sasa Industries/Karachi, Shan Industries/Karachi or approved equal.		
	<b>i)</b> 6 feet width	Nos.	3
	<b>ii)</b> 14 feet width	Nos.	2
<b>23)</b>	Produce Shop drawings.	Set	3
<b>24)</b>	Produce as built drawings.	Set	3
<b>25)</b>	Lifting/ Shifting/ Rigging of all Equipment to specified locations	Job	1
<b>26)</b>	Providing necessary uniform, safety equipment (PPE) to workers throughout the project duration.	Lot	1
<b>27)</b>	Cost of testing, starting-up, commissioning, adjusting & handing over of complete system as per specifications.	Job	1
<b>28)</b>	Cost of air balancing of all air circuit.	Job	1
<b>29)</b>	Cost of chilled water balancing.	Job	1
<b>30)</b>	Packaged Type small RO Plant for chilled water make-up water of 12 USGPM, complete with prefilter, post filter pumps control panel etc.	Lot	1
<b>31)</b>	Water Booster Pump 12 USGPM with adequate pressure for the system.	Lot	1
<b>32)</b>	Misc. items to complete the job.	Lot	1

**Section VI.**  
**Sample Forms**

## Sample Forms

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# 1. Bid Form and Price Schedules

NIT / IFB N°: \_\_\_\_\_

Date: \_\_\_\_\_

To: *[name and address of Procuring Agency]*

Gentlemen and/or Ladies:

Having examined the bidding documents including Addenda Nos. *[insert numbers]*, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply and deliver *[description of goods and services]* in conformity with the said bidding documents for the sum of *[total bid amount in words and figures]* or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to deliver the goods *[insert offered delivery schedule]*.

If our Bid is accepted, we will obtain the guarantee of a bank in a sum equivalent to \_\_\_\_\_ percent of the Contract Price for the due performance of the Contract, in the form prescribed by the Procuring agency.

We agree to abide by this Bid for a period of *[number]* days from the date fixed for Bid opening under Clause 22 of the Instructions to Bidders, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

Name and address of agent	Amount and Currency	Purpose of Commission or Gratuity
---------------------------	---------------------	-----------------------------------

_____	_____	_____
_____	_____	_____
_____	_____	_____

(if none, state "none")

We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_.

\_\_\_\_\_  
*[signature]*

\_\_\_\_\_  
*[in the capacity of]*

Duly authorized to sign Bid for and on behalf of \_\_\_\_\_

2. (A) **PRICE SCHEDULE IN PAK RUPEES**

**FOR GOODS OFFERED WITHIN THE PROCURING AGENCY'S COUNTRY**

Name of Bidder \_\_\_\_\_, IFB / NIT Number \_\_\_\_\_.

<b>S#</b>	<b>Detailed Specification of Services</b>	<b>No. of Jobs</b>	<b>Unit</b>	<b>Unit Price (Excluding SST)</b>	<b>Total Cost (Excluding SST)</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>TOTAL AMOUNT (EXCLUDING SST) IN PAK RS</b>					
<b>S.S.T (13%)</b>					
<b>GRAND TOTAL</b>					

Name \_\_\_\_\_

In the capacity of \_\_\_\_\_

Signed \_\_\_\_\_

Duly authorized to sign the Bid for and on behalf of \_\_\_\_\_

Date \_\_\_\_\_



2. (B) **PRICE SCHEDULE IN FOREIGN CURRENCY**  
**(CFR / CNF/ C&F / CPT - KARACHI BASIS)**

**FOR GOODS OFFERED FROM OUTSIDE THE PROCURING AGENCY’S COUNTRY**

Name of Bidder \_\_\_\_\_ . IFB / NIT Number \_\_\_\_\_ .

S#	Detailed Specification of Goods	Model / Cat No.	Name of Manufacturer	Country of Origin	Port of Shipment	Quantity of Stores	Unit	Currency	Rate Per Unit	Total Price
1	2	3	4	5	6	7	8	9	10	11
<b>Total Amount in Foreign Currency</b>										

Name \_\_\_\_\_

In the capacity of \_\_\_\_\_

Signed \_\_\_\_\_

Duly authorized to sign the Bid for and on behalf of \_\_\_\_\_

Date \_\_\_\_\_

**NOTE:**

Port of Shipment and Country of origin of “MAJOR PART(S) OF THE EQUIPMENT” must be clearly reflected separately in the Technical and Financial bids. The “Origin” means the place where the “goods” are mined, grown, or produced.

## Bid Security Form

Whereas *[name of the Bidder]* (hereinafter called “the Bidder”) has submitted its bid dated *[date of submission of bid]* for the supply of *[name and/or description of the goods]* (hereinafter called “the Bid”).

KNOW ALL PEOPLE by these presents that WE *[name of bank]* of *[name of country]*, having our registered office at *[address of bank]* (hereinafter called “the Bank”), are bound unto *[name of Procuring agency]* (hereinafter called “the Procuring agency”) in the sum of for which payment well and truly to be made to the said Procuring agency, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this \_\_\_\_ day of \_\_\_\_ 20\_.

THE CONDITIONS of this obligation are:

- 27 If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or
- 28 If the Bidder, having been notified of the acceptance of its Bid by the Procuring agency during the period of bid validity:
  - 28.1 fails or refuses to execute the Contract Form, if required; or
  - 28.2 fails or refuses to furnish the performance security, in accordance with the Instructions to Bidders;

we undertake to pay to the Procuring agency up to the above amount upon receipt of its first written demand, without the Procuring agency having to substantiate its demand, provided that in its demand the Procuring agency will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including twenty eight (28) days after the period of bid validity, and any demand in respect thereof should reach the Bank not later than the above date.

---

*[signature & Seal of the bank]*

## 2. Contract Form

**THIS AGREEMENT** made the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_ between [name of Procuring Agency] (hereinafter called “the Procuring Agency”) of the one part and [name of Supplier] of [city and country of Supplier] (hereinafter called “ the Supplier” of the other part:

WHEREAS the Procuring agency invited bids for certain goods and ancillary services, viz., [*brief description of goods and services*] and has accepted a bid by the Supplier for the supply of those goods and services in the sum of [*contract price in words and figures*] (hereinafter called “the Contract Price”).

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

- the Bid Form and the Price Schedule submitted by the Bidder;
- the Schedule of Requirements;
- the Technical Specifications;
- the General Conditions of Contract;
- the Special Conditions of Contract; and
- The Procuring agency’s Notification of Award.

In consideration of the payments to be made by the Procuring agency to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Procuring agency to provide the goods and services and to remedy defects therein in conformity in all respects with the provisions of the Contract

The Procuring agency hereby covenants to pay the Supplier in consideration of the provision of the goods and services and the remedying of defects therein, 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 in accordance with their respective laws the day and year first above written.

Signed, sealed, delivered by \_\_\_\_\_ the\_(for the Procuring agency)

Signed, sealed, delivered by \_\_\_\_\_ the\_(for the Supplier)

### 3. Performance Security Form

To: *[name of Procuring agency]*

WHEREAS *[name of Supplier]* (hereinafter called “the Supplier”) has undertaken, in pursuance of Contract No. *[reference number of the contract]* dated \_\_\_\_\_. to supply *[description of goods and services]* (hereinafter called “the Contract”).

AND WHEREAS it has been stipulated by you in the said Contract that the Supplier shall furnish you with a bank guarantee by a reputable bank for the sum specified therein as security for compliance with the Supplier’s performance obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Supplier a guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of *[amount of the guarantee in words and figures]*, and we undertake to pay you, upon your first written demand declaring the Supplier to be in default under the Contract and without cavil or argument, any sum or sums within the limits of *[amount of guarantee]* as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the \_\_\_\_\_ day of \_\_\_\_\_.

Signature and seal of the Guarantors

\_\_\_\_\_  
*[name of bank or financial institution]*

\_\_\_\_\_  
*[address]*

\_\_\_\_\_  
*[date]*

#### 4. Bank Guarantee for Advance Payment

To: *[name of Procuring agency] [name of Contract]*

Gentlemen and/or Ladies:

In accordance with the payment provision included in the Special Conditions of Contract, which amends Clause 16 of the General Conditions of Contract to provide for advance payment, *[name and address of Supplier]* (hereinafter called “the Supplier”) shall deposit with the Procuring agency a bank guarantee to guarantee its proper and faithful performance under the said Clause of the Contract in an amount of *[amount of guarantee in figures and words]*.

We, the *[bank or financial institution]*, as instructed by the Supplier, agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to the Procuring agency on its first demand without whatsoever right of objection on our part and without its first claim to the Supplier, in the amount not exceeding *[amount of guarantee in figures and words]*.

We further agree that no change or addition to or other modification of the terms of the Contract to be performed thereunder or of any of the Contract documents which may be made between the Procuring agency and the Supplier, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition, or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment received by the Supplier under the Contract until *[date]*.

Yours truly,

Signature and seal of the Guarantors

\_\_\_\_\_  
*[name of bank or financial institution]*

\_\_\_\_\_  
*[address]*

\_\_\_\_\_  
*[date]*

## 5. Manufacturer's Authorization Form

*[See Clause 13.3 (a) of the Instructions to Bidders.]*

To:  
The [Procuring Agency]  
Karachi.

WHEREAS [name of the Manufacturer] who are established and reputable manufacturers of [name and/or description of the goods] having factories at [address of factory] do hereby authorize [name and address of Agent] to submit a bid, and subsequently negotiate and sign the Contract with you against IFB No. [reference of the Invitation to Bid] for the above goods manufactured by us.

We hereby extend our full guarantee and warranty as per Clause 15 of the General Conditions of Contract for the goods offered for supply by the above firm against this Invitation for Bids.

We hereby undertake that we will provide the complete after sale services support in case of agency transfer or withdrawn from the bidder and will inform timely of any transition.

Our representative may be reached in need of support,

Name:

Designation:

Email Address:

---

*[signature for and on behalf of Manufacturer]*

*Note:* This letter of authority should be on the letterhead of the Manufacturer and should be signed by a person competent and having the power of attorney to bind the Manufacturer. It should be included by the Bidder in its bid.

## 6. Integrity Pact (AFFIDAVIT)

### DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC. PAYABLE BY THE SUPPLIERS/CONTRACTORS/CONSULTANTS.

Contract Number: \_\_\_\_\_ Dated: \_\_\_\_\_

Contract Value: \_\_\_\_\_

Contract Title: \_\_\_\_\_

**[Name of Supplier/Contractor/Consultant]** 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 Sindh (GoS) or any administrative subdivision or agency thereof or any other entity owned or controlled by it (GoS) through any corrupt business practice.

Without limiting the generality of the foregoing, **[Name of Supplier/ Contractor/ Consultant]** 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 Procuring Agency (PA), except that which has been expressly declared pursuant hereto.

**[Name of Supplier/Contractor/Consultant]** 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 PA and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

**[Name of Supplier/Contractor/Consultant]** 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 right and remedies available to PA under any law, contract or other instrument, be voidable at the option of PA.

Notwithstanding any rights and remedies exercised by PA in this regard, **[Name of Supplier/Contractor/Consultant]** agrees to indemnify PA for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to PA in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by **[Name of Supplier/Contractor/Consultant]** 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 PA.

\_\_\_\_\_  
[Procuring Agency]

\_\_\_\_\_  
[Supplier /Contractor/Consultant]

**(FORM A)**

**HUMAN RESOURCE INCLUDING DETAIL OF TECHNICAL TEAM**

S. #	Name	Designation	Contact Number	Posted Location	Date of Joining	Education	Trainings (Equipment, Country)

Note: Supporting Documents must be provided for each employee.

**CEO/ Proprietor/ Managing Director**

Name: \_\_\_\_\_  
Email Address: \_\_\_\_\_  
Cell Phone: \_\_\_\_\_

**Director / General Manager Services**

Name: \_\_\_\_\_  
Email Address: \_\_\_\_\_  
Cell Phone: \_\_\_\_\_

**Director / General Manager Sales**

Name: \_\_\_\_\_  
Email Address: \_\_\_\_\_  
Cell Phone: \_\_\_\_\_

**Technical Focal Person for this Project**

Name: \_\_\_\_\_  
Email Address: \_\_\_\_\_  
Cell Phone: \_\_\_\_\_  
Address: \_\_\_\_\_





**7. MAINTENANCE CONTRACT SPECIMEN**

THIS AGREEMENT made on this \_\_\_ day of \_\_\_\_\_ 2024 between M/s. \_\_\_\_\_  
\_\_\_\_\_(Name and Address of the Contractor)  
(hereinafter referred to as the CONTRACTOR, which expression shall, unless it be repugnant to the context or meaning thereof, be deemed to mean and include its successors and assigns) of the ONE PART and the DOW UNIVERSITY OF HEALTH SCIENCES, KARACHI (herein after referred to as the DUHS, which expression shall, unless it be repugnant to the context or meaning thereof, be deemed to mean and include its successors and assigns) of the OTHER PART.

WHEREAS the Contractor is a service provider  
AND

WHEREAS the DUHS is procuring agency. The DUHS intends to hire firm for **SUPPLY / FIXING / INSTALLATION / TESTING & COMMISSIONING OF HVAC SYSTEM AT WAREHOUSE, OJHA CAMPUS, DUHS, KARACHI**. Therefore, invited bids through **NIT No: DUHS/P&D/2024/11745 Dated 23 Feb, 2024 (REF. NO. DUHS/W&S-NIT/142)**

WHEREAS the Contractor (successful bidder) submitted his bid vide \_\_\_\_\_ in accordance with the bid document and was selected as “successful bidder” pursuant to the bidding process and negotiation on contract prices, awarded the “Letter of Acceptance / Intent”(LoA/LoI) No.to the Contractor on \_\_\_\_\_.

BOTH THE PARTIES HERETO agree to abide the terms and conditions as mentioned in Special Conditions of the Agreement of the Tender Document.

\_\_\_\_\_  
(Signature of Contractor / Authorized Representative)  
Name: \_\_\_\_\_  
Designation: \_\_\_\_\_  
Address: \_\_\_\_\_  
Seal: \_\_\_\_\_

\_\_\_\_\_  
(Signature of Authorized officer of the DUHS)  
Name: \_\_\_\_\_  
Designation: \_\_\_\_\_  
Address: \_\_\_\_\_  
Seal: \_\_\_\_\_

**WITNESS -1**

Name: \_\_\_\_\_  
CNIC #: \_\_\_\_\_  
Address: \_\_\_\_\_

**WITNESS -2**

Name: \_\_\_\_\_  
CNIC #: \_\_\_\_\_  
Address: \_\_\_\_\_

**Section VII.**  
**DETAIL TECHNICAL SPECIFICATIONS**

# DETAIL TECHNICAL SPECIFICATION

## HVAC WORKS

### 1.0 GENERAL:

The contract drawings indicate the extent and general arrangement of the air-conditioning system. Equipment, ductwork and piping shall fit into the space allotted and shall allow adequate and acceptable clearance for entry, servicing and maintenance. Where component parts of equipment or system cannot be serviced without distributing adjacent work resulting from original installation of other work, corrective action satisfactory to the DUHS's Engineer shall be taken, without any additional cost to the Owner.

- (a) Capacities of equipment and materials shall not be less than those indicated.
- (b) Conformance with Agency requirements: Where materials or equipment are specified to conform to requirements of Underwriter's laboratory, Inc., Air-conditioning and Refrigeration Institute of Heating, Refrigeration and Air-conditioning Engineers, etc., the Contractor shall submit proof of conformance. The label or listing of the specified agency will be acceptable evidence.
- (c) Nameplates: Each major item of equipment shall have the manufacturer's name, address serial and model numbers on a plate securely attached to the item.
- (d) Protective and Access requirements: Belts, pulleys, chains, gears, coupling, projecting set-screws, keys and other rotating parts are so located that any person in close proximity shall be fully enclosed or properly guarded. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type specified in Clause - THERMAL INSULATION. Items such as catwalk ladders and quadrails shall be provided where indicated for safe operation and maintenance of equipment.
- (e) Verification of dimensions: The Contractor shall visit the premises to thoroughly familiarize himself with all details of the work and working conditions and verify all dimensions in the field, and shall advise the DUHS's Engineer of any discrepancy before performing any work. The Contractor shall be specifically responsible for the co-ordination and proper relation of his work to the building structure and to the work of all trades.
- (f) Cost of wooden frame at all duct penetration: The cost of 25-mm thick termite treated deodar wood frame equal to opening width shall be deemed to have been included in the relevant items.
- (g) Pipes and ducts crossing fire rated wall, the gap between wall and pipe/duct shall be filled with soft packing like mineral wool, the ends shall be closed with gauge 16 duct sleeves or approved sealant shall be deemed to have been included in the relevant items.
- (h) The heating, ventilation, cooling and air conditioning systems shall be in accordance with ASHRAE, SMACNA, ASME and NFPA except as modified by rules, regulations and by-laws of authorities having jurisdiction.

### 1.1 EQUIPMENT AND MATERIAL:

- (a) General:

These shall conform to the respective publications and other requirements specified herein, and as shown on the drawings and shall be the products of the manufacturers regularly engaged in the manufacture of such products. Items of equipment shall essentially be duplicate of equipment that has been in satisfactory use at least 5 years prior to bid opening and shall be supported by a

service organization that is, in the opinion of the DUHS's Engineer, reasonably convenient to the site. It shall be solely the Contractor's responsibility to ensure that the equipment supplied by him shall fit into the space allotted for the purpose. If at any stage it is detected that the equipment supplied by him cannot fit into the space provided for the equipment, then the Contractor shall be responsible for supplying other equipment of suitable size, without incurring any additional cost to the Owner.

(b) Approval of Equipment and Material:

Before starting installation of any material or equipment, the Contractor shall submit to the DUHS's Engineer for approval working drawings of all areas and lists of materials and equipment to be incorporated in the work. The layout drawings shall include a plan and elevations of the proposed piping, ductwork and equipment to establish that the equipment will fit in the allotted space with clearances for installation and maintenance. The drawings shall show proposed details for attachment anchoring, and hanging to structural framing of the building; vibration isolation units; foundation and support; location and size of sleeves and prepared openings for passage of pipes and ducts. If departures from the contract drawings are deemed necessary by the Contractor, details of such departures including changes in related portions of the project and the reasons thereof shall be submitted with the drawings. Approved departures shall be made at no additional cost to the Owner. A complete electrical connection diagram, for each electrically controlled component having more than automatic or manual control device, shall be submitted to the DUHS's Engineer for approval in addition to the automatic temperature control diagram required hereinafter. Wiring diagrams shall identify each component and one diagram shall show all interconnected or interlocked components. The lists of materials and equipment shall be supported by sufficient descriptive material, such as catalogs, diagrams, performance curves, charts, layout drawings and other data published by the manufacturer, to demonstrate conformance to the specification requirements; model numbers alone will not be acceptable. The data shall also include the name and address of the nearest service and maintenance organization that regularly stock repair parts. Listings of items that function as parts of an integrated system shall be furnished at one time. One copy of the layout drawings, wiring diagrams and lists will be returned, marked to indicate approval. All material shall be submitted to the DUHS's Engineer for approval and only approved material shall be supplied to the site.

## 1.2 SAMPLES:

The contract shall provide at his cost, samples of material, instruments, gauges and electrical items, for approval by the Engineer before order is placed for the same. Engineer may waive this requirement, if detailed published catalogues submitted by the contractor provide sufficient information for approval. These samples shall include but not limited to:

1. G.I Sheet, each gauge to be used
2. MS Schedule 40 Pipes and Fittings
3. Pressure Gauges and Thermometers etc.
4. Duct Insulation, Liner and Covering
5. Pipe Insulation and Covering
6. Insulation Adhesive and Tapes

7. Air devices (Diffusers, Grilles, Registers)
8. OA / EA Louvers
9. All types of Dampers
10. Power and Control Cables
11. Electrical Items, Push Buttons, HOA & Toggle Switches, Pilot Lamps, Contractor, Relays, Circuit Breakers and Isolating Switches
12. Vibration Isolating Springs, Pipe Hangers, Duct Hangers and Rollers
13. Copper Piping, Condensate Drain Piping, GI Piping

### **1.3 FACTORY INSPECTION OF EQUIPMENT AND MATERIALS:**

All major equipment listed below to be supplied under this Contract which has been manufactured or shop assembled in or outside Pakistan shall be subject to inspection by the Employer's two numbers authorized representatives for each equipment at manufacturer's factory of origin before its dispatch to site. The Contractor shall make necessary arrangements and provide all the facilities required for such inspection. The Contractor to arrange travel, boarding and lodging for 02 persons on his expense.

The following equipment shall be inspected and tested at the manufacturer's place:

1. Air Handling Units
2. Motor Control Centre (MCC)

### **2.0 LOW VELOCITY CHILLED WATER-AIR HANDLING UNITS:**

- 2.1 Air handling units as shown on the drawings, low velocity type shall be provided for various areas of the Building and shall be of capacities under the specified conditions of operation as given in the AHUs Schedule Operating Conditions. All components to be heavy duty type and suitable for continuous operation.

The Units installed outdoors to have weather proof construction.

- 2.2 The unit shall be complete with cooling/heating coil(s), fan(s), fan motor(s), direct drive, dampers (VCDs) as specified, internal face and bypass dampers for single zone units if specified in the Schedule, multizone units to have segmented zone face and bypass dampers, perforated plate in the bypass section (if heating coil not installed) to balance air resistance across the cooling coil, filter section(s) suitable for filters specified elsewhere, plenum sections with access doors for high efficiency filters, eliminators if required, mixing box with VCDs as shown in the drawings or specified, Stainless Steel drain pan and all other components and accessories to complete the unit.
- 2.3 The casing shall be modular type, panels of best quality not less than 1.2mm thick sheet steel, properly reinforced and braced for maximum rigidity, with smooth internal and external surfaces and to have removable panels and access doors for easy access to all internal parts.
- 2.4 Double Skin (DS) Units. Where specified, units of double skin construction shall be supplied. DS units shall have insulation sandwiched between two steel sheets, internal to be min. 0.6mm thick and external 1.2mm thick. The casing panels and access doors to be formed by sheets folded together at

edges with smooth internal and external surfaces. The panels to be supported between sturdy aluminium corners/frame work or equivalent arrangement.

Internal/external sheets may be of material other than steel as specified in the Schedule.

Thermal barrier shall be provided between internal and external metal surfaces to prevent sweating.

The insulation may be min. 70Kg.cum density rigid board type or foamed in place polyurethane. Units 50mm thick panels.

The integrity and quality of insulation to prevent sweating of panels and panel joints with ambient dew point of 29°C.

Unit sections thru which air at ambient temperature only is flowing may not be insulated and be of single skin construction.

- 2.5 The unit sections requiring draining (coils, humidifiers, eliminators) shall be installed on a common base frame to act as a drain pan with drain outlet connection on both sides. The construction shall be sandwich type, bottom & sides completely insulated to maintain 60mm thick panel with foamed-in-place insulation without any joint, to prevent sweating with ambient dew point of 29°C.
- 2.6 To provide easy access to all internal parts, the casing shall have access doors or inspection panels of same construction, with inner surface flush and smooth with adjoining surfaces, tightly sealed with sealing gasket and easy to open or close, provided with handles and locks fitted with operating knobs. Units of upto 1.5cum.sec (4200cfm) capacity may have removable type panels/doors with hand grip bolts and larger sizes with access doors hinged type or hung on hand grip bolts.
- 2.7 The casing panel sheets and supporting frame work to be corrosion protected, bonderised and powder paint coated or baked enamel finished, or as specified in the Schedule of Equipment.
- 2.8 Multi leaf opposed blade type air volume control dampers (VCDs) shall be provided in the mixing box and other sections as specified in the Schedule or shown in the drawings.

The damper blades to be interlinked with nylon construction gear wheels at one end to ensure simultaneous smooth movement of all blades. Damper blades fitting within the frame to allow minimum air leakage from the sides. The blades to interlock on closure for effective air seal. Damper operating lever with lock screw and quadrant having Open to Close position indicator to be provided.

Segmented zone face and bypass dampers of multizone units to have linkage to ensure simultaneous close/open operation.

All damper blades rods provided with ball bearings and linkages of construction and design to be easily movable with minimum force and suitable for operation by automatic controls damper actuators. Nylon bushings may be approved instead of ball bearings; metallic bushings not to be used.

- 2.9 The different components of each unit section to be fixed through the casing to two external base channels so that the unit is not in contact with the floor.

The design of the unit should make site assembly work quick and easy. The assembly will be only with nuts and bolts and clamps. The assembled panels shall form a strong and rigid casing.

- 2.10 The casing shall be tested to be air tight against a positive pressure of 150mm wg (1500 pascal), and

negative pressure of 100mm wg (1000 pascal), or higher if specified.

- 2.11 The fans to be plug type and statically and dynamically balanced and tested in the factory.  
Fan to be selected for quiet operation, max. 2000rpm, fan outlet velocity not to exceed 10m.s (2000 fpm) or as specified, fan outlet connected to the casing with short flexible collar of heavy duty airtight canvas properly sewn and clamped, max. 1450 rpm electric motor.  
The fan motor to be suitable for Variable Frequency Drive, of protection Class IP44, if specified or in open locations Class IP54 or IP55 and selected so as not to be loaded more than 90% of net rated HP under specified operating conditions. The fan motor to be mounted on a sturdy adjustable base.  
The fan motor may be located inside or outside the unit casing.  
The units with fan motor installed outside the casing, shall be installed on rubber-in-shear or similar approved vibration isolators to isolate the units from the Building structure.  
The units with fan motor inside the casing shall have both fan and motor installed on a common sturdy base mounted on rubber-in-shear or similar vibration isolators and isolated from the unit casing and other sections. External vibration isolators for the unit not to be provided in this case.
- 2.12 The cooling/heating coil(s) shall be of heavy gauge seamless copper tubes with mechanically bonded aluminium fins, tested with at least 20 bar air pressure in a water tank. Unless otherwise specified the cooling and cooling/heating coils shall have not more than 4 fins/cm (10 fins/inch) and face velocity not to exceed 2.5m.s (500 fpm) and heating coils to have not more than 5fins/cm (12 fins/inch) and face velocity not to exceed 5.1m.s (1000 fpm). The unit design to ensure that the air flow is uniform across the coil face.
- 2.13 If specified the coils to have protective coating for corrosion protection against sea air. The tenderer to furnish details of the protective coating.
- 2.14 The conditions of operation for the units, coil capacities, water pressure drop through the coil, steam supply pressure, etc. shall be as given in the AHUs Schedule of Operating Conditions. Coil capacity ratings shall be ARI certified for units of USA origin.
- 2.15 In selecting the units, the tenderer shall carefully check and confirm that the units can be installed and conveniently serviced and maintained within the respective spaces indicated on the drawings for unit installation.
- 2.16 All air handling units shall be selected to provide noise level of not more than NC 40 in the air-conditioned space. The Contractor shall be responsible for evaluation of the noise level of the AHU and to incorporate sound attenuators, if required, to provide the noise level specified in the space, no additional cost and no variation or claim shall be entertained in this regard.
- 2.17 General: The Contractor shall be responsible for installation of the Air Handling Units, as shown on the drawings, complete in all respects and as per satisfaction of the DUHS's Engineers. The installation shall be carried out complete in all respects as per recommendations of the manufacturer and as specified herein. Pipe connections, duct connections, flexible connections, electrical connections, drain connections, etc. shall be done by the Contractor, complete in all respects.



2.18 Foundation: Foundation shall consist of 6" (150 mm) concrete pads constructed of 1:2:4 cement concrete. The foundation shall be isolated from the structure and AHU / machine room floor by using 2" (50 mm) thick higher density cork sheet. The foundation shall be finished with 3/16" thick cement plaster, edges shall be chamfered.

2.19 Commissioning & Testing: The unit shall be commissioned and tested as per the Manufacturer's recommendations. Drives shall be adjusted to provide the required airflow rate and valves shall be adjusted for the proper water flows, etc.

2.20. The tenderer to supply the following information:

- (a) Unit construction details.
- (b) The overall unit dimensions and operating weight.
- (c) Coil(s) construction, face area, number of fins per cm (or inch), face air velocity, air resistance, water pressure drop.
- (d) Type of fan, fan rpm, air velocity at fan outlet, unit noise level rating in dBA, fan HP requirement, fan motor HP & rpm, air flow capacity cum.sec (or cfm) and total static pressure at which the fan selected.
- (e) Manufacturer's performance guarantee certificate and technical bulletins including coil capacity tables and fan performance curves.

### **3.0 AIR-COOLED VRF CONDENSING MODULAR WATER CHILLER UNITS**

- 3.1 The offered unit shall be heat pump type, inverter scroll compressor type.
- 3.2 The offered unit shall have part load performances meet the highest efficiency values and delivers performance beyond typical heat pump efficiency levels in cooling and heating.
- 3.3 The unit shall be capable of satisfactory operation at ambient temperature of 52°C in cooling mode and -25°C in heating mode.
- 3.4 The unit shall be capable of delivering a minimum of 5°C chilled water in cooling mode and a minimum of 45°C hot water in heating mode.
- 3.5 The EER of offered unit including hydronic kit at AHRI Conditions shall be greater than 3.0.
- 3.6 The unit shall be offered with high efficiency DC Inverter compressor together with advanced variable frequency drive technology to ensure stable operation across the entire operating range.
- 3.7 The offered unit high efficiency DC Inverter compressor frequency range shall be from 15 ~ 120%, to quickly and efficiently meet the needs of load profile.
- 3.8 The offered unit shall have brazed plate type heat exchanger.
- 3.9 The unit shall be offered with dual condenser fans equipped with high efficiency, low noise DC inverter motor which adjusts the air flow to exactly match the capacity accurately and efficiently.
- 3.10 The sound pressure level of unit shall not exceed 59 dB(A) at full load conditions.
- 3.11 The offered heat pump shall be provided with a standard built-in hydronic loop circulating pump, with external pressure head not less than 14m.
- 3.12 The offered heat pump shall be provided with a standard built-in expansion tank to ensure constant flow to hydronic loop circulating pump.
- 3.13 The offered unit shall also be equipped with built-in water flow switch.

3.14 The offered unit shall have the provision for synchronized connection to a minimum of 4 modules via RS485 interface through the Modbus protocol that shall have easy access and user-friendly real-time control.

**3.19 SPECIAL CONDITIONS**

3.19.1 DESIGN CONDITIONS

HVAC System has been designed for the conditions listed hereunder. These conditions are being given for the information of the Contractor to enable him to perform specified tests under these conditions.

3.19.2 Outside Design Conditions

- a) Summer Dry Bulb Temp: 109.4° F (43°C)  
           Wet Bulb Temp: 84° F (28.9°C)  
           Daily range: 14° F (7.7°C)
- b) Winter Dry Bulb Temp: 49° F (9.4°C)
- c) Latitude: (27.7°) North.

3.19.3 Inside Design Conditions (air-conditioned areas)

**Summer**

- a) All air-conditioned areas 73.4°F ± 2°F (23 °C ±2°C)  
           50% ± 10% RH

**4.0 ELECTRIC MOTORS**

4.1 Electric motors shall be of the sizes and types as specified for driving all plant and equipment. The motors shall be of atleast the horsepower specified but shall be of proper horse-power and speed to suit the specific plant and equipment offered by tenderer. Any adjustment in motor horsepower or speed must be included in the tender and no additional cost will be allowed on this account. The motors shall be heavy duty quiet running type suitable for continuous operation under the site conditions. The minimum motor efficiency and power factor shall be 0.85.

4.2 The motors shall be designed for 50 cycle AC supply of following voltage characteristics:

	<u>Imported</u>	<u>Indigenous</u>
Fractional HP, 1-phase	220±10%	220±10%
1 HP & above, 3-phase	400±10%	400+5%-10%

4.3 All motors shall be constant speed type unless otherwise specified but suitable for running with VFD. 3-phase motors,150 HP and below shall be squirrel cage type and above 150 HP slipring type.

Squirrel cage motors 10HP and above shall have 6 winding leads brought to motor terminal block for star-delta starting. Single phase motors shall be split phase type or capacitor start induction run type.

- 4.4 The motors shall be tropicalized and fungus proof. Unless otherwise specified, drip proof ventilated or totally enclosed fan cooled construction with Class IP44 Protection for indoor installation, totally enclosed fan cooled weather proof construction with Class IP54 Protection for outdoor installation or where coming in contact with high humidity air. The motors and starters shall be suitable for operation under site conditions as specified; minimum ambient temperature 45°C and altitude 600m amsl. Where required, motors installed outside shall be provided with sheet metal cover to protect from direct sun.
- 4.5 The motors to have cast iron frame with cast in cooling ribs, integral feet and cast in end shields, protective cover for cooling fan, quiet running ball or roller bearings to meet the specified duty, terminal box and grease nipples in upper part of end shields to be accessible while motor is running. Motors to be suitable for direct or pulley drive.
- 4.6 All motors should be arranged for quiet operation and guaranteed to give the required output and fulfil the requirements of the driven machinery without producing any sound audible outside the machine room.
- 4.7 The slipring motors shall have inspection windows for access to brushes and slip rings. Rotor connections shall be made thru a cable gland or terminal box. There shall be a safety control to ensure that the motor cannot be started without the brushes in position.
- 4.8 All motors provided under this contract should be of one manufacturer except for the equipment where special motors and starters are provided as standard component. The Contractor shall submit manufacturers' technical bulletins of motors to the DUHS's Engineer for approval before supply.
- 4.9 Special fire resistant, explosion proof, 2-speed or multi speed motors and starters shall be supplied if specified elsewhere in the documents.
- 4.10 Recommended Motor Brand: Siemens

## **5.0 FILTERS**

### **PANEL TYPE G-4 AND F-9 FILTER, BAG TYPE F-6 AND F-8 FILTERS:**

Pre-Filters (G-4).Panel Type with metallic holding frames, 2.5m/s, initial resistance not over 70 pascal and filter media shall be regenerative type.

The filter grade shall be G-4 according to EN 779 and average synthetic dust weight arrestance shall not be less than 90%.

Filters shall be provided complete, consisting of holding frame and installation frames.

Front withdrawal type F-6 and F-8 Bag type air filters to be with holding frames, gaskets, etc.

Maximum face velocity 2 m/s, recommended size as per schedule of filters, initial resistance for F-6 filters not over 70 pascals and F-8 filters not over 110 pascals. Recommended size as indicated in the Schedule.

The filter grade shall be according to EN 779 and atmospheric Dust SPOT average efficiency shall not be less than 65% for F-6 and 95% for F-8 filters respectively.

Filters shall be Bag type filter inserts having long service life with high and constant dust extraction efficiencies, high stability of filter elements and low pressure loss even under large air flows.

Filter media shall be of high quality spun fibreglass media specifically made for separation of fine dust, suspended particles and aerosols or approved equal.

Filters shall be provided complete, consisting of cell (holding) frame, installation frame, special installation frames for installation in duct/ AHUs and required amount of flat steel stiffeners for special installation frames.

- 5.2.2 Panel filters G-4 TROX/CAMFIL/AAF/MGT, F-6 to be TROX/CAMFIL/AAF/MGT, and F-8 to be TROX/CAMFIL/AAF/MGT, or approved equal.

## **6.0 AIR COOLED SPLIT AIR CONDITIONING UNIT**

- 6.1 Electrically operated, Refrigerant-HFC 410A split units cooling type air conditioner with remote air cooled condensing unit of minimum capacity as specified in Schedule of Equipment or in BOQ. The condensing unit to be complete with compressors, air cooled condensers, condenser fans, fan motor, controls, casing and safety devices and all other accessories to complete the unit. The fan coil unit to be suitable for installation within the space and as indicated on the drawings.
- 6.2 INDOOR UNIT Indoor Unit shall be wall mounted type. The casing shall be constructed of galvanized steel. The units shall be provided with decorative plastic side panels and return grille/filters on the front of the unit. Drain pan shall be double walled insulated, epoxy resin coated rolled steel plate insulated with fire retardant foam coating with removable drain pan extended beyond coil to serve connections. Fans shall be forward curved centrifugal direct driven type double width double inlet type. Bearings shall be permanently lubricated sealed ball bearings. Motors shall operate on 220 volt 50 Hz power and shall be suitable for multi- speed control from manual selector and shall be tapped wound permanent split capacitor type with UL listed thermal overload protection. Maximum sound power level shall not exceed 56 dB at 250 cps. The direct expansion cooling coil shall be fabricated of copper tubes with mechanically bonded aluminum fins, and tested to 31 bar pressure and suitable for working pressures up to 24.1 bar.
- 6.3 CONDENSING UNIT

The air cooled condenser shall have ample surface area to meet the specified capacity requirements,

weather proof construction with galvanized steel casing, copper tubes with mechanically bonded aluminum fins, working pressure 24.1 bar, propeller or axial flow type galvanized fans with vertical upward or side air discharge, totally enclosed fan motors with automatic direct on line magnetic starters. The condenser should preferably have liquid sub cooling arrangement. The compressors shall be hermetically sealed reciprocating or Rotary type complete with suction and discharge valves with connections for pressure gauges, suction gas cooled motor having internal thermal over load protection in each phase winding, internally spring mounted to provide quiet free floating operation forced feed lubrication system with built-in anti-sludging device. The unit shall be complete with operating charges of refrigerant and oil and all interconnecting piping controls and accessories

6.4 CONTROLS Provide thermostat and three speed on-off selector switch for each unit suitable for remote wall mounting. The tenderer shall supply the following information. (a) Capacity of unit. (b) Motor BHP. (c) CFM capacity and static pressure of DX evaporator. (d) Manufacturer's performance guarantee certificate. (e) Over all dimensions.

#### 6.5 EXECUTION

Installation work shall include all rigging, setting, aligning and grouting necessary to prepare equipment and its integral parts for normal continuous operation. All installation work shall be done according to best practice and recommendations of equipment manufacturer.

### 7.0 PIPING, FITTING AND FLANGES:

**Copper piping** shall be seamless pipe ASTM B88 type K plain ends with wrought copper fitting ANSI B16.22

**Condensate drain piping** shall be uPVC class E ASTM D1785 or BS3505 with solvent welded fitting for installation not expose to view and GI pipe class B (medium) BS1387 with threaded fittings for installation on roof and within plant room.

### 7.1 INSTALLATION:

(a) General:

Pipes shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, properly clearing all windows, doors and other openings. Excessive cutting or other weakening of the building structure to facilitate piping insulation will not be permitted without written approval. Layout drawings required under the title of “**APPROVAL OF MATERIAL AND EQUIPMENT**” shall show locations of all supports, the load imposed on each fastening or anchor, typical details for special anchorage, and details for special anchorage for supports attached to metal roof decking, for suspended piping, valves, tank, pumps, converters, and other mechanical equipment. Supports shall be attached to metal decking. Where supports are

required between structural framing shall be provided and detailed. Pipe shall have burrs removed by reaming and shall be installed to permit free expansion and contraction without damage to joints and hangers. Changes in direction shall be made with fittings, except that bending of pipe bender is used and wide sweep bends are formed. The centerline radius of bends shall not be less than 6 diameters of the pipe. Bent pipe showing kinks wrinkles, flattening or other mal-formations will not be accepted. All piping shall be installed with sufficient pitch to ensure adequate drainage and venting. Piping connections to equipment shall be provided with unions or flanges. Open ends of pipelines or equipment shall be properly capped or plugged during installation to keep dirt and other foreign matters out of the system.

### 7.1.1 Pipe Supports:

- (a) General: pipe hangers, brackets, saddles, inserts, clamps and pipe rolls including rods, bolts, turn buckles, bases and protection shields shall conform to standard recommended engineering practice, using stock or production parts wherever possible. Chain, wire, strap or other makeshift devices will not be permitted as hangers or supports.

Accurate weight balance calculations shall be made to determine the required supporting force at each hanger location and pipe weight load at each equipment connection. Pipe hangers shall be capable of supporting the pipe in all conditions of operations. They shall allow free expansion and contraction of the piping, and prevent extra stress resulting from transferred weight being included in the pipe or connected equipment. Hangers shall be supported from beams, clamps, concrete inserts Phillips concrete fasteners, and power actuated drive pins. Concrete inserts when used shall be installed in the exact location prior to the pouring of the concrete.

- (b) Suspended Horizontal Piping: shall be supported by adjustable hangers or supports, which shall provide a means of vertical adjustment after erection. Unless otherwise indicated on drawings maximum spacing between pipe supports for straight runs of pipe shall be in accordance with recommended spacing shown in accordance with recommended spacing shown in the table given below:

Nominal Pipe Size Inches (mm)	0.5	0.75	1	1.5	2	2.5	3	4	5	6	8	10
	-13	-20	-25	-40	-50	-65	-75	-100	- 125	- 150	-200	- 250
Maximum Span Feet (Meters)	5	6	7	9	10	11	12	14	16	17	19	22
	- 1.5	-1.8	- 2.1	- 2.7	-3	- 3.3	- 3.6	-4.2	-4.8	-5.2	-5.8	-6.7
Rod Size dia mm.	10	10	10	10	10	13	13	16	16	19	22	22

Pipe hangers and supports shall be spaced not over 5 feet (1.5m) apart at heavy fittings and valves.

A hanger shall be installed not over 1 foot (0.3m) from each change in direction of piping. Where necessary to prevent vibration transmission, the support closest to the sources of vibration shall be spring cushion, or other approved type of isolation hanger. Where the piping system is subject to

shock loads, such as thrusts imposed by the actuation of safety valves, hanger design shall include provision of shock absorbing devices of approved design. Hangers shall be designed so that they cannot become disengaged by movements of the supported pipe.

- (c) Vertical Piping: shall be guided or supported in the center of each riser but not over 15 feet on center and shall be supported at the base of the riser on a base elbow or tee with a pipe stand only where required. For un-insulated brass or copper pipe or tubing, the riser clamp shall be compatible nonferrous or electrolytic ally coated steel as for hangers.
- (d) Piping in trenches: Pipes shall rest on suitable wall floor supports with rollers.
- (e) Pipe Sleeves: Pipes passing through concrete or masonry walls or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction or afterwards if necessary. Each sleeve shall extend through its respective wall, floor or roof and shall be cut flush with each surface. Sleeves shall be of such size as to provide a minimum of 1/4" all around clearance between bare pipe and sleeve or between jacket over insulation and sleeve. Sleeves in bearing walls shall be steel or cast iron pipe. Sleeves in non-bearing walls, floors, or ceiling may be steel pipe, cast iron pipe or G.I. sheet metal gauge 14, with lock type longitudinal seam. Sleeves in bearing walls shall be steel or cast iron pipe.

## **8.0 LOW VELOCITY LOW/MEDIUM PRESSURE SHEET METAL DUCTING**

- 8.1 All sheet metal work for various air systems shall be furnished, installed, completely connected, tested and adjusted.
- 8.2 The Contractor shall make shop drawings of all duct work and the same shall include details of all splitters, takeoffs, vanes, dampers, elbows and all other necessary fittings required for the proper operation of the air systems. Shop drawings and other details shall be submitted to the DUHS's Engineer for approval before fabrication.
- 8.3 Exact dimensions and locations of diffusers, registers, grilles and louvers shall be submitted to the DUHS's Engineer for approval, otherwise any changes directed after installation shall be made by the Contractor without any additional cost to the Employer. For diffusers and registers adequate provision shall be made in the neck connections for installation of deflectors and dampers.
- 8.4 All duct openings, diffuser, register and grille necks/ boxes must be tightly closed during construction to keep out rubbish.
- 8.5 All ducts passing through walls shall have 20 gauge G.I. sheet sleeves extending 6mm beyond the finished face of the wall on both sides. The sleeves shall be of sufficient size to cover duct insulation or any other duct covering and allow atleast 9mm clearance in the sleeve for free movement of the finished ducting. The clearance shall be filled with fiberglass pads or other approved material at fire walls and similar locations. The Contractor shall be responsible for supplying, locating and setting of all necessary duct sleeves.
- 8.6 All sheet metal duct work shall be fabricated from commercial quality prime finish galvanised steel sheets. The specifications for USA and Canadian sources shall be base steel sheets according to ASTM designation A366:62T and zinc coating according to 525-64T, 1.25 oz./sq.ft. and for all other

sources base steel sheets cold rolled B.S. 1449:Part 1B:1962 and zinc coating according to B.S. 2989:1958 Class D, 1.25 oz./sq.ft. The zinc coating should be applied uniformly by continuous hot dip method to both sides of the base metal so that the sheet metal can be drawn, formed, lock-seamed and spun without danger of flaking or peeling off the zinc coating.

- 8.7 All uninsulated ducts shall be cross broken. Insulated ducts not to be cross broken.
- 8.8 All ducting shall be substantially built with approved joints and seams shall be made smooth on the inside and neat on the outside. The duct joints shall be made as air tight as possible. The laps shall be made in the direction of air flow and no flanges shall project inside the ducting.
- 8.9 Ducts, the width of the greater dimension of which exceeds 30 inches shall be constructed of not more than four feet sections. Ducts, the width of the greater dimension of which is 30" or less shall be constructed of not more than eight feet sections.
- 8.10 All elbows shall preferably be full radius type. If space does not permit, square elbows may be used with double thickness shop fabricated turning vanes rivetted with the ducting. Due to space limitations curved elbows with less than a full radius bend may also be used provided single thickness turning vanes are installed in the elbow. Full radius elbows of widths 40"-60" shall have one and over 60" shall have two single thickness turning vanes. Minimum throat radius of any curved or square elbow shall be 3 inches.
- 8.11 Wherever necessary in duct work, casings or sheet metal partitions, suitable access doors and frames shall be provided to permit inspection, operation and maintenance of valves, controls, fire dampers, filters, bearings, traps or other apparatus concealed behind the sheet metal work. Access doors shall also be provided at distance not exceeding 23m for duct cleaning. All such doors shall be of double construction, of not less than 20 gauge G.I. sheet metal and shall have sponge rubber gasket around the entire perimeter to make the joint airtight. They shall be hung on heavy flat hinges and shall be secured in the closed position by means of wing type catches. In no case shall access to any of the items of equipment requiring inspection, adjustment or servicing require the removal of nuts, bolts, screws, wedges or any other screwed or loose device.
- 8.12 The supply and return air duct connections with the fans and equipment shall be made through heavy duty air tight pre-fabricated flexible duct connector to prevent transmission of vibrations. The flexible duct connector will have 75mm 24g G.I. sheet, 150mm of fabric and 75mm 24g G.I. sheet. The fabric shall be fixed with G.I. sheets with double-lock grip. The fabric shall be non-combustible heavy glass fabric double coated with fire retardent neoprene to become fully water proof and air tight of approx. 30oz weight per sq.yd. The flexible connector shall be Duro-Dyne Super Metal Fab or approved equal.
- 8.13 The ducts shall be adequately supported from hangers firmly fixed and generally suspended from the building structure with the help of concrete inserts, rawl bolts or shooting bolts. The hangers and supports shall not pierce the insulation which shall be suitably protected and reinforced at that location. The bottom support shall be 30x6mm M.S. flat or 25x3mm angle for ducts upto 12" width,



30x3mm angle upto 30" width, 40x3mm angle upto 72" width and 50x5mm angle upto 96" width. Hangers shall be spaced on average 3 meter centres with a hanger no further than 300mm on each side of any changes of direction. Ducting passing through building expansion joints shall be supported on either side of joint. The hangers for horizontal ducts shall be 9mm round rods for ducts upto 30" width, 12mm round rods or 40x3mm M.S. flat upto 72" width and 40x5mm M.S. flat upto 96" width. The vertical ducts shall be supported at each floor with M.S. angle or channel supports resting on slab and bolted with the duct bracing or MS flat straps rivetted with the duct. Perforated band or wire shall not be used in any case for supporting the ducts.

8.14 The low pressure ducting with static pressures upto 50mm wg and velocities upto 10mps, shall be fabricated according to the following schedule:

Rectangular Ducting

To 8" larger dimension	26 gauge (all four sides)
9"-27" larger dimension	24 " "
28"-51" " "	22 " "
52"-81" " "	20 " "
Above 81" " "	18 " "

8.15 The ducts shall be fabricated with following type of joints or as approved:

(a) Longitudinal

Pittsburgh lock, double seam, or grooved seam.

(b) Circumferential (all four sides):

Duct larger dimension

To 23" Drive slip

24" - 42" 1" high pocket lock or standing seam

43" - 72" 1-1/2" high pocket lock or standing seam

73" - 96" 1-1/2" high reinforced pocket lock or standing seam

8.16 The bracing for ducting shall be as follows:

Duct larger dimension Size of bracing MS angle

to 23" None

24"-30" Joints at 4' centres without bracing or joints at 8' centres with 25x25x3mm bracing between joints.

31" - 42" 25x25x3mm bracing @ 4ft centres

43" - 72" 40x40x3mm " @ 4 "

73" - 84" 40x40x3mm " @ 2 "

85" - 96" 40x40x5mm " @ 2 "

The 2' centres bracing would be located at joints and between joints.

The bracing shall be carried around all four sides, bracing angle frame welded at 4 corners and rivetted with the ducts at maximum 150mm centres.

8.17 Special joints, bracing and hangers as specified by the DUHS's Engineer shall be used for ducts with larger dimension over 96".

8.18 The medium pressure ducting with static pressures upto 150mm wg and velocities upto 15mps, shall be fabricated according to the following schedule:

Rectangular Ducting

To 18" larger dimension	24 gauge (all four sides)
19"-45" larger dimension	22 " "
46"-69" " "	20 " "
Above 69" " "	18 " "

8.19 The ducts shall be fabricated with following type of joints or as approved:

(a) Longitudinal  
Pittsburgh lock, double seam, or grooved seam.

(b) Circumferential (all four sides):

Duct larger dimension

To 18"	1" high pocket lock, standing seam or bar slip.
19" - 36"	1-1/2" high pocket lock or standing seam.
37" - 48"	Reinforced standing seam with 40x40x3 mm angle or 32x32x3 mm companion angle flanged joint.
49" - 60"	40x40x3 mm companion angle flanged joint.
61" - 84"	50x50x5 mm companion angle flanged joint.

The companion angle flanged joints shall have neoprene gasket to make the joint air tight.

8.20 The bracing for ducting joints at 4 ft centre shall be as follows:

Duct larger dimension	Size of bracing MS angle to 12"	None
13" - 24	25x25x3mm bracing between joints.	
25" - 36"	32x32x3mm " @ 2 ft centres	
37" - 48"	40x40x3mm " @ 2 "	
49" - 60"	50x50x3mm " @ 2 "	
61" - 84"	75x75x5mm " @ 2 "	

The 2' centre bracing would be located at joints and between joints.

The bracing shall be carried around all four sides, bracing angle frame welded at 4 corners and rivetted with the ducts at maximum 150mm centres.

8.21 Special joints, bracing and hangers as specified by the DUHS's Engineer shall be used for ducts with larger dimension over 84".

8.22 The ducting and air dampers shall be furnished to comply with these specifications and latest edition of SMACNA Duct Construction Standards. Where there is a conflict between the two, these specifications will prevail.

## **9.0 THERMAL INSULATION:**

### **9.1 GENERAL:**

The Contractor shall install the insulation on ducting, piping, etc., as specified below. Installation shall be done as per the following specification. The insulation shall be provided as per List of Approved Manufacturer's or in BOQ or equivalent make subject to the approval of DUHS's Engineer.

### **9.2 PIPING INSULATION:**

- (a) Installation of Cross-linked Polyolefin pipe Insulation (density 25-30 kg/m<sup>3</sup> , Class "O" in Fire, Thermal Conductivity 0.035 W/(m.k) and Zero Permeability) for duct with alupet foil and self-adhesive tape.
- (b) Condensate Drains: shall be insulated with 1/4" thick closed cell synthetic elastomeric foam insulation such as Aero flex-Europe or equivalent.

### **9.3 DUCT INSULATION:**

- (a) Cross-linked Polyolefin duct Insulation (density 25-30 kg/m<sup>3</sup> , Class "O" in Fire, Thermal Conductivity 0.035 W/(m.k) and Zero Permeability) for duct with Alupet foil and self adhesive including all material and accessories, complete in all respect and to the satisfaction of Engineer In charge.

Insulation shall be continuous and no gaps, crevices and other discontinuities shall be acceptable. All gaps shall cover 100% surface area of the duct and insulation and joint shall be overlapped 50mm.

All exhaust air duct heading toward energy recovery wheel or passing through plenum in the Air-conditioned areas shall also be insulated with 25-mm insulation to avoid any condensation.

### **9.4 INSTALLATION:**

9.4.1 Duct insulation: The insulation shall be fixed to the duct with a good quality fire-resistant, approved adhesive. Adhesive shall cover at least 75% of duct area. Sheet metal hooks only will not be allowed. At all elbows, tees or turnings insulation shall be applied in such a way as to allow the insulation to be installed flush with the duct. Insulation shall be continuous, and no gaps, crevices, or other discontinuities shall be acceptable. All gaps remaining shall be filled up with fiber glass scrim.

- (a) Vapor barrier shall be fixed to the insulation with a good quality, fiber resistant adhesive, approved by the DUHS's Engineer. All circumferential and longitudinal joints shall be lapped at least 1.5 inches. Vapor barrier shall be completely continuous. All scratches, tears, etc. shall be made good by pasting fresh layers of Kraft paper on the discontinuity. Adhesive shall cover at least 75% of the insulation area.

(b) Jacketing & cladding shall be done, on exposed to atmosphere ductwork.

9.4.2 Pipe Insulation: No insulation shall be applied to any system of piping until all pipe work has been tested, cleaned out and made tight. All insulation shall be applied in a manner consistent with good practice and methods. All longitudinal joints of pipe shall be at the top and bottom. Insulation shall be continuous through walls, floors, ceiling and partitions etc.

Chilled Water Piping: shall be insulated with preformed sectional Rubber form insulation. All insulation shall be fixed to the pipe with a good quality, fire resistant, approved adhesive. Insulation shall be continuous and gaps if any shall be filled up with insulation yarn scrim and bounded with twine. Circumferential and longitudinal joints of vapor barrier and jacket shall be overlapped at least 50 mm. Soft aluminum bands shall be installed at every 450 mm.

9.4.3 Cladding: All insulated pipes in the central plant room and where expose to atmosphere shall be provided with a cladding of 26 gauge G.I. sheet metal. At all flanges and Valves shall be provided with valve boxes with quick opening clamps.

The cladding shall be painted with one coat of primer and two coats of finish paint.

## **10.0 DIFFUSERS, REGISTERS AND GRILLES:**

### **10.1 GENERAL:**

The Contractor shall confirm with the Architect regarding the interior color scheme of the building to match the colors and type of the diffusers and grills. The Contractor shall be responsible for diffusion, spread, drop and throw. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactory, the units shall be re-selected to perform quietly and effectively in accordance with the manufacturer's recommendations as approved by the DUHS's Engineer.

A schedule of all air inlets and outlets shall be submitted to the DUHS's Engineer, indicating location, types, specified air quantity, neck or face velocity, sound power level values, pressure drop, throw and drop for registers and maximum and minimum diffusion range, prior to ordering. Diffusers and registers shall be provided with opposed blade volume controller with accessible key operator. The manufacturer of these units shall be as per list of approved manufacturers.

1. The cutting of false ceiling (tiles) shall be the responsibility of the HVAC contractor.
2. All air inlet and outlets shall be manufactured as per turtle & belly standards of air inlets / outlets.
3. Diffusers connected to VAV systems shall be the non-dumping type.
4. The interior of all grilles and diffusers is to be factory painted matt black.
5. All grilles, diffusers and registers shall be tested to the requirements of ASHRAE and ADC and ARI.

All grilles and diffusers supplied on this project shall be tested and rated in accordance with ASHRAE standard 70-72, ADC Test code 1062-GRD and ISO 3741.

Test and rate air outlets and inlets in accordance with ASHRAE 70 “Method of Testing for Rating the Air flow performance of outlets and inlets” and ARI 650 “Standard for air outlets and inlets” Test and rate louvers in accordance with AMCA 500 “Test Method for louvers, dampers, and shutters”

## **10.2 DIFFUSERS:**

10.2.1 Shall be square, rectangular, slot, strip shape, jet nozzle or perforated type with fixed or adjustable air discharge pattern, as indicated in the drawings. Ceiling mounted units shall be furnished with anti-smudge device, unless the diffuser unit minimizes ceiling smudging through design features. Diffusers shall be provided with air deflectors specified herein. Ceiling mounted units shall be installed with trims tight against ceiling whether flush, recessed or surface mounted. Sponge rubber gasket shall be provided between ceiling and surface mounted diffusers, when necessary for air leaking-control. Suitable trim shall be provided for flush mounted diffusers.

## **10.3 REGISTERS:**

Shall be four-way directional-control type except that return and exhaust registers may be fixed horizontal or vertical louver type similar in appearance to the supply registers face.

Registers shall be provided with sponge rubber gaskets between flanges and walls or ceilings. Wall supply registers shall be installed at least 150 mm (6”) below the ceiling unless otherwise indicated. Type of registers shall be as indicated on the drawings or approved.

## **10.4 RETURN GRILLES:**

Shall be of sizes shown on the drawings and shall consist of fixed louvers at 40° angle along the longer side and shall not be provided with control dampers unless otherwise indicated on drawings.

## **10.5 LOUVERS:**

Louvers shall be extruded aluminum frame with aluminum blades of not less than 2 mm thickness, and shall be firmly fixed so as not to vibrate. Unsupported blade width shall not exceed 1800mm. behind each louver there shall be an insect mesh screen 76 x 6 mm made from 2 mm diameter stainless steel wire. The screen will be clamped by a 20 mm frame and will be firmly fixed to the outer edges of the louver. The frame shall be hot dip galvanized after fabrication. The connection to the louver shall be flexible and shall ensure no duct load is transmitted to the louver. Louvers shall be provided with powder coated finish to the approval of the engineer.

## **10.6 AIR DAMPERS**

10.6.1 In all duct work the Contractor shall furnish and install factory fabricated dampers (VCDs) for proper control of air volumes and balancing of air distribution systems or for closing/ opening of air systems.

These dampers shall be separate from any other dampers provided with supply, return and exhaust

air diffusers, registers and grilles or provided by the manufacturer in the equipment.

10.6.2 A multi leaf opposed blade type damper shall be installed in each zone supply air duct near the multizone type airhandling unit outlet to adjust the supply air cfm of each zone.

10.6.3 Dampers shall be factory fabricated, of rigid construction, free of all rattling and vibrations with edges crimped or creased for stiffness.

Damper blades fitting within the damper frame to allow minimum air leakage from sides.

All dampers blades rods provided with ball bearings and linkages of construction and design to be easily movable with minimum force and suitable for operation by automatic controls damper actuators. Nylon bushings may be approved instead of ball bearings; metallic bushings not to be used.

10.6.4 All dampers shall have through rods, not less than 9mm diameter, fastened to blade with two or more yokes with set screws. There shall be a galv. steel/nylon washer at each end of the damper rod.

10.6.5 Damper blades shall be of same material as duct work but two gauge heavier. Damper blades of 18 gauge and lighter shall have the edges double hemmed. Damper blades larger than 900mm length shall have 'V' crease in middle in which damper rod shall be located.

10.6.6 Dampers of less than 200mm width may be single leaf, 200mm and wider, multi-leaf opposed blade type, or if specified parallel blade type.

Multi leaf damper blades to be interlinked with nylon construction gear wheels at one end to ensure simultaneous smooth movement of all blades. The blades to interlock on closure for effective air seal.

10.6.7 Dampers shall have through damper rod with operating lever and lock screw and a quadrant having Open to Close position indicator at one end, damper lever shall be fastened to the rod with set screws. On insulated duct work, quadrants shall be mounted on metal saddles finished flush with insulated surface. The quadrant and lever unit shall be factory fabricated, made of heavy gauge steel electro galvanised, of Engatech manufacture or as approved.

10.6.8 Two position full open-full close dampers (OCD), to be provided where specified or shown on the drawings, shall be of construction as specified above for VCDs except that a quadrant with two position indicator shall be provided for operating the damper.

10.6.9 Splitter dampers shall be installed for air volume adjustment in throats at branch take offs from trunk ducts. Splitter dampers shall be of rigid construction, securely held in adjusted position for operation by means of a rod with damper position indication markings.

10.6.10 Fire dampers shall be installed in all supply air ducts after airhandling or airconditioning units, in return air ducts or wall inlets in AHU or Airconditioning Unit Rooms, at duct crossings of fire wall partitions of the Building, at ventilation fans discharge, exhaust fans inlet, and at other locations shown in the drawings.

The dampers shall be of heavy gauge steel plate mounted to turn freely in steel plate frame inserted in duct or installed in the wall, proportioned and weighted to close at once if released from link and provided with spring catches to hold closed until manually reset. Dampers and frames shall have

suitable eyes and standard fusible links, normally holding them open but releasing upon contact. Ample sized, conveniently located access doors shall be provided for resetting the dampers. Two sets of spare fusible links shall be supplied.

10.6.11 The dampers shall be of Engatech manufacture or as approved.

## **10.7 FIRE DAMPERS**

Fire dampers shall be UL listed. Unless otherwise permitted by the Engineer all curtain-type fire dampers shall be Type B with curtain completely clear of the air stream. Fire dampers shall be installed the manner in which they were twisted and shall meet all applicable codes. Fusible links shall be rated for 100°C unless otherwise damper shall have the same fire rating as the wall in which they are installed Fire dampers installed in duct where air flow may still exist during a fire shall be dynamic type.

## **10.8 INSTALLATION:**

Installation shall ensure that all lines are perpendicular and parallel to the building walls and other surfaces and properly centered so that complete symmetry is obtained.

All diffusers shall be installed directly to the supply air ducting, so that the weight of the diffusers is not transferred to the ceiling. Diffusers shall be so installed that the collar is flush with the ceiling. Gaskets shall be used to prevent leakage.

Registers and grills or duct penetration on sidewalls shall be fixed on GI Sheet 18 Gauge frames. Frame thickness shall be 3 mm (1/8") less than the register/grill collar and shall cover the full width of the wall. Perfect alignment and symmetry shall be maintained.

After the system is in operation, if drafts, dead spots, or excessive noise are noticeable in the conditioned areas due to improper selection or construction of the air outlet, the grill/diffuser/register shall be changed to the proper type to remove the defect, without additional cost to the owner.

## **11.0 SUPPLY AND EXHAUST FANS:**

### **11.1 GENERAL:**

The contractor shall supply and install fans of the type and capacity specified in Schedule Sheet and conforming to the specifications given herein. The contractor shall be responsible for the proper selection of the fans so that the specified operating conditions are obtained. Motor shall be sized to provide the required BHP for meeting the specified conditions without overloading. The Fans shall be provided as per List of Approved Manufacturer's.

External static pressure given in the schedule are indicative and for guidance only. The Contractor shall calculate the external and total static pressure for all fans and shall submit the same for Engineer's review and approval before ordering the fans. Required fan and motor shall be provided without any additional cost and no variation or claim shall be entertained in this regard.

## **11.2 CENTRIFUGAL FANS:**

Shall be capable of delivering the specified capacity against the specified static pressure. Scroll shall be fabricated of heavy gauge steel, completely welded for maximum duty and leak proof construction. Fan wheel shall be of aluminum and have backward curved blades, rigidly constructed with non-overloading characteristics, and shall be balanced both statically and dynamically, and shall be free from objectionable noises and vibration. Sealed permanently lubricated, sleeve, roller or ball bearings shall be provided. Spring type vibration isolators shall be provided. Fan shall be provided with 1450 rpm motor with weather proof enclosure, suitable for 400V, 3 phase, 50 Hertz. Fan shall be driven through an adjustable speed belt drive, rated for 1.5 times motor H.P. Fans shall be provided with inlet and outlet flanges/screen. Motor and belt drive shall be provided with a baked enamel finish.

## **11.3 INSTALLATION:**

11.3.1 General: Fans as shown on drawings shall be installed by the Contractor, complete in all respects and as per satisfaction of the DUHS's Engineers. Fans shall be rigidly secured so that they operate without vibration and transmission of vibration to the structure shall be through isolated. Connection to ducting shall be through flexible connectors. Ducting connection to fan shall ensure lowest turbulence and smooth transition of sizes. All supporting arrangements of the fans shall be drawn up by the Contractor and submitted to the Engineer for approval.

Floor mounted fans shall be installed on concrete housekeeping pad at minimum of 100 mm above the floor, fan shall be mounted on vibration isolator. Structural suspended fans shall be installed using threaded rods and vibration isolator.

11.3.2 Commission & Testing: The fans shall be commissioned and tested by the Contractor.

## **12.0 ELECTRICAL WORKS:**

### **12.1 ELECTRICAL WIRING:**

The Contractor shall be responsible for the complete power and control electric wiring of the required of the HVAC and BMS Works and other areas as required for the system. A 3 phase and neutral, 4 wire Electric Supply with earthing continuity conductors where indicated on the drawings will be available for the Contractor. Wiring onwards from this supply point to all motors, controls, etc., shall be the responsibility of the Contractor.

The Contractor shall verify the electric power given in motor control center drawings at the time of bidding. No additional cost and no variation or claim shall be entertained if Contractor supplied higher electric power equipment's.

For remotely located equipment, a power point shall be supplied near each unit, or where indicated on the drawings and wiring onwards shall be the responsibility of the air-conditioning contractor.

The electrification work shall be carried out by a licensed workman, authorized to undertake such a



work under the provision of Pakistan Electricity Act and Rules and the latest edition of I.E.E. Wiring Regulations.

Any special requirements of the local Electric Supply Company shall be complied with.

## **12.2 CABLES:**

All the cables listed, except otherwise specified, are four cores PVC insulated PVC sheathed cables 600/1000 volts grade as per British Standard B.S. 6004:1969. The conductors shall be of high conductivity annealed copper wires of 99.97% purity heavily insulate with PVC compound and sheathed overall with PVC compound. The insulation color identification will be as red, yellow, blue and black for neutral. In general all the cables, except otherwise specified in the cable schedule will be non-armored types. All cables shall be selected at 45°C.

## **12.3 MOTOR CONTROL CENTER CONSTRUCTION AND COMPONENTS:**

- (a) General: The central control panel shall be located as indicated in drawings. It shall be floor-mounted, free standing and front access design.

Each piece of equipment on the part shall be identified by a nameplate.

Nameplate may be plastic or metal and attached to the surface of the panel or integral with it.

Painting or lettering, directly on the panel will not be permitted. Control instruments, wiring and terminals shall be within the panel, except that switches pilot lights, and push buttons shall be mounted on the panel front. The front panel shall be hinged for front access. The Motor control centers shall be from Standard manufacturers and shall be provided as per List of Approved Manufacturer's or equivalent make subject to the approval of DUHS's Engineer.

Cable and breaker sizes and other components of MCC shown in the drawings are indicative and for guidance only. The Contractor shall submit all MCC based on approved equipment's and get approval before ordering. Any change in approved MCC's shall be provided without any additional cost.

- (b) Construction: The control center shall be consisted of 90 inches high and approximately 12-18 inches deep. The external panels shall be of flanged 14-gauge sheet steel. Side, top, back and full floor plates shall be rigidly joined by cross members and angle iron brackets. Removable floor channels 1.5" x 3" shall be provided to support and mount the entire control center.
- (c) Unit Compartments: provide each compartment with an individual front door.
- (d) Bus: Power shall be distributed horizontally within the control center by a three phase electrolytic imported copper bus (99.7% purity), rated for the required Amperes continuous current and braced for minimum 40,000 ampere RMS asymmetrical short circuit current or as indicated on drawings. The bus shall be efficiently isolated from all wiring troughs and other working areas. Power within vertical sections shall be distributed by vertical copper bus bars. Bus bars shall be painted red, yellow and blue.

All the bus bars, internal wiring cables and other equipment shall be rated for 45°C ambient and bus bar end temperature of 65°C.

Provide copper ground bus of the required amperage but having not less than 200 amperes capacity in the base of the control center permanently grounding the structure. Provide lugs as required for ground wire attachment.

- (e) Incoming & Outgoing Cable Termination: Provide 12" or more of wiring space just below the main bus for incoming cable. Provide space for outgoing cables through either top or bottom of all standard vertical sections.
- (f) Main Protective Device: The incoming line protection device unless otherwise specified shall be a circuit breaker of the frame size and ampere rating required for the power supply to the plant.
- (g) Motor Starters: All starters for single phased motors shall be automatic magnet direct-on-line types with adjustable overload cutout start/reset push button. Where electrical interlocking is required the starters shall be additionally provided with hand/off/auto switch and at least two auxiliary contacts for electric or electronic interlocking or as specified.

All three phase motor starters up to 7.5 HP shall be automatic magnetic direct-on-line type, with three adjustable overload cut-outs, Ammeter low voltage cut-out, single phasing preventer, stop-reset push button, HAND-OFF-AUTO switch and at least one auxiliary contact for electrical interlocking circuit or as specified.

The squirrel cage induction motors above 7.5 HP shall have star-delta type reduced voltage starters. The automatic starter shall have hand/off/auto switch, wherever electrical interlocking is required or where shown on the drawings. All starters should have three adjustable overload cutouts, Ammeter low voltage cutout, single phasing preventer, stop-reset push button, at least two auxiliary contacts for electrical interlocking circuit.

All starters control circuit and magnetic coils to be suitable for 220 volt, 1 phase A.C. For motors requiring electrical interlocking or remote control or sequence starting control or any other such feature, starters should have necessary auxiliary contacts providing the desired control arrangement. A separate set of terminals is required for each control circuit. All motors and starters provided under this contract should be of one manufacturer except for the equipment where special motors and starters are provided as standard components.

- (h) Unit Nameplate: Each unit shall be identified by a ½" x 4" engraved nameplate.
- (i) Motor Protection: Furnish and install all starters, overload heaters, as well as fuses unless specifically noted otherwise on the drawings. The selection of the overload heaters shall be based on the motor nameplate data. Fuses shall be of the dual element type, unless specifically noted otherwise. They shall be properly coordinated and in general sized according to fuse manufacturer's recommendations for the loads served.
- (j) Air Break Contractors: The contractors shall be suitably rated according to the motor output rating if not specified in the drawings and having rupturing capacity of 25 kA. Backup fuses to be provided if rupturing capacity is lower than the required.

The contractors should have sturdy magnets and bearings and should have bouncing, easily replaceable contacts of silver alloy and long contact life.

- (k) Time Relays: Time relays used in Automatic star-delta starter can be motor driven or electronic type but should have a high timing accuracy independent of voltage and temperature fluctuations.

The relays should generally have operating time range between 0.5 to 20 seconds. However in cases of motors having longer starting periods the Contractor will check their starting time and use matched time relays accordingly.

- (l) Selector Switches, Pilot Lamps, Relays, etc.: In general, where motors are to be automatically controlled a “HAND-OFF-AUTO” selector switch shall be provided and mounted in the enclosure cover. Selector switches shall be equipped with Voltmeter and Ammeter. Provide motors that are to be started manually with “START-STOP’ buttons mounted in the enclosure cover.

For all motors installed in the plant room, pilot lights, for ON-OFF-OVERLOAD status indication shall be provided on this panel, or specifically as shown on drawings.

Necessary relays etc. for interlocking starters, LEAD-LAG Switch, etc., shall also be provided.

The overload relays shall be of the soldered ratchet type.

Starters used on 400 volts circuits shall have a 220 volt step-down control transformer included in the enclosure of 350 volt amperes.

Provide each starter with a blank plastic nameplate with the equipment identification marked thereon.

#### **12.4 MOTOR CONTROL CENTER CONFIGURATION:**

Motor control centers shall have the configuration as shown on the drawings.

#### **12.5 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 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.

## **12.6 INSTALLATION:**

12.6.1 General: The Contractor shall be responsible for the complete power and control electric wiring of the HVAC and BMS Works. A 3 phase and neutral, 4 wire Electric Supply with earthing continuity conductors where indicated on the drawings will be available for the Contractor. Wiring onwards from this supply point to all motors, controls, etc., shall be the responsibility of the Contractor.

12.6.2 Electric Wiring & Earthing: The electrification work shall be carried out by a Licensed Electrician, authorized to undertake such work under the provision of Pakistan Electricity Act & Rules. The installation shall be carried out in conformity with Pakistan Electricity Act & Rules and the latest edition of I.E.E. Wiring Regulations. Any special requirements of the local Electricity Supply Company shall be complied with.

All power and control wiring shall be duly tagged/ numbered on circuit for the ease of trouble shooting on wiring diagram and on circuits in MCC. All wiring in Plant Room shall be run in approval rigid and flexible steel conduits from the MCC to the motors, on the surface of walls, roofs & columns. Galvanized steel saddle and clamps of minimum 16 SWG, approved by the DUHS's Engineers, shall be fixed to the surface using nylon plugs and galvanized steel screw, with a maximum distance of 3 ft. between clamps. Pull boxes, having sized of 4' x 4" & 2" deep and constructed of 18 SWG sheet steel shall be installed wherever required to limit the pulling length and shall be in a flexible steel conduit, provided with suitable bras glands and check nuts.

Earthing continuity conductors shall be hard drawn base electrolytic copper wires of the recommended size for the motor being served and shall be run along the cables. Earthing to each motor of 1 HP and above shall be with 2 conductors. The minimum size for the earthing shall be 10 SWG.

### **12.6.3 Steel and G.I 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.

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 underground installation shall be given bituminous paint coating and wrapped with suitable paper or cloth before installation.

#### **12.6.4 Testing:**

- (a) General: Upon completion of installation and carrying out physical inspection of works, the Contractor shall perform field tests on all equipment and material before commissioning. All tests shall be performed in the presence of the DUHS's Engineer's and client representatives for the purpose of demonstrating the equipment or system compliance with specifications, and that each

component shall electrically and mechanically function properly as intended. In general the tests shall be carried out in accordance with Section 'E' of Regulations for the Electrical Equipment of Buildings. The Contractor shall however insure that the requirements of the Local Electrical Inspector are met with, and the installation is duly approved by the Electrical Inspector. Proper regards to manufacturer's instructions for testing procedures shall be given for equipment.

The Contractor shall furnish, install and maintain all tools, instruments, test equipment, material, etc., including all personnel required for carrying out the setting, adjustment and recording associated with the testing procedures. All tests shall be made with due consideration to the protection of installation and personnel carrying out the tests. Adequately qualified and trained staff shall supervise the tests. The procedure and sequence of testing shall be furnished to the DUHS's Engineer at least 48 hours before starting of tests. The Contractor shall systematically keep a record of results of all tests carried out. Two copies of all test data and compiled results duly initialed by Engineer Incharge/Authorized Representative present during the tests shall be supplied to the DUHS's Engineer for record purposes and approval obtained.

- (b) Insulation Resistance Test: Insulation Resistance tests shall be carried out on all electrical equipment and wiring, using a self-contained instrument such as direct indicating Ohmmeter of generator type. Only direct current potential shall be used for such testing; voltage range for the same areas under:

Circuits up to 250 volts:                      500 volts D.C.

Circuits above 250 volts

and up to 500 volts:                              1000 volts D.C.

All cables before connection at switchgear of equipment shall be tested for insulation resistance. The test shall be carried out individually between each cable in circuit and also between cable and earth. The minimum acceptable value of insulation resistance shall be 1 Megohm.

Before making any connection all switchgear shall be tested for insulation resistance between live parts and earth. Insulation tests on circuit breakers between each phase and earth. The minimum acceptable value of insulation shall be 5 Meg. Ohms. If the Insulation resistance of any circuit or equipment under test is less than the specified values, the cause of low reading shall be determined and necessary corrective measures carried out. Tests shall be repeated after rectification of defective section for ensuring correct value of insulation resistance before commissioning.

- (c) Operational Tests:

All equipment power feeders shall be tested for operation under load conditions.

Each switch shall be carried to ensure that the operating mechanisms are working. Nameplates are also to be checked for proper designation with respect to the equipment connected. The Contractor shall identify the phases of incoming supply and all equipment, to ascertain that each circuit is connected in proper phase sequence. Wherever required phase identification markings or labelling shall be provided on switchgear and cables. Motors must be tested for proper rotation and stroboscopic effect.

### **13. SYSTEM AUTOMATIC CONTROLS.**

A factory trained Engineer duly authorised by the automatic controls manufacturer alongwith skilled help shall commission, calibrate, adjust and set all automatic control systems till the specified requirements are achieved to the satisfaction of the DUHS's Engineer. The authorised Engineer shall give instructions at site to the Employer's operating personnel for operation and maintenance of the automatic controls for a period of atleast two weeks. The safety controls shall also be adjusted and set to meet the requirements specified by the equipment manufacturers.

- 13.1 The Contractor shall depute experienced Engineer(s) and skilled help well familiar with the nature of the work and provide all instruments etc. required for testing, balancing and adjustment of equipment and automatic and safety controls.
- 13.2 The testing, adjusting and proper setting of the various systems, automatic and safety controls as specified above and as required to ensure that the plants meet the specified performance requirements, are an essential part of the works and the Engineer/DUHS's Engineer will check and test the plants performance after the same have been completed by the Contractor.
- 13.3 The works shall not be considered as completed till the requirements specified above have been complied with to the satisfaction of the Engineer.

### **14 INSTRUMENTS**

- 14.1 The Contractor shall supply and install all necessary indicating thermometers, pressure gauges etc. for easy checking of operation of the complete plant. Amongst others, the following instruments and measuring points shall be included but duplication of instruments and points is to be avoided. The selected scale range of instruments shall suit the anticipated operational range. The suggested ranges are 10-35<sup>o</sup>, 0-50<sup>o</sup>, 0-70<sup>o</sup>, 0-100<sup>o</sup> and 0-200<sup>o</sup>C for thermometers and 990mBarvacuum - 2Bar, 0-4, 0-7, 0-10 and 0-20 Bar for pressure gauges.
- 14.2 Insertion type duct mounted 75mm dia dial thermometer shall be provided in each return air inlet and on the leaving side of each cooling and heating coil of airhandling units, fresh air inlet and supply air of zones.
- 14.3 Industrial type pipe insertion thermometers atleast 100mm dia dial scale with external recalibration or 230mm long stem scale, separable copper wells and sockets with extension neck for insulated piping, shall be provided at each water inlet and outlet of water chiller/heater, condenser, absorber, hot water boiler, heat exchanger, cooling coil, heating coil and pumps. Where only thermometer wells have been shown in the drawings only these shall be supplied.
- 14.4 Compound/pressure gauges, atleast 100mm diameter with Bourdon tube type element and internal mechanism with individual bearings to give best accuracy under fluctuating pressure and vibrations

shall be provided at suction and discharge of all water pumps, inlet and outlet of water chiller/heater, condenser, absorber, hot water boiler, heat exchanger and cooling coil and heating coil. Where only gauge cocks have been shown in the drawings, only these shall be supplied.

14.5 At the chilled/hot water supply and return branch take-off from the main piping, a thermometer copper well and pressure gauge connection with cock, and a pressure gauge connection with cock across each pressure reducing valve should be provided so that when required the Operator can install thermometers and gauges for taking readings. The gauge connection shall further be capped.

14.6 Inclined scale manometers of 0-25mm,0-50mm or 0-75mm Wg scale range shall be installed across each air filter bank.

14.7 The gauge cocks shall be of brass with lever handle and for steam gauges, a siphon filled with water shall be installed between the cock and gauge to prevent steam from entering the Bourdon tube.

14.8 The instruments shall be Ashton/Ashcroft/Negretti and Zambara/ Taylor/Weksler manufacture or approved equal.

14.9 The tenderer to give complete details of all the instruments offered by him.

## **15.0 CLEANING, TESTING, BALANCING AND TEST DATA:**

### **15.1 GENERAL:**

- a) The entire testing balancing and adjusting process to be thoroughly organized & planned. All activities, including the organization, procurement of required test instrumentation and the actual system should be scheduled as soon as practical after the installation has been completed.
- b) The contractor shall appoint an independent agency specialized in the testing & balancing of HVAC systems as a third party and their appointment must be subjected to DUHS's Engineer's and client approval.
- c) Testing and balancing shall be performed in accordance with NEBB (National Environmental Balancing Bureau) USA, code of practices and all final reports shall be signed and certified by the agency appointed to perform such works.
- d) The TBA agency must carry out the preparatory works which shall include the planning and scheduling of all TBA procedures, collecting the necessary data, reviewing the data collected, studying the system to be balanced, recording the published data on the test report forms, and finally, making preliminary field checks of the HVAC equipment and systems.



- e) The contractor shall submit six copies of the complete test procedure to the engineer for approval one month prior to the date of commencement of the balancing and performance test.

## **15.2 CLEANING AND ADJUSTING:**

Pipe shall be cleaned free of scale and thoroughly flushed of all foreign matter. Temporary bypass shall be provided for all water coils to prevent flushing water from passing through coils. Strainers and valves shall be thoroughly cleaned of all debris and blown free of all small particles of rubbish and dust before installation of outer faces. Equipment shall be wiped clean, with all traces of oil, dust or paint spots removed. Temporary filters shall be provided for all fans that are operated during construction, and after all construction dirt has been removed from the building, new filters will be installed.

Bearings shall be properly lubricated with oil or grease as per recommendations of the manufacturer. Belts shall be tightened to proper tension. All control valves and other miscellaneous equipment, are requiring adjustment shall be adjusted for setting indicated or directed. Fans shall be adjusted to speed indicated by the manufacturer to meet the specified conditions.

## **15.3 TESTING:**

- (a) Piping: After cleaning, water and steam piping shall be hydrostatically tested at a pressure equal to 150% of the maximum operating pressure for a period of time sufficient to inspect every joint in the system and in no case less than four hours. No loss of pressure will be allowed. Leaks found during tests shall be repaired by re-welding or replacing pipe or fittings. Caulking of joints will not be permitted. Concealed piping shall be tested in place before concealing. Tests shall be conducted in the presence of the DUHS's Engineer or the DUHS's Engineer's representative who shall be given 10 days' notice before any test is to be conducted. Water and electricity required for the test shall be furnished by the Owner. Any material, equipment or instruments required for tests shall be provided by the Contractor.
- b) Duct Work: Ducts, plenums and casings shall be tested and made substantially air tight at static pressure indicated for the system before covering with insulation or concealing in the masonry. The term substantially airtight shall be constructed to mean that no air leakage is noticeable through the senses of feeling or hearing.

## **15.4 BALANCING:**

- (a) Duct system shall be balanced to produce air quantities within 5% of that indicated.

## **15.5 PERFORMANCE TESTS:**

After cleaning, balancing, and testing operations have been completed, as herein before specified, the system shall be tested as a whole to see that all items perform as an integral part of the system, and that temperature and conditions are evenly controlled throughout the building. Corrections and adjustments shall be made as necessary to produce the conditions indicated, at no additional cost to the Owner.

## **15.6 TEST DATA:**

General: The Contractor shall provide the DUHS's Engineer with typewritten schedules of readings taken during the balancing and testing operation for the following items:

#### **15.6.1 AIR BALANCE:**

- (a) Fans: Size, type, speed in revolutions per minute, static pressure in inches of water, air quantity in cubic feet per minute, and motor load in amperes and voltage.
- (b) Coils: Size, face velocity in feet per minute, air-condition on-and-off Uni.-wet-bulb and dry-bulb temperature in °F., water temperature drop through heating/cooling coil, temperatures entering coil in °F.
- (c) Ducts: Size, velocity in feet per minute, and air quantity in cubic feet per minute.
- (d) Air Outlets and Inlets: Size, velocity in feet per minute, and air quantity in cubic feet per minute.

#### **15.6 CONTROL SETTING:**

The actual on site setting of all automatic controls including thermostats, safety controls, minimum damper settings, fan safety thermostats, pressure controls, temperature and humidity controls and other similar items shall be provided in the form of a tabulated list indicating type of control, location, setting and function.

#### **15.7 OTHER EQUIPMENT:**

The contractor shall also provide written data on the performance of any other equipment; in the form and manner and giving all information required by the DUHS's Engineer/Engineer. The Contractor shall also submit a certificate along with all test reports submitted, certifying that all test have been carried out by component engineers, and that all data submitted has been verified and found to be correct.

#### **15.8 TEST PROCEDURES:**

The contractor shall be responsible to follow the test procedure as under

1. Preliminary inspection & tests.
2. Balancing and commissioning.
3. Performance tests
4. Reliability trail test.

#### **16.0 PAINTING AND FINISHING:**

##### **16.1 GENERAL:**

Painting shall include furnishing labour, materials, equipment, ladders, scaffolding, protective covers, other items required to prepare and finish surfaces of work specified herein or in any other sections.

Paint shall be applied as per manufacturer's printed application directions. Paint color schemes shall be specified at the time of painting or earlier.

Paint shall be applied to the following:

- (a) Materials and Equipment: All materials and equipment factory fabricated, imported or otherwise shall be provided with a fresh coat of paint, of same color as the original factory-paint. Unless otherwise directed by the DUHS's Engineer. The items covered under this head shall include chillers, air handling units, fan coil units, pumps, Cooling tower, fans, etc.
- (b) Piping and Pipe fittings and valves etc. shall be provided with two coats of red lead from an approved manufacturer. Chilled water piping shall be further provided with two finish coats. All valves etc. shall be painted in a color, different from the color on the adjacent pipe. Apply two coats of asphalt paint to all pipes laid in concrete or passing through concrete.
- (c) Hangers and Supports shall be provided with two coats of red iron from an approved manufacturer. All hangers and supports exposed to view shall be further providing with two coats of finish paint of an approved color.

All new surfaces to be painted are prepared properly to receive prime coat of paint. Surfaces shall be scraped or wire-brushed to remove mill scale, rust and clean with solvent of remove grease, oil and dirt. All surfaces shall be thoroughly dried before application of paint. Prime coat shall be suitable for subsequently applied finish coats. For prime coat red lead paint of an approved manufacturer shall be used, such as 'KROMIC' Synthetic Red Lead by Johnson & Nicholson shall be used.

Before finish coat is applied to all prime coated surfaces shall be properly touched up. The equipment and piping shall not be finished painted until they have been tested and approved. All succeeding coats shall be applied only when the undercoats are thoroughly dried.

For piping system identification a color scheme based on American Standard "Scheme for identification of Piping System", "ASA A-13.1-1975" shall be specified and get approved by the DUHS's Engineer and then this color scheme shall be used to finish painting.

## **16.2 STENCILING:**

The Contractor shall stencil near each valve on the pipe, the name of the fluid. Also an arrow should be painted next to the legend indicating the direction of flow in pipe. The stencil legend shall be placed in a location so that it can easily be read from the floor.

## **16.3 IDENTIFICATION TAGS:**

Shall be installed on valves, controls and other parts of the system where directed to do so. Tags shall be polished or lacquered brass 40 mm round, or octagonal with stamped letters or numbers, 12 mm high, filled with black paint and fastened securely with brass "S" hooks or chains.

The Contractor shall further provide charts, diagrams, of size and type as approved designating number, service or function and location of each tagged item.

## **16.4 PIPING AND DUCT WORK IDENTIFICATION:**

1. After completion of insulation and /or painting, all piping and ductwork exposed or concealed shall be marked in English to show the services name and direction of flow.
2. Marking shall be placed at each side of any wall, partition or floor, at 10m intervals on all exposed piping and ductwork and at each access panel or door. Marking shall be located so as to be in full view.
3. Marking shall be stenciled. Use black stencil on light coloured surfaces, yellow stencils on dark coloured surface except where fire lines which shall be stenciled in accordance with civil defence requirements. Stencils shall have distinct edges. Blurred stencils are not acceptable. The name of the services shall be stenciled fully or with abbreviations standard to the industry. Non standard abbreviations are not acceptable. Letters shall be a minimum of 50mm high for ducts and for pipes 75mm or larger to outside of insulation. Letters for smaller pipes shall be 20mm high. All markings shall be clearly legible from 1.5m above the adjacent floor or platform.

## **17.0 OPERATING AND MAINTENANCE INSTRUCTIONS:**

### **17.1 BOUND INSTRUCTIONS:**

Six complete sets of operating and maintenance manuals, duly approved by the DUHS's Engineer, shall be supplied by the Contractor, prior to hand over of the project to the owner. Each set shall be permanently bound and shall have a hard cover. Each manual shall be inscribed with suitable legend for proper identification and use of the manual. The matter shall be legibly typed and/or shall be clear Photostat copies of the original documents, catalogues, etc. Flysheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8 ½" x 11", with large sheets of drawings folded in. The manual shall be arranged in two parts, and shall generally conform to the arrangement shown below.

#### Part I – Systems

1. The system volumes shall be organized into divisions wherein each division represents a generic function. System shall then be classified under appropriate divisions.
2. The material for each system shall then be organized in sections descriptive of the following basic areas of information:
  - (a) Descriptive Information
  - (b) Operating Instructions
  - (c) Inspection and maintenance instructions.
3. Sections shall be organized to include the following categories of information:
  - (a) Descriptive Information:
    - (1) Function of service.
    - (2) Classification.
    - (3) Design Capability.
    - (4) Performance characteristics.
    - (5) Principal components.

- (6) Distribution arrangement.
- (7) Schematic diagram.
- (8) Control diagram.
- (9) Equipment data:
  - (a) Inventory designation.
  - (b) Manufacturer and Model.
  - (c) Size and rating.
  - (d) Pressure, speed, and temperature limitations.
- (b) Operating Instructions:
  - (1) Starting and stopping procedures.
  - (2) Adjustment and regulation.
  - (3) Seasonal changeover.
  - (4) Seasonal start-up.
  - (5) Seasonal shutdown.
  - (6) Logs and records.
- (c) Inspection and Maintenance:
  - (1) Inspection schedule & checklist.
  - (2) Schedules and procedures for lubrication, adjustment, cleaning, painting, protection and testing.
  - (3) Inspection and maintenance record.

#### 4. Reference Documents.

- (a) Construction drawing list.
- (b) Construction Specifications.
- (c) As-built record drawings.
- (d) Test and balance records.

#### Part II – Equipment

1. This part of the manual shall be composed of manufacturer's data on equipment and materials organized into divisions wherein each division represents generic classification of equipment, such as:

Division Title	
Air-conditioning & Ventilation..	1
Controls.	2
Instruments & Accessories	3
Motors	4
Refrigeration	5
Starters	6
Fans	7

2. Each division shall be organized in sections wherein each section would represent a specific type of equipment. For example, for Division 1 the sections shall generally include the following:

Air Conditioning & Ventilating	1.0
Coils cooling	1.1
Fans	1.2
Centrifugal	1.3
Filters roughing	1.4
Terminal	1.5
Duct..	1.6
Other equipment	1.7

3. Coverage of section. Each section shall include the following manufacturer information:

- (a) Descriptive literature
  - (1) Catalogue cuts, brochures, or shop drawings.
  - (2) Dimensional drawings.
  - (3) Materials of constructions.
  - (4) Parts designations.
- (b) Operating characteristics:
  - (1) Performance tables and charts.
  - (2) Performance curves.
  - (3) Pressure, temperature and speed limitations.
  - (4) Safety devices.
- (c) Operating Instructions:
  - (1) Prestart checklist.
  - (2) Start-up procedures.
  - (3) Inspection during operation.
  - (4) Adjustment and regulations.
  - (5) Testing.
  - (6) Detection of malfunction.
  - (7) Precautions.
- (d) Inspection Instructions and procedures:
  - (1) Normal and abnormal operating temperature, pressures and speed limits.
  - (2) Schedule and manner of operation.
  - (3) Detection signals.
- (e) Maintenance Instructions and Procedures
  - (1) Schedule of routine maintenance.
  - (2) Procedures.
  - (3) Troubleshooting chart.
- (f) Parts List.
- (g) Spare parts.
  - (1) Essential inventory.
  - (2) Distributor Directory.
- (h) Service Contracts.

## **17.2 FRAMED INSTRUCTIONS:**

Approved wiring and control diagrams showing the complete layout of the entire system, including equipment, piping, valves and control sequence, framed under glass or in approved laminated plastic, shall be posted, wherever directed. In addition, condensed operating instructions, explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. Proposed diagrams, instructions, and other sheets shall be submitted for approval prior to posting. The framed instructions shall be posted before acceptance testing of the system.

## **17.3 FIELD INSTRUCTIONS:**

Upon completion of the work and at a time designated, the services of one or more project engineers shall be provided by the Contractor for a period of not less than 60 days to instruct representatives of the Owner in the operation and maintenance of the Air-conditioning system. The field instructions shall cover all the items contained in the bound instructions.

## **18.0 TEST RUNS**

- 18.1 The Contractor shall be required to carry out test run(s) as specified in the Memorandum of Tender after the issue of the Certificate of Substantial Completion for the complete works by the Engineer. The period for the test run(s) would be designated in writing by the Engineer. The test run observations shall be recorded in duplicate by the Contractor on printed log sheets approved by the Consultant. The Contractor shall depute an experienced Site Engineer and sufficient skilled labour for taking and recording test run observations. The normal plant operation shall be carried out by the Employer's Operators.
- 18.2 The Employer shall only provide without charge to the Contractor water, electricity and fuel for the test run(s) and the Contractor shall be responsible for the supply of all tools and instruments etc. required to take and record the test run observations.
- 18.3 The log sheets shall be jointly signed by the Employer's Representative and Contractor's Site Engineer. The Contractor shall hand over one set of log sheets to the Employer's Representative every day.
- 18.4 The Contractor's Project Engineer shall check and prepare a summary of observations on printed forms approved by the Consultant in quadruplicate at the end of each test run week. One set each shall be supplied to the Engineer, Consultant and Employer's Representative within one week of the conclusion of the corresponding test run week.
- 18.5 The Engineer shall check the performance of the plant(s) during the test run(s). If the plant(s) performance meets the specified requirements, the Engineer shall issue a Certificate of satisfactory completion of test run(s) to the Contractor.

## **19.0 MAINTENANCE**

- 19.1 The Contractor shall be responsible without additional charge to the Employer for maintenance and servicing of the complete plant during the period of maintenance named in the Memorandum after the issue of the Certificate of Substantial Completion by the Engineer.
- 19.2 The Contractor shall be responsible for arranging all tools, instruments and Technical Staff including Specialist Technicians/Engineers required for the work. The Employer shall be responsible to supply all materials and spare parts required for the work excluding parts defective due to manufacturing defect which shall be replaced by the Contractor under the terms of the contract.
- 19.3 The Contractor shall service the complete plant regularly according to the Schedule of Servicing and Maintenance as approved or amended by the Consultant but not less than once a month during the operational seasons. The servicing and maintenance shall be carried out by competent skilled labour under supervision of a qualified Engineer.
- The Contractor shall take a certificate of satisfactory completion of monthly servicing from the Employer's Representative.
- 19.4 The Contractor shall carry out annual servicing, maintenance and overhauling of the complete plant at the end of the operational season and make the plant ready for operation in all respects well before the commencement of the next operational season. On receiving notification from the Contractor that annual servicing, etc. is nearing completion, the Consultant shall check the work carried out and give directions to the Contractor for completion of outstanding work, if any.
- 19.5 On satisfactory completion of annual servicing, maintenance and overhauling of the complete plant, the Engineer shall issue a Certificate of satisfactory completion to the Contractor.

## **20. DOMESTIC WATER PUMPING SET**

01. Domestic Water Supply Pumping Set for cold & hot water supply system.
02. The system shall be skid mounted, completely assembled and wired with suction gate valves, strainers and discharge combination flow regulating control valves and check valve for each pump, pressure gauges, instruments, MS Schedule 40 piping with flanged connections and header. The selection of valves / piping to be done at velocity 6fps (2m/s).
- Water supply pumping set with electric motor driven water supply pumps. Total Capacity 200 USgpm (45 M<sup>3</sup>/h) against 200ft net discharge head.
- The unit shall comprise of three pump motor sets each of 70 USgpm (16 M<sup>3</sup>/h) capacity against a static head of 200ft (60m).
- The system shall be skid mounted, completely assembled and wired with suction gate valves, strainers and discharge combination flow regulating control valves and check valve for each pump, pressure gauges, instruments, MS Schedule 40 piping with flanged connections and header. The selection of valves/piping to be done at velocity 6fps (2m/s).
- Water supply pumping set with electric motor driven water supply pumps. Total Capacity 210 USgpm (48M<sup>3</sup>/h) against 200 ft (60m) net discharge head.



**Sequence of Operation:**

Automatic controls to operate the pumps according to water supply demand and operate pumps in rotating order. The pumps shall have variable frequency drives. A pressure regulator at the header shall control the speed of variable frequency drives and when the limit of one pump has reached it shall start the next pump and so on. Similarly when the water demand goes down it shall speed down the pump and finally switch off the pump when low limit has reached.

The controls and variable frequency drives and controls shall be enclosed in an IP55/NEMA-2 enclosure having ventilation fan and suitable for operations up-to 130 deg F (55deg C) ambient temperature.

**21. Centrifugal Pumps.**

The centrifugal pump-motor sets shall be heavy duty industrial type suitable for continuous and quiet operation.

The centrifugal pumps shall be single stage, small sizes of vertically split casing.

The pumps to be volute type, cast iron body, fully bronze fitted, SS impeller of radial type with double curvature vanes, stainless steel shaft, properly lubricated heavy duty bearing pedestals, readily accessible mechanical shaft seal approved integral cast iron or MS channel base plate for the pump and the motor with drain outlet for connection to the nearest drain point, pump manufacturer supplied approved flexible coupling between the motor and the pump shafts covered with approved guard, pump casing to be complete with drain and vent plugs and designed, tested and proven tight for a test pressure at least equal to 1.5 time the maximum working pressure as calculated according to specified conditions of operation.

Each pump shall have vibration isolators and to be fitted with a separate pre-immediately up-stream of each pressure reducing valve.

**22. Electric Motors**

The motors shall squirrel caged type, totally enclosed fan cooled construction with IP55 protection and class F insulation and suitable for operation with Variable Frequency Drives.

The motors to be tropicalized and fungus proof. They shall be suitable for operation up to 55 deg c. ambient temperatures.

The motors shall be give guaranteed name plate output power and selected for atleast 120% of BHP of the pump. The motor HP shall be further enhanced to take care of frequency up to 55Hz. (The pump rpm shall be increased up to 55Hz and increased flow and head is to estimated)

All motors shall be of same manufacturer and suitable for 50Hz (Suitable for VFD) 400 +5%-10% V.

**23. Variable Frequency Drives**

The variable speed drive (VSD) shall be capable of converting 3-phase/1-phase (50Hz) AC voltage into a variable output voltage and frequency. It shall supply a full output voltage to the motor even at a continuous supply voltage  $\pm 10\%$ . The VSD shall control motors of different sizes connected in parallel, and it must be

possible to stop a machine during operation without the risk of tripping and shall regulate all types of IEC standard motors without load reduction and without the motor temperature becoming higher than under normal mains operation. The VSD shall be compatible with LON based system.

The variable frequency drive shall be manufactured and tested in accordance with ISO9001 and BS5750, part 1&2. The metal enclosure shall conform to IP66. The enclosure shall have high frequency noise filter so as the VFD shall not interfere with any other adjoining electronic system.

The VSD must have an interface to provide linear control, with BMS supplied 4-20mA signals.

The VSD unit shall have following minimum standard functions:

- Inverter trip at 75°C on the heat sink.
- Protection against under and over -voltage.
- Alpha-numeric display (alpha-numeric code).
- Choice of language in display.
- ‘ON’, ‘ALARM’ indication.
- Choice of minimum 12 different displays, e.g. output current, voltage, frequency, speed, output, torque, motor temperature, energy kWh.
- The speed must be controllable via the keys (in manual operation).
- Lock to prevent unintended programming of the VSD.

The frequency speed controller shall be of the flux vector control type and shall have:

(i)	Input Frequency	50Hz +/- 10%
(ii)	Output Frequency	15-100 HZ
(iii)	Output Voltage	400V 3 phase
(iv)	Input voltage	400 + 10%
(v)	Control By external signal	(4-20mA) preferably through LON
(vi)	Acceleration/Deceleration Times	1-20 Sec. (separately adjustable)
(vii)	Overload Capacity	150% for 30 seconds (current) 110% continuously

The Variable Frequency Drive shall be installed in accordance with manufacturer’s recommendations and shall be commissioned and tested in accordance with ISO and by the manufacturer’s representatives.

Spares for two years operation shall be supplied along with minimum three sets of spare fuses for each size VFD.

Technical bulletins, internal wiring diagram, test reports includes motor load test shall be submitted to the consultant for approval, along with technical operation and maintenance literature.

The VSD shall be of Danfoss/Siemens/ABB/Schneider.

**Section VIII.**  
**DRAWINGS**

WAREHOUSE  
DUHS – OJHA CAMPUS – KARACHI

HVAC TENDER DRAWINGS



## LIST OF DRAWINGS

SR. NO.	DRAWING NUMBER	TITLE
1	A/C 001	HVAC LAYOUT PLAN - GROUND FLOOR
2	A/C 002	HVAC LAYOUT PLAN - MEZZANINE FLOOR
3	A/C 003	HVAC CHILLED WATER PIPING AND CASSETTE FCUS
4	A/C 004	SCHEDULE OF HVAC EQUIPMENT
5	A/C 005	SINGLE LINE DIAGRAM MAIN -DB-HVAC
6	A/C 006	SINGLE LINE DIAGRAM POWER MCC-01
7	A/C 007	DDC CONTROLS FOR AHU and VAV
8	A/C 008	HVAC MISC. DETAIL



NOTES:



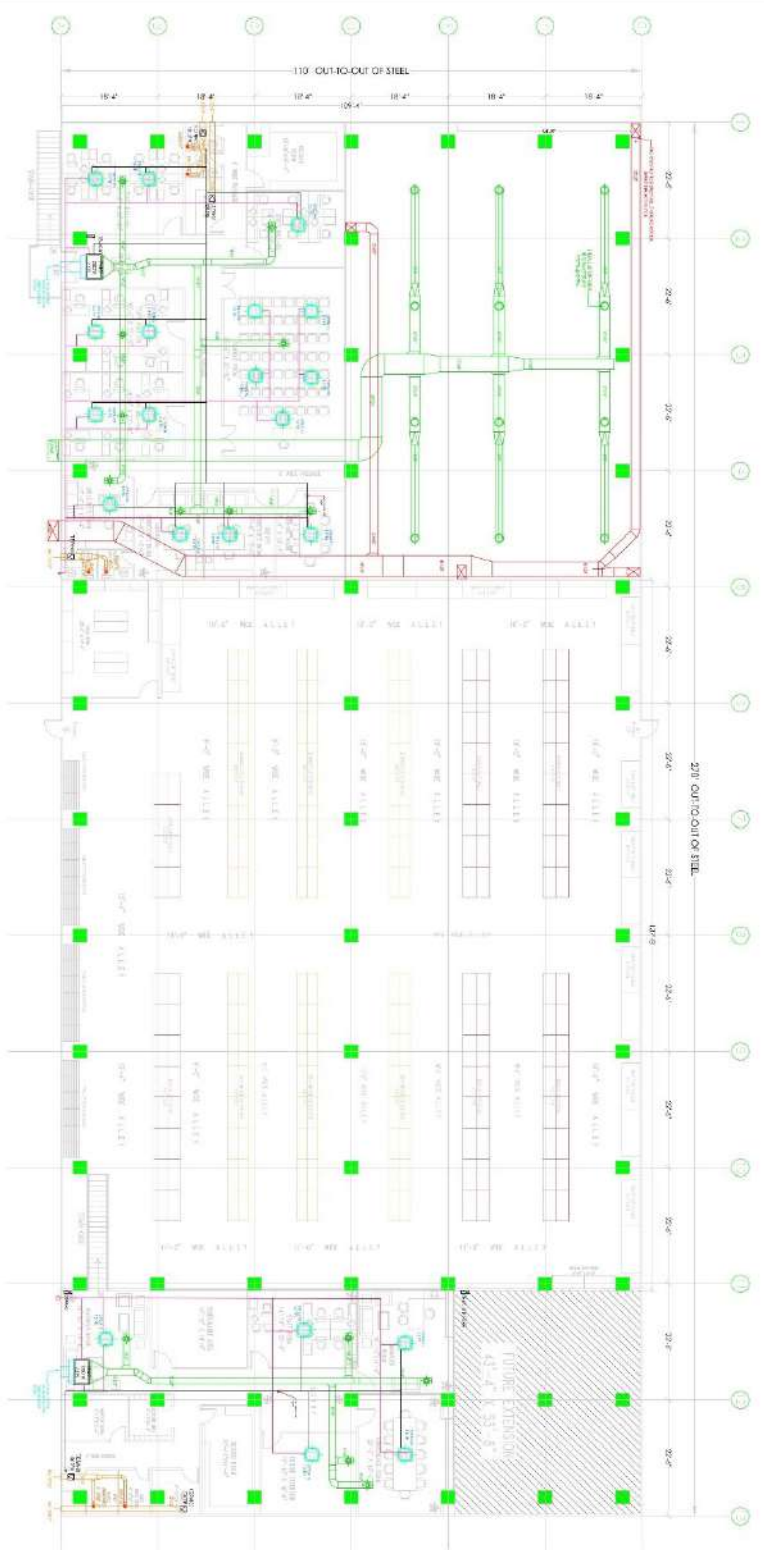
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 CHECKED BY: JAVIER  
 PROJECT: DPMH - 2ND FLOOR - GRADUATE FLOOR



PROJECT: DPMH - 2ND FLOOR - GRADUATE FLOOR  
 ARCHITECT: JAVIER

DATE: 08/14/2018  
 DRAWN BY: JAVIER  
 CHECKED BY: JAVIER

DATE: 08/14/2018  
 DRAWN BY: JAVIER  
 CHECKED BY: JAVIER



NOTES



NO.	DATE	DESCRIPTION

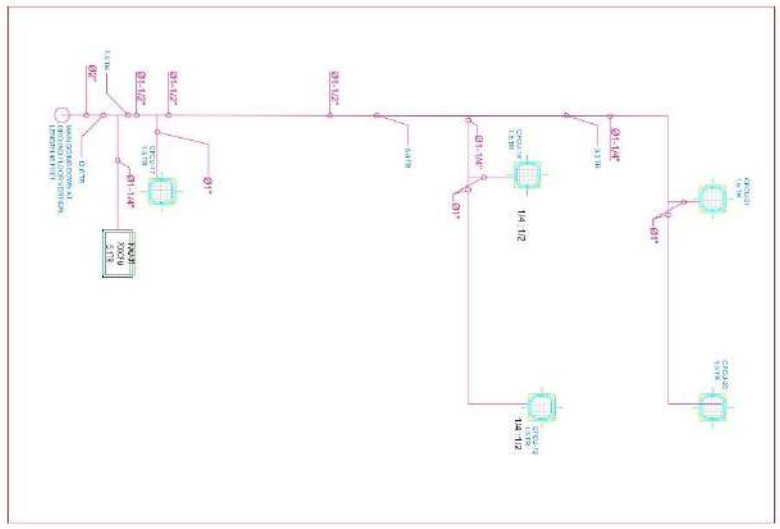
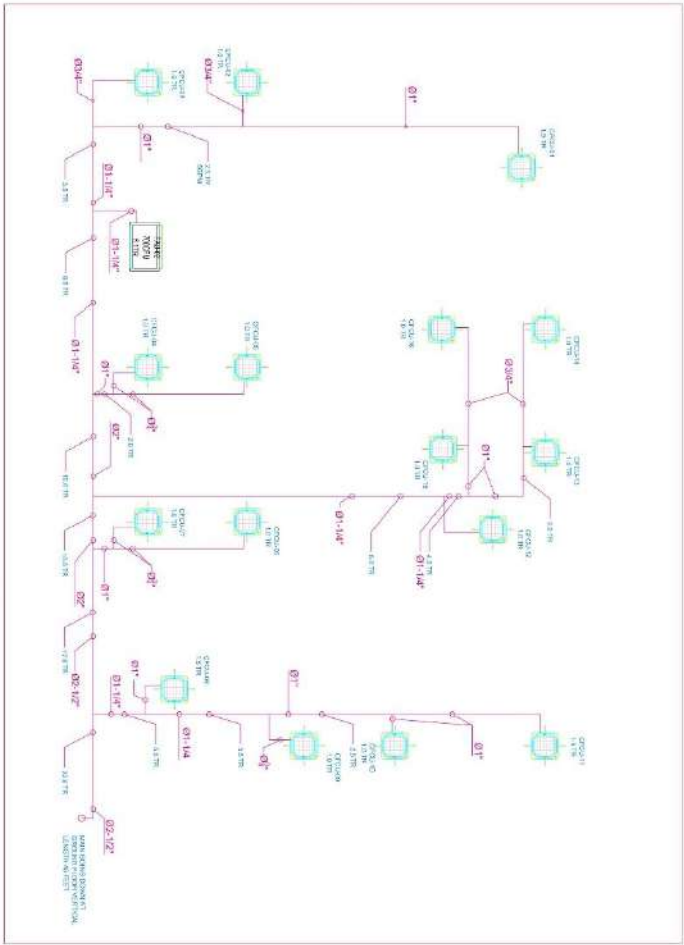
NO.	DATE	DESCRIPTION

CLIENT NAME: **Dow University of Health Sciences**

PROJECT: **WAREHOUSE**  
**DUMS - OMA CAMPUS - PHASE 1**

TRANSMITTEE: **PHD**  
**LAUNCH PLAN - MEZZANINE FLOOR**

DATE: **2023.07.07**  
 DRAWN BY: **PHD**  
 CHECKED BY: **PHD**  
 SCALE: **AS SHOWN**



No.	Date	Description

REVISION SCHEDULE

PROJECT: WAREHOUSE  
 DIS - ODM CAVES - MARJIL

DESIGNED BY: HMC	CHECKED BY: S/0048
DRAWN BY: S/0048	APPROVED BY: H/0048
SCALE: 1:1	DATE: 20/01/2023
SHEET NO: 1	TOTAL SHEETS: 1
PROJECT NO: ACC/000	











