



# **NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED**

## **REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**

### **BIDDING DOCUMENTS**

#### **SUMMARY OF VOLUMES**

##### **VOLUME I-A**

- Invitation to Bid
- Instructions to Bidders with Appendices (A-C)
- Letter of Technical Bid
- Schedules (A-L) to Bid
- Preamble to Conditions of Contract
- General Conditions of Contract
- Particular Conditions of Contract
- Standard Forms

##### **VOLUME I-B**

- Letter of Price Bid
- Schedule of Prices

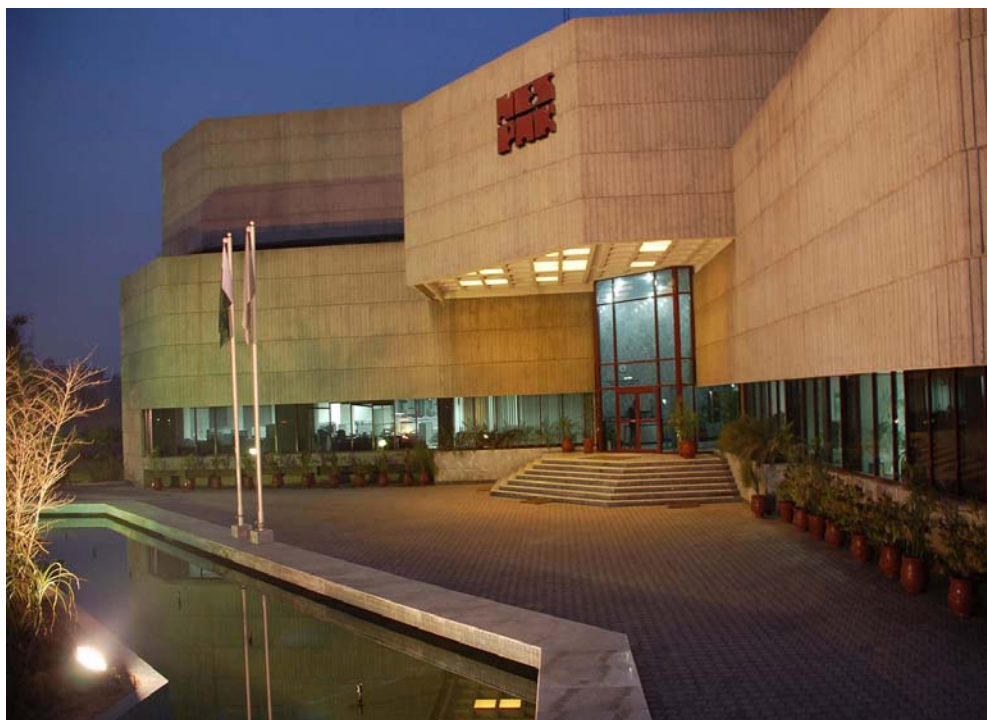
##### **VOLUME II**

- Specifications - Special Provisions
- Specifications - Technical Provisions
- Equipment Schedule



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- **Standard Forms**

**February 2024**



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• Form of Bank Guarantee for Advance Payment	AS-1

# **NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED (NESPAK)**

## **INVITATION TO BID**

### **REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) NOS. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**

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

**Bid Reference No.:** \_\_\_\_\_

1. National Engineering services Pakistan (Pvt.) Ltd. (NESPAK), Pakistan's premier consultancy organization invites sealed bids on 'Single Stage-Two Envelope' basis from the eligible firms in category **C-5 in Specialization (ME-01) or higher** registered with Income Tax Department and who are also on Active Taxpayer's List of the Federal Board of Revenue for the "Replacement, Supply & Installation, Testing & Commissioning of Five (5) Nos. Air Handling Units at **NESPAK House, 1-C, Block-N, Model Town Extension, Lahore**".
2. Bidding Documents, containing detailed terms and conditions, etc. are available at the below mentioned address. Price of the Bidding Documents is PKR. 1000 (Pak Rupees One Thousand only).
3. The Bids, prepared in accordance with the instructions in the Bidding Documents, must reach at the below mentioned address on or before **February 19 , 2024 upto 1500 hours**. Bids will be opened on the same day at 1530 hours. This advertisement is also available on PPRA website at [www.ppra.org.pk](http://www.ppra.org.pk).

Manager General Services  
Human Resource Division,  
NESPAK House 1-C, Block-N,  
Model Town Extension, Lahore-54700.  
Tel: 042-99231944 / 99090000, Ext: 545  
Fax: 042-99231950



# **INSTRUCTIONS TO BIDDERS**

## INSTRUCTIONS TO BIDDERS

### A. GENERAL

#### IB.1 Scope of Bid and Source of Funds

##### 1.1 Scope of Bid

National Engineering Services Pakistan (Pvt.) Limited (NESPAK) (hereinafter called "the Employer") wishes to receive bids for the following scope of work:

Replacement, Supply, Installation, Testing & Commissioning of Five (5) nos. Air Handling Units at NESPAK House, 1-C, Block-N, Model Town Extension, Lahore.

Bidders must quote for the complete scope of work. Any Bid covering partial scope of work will be rejected as non-responsive, pursuant to Clause IB.24.

Bidding will be conducted through Open Competitive Single Stage Two Envelope bidding procedure specified in Public Procurement Rules, 2004.

##### 1.2 Source of Funds

The Project shall be financed by Employer's own resources.

#### IB.2 Eligible Bidders

##### 2.1 Bidding is open to all firms meeting the following requirements:

- a) duly licensed by Pakistan Engineering Council (PEC) in category **C-5 (specialized in ME-01) or higher**;
- b) registered with Income Tax Department and is on Active Taxpayers List of Federal Board of Revenue (FBR);
- c) has not been blacklisted/debarred by the Employer or any other Government/Semi Government Department/Public Department /foreign country/international organization or other foreign institution.

#### IB.3 Eligible Goods and Services

##### 3.1 All Goods and ancillary Services to be supplied under this Contract shall have their origin in eligible countries listed in Appendix 'A' to Instructions to Bidders and all expenditures made under the Contract will be limited to such Goods and Services.

##### 3.2 For purpose of this Clause, "origin" means the place where the Goods are mined, grown or produced or from where the ancillary services are supplied. Goods are produced when, through manufacturing, processing or substantial

and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

- 3.3 The origin of Goods and Services is distinct from the nationality of the Bidder.

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

- 4.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Bidding process.

### **B. BIDDING DOCUMENTS**

#### **IB.5 Contents of Bidding Documents**

- 5.1 In addition to Invitation to Bid, the Bidding Documents are those stated below, and should be read in conjunction with any Addendum issued in accordance with Clause IB.7.

1. Instructions to Bidders (ITB) with following Appendices
  - Appendix A: Name of Eligible Countries
  - Appendix B: Evidence of Bidder's Capability
  - Appendix C: Domestic goods (value added in Pakistan)
2. Letter of Technical Bid and Price Bid & following Schedules to Bid
  - i) Schedule A: Specific Works Data
  - ii) Schedule B: Work to be Performed by Subcontractors
  - iii) Schedule C: Proposed Programme of Works
  - iv) Schedule D: Deviations from Technical Provisions
  - v) Schedule E: Deviations from Contractual/Commercial Conditions
  - vi) Schedule F: Method of Performing Works
  - vii) Schedule G: Proposed Organization
  - viii) Schedule H: List of Recommended Manufacturers
  - ix) Schedule I: Bidder's Equipment Data
  - x) Schedule J: Health & Safety Procedures
  - xi) Schedule K: Integrity Pact
  - xii) Schedule L: Estimated Progress Payment
3. Schedule of Prices
4. Preamble to Conditions of Contract
5. General Conditions of Contract
6. Particular Conditions of Contract
7. Standard Forms
  - Forms include the following:

- (i) Form of Bid Security
- (ii) Form of Contract Agreement
- (iii) Form of Performance Security
- (iv) Form of Bank Guarantee for Advance Payment

8. Specifications - Special Provisions

9. Specifications - Technical Provisions

5.2 The Bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of Bid submission will be at the Bidders own risk. Pursuant to Clause IB.24, Bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

## **IB.6 Clarification of Bidding Documents**

6.1 A prospective Bidder requiring any clarification(s) in respect of the Bidding Documents may notify the Employer with a copy to the Engineer Representative in writing at the address:

a) The Employer Representative:

Manager General Services  
Human Resource Division  
National Engineering Services (Pvt.) Limited ( NESPAK)  
NESPAK House,1-C, Block N, Model Town Extension Lahore-54700  
Ph: 92-42-99231944/99090000, Ext: 545;  
Fax:92-42-99231950

b) The Engineer Representative

National Engineering Services (Pvt.) Limited  
New Ventures Division  
IEEEP Building, 17-C-1, Civic Centre, Lahore  
Ph: 92-42-99232261-74  
Fax:92-42-99232275

The Employer will examine the request for clarification of the Bidding Documents which it receives not later than seven (07) days prior to the deadline for the submission of Bids and if needed will issue the clarification/amendment of the Bidding Documents at least three (03) days before the date of submission of Bids (without identifying the source of enquiry) to all prospective Bidders who have purchased the Bidding Documents.

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

- 7.1 At any time prior to the deadline for submission of Bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Documents by issuing addendum.
- 7.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 7.1 hereof, and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective Bidders shall acknowledge receipt of each addendum in writing to the Employer. The Bidder shall also confirm in the respective letter(s) of Bid that the information contained in such addenda have been considered in preparing his Bid.
- 7.3 To afford prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may at its discretion extend the deadline for submission of Bids in accordance with Clause IB.19.

## **C. PREPARATION OF BIDS**

### **IB.8 Language of Bid**

- 8.1 The Bid prepared by the Bidder and all correspondence and documents relating to the Bid, exchanged by the Bidder and the Consultant/Engineer's Representative shall be written in the English language, provided that any printed literature furnished by the Bidder may be written in another language so long as accompanied by an English translation of its pertinent passages in which case, for purposes of interpretation of the Bid, the English translation shall govern.

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

- 9.1 The Bid shall be prepared in two (02) separate envelopes, one containing the "Technical Bid" and other containing the "Price Bid" comprising the following documents in the respective envelope.
- (1) The "Technical Bid" shall comprise the following:
- (a) Covering Letter (if any) along with proof of purchase of Bidding Documents from the Employer;
  - (b) Letter of Technical Bid duly filled, signed and sealed, in accordance with Clause IB.17;
  - (c) Appendices to ITB duly filled and signed, containing the following appendices:
    - (i) Appendix A [*Name of Eligible Countries*] to ITB.
    - (ii) Qualification information/documents as detailed in Appendix B [*Evidence of Bidder's Capability*] to ITB, to determine the Bidder's capability and adequacy of resources

to carry out the Contract effectively. The Appendix B contains the following forms:

- Form B-1, General Information;
- Form B-2, General Experience Record;
- Form B-3, Particular Experience Record;
- Form B-4, Details of Contracts of Similar Nature and Complexity;
- Form B-5, Current Contract Commitments/Works in Progress;
- Form B-6, Evaluation Criteria.

(bi) Appendix C [Domestic Goods (value added in Pakistan)] to ITB;

- (d) Bid Security furnished in accordance with Clause IB.15;
- (e) Schedules (A to L) to Bid, duly filled and signed in accordance with the instructions contained therein;
- (f) Power of Attorney authorizing the signatory of the Bidder in accordance with Clause IB 17.5;
- (g) In case of joint Venture, a copy of the Joint Venture Agreement in accordance with Clause IB 13.4;
- (h) Documentary evidence established in accordance with Clause IB.13 that the Bidder is eligible to Bid and is qualified to perform the Contract if its Bid is accepted;
- (i) Documentary evidence established in accordance with Clause IB.14 that the Goods and ancillary Services to be supplied by the Bidder conform to the Bidding Documents; and
- (j) Any other documents prescribed in Particular Conditions of Contract or Technical Provisions to be submitted with the Technical Bid.

(2) The “Price Bid” shall comprise the following:

- (a) Letter of Price Bid duly filled, signed and sealed, in accordance with Clause IB.17;
- (b) Schedule of Prices completed in accordance with Clauses IB.11 and IB.12; and
- (c) Any other document required to be submitted with the Price Bid.

## **IB.10 Letters of Bid and Schedules**

10.1 The Bidder shall complete, sign and seal the Letters of Technical and Price Bids, Schedules (A to L, or as modified) to Bid and Schedule of Prices furnished in the Bidding Documents and shall also enclose other information as detailed in Clause IB.9.

10.2 Not Used.

### **IB.11 Bid Prices**

- 11.1 The Bidder shall fill up the Schedule of Prices (SOP), provided in Bidding Documents Volume I-B, indicating the unit rates and prices of the Works to be performed under the Contract. Prices on the Schedule of Prices shall be entered keeping in view the instructions contained in the Preamble to the Schedule of Prices.
- 11.2 The Bidder shall fill in rates and prices for all items of the Works described in the Schedule of Prices. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Schedule of Prices.
- 11.3 The Bidder's separation of price components in accordance with Sub-Clause 11.1 above will be solely for the purpose of facilitating the comparison of Bids by the Employer/Engineer's Representative and will not in any way limit its right to contract on any of the terms offered.
- 11.4 Unless otherwise stipulated in the Conditions of Contract, prices quoted by the Bidder shall remain fixed during the Bidder's performance of the Contract and not subject to variation on any account. When the Bidders are required to quote only fixed price(s), a Bid submitted with an adjustable price quotation will be treated as non-responsive and rejected, pursuant to Clause IB.24.
- 11.5 Any discount offered shall be valid for at least the period of validity of the Bid. A discount valid for lesser period shall be considered null and void.

### **IB.12 Currencies of Bid**

- 12.1 Prices shall be quoted in the following currencies:

For Goods and Services which the Bidder will supply from within Pakistan or from outside Pakistan, the prices shall be quoted entirely in Pak. Rupees. Any exchange risk, if involved, shall be deemed to be included in the offered Bid Price by the Bidder

12.2 Not Used.

12.3 Not Used.

### **IB.13 Documents Establishing Bidder's Eligibility and Qualifications**

- 13.1 Pursuant to Clause IB.9, the Bidder shall furnish, as part of its Bid, documents establishing the Bidders 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 Employer's satisfaction that the Bidder, at the time of submission of its Bid is eligible as defined under Clause IB. 2.

13.3 To be qualified for award of the Contract, the Bid shall include the following information:

- i) Duly licensed by Pakistan Engineering Council as Constructor in appropriate category C-5 (in Specialization code ME-01) or higher.
- ii) Registered with Income Tax Department and is on active Tax payer list of Federal Board of Revenue (FBR).
- iii) Has not been blacklisted/debarred by the Employer or any other Government/Semi Government Department.
- iv) Availability of critical equipment and workshop facility owned by the Bidder
- v) Contractor Performance as Contractor of at least ten (10) assignments of similar nature (AHU/Central HVAC System installation work) completed in last Ten years.
- vi) The qualifications and experience of key personnel one (01) BS Mechanical/Electrical Engineer with five years of experience, One (01) BTech/Diploma Associate Engineer in Mechanical with five years of experience and proposed for administration and execution of the Contract, both on and off site
- vii) Availability of Audited balance sheets of last three years.
- viii) Availability of Accounts maintenance certificate from banks.
- ix) Average annual turnover of the Bidder to be more than 10 Million for last three years.

#### 13.4 Joint Venture

In order for a Joint Venture to qualify:

- (a) At least one of the partners of joint venture shall satisfy the relevant experience criteria specified in Sub-Clause 13.4(a) hereinabove.
- (b) All firms comprising the joint venture shall be legally constituted and shall meet the eligibility requirement of Sub-Clause 2.1 hereof.
- (c) All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally to Employer for the execution of the entire Contract in accordance with the Contract terms and conditions and a statement to this effect shall be included in the authorization mentioned under para (f) below as well as in the Form of Bid and Form of Contract Agreement (in case of a successful bidder).



- (d) The Form of Bid, and in the case of successful bidder, the Form of Contract Agreement, shall be signed so as to be legally binding on all partners.
- (e) One of the joint venture partners shall be nominated as being in-charge and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners.
- (f) The partner-in-charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture.
- (g) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid stating the conditions under which it will function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. No amendments / modifications whatsoever in the joint venture agreement shall be agreed to between the joint venture partner without prior written consent of the Employer.

13.5 For the purposes of this particular Contract, the Bidders shall have to meet the minimum qualifying criteria as mentioned in Appendix B to Instruction to Bidders and above in IB 13.3.

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

- 14.1 Pursuant to Clause IB.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 perform under the Contract.
- 14.2 The documentary evidence of the Goods and Services eligibility shall establish to the Employer's satisfaction that they will have their origin in an eligible source country as defined under Clause IB.3. A certificate of origin issued at the time of shipment will satisfy the requirements of the said Clause.
- 14.3 The documentary evidence of the Goods and Services' conformity to the Bidding Documents may be in the form of literature, drawings and data and shall furnish:
  - (a) A detailed description of the Goods, essential technical and performance characteristics.

(b) Complete set of technical information, description data, literature and drawings as required in accordance with Schedule A to Bid, Specific Works Data. This will include but not be limited to the following:

- (i) A sufficient number of drawings, photographs, catalogues, illustrations and such other information as are necessary to illustrate clearly the significant characteristics such as general construction dimensions and other relevant information about the Goods to be furnished.
- (ii) Details of equipment and machinery with capacity.
- (iii) Any other information which is required for evaluation purposes.

(c) A clause-by-clause commentary on Technical Provisions, provided with the Bidding Documents, demonstrating the Goods' and Services' substantial responsiveness to those Specifications or a statement of deviations and exceptions to the provisions of the Technical Provisions as required in Schedule D to Bid.

14.4 For purpose of the commentary to be furnished pursuant to Sub-Clause 14.3(c) above, the Bidder shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers, designated by the Consultant in the Technical Provisions 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 Consultant's satisfaction that the substitutions are substantially equivalent or superior to those designated in the Technical Provisions. Copies of the standards proposed by the Bidder other than those specified in the Bidding Documents shall be furnished.

#### **IB.15 Bid Security**

15.1 Each Bidder shall furnish, as part of Technical Bid, a Bid Security for an amount PKR 850,000 (Pak Rupees Eight hundred fifty thousand only) or an equivalent amount in a freely convertible currency.

15.2 The Bid Security shall be, at the option of bidder, in the form of Cash Deposit at Call or a Bank Guarantee issued by a Schedule Bank in Pakistan or from a foreign bank duly counter-guaranteed by a Schedule Bank or an insurance company having at least AA rating from PACRA/JCR in favour of the Employer valid for a period twenty eight (28) days beyond the Bid validity date.

15.3 The Bid Security is required to protect the Employer against the risk of Bidder's conduct which would warrant the security's forfeiture, pursuant to Sub-Clause 15.7 hereof.

15.4 Any Bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive, pursuant to Clause IB.24.

- 15.5 At the end of evaluation of Technical Bid, the Employer will return the Bid securities of the Bidders along with price Bids whose Technical Bids have been declared non responsive to the requirements of the Bidding Documents. The Bid securities of unsuccessful Bidders submitting responsive Bids will be returned upon award of Contract to the successful Bidder or on the expiry of validity of Bid Security whichever is earlier.
- 15.6 The Bid Security of the successful Bidder will be returned when the Bidder has furnished the required Performance Security, pursuant to Clause IB.34 and signed the Contract Agreement, pursuant to Clause IB.35.
- 15.7 The Bid Security may be forfeited:
- a) If a Bidder withdraws his Bid during the period of Bid validity; or
  - b) If a Bidder does not accept the correction of his Bid Price, pursuant to Sub-Clause 24.2 hereof; or
  - c) If the Bidder is found in corrupt and fraudulent practices; or
  - d) In the case of a successful Bidder, if he fails to:
    - i) Furnish the required Performance Security in accordance with Clause IB.34, or
    - ii) Sign the Contract Agreement, in accordance with Clause IB.35.

#### **IB.16 Validity of Bids**

- 16.1 Bids shall remain valid for 120 days after the date of Bid opening as prescribed in Clause IB.19.
- 16.2 In exceptional circumstances prior to expiry of original Bid validity period, the Employer may request the Bidders to extend the period of validity for a specified additional period which shall in no case be more than the original Bid validity period. The request and the responses thereto shall be made in writing. A Bidder may refuse the request without forfeiture of his Bid Security. A Bidder agreeing to the request will not be required or permitted to modify his Bid, but will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects.

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

- 17.1 Bidders are particularly directed that the amount entered on the Letter of Price Bid shall be for performing the Contract strictly in accordance with the Bidding Documents.
- 17.2 All Schedules to Bid (A to L) are to be properly completed and signed.

- 17.3 No alteration is to be made in the Letters of Bid nor in the Schedules thereto except in filling up the blanks as directed. If any alteration be made or if these instructions be not fully complied with, the Bid may be rejected.
- 17.4 Each Bidder shall prepare one (1) Original and one (01) Copy, of the documents comprising the Bid as described in Clause IB.9.1 and clearly mark them "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.
- 17.5 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign (in the case of copies, Photostats are also acceptable). This shall be indicated by submitting a written Power of Attorney authorizing the signatory of the Bidder to act for and on behalf of the Bidder. All pages of the Bid shall be initialed and stamped by the person or persons signing the Bid.
- 17.6 The Bid shall contain no alterations, omissions or additions, except to comply with instructions issued by the Employer, or as are necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.
- 17.7 Bidders shall indicate in the space provided in the Letters of Bid their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their Bids and the Contract is to be sent.
- 17.8 Bidders should retain a copy of the Bid as their file copy.

#### **D. SUBMISSION OF BIDS**

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

- 18.1 Each Bidder shall submit his Bid as under:
- (a) Technical Bid (ORIGINAL and one COPY) and Price Bid (ORIGINAL and one Copy) shall be contained in two separate envelopes. One envelope shall contain all documents as listed under paragraph (1) of Clause IB. 9.1 hereof and marked as "Technical Bid". The other envelope shall contain all documents as listed under paragraph (2) of Clause IB 9.1 hereof and marked as "Price Bid".
  - (b) The two envelopes, one containing the ORIGINAL and one COPY of "Technical Bid" and the other containing the ORIGINAL and one COPY of "Price Bid" will be put in outer envelope, sealed and addressed/identified as given in Sub-Clause 18.2 hereof.
- 18.2 The inner and outer envelopes shall;

- (a) be addressed to the Employer at the address given in Sub-Clause 6.1 heretofore.
  - (b) bear the Project name, Bid No. and Date of opening of Bid.
  - (c) provide a warning not to open before the time and date for Bid opening.
- 18.3 The Bid shall be delivered in person or sent by registered mail at the address to Employer as given in Sub-Clause 6.1 heretofore.
- 18.4 In addition to the identification required in Sub-Clause 18.2 hereof, the inner envelope shall indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared "late" pursuant to Clause IB.20.
- 18.5 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

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

- 19.1
  - (a) Bids must be received by the Employer at the address specified in Sub-Clause 6.1 hereof not later than the time and date stipulated in the Invitation for Bids.
  - (b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the Bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of Bids.
  - (c) Where delivery of a Bid is by mail and the Bidder wishes to receive an acknowledgment of receipt of such Bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed Bid package.
  - (d) Upon request, acknowledgment of receipt of Bids will be provided to those making delivery in person or by messenger.
- 19.2 Bids submitted through telegraph, fax or e-mail shall not be considered.
- 19.3 The Employer may, at his discretion, extend the deadline for submission of Bids by issuing an addendum in accordance with Clause IB.7, in which case all rights and obligations of the Employer and the Bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

#### **IB.20 Late Bids**

- 20.1
  - (a) Any Bid received by the Employer after the deadline for submission of Bids prescribed in Clause IB.19 will be returned unopened to such Bidder.
  - (b) Delays in the mail, delays of person in transit, or delivery of a Bid to the wrong office shall not be accepted as an excuse for failure to deliver a Bid at the proper place and time. It shall be the Bidder's responsibility

to determine the manner in which timely delivery of his Bid will be accomplished either in person, by messenger or by mail.

#### **IB.21 Modification, Substitution and Withdrawal of Bids**

- 21.1 Any Bidder may modify, substitute or withdraw his Bid after Bid submission provided that modification, substitution or written notice of the withdrawal is received by the Employer prior to the deadline for submission of Bids.
- 21.2 The modification, substitution or notice for withdrawal of any Bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.18 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL", as appropriate.
- 21.3 Withdrawal of a Bid during the interval between the deadline for submission of Bids and the expiration of the period of Bid validity specified in the Form of Bid may result in forfeiture of the Bid Security pursuant to Clause IB.15.

### **E. BID OPENING AND EVALUATION**

#### **IB.22 Bid Opening**

- 22.1 A 'Single Stage Two Envelopes' Bidding procedure shall be adopted for opening of Bids. First of all, the envelopes marked "Technical Bid" will be opened in the presence of Bidder's representatives and the envelopes marked "Price Bids" shall be held in custody of the Employer until the specified time of their opening.

A committee consisting of nominated members by the Employer and by the Engineer will open the Technical Bids, including withdrawals, substitution and modifications made pursuant to Clause IB.21, in the presence of Bidders' representatives who choose to attend, at the time, date and location stipulated in the Invitation for Bids.

The Bidders' representatives who are present shall sign in a register evidencing their attendance.

- 22.2 Envelopes marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" shall be opened and read out first and the name of the Bidder shall be read out. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause IB.21 shall not be opened.
- 22.3 All the envelopes marked Technical Bids shall be opened one at a time, and the Bidder's name, Bid modifications, presence or absence of Bid Security, substitutions and withdrawals, other details as the Employer at its discretion may consider appropriate, will be announced by the Employer at the opening of Technical Bids. The Employer will record minutes of opening of Technical Bids.

- 22.4 After evaluation of Technical Bids, the Employer will invite the Bidders who have submitted substantially responsive Technical Bids and who have been determined as being technically qualified to attend the opening of Price Bids. The date, time and location of opening of the Price Bids will be intimated in writing by the Employer. Bidders will be given reasonable notice of the opening of the Price Bids.
- 22.5 The Employer will notify the Bidders in writing whose Bids have been determined to be non-responsive and their Price Bids shall be returned unopened.
- 22.6 The Employer shall conduct the opening of Price Bids of the Bidders who submitted substantially responsive Technical Bids, in the presence of Bidder's representative who choose to attend at the address, date and time specified by the Employer. The Bidder's representatives who are present shall sign a register evidencing their attendance.
- 22.7 All envelopes containing Price Bids shall be opened one at a time and the following shall be read out and recorded:
- (a) The name of the Bidder;
  - (b) Whether there is a modification or substitution;
  - (c) The Bid Prices, including any discounts; and
  - (d) Any other details as the Employer may consider appropriate.

Any Bid Price or discount which is not read out and recorded at the time of Price Bid opening will not be taken into account in the evaluation of Bid.

- 22.8 Discounts offered for lesser period than the Bid validity shall not be considered in evaluation.

### **IB.23 Clarification of Bids**

- 23.1 To assist in the examination, evaluation and comparison of Bids the Engineer's Representative 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 price or substance of the Bid shall be sought, offered or permitted.

### **IB. 24 Preliminary Examination & Determination of Responsiveness of Bids**

- 24.1 Prior to the detailed evaluation of the Technical/Price Bids, pursuant to Clause IB.26,
- (a) the Employer/Engineer will examine the Technical and Price Bids against the relevant Bidding requirements inter alia to determine whether;
    - (i) the Bid is complete and does not deviate from the scope,
    - (ii) any computational errors have been made,
    - (iii) the requisite undertaking and required sureties have been furnished,
    - (iv) the documents have been properly signed,
    - (v) the Bid is valid till required period,

- (vi) the Bid prices are firm during currency of contract if it is a fixed price bid,
  - (vii) completion period offered is within specified limits,
  - (viii) the Bidder is eligible to Bid and meets the requisite qualification criteria,
  - (ix) Works and materials to be supplied, meet the eligibility requirements,
  - (x) the Bid does not deviate from basic technical requirements, and
  - (xi) the Bids are generally in order.
- (b) A Bid is likely not to be considered, if;
- (i) it is unsigned,
  - (ii) its validity is less than specified,
  - (iii) it is submitted for incomplete scope of work,
  - (iv) it indicates completion period beyond 30 days later than specified,
  - (v) it indicates that Works and materials to be supplied, do not meet eligibility requirements, and
  - (vi) it indicates that Bid prices do not include the amount of income tax.
- (c) A Bid will not be considered, if;
- (i) Technical Bid is not accompanied with Bid Security in accordance to Clause IB. 15.
  - (ii) It is submitted by a bidder who has participated in more than one bid,
  - (iii) it is received after the deadline for submission of bids,
  - (iv) it is submitted through fax, telex, telegram or email,
  - (v) the Bidder does meet the requisite qualification criteria as per clause IB.13 and appendix B to ITB of evaluation criteria,
  - (vi) it indicates that prices quoted are not firm during currency of the contract whereas the Bidders are required to quote fixed price(s),
  - (vii) the bidder refuses to accept arithmetic correction,
  - (viii) it is materially and substantially different from the Conditions/ Specifications of the Bidding Documents,
  - (ix) if it is not accompanied with duly filled-in and signed and stamped Letter of Technical Bid and/or Letter of Price Bid.
  - (x) If any information provided by bidder is found to be false, forged, misleading or misrepresenting.

#### 24.2 Arithmetical errors will be rectified on the following basis:

If there is a discrepancy between the unit price and 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 there is a discrepancy between the words and figures the amount in words shall prevail. If there is a discrepancy between the total Bid price entered in Letter of Price Bid and the total shown in Summary of Bid Prices, the amounts stated in the Letter of Price Bid will be corrected by the Engineer in accordance with Corrected Schedule of Bid Prices.

If the Bidder does not accept the corrected amount of Bid, his Bid will be rejected and his Bid Security will be forfeited.



- 24.3 Prior to the detailed evaluation, pursuant to Clause IB.26 the Employer/Engineer will determine the substantial responsiveness of each Technical/Price Bid to the Bidding Documents. For purpose of these Clauses, a substantially responsive Bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations.

A material deviation or reservation is one

- (i) which affects in any substantial way the scope, quality or performance the Works, or
- (ii) which limits in any substantial way, in consistent with the Bidding Documents, the Employer's rights or the bidders obligations under the Contract; or
- (iii) whose rectification/adoption would affect unfairly the competitive position of other bidders presenting substantially responsive Bids.

The Employer's/Engineer's determination of a Bid's responsiveness will be based on the contents of the Bid itself without recourse to extrinsic evidence.

- 24.4 A Bid determined as non-responsive will be rejected and will not be subsequently be made responsive by the Bidder by correction of the non-conformity.
- 24.5 Any minor informality or non-conformity or irregularity in a Bid which does not constitute a material deviation may be waived by Employer, provided such waiver does not prejudice or affect the relevant ranking of any Bidder.

The Employer/Engineer may request that the Bidder to submit the necessary information or the documents to rectify non-material/non-conformities in the Bid.

## **IB.25 Conversion to Single Currency ( Not Used)**

## **IB.26 Detailed Evaluation of Bids**

- 26.1 The Employer's/Consultant's/Engineer's representative will evaluate and compare only the Bids not previously rejected as being non responsive pursuant to Clause IB.24 as per requirements given hereunder.

### **26.2 Evaluation and Comparison of Bids**

- (a) Bids will be evaluated for each item and/or complete scope of work.
- (b) Basis of Price Comparison  
The prices will be compared on the basis of the Evaluated Bid Price pursuant to Para (e) herein below.
- (c) Technical Evaluation  
It will be examined in detail whether the Goods offered by the bidder comply with the Technical Provisions/Specification of the Bidding

Documents. For this purpose, the Bidder's data submitted with the Bid will be compared with the specific work data prescribed by the Employer and technical features/criteria of the Goods detailed in the Technical Provisions/Specification. Other technical information submitted with the Bid regarding the Scope of Work will also be reviewed.

(d) Commercial Evaluation

It will be examined in detail whether the Bids comply with the commercial/contractual conditions of the Bidding Document. It is expected that no major deviation/stipulation shall be taken by the bidders.

(e) Evaluated Bid Price

In evaluating the Bids, the Employer will determine for each Bid in addition to the Bid Price, the following factors (adjustments) in the manner and to the extent indicated below to determine the Evaluated Bid Price:

- (i) making any correction for errors pursuant to Sub-Clause 24.2 hereof.
- (ii) excluding Provisional Sums, if any, but including priced Day work, if any and
- (iii) making an appropriate adjustment for any other acceptable variation or deviation.

### 26.3 Evaluation Methods

Pursuant to Sub-Clause 26.2, Para (e) (iii) following evaluation methods for price adjustments will be followed:

- (i) Price Adjustment for Completeness in Scope of Work
- (ii) Price Adjustment for Technical Compliance
- (iii) Price Adjustment for Contractual/Commercial Compliance
- (iv) Price Adjustment for Deviations in Terms of Payment
- (v) Price Adjustment for Completion Schedule

- (i) Price Adjustment for Completeness in Scope of Work

The adjustments for completeness in Scope of Work will be added to the Corrected Total Bid Price for comparison purposes only and will be applied taking the highest price quoted by other Bidders being evaluated in detail in their original Bids for corresponding items: In case of non-availability of price from other Bidders, the price will be estimated.

In case of omission in the scope of work of a quoted item no price adjustment for the omitted item(s) shall be applied provided that the Bidder has mentioned in his Bid that the same is covered in any other item.

The price adjustment shall not justify any additional payment by the Employer. The price(s) of omitted item(s) shall be deemed covered by other prices of the Schedule of Prices.

(ii) Price Adjustment for Technical Compliance

The cost of making good any deficiency resulting from technical non-compliance will be added to the Corrected Total Bid Price for comparison purposes only. The adjustments will be applied taking the highest price quoted by other Bidders being evaluated in detail in their original Bids for corresponding item. In case of non availability of price from other Bidders, the price will be estimated.

(iii) Price Adjustment for Contractual/Commercial Compliance

The cost of making good any deficiency resulting from any quantifiable variations and deviations from the Bids Schedules and Conditions of Contract, as determined by the Engineer will be added to the Corrected Total Bid Price for comparison purpose only. Adjustment for commercial compliance will be based on Corrected Total Bid Prices.

(iv) Price Adjustment for Deviation in Terms of Payment

If a Bid deviates from the Terms of Payment/Payment Conditions as specified in the Conditions of Contract and if such deviation is considered acceptable to the Employer, mark-up earned for any earlier payments involved in the terms outlined in the Bid as compared to those stipulated in the Conditions of Contract shall be calculated at the mark-up rate of KIBOR +2% per annum and shall be added to the Corrected Total Bid Price for comparison purposes only.

(v) Price Adjustment for Completion Schedule

Bids indicating completion in advance of the dates stated in Preamble to Conditions of Contract, no credit will be given in this evaluation.

Bids indicating completion period later than the period set out in Preamble to Conditions of Contract shall be adjusted in the evaluation by adding a factor of 0.05% of the Corrected Total Bid Price for each calendar day of completion later than specified period of the completion.

Bids indicating completion beyond thirty (30) days later than the dates set out in Preamble to Conditions of Contract shall not be considered and rejected as non-responsive.

- 26.4** If the Bid of the successful Bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract,

the Employer may require the Bidder to produce detailed price analysis for any or all items of the Schedule of Prices to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analysis, the Employer may require that the amount of the Performance Security set forth in Clause IB.34 be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

#### **IB.27. Domestic Preference ( Not Used)**

- 27.1 In the comparison of evaluated Bids, the Goods manufactured in Pakistan, will be granted a margin of preference in accordance with the following procedures, provided the bidder shall have established to the satisfaction of Employer that the manufacturing cost of such Goods includes a domestic value addition equal to at least 20% of the ex-factory Bid price of such Goods. Bidders applying for domestic preference shall fill in Appendix C to these Instructions to substantiate their claim.
- 27.2 The Employer/Engineer will first review the Bids to determine, the Bid group classification in accordance with Sub-Clause 10.2 hereof.
- 27.3 The comparison shall be Ex-factory price of the Goods to be offered from within Pakistan (such prices to include all costs as well as custom duties and taxes paid or payable on raw materials and components incorporated or to be incorporated in the Goods) and the DDP (CIF + Customs duty, sales tax and other import charges) Pakistan seaport price of the Goods to be offered from outside Pakistan.
- 27.4 The lowest evaluated bid of each Group shall first be determined by comparing all evaluated bids in each Group among themselves taking into account:
- (a) In the case of Goods manufactured in Pakistan, sales tax, local body charges and other similar taxes which will be payable on the furnished Goods in Pakistan.
  - (b) In the case of Goods of foreign origin offered from abroad, customs duties, sales tax and other import charges which will be payable on furnished Goods in Pakistan.
  - (c) In the case of Goods of foreign origin already located in Pakistan, customs duty, sales tax and import charges on CIF price as applicable for Sub-Clause 27.4(b) here above.
- 27.5 The price preference to Group A bids will be:
- (i) 15% of the ex-factory bid price, if the value addition through indigenous manufacturing is at least 20%;

(ii) 20% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 20% and up to 30%; and

(iii) 25% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 30%.

- 27.6 The applicable price preference i.e., as per Sub-Clause 27.5 here above will be applied to Group A Bid by reducing the ex-factory bid price.

## **IB.28 Process to be Confidential**

- 28.1 Subject to Clause 23 heretofore, no Bidder shall contact Employer and/or Engineer on any matter relating to its Bid from the time of the Bid opening to the time the Technical/ Price Bid evaluation result is announced by the Employer. The final evaluation result shall be announced at least fifteen (15) days prior to award of Contract. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the Bids evaluated.
- 28.2 Any effort by a Bidder to influence Employer and/or Engineer Representative in the Bid evaluation, Bid comparison or Contract Award decisions may result in the rejection of his Bid. Whereas any Bidder feeling aggrieved may lodge a written complaint not later than seven (07) days of announcement of Technical evaluation results and five (05) days after the announcement of the final Bid evaluation result; however, mere fact of lodging a complaint shall not warrant suspension of the procurement process.

## **F. AWARD OF CONTRACT**

### **IB.29 Post-Qualification**

- 29.1 The Employer, at any stage of the bid evaluation, having credible reasons for or prima facie evidence of any defect in Bidder's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:  
Provided that such qualification shall only be laid down after recording reasons therefor in writing. They shall form part of the records of that bid evaluation report.

### **IB.30 Award Criteria**

- 30.1 Subject to Clause IB.32, the Employer will award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the Bidding Documents and who has offered the most advantageous Bid having lowest evaluated Bid Price, provided that such Bidder has been determined to be qualified to satisfactorily perform the Contract in accordance with the provisions of Clause IB.13.

### **IB.31 Employer's Right to Vary Quantities**

- 31.1 Employer reserves the right at the time of award of Contract to increase or decrease by upto 15% the quantity of goods and services specified in the Cost Estimate without any change in the unit price or other terms and conditions.

### **IB.32 Employer's Right to Reject all Bids**

- 32.1 Notwithstanding Clause IB.30, the Employer reserves the right to annul the Bidding process and reject all Bids, at any time prior to award of Contract, without thereby incurring any liability to the affected Bidders or any obligation to inform the affected Bidders of the grounds for the Employer's action except that the grounds for its rejection shall upon request be communicated, to any Bidder who submitted a Bid, without justification of grounds. Rejection of all Bids shall be notified to all Bidders promptly.
- 32.2 No negotiations with the Bidder having been evaluated as lowest responsive or any other Bidder shall be permitted. However, the Employer may have clarification meeting(s) to get clarify any item(s) in the Bid evaluation report.

### **IB.33 Notification of Award**

- 33.1 Prior to expiration of the period of Bid validity prescribed by the Employer, the Employer will notify to the successful Bidder in writing ("Letter of Acceptance") that his Bid has been accepted. This letter shall name the sum which the Employer will pay to the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the "Contract Price").
- 33.2 The Letter of Acceptance and its acceptance by the Bidder will constitute the formation of the Contract, binding the Employer and the Bidder till signing of the formal Contract Agreement.
- 33.3 Upon furnishing by the successful Bidder of a Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful and return their Bid securities.

### **IB.34 Performance Security**

- 34.1 The successful Bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Conditions of Contract within a period of fourteen (14) days after the receipt of Letter of Acceptance.
- 34.2 Failure of the successful Bidder to comply with the requirements of Sub-Clause IB.34.1 or Clause IB.35 or Clause IB.43 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

### **IB.35 Signing of Contract Agreement**

35.1 Within fourteen (14) days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the successful Bidder shall depute his representative duly authorized for formal signing of Contract Agreement, form for which is provided in the Bidding Documents.

35.2 Not Used.

## **G. ADDITIONAL INSTRUCTIONS**

### **IB.36 Instructions not Part of Contract**

36.1 Bids shall be prepared and submitted in accordance with these Instructions which are provided to assist Bidders in preparing their Bids, and do not constitute part of the Bid or the Contract Documents.

### **IB.37 Contract Documents**

37.1 The Documents which will be included in the Contract are listed in the Form of Contract Agreement set out in these Bidding Documents.

### **IB.38 Sufficiency of Bid**

38.1 Each Bidder shall satisfy himself before Bidding as to the correctness and sufficiency of his Bid in the Summary of Bid Price. Except insofar as it is otherwise expressly provided in the Contract, the percentage entered above or below in the Summary of Price Bid shall cover all his obligations under the Contract and all matters and things necessary for the proper completion of the Works.

### **IB.39 One Bid per Bidder**

39.1 Each Bidder shall submit only one Bid either by himself, or as a partner in a joint venture. A Bidder who submits or participates in more than one Bid (other than alternatives pursuant to Clause IB.41) will be disqualified and Bids submitted by him shall not be considered for evaluation and award.

### **IB.40 Bidder to Inform Himself**

40.1 The Bidder is advised to obtain for himself at his own cost and responsibility all information that may be necessary for preparing the Bid and entering into a Contract for execution of the Works. This shall include but not be limited to the following:

- (a) Inquiries on Pakistani Income Tax to the Commissioner of the Income Tax and Sales Tax, Lahore, Pakistan.
- (b) Inquiries on customs duties and other import taxes, to the concerned authorities of Customs and Excise Department.

- (c) Information regarding port clearance facilities, loading and unloading facilities, storage facilities, transportation facilities and congestion at Pakistan seaports.
- (d) Investigations regarding transport conditions and the probable conditions which will exist at the time the Goods will be actually transported.

#### **IB.41 Alternate Proposals by Bidder**

Not Used.

#### **IB.42 Local Conditions**

- 42.1 Bidder must verify and supplement by his own investigations the information about site and local conditions. However, the Employer will assist the Bidder wherever practicable and possible.

#### **IB.43 Integrity Pact**

The Bidder shall sign and stamp the Integrity Pact provided at Schedule-K to Bid in the Bidding Documents for all Federal Government procurement contracts exceeding Rupees ten million. Failure to provide such Integrity Pact shall make the Bid non-responsive.



**APPENDICES TO  
INSTRUCTIONS TO BIDDERS**

**NAME OF ELIGIBLE COUNTRIES**

Pakistan and all countries of the World with whom Islamic Republic of Pakistan has commercial/trade relations except the countries upon which international sanctions are imposed.

**EVIDENCE OF BIDDER'S CAPABILITY**

The Appendix B contains the following forms:

- Form B-1, General Information;
- Form B-2, General Experience Record;
- Form B-3, Particular Experience Record;
- Form B-4, Details of Contracts of Similar Nature and Complexity;
- Form B-5, Current Contract Commitments/Works in Progress;
- Form B-6, Evaluation Criteria.

## Bidder's Form B – 1

**General Information**

*All individual firms and each partner of a joint venture submitting Bid are requested to complete the information in this form. Nationality information is also to be provided for foreign owners or Bidders who are forming part of the Joint Ventures as required under the PEC Bye-Laws as a Partnership/Joint Venture.*

*Where the Bidder proposes to use named subcontractors for critical components of the works or for work contents in excess of 10 percent of the value of the whole works, the following information should also be supplied for the specialist subcontractor(s).*

1.	Name of Firm	
2.	Head Office Address	
3.	Telephone	Authorized Person: Name: Title:
4.	Fax	
5.	Place of Incorporation/Registration	Year of Incorporation/Registration

NATIONALITY OF OWNERS		
	NAME	NATIONALITY
1.		
2.		
3.		
4.		
5.		

Bidder's Form B – 2

**General Experience Record**

Name of Bidder or partner of a joint venture
--

*All individual firms and all partners of a joint venture are requested to complete the information in this form. The information supplied should be the annual turnover of the Bidder (or each member of a joint venture), in terms of the amounts billed to clients for each year for work in progress or completed over the past three years.*

*Use a separate sheet for each partner of a joint venture.*

<b>Annual Turnover</b>		
<b>Year</b>	<b>Turnover (in actual currency)</b>	<b>Equivalent Pak Rupees in Millions</b>
1.		
2.		
3.		

## Bidder's Form B – 3

### Particular Experience Record

<i>Name of Bidder or partner of a joint venture</i>
---

*On a separate page, using the format of Bidder's Form B-4, each Bidder is required to list all contracts of a value equivalent to Pak Rupees 10 million (PKR. Ten million) and above of a similar nature and complexity to the contract for which the Bidder wishes to qualify, undertaken during the last five years. The information is to be summarized, using Bidder's Form B-5, for each contract completed or under execution by the Bidder.*

*(Where the Bidder proposes to use named subcontractor(s) for critical components of the works or for work contents in excess of 10 percent of the value of the whole works, the information in the afore-mentioned forms should also be supplied for each specialist subcontractor).*

**Bidder's Form B – 4****Details of Contracts of Similar Nature & Complexity**

<i>Name of Bidder or partner of a joint venture</i>
---

Use a separate sheet for each contract.

1.	Name of Contract
	Country
2.	Name of Employer
3.	Employer Address.....
4.	Nature of works and special features relevant to the contract for which the Bidder wishes to qualify ..... .....
5.	Contract Role (Tick One) (a) Sole Contractor                      (b) Sub- Contractor                      (c) Partner in a Joint Venture
6.	Value of the total contract (in specified currencies) at completion, or at date of award for current contract  Currency .....                      Currency .....                      Currency .....
7.	Equivalent in Pak/Rs.
8.	Date of Award
9.	Date of Completion
10.	Contract Duration (Years and Months)  _____ Years                      _____ Months

**Bidder's Form B – 5****Summary Sheet: Current Contract Commitments/Works in Progress**

<i>Name of Bidder or partner of a joint venture</i>
---

*Bidders and each partner of joint venture should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which substantial Completion Certificate has yet to be issued.*

<b>Name of Contract</b>	<b>Value of Outstanding work (Equivalent Pak Rs. Millions)</b>	<b>Estimated Completion Date</b>
1.		
2.		
3.		
4.		
5.		
6.		



**Check List**

Yes	No	Check list
<input type="checkbox"/>	<input type="checkbox"/>	Valid PEC Certificate(s) in required category
<input type="checkbox"/>	<input type="checkbox"/>	Bidder's form (B-1), General Information
<input type="checkbox"/>	<input type="checkbox"/>	Bidder's form (B-2), General Experience Record
<input type="checkbox"/>	<input type="checkbox"/>	Bidder's form (B-3), Particular Experience Record
<input type="checkbox"/>	<input type="checkbox"/>	Bidder's form (B-4), Detail of Contracts of Similar Nature and Complexity
<input type="checkbox"/>	<input type="checkbox"/>	Bidder's form (B-5), Current Contract Commitments/Works in Progress
<input type="checkbox"/>	<input type="checkbox"/>	Financial documents including Audit sheets and Account Maintenance Certificate.
<input type="checkbox"/>	<input type="checkbox"/>	Original affidavit that the Bidder has not been declared bankrupt on non-judicial stamp paper of Rs. 50
<input type="checkbox"/>	<input type="checkbox"/>	Original affidavit that the firm has not been black listed on non-judicial stamp paper of Rs. 50
<input type="checkbox"/>	<input type="checkbox"/>	Bidders legal status
<input type="checkbox"/>	<input type="checkbox"/>	Principal place of Business
<input type="checkbox"/>	<input type="checkbox"/>	Place of incorporation or registration
<input type="checkbox"/>	<input type="checkbox"/>	NTN Number and certificate of registration with Income Tax Department
<input type="checkbox"/>	<input type="checkbox"/>	List of Projects of similar nature and complexity in-hand
<input type="checkbox"/>	<input type="checkbox"/>	List of HVAC System contracts executed last ten years
<input type="checkbox"/>	<input type="checkbox"/>	Documentary Evidence that the proposed BS Mechanical/Electrical Engineer and BTech/DAE personnel are employed by the bidder.
<input type="checkbox"/>	<input type="checkbox"/>	List of Associates Engineers (DAE) with their CVs having relevant experience

## **Bidder's Form B – 6**

### **EVALUATION CRITERIA**

#### **1.1 Eligibility Criteria**

The Bidders fulfilling the following basic eligibility criteria shall only be considered for further evaluation (relevant documents to be attached):

1. The Bidder shall be duly licensed by Pakistan Engineering Council (PEC) in category C-5 or higher with field of specialization code ME-01. In case validity of License has expired; the Bidder had applied for renewal of license before submission of its Bid.
2. Registration with Income Tax and the Bidder is on Active Taxpayers List of Federal Board of Revenue (FBR).
3. The firm has not been blacklisted/debarred by the Employer or any other Government/Semi Government Department/public department /foreign country/international organization or other foreign institution

Note: In case of Joint Venture, all the partners have to meet in full the basic Eligibility requirement mentioned at Sr. No. 2 & 3 above. JV partners shall collectively meet requirement of Sr. No. 1 above wherein, all the partner shall be duly licensed by PEC and the sum total of the limit of construction cost permitted by the categories of the individual licensees shall not be less than limit of construction cost permitted by the category required here above.

#### **1.2 Qualification Criteria**

1. Contractor Performance as Contractor of at least ten (10) assignments of similar nature (AHU/Central HVAC System supply and installation work) completed in last Ten years.
2. One BS Mechanical/Electrical Engineer and One BTech/DAE personnel must be on company payroll.
3. Availability of Audited balance sheets of last three years.
4. Availability of Accounts maintenance certificate from banks.
5. Average annual turnover of the supplier to be more than 10 Million for last three years.
6. Availability of workshop facility own by manufacturer.

## Appendix C to Instructions to Bidders

**Domestic Goods (Value added in Pakistan)  
(Not Used)**

[Bidders claiming eligibility for domestic preference should fill in for supply items only, all columns hereunder and provide necessary documentation to substantiate their claim]

Sr. No.	Description of Indigenous Goods	Unit	Qty	Total Price of Goods Ex-Factory (Pak Rs.)	Domestic value added in the manufacturing cost as percentage of Ex-Factory Price	Amount of value addition (Pak Rs.)
1	2	3	4	5	6	7
Total in columns 5 & 7						

### Computations:

- A. Total amount of Value Addition (from Col.7) Rs \_\_\_\_\_
- B. Total Ex-Factory Price of Indigenous Goods (from Col.5) Rs \_\_\_\_\_
- C. Total DDP Price of imported supply items Eqv.Rs \_\_\_\_\_
- D. Total Price of supply items [B+C] Eqv.Rs \_\_\_\_\_
- E. % of value addition =  $[(A/D) \times 100]$  \_\_\_\_\_ %
- F. Domestic Preference = (15,20 or 25)% of B Rs \_\_\_\_\_

**LETTER OF TECHNICAL BID  
AND  
SCHEDULES TO BID**

## **LETTER OF TECHNICAL BID AND SCHEDULES TO BID**

### **Letter of Technical Bid**

### **Schedules to Bid**

- Schedule A: Specific Works Data
- Schedule B: Work to be Performed by Subcontractors
- Schedule C: Proposed Program of Works
- Schedule D: Deviations from Technical Provisions
- Schedule E: Deviations from Contractual/Commercial Conditions
- Schedule F: Method of Performing Works
- Schedule G: Proposed Organization
- Schedule H: List of Recommended Manufacturers
- Schedule I: Bidder's Equipment Data
- Schedule J: Health & Safety Procedures
- Schedule K: Integrity Pact
- Schedule L: Estimated Progress Payments

## LETTER OF TECHNICAL BID

Bid Reference No. \_\_\_\_\_

Replacement, Supply, Installation, Testing & Commissioning of Five (5) Nos.  
Air Handling Units at NESPAK House, 1-C, Block-N, Model Town Extension,  
Lahore.

To:

Manager General Services  
Human Resource Division  
National Engineering Services (Pvt.) Limited ( NESPAK)  
NESPAK House, 1-C, Block N, Model Town Extension Lahore-54700  
Ph: 92-42-99231944/99090000, Ext: 545;  
Fax:92-42-99231950

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Schedules to Bid, Schedule of Prices and Addenda Nos. \_\_\_\_\_ for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address \_\_\_\_\_ and being duly incorporated under the laws of Islamic Republic of Pakistan hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto.
2. We understand that all the Schedules attached (A-L) hereto form part of this Bid.
3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of PKR. \_\_\_\_\_ (Pak. Rupees \_\_\_\_\_ only) drawn in your favor or made payable to the Employer and valid for a period twenty eight (28) days beyond the period of validity of Bid.
4. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the whole of the Works comprised in the Contract within the time(s) stated in Preamble to the Conditions of Contract.
5. We agree to abide by this Bid for the period of one hundred and twenty (120) days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
6. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

7. We undertake, if our Bid is accepted, to execute the Performance Security referred to in Clause 10 of Conditions of Contract for the due performance of the Contract.
8. We understand that you are not bound to accept the lowest or any Bid you may receive.
9. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a Bid for the Works.
10. We confirm, if our Bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer. (Please delete in case of Bid from a single firm).
11. We, including any Subcontractors for any part of the Contract, are not debarred/blacklisted by the Employer itself, any other Employer or any Government/Semi Government/Public Department/ foreign country/ international organization or other foreign institutions in Pakistan whether notified or not by PPRA on its website in accordance with paragraph) of sub-clause IB.2.1 of Instructions to Bidders;
12. We are not submitting more than one Bid in this bidding process in accordance with Clause IB.39 of Instructions to Bidders.
13. We, including any Subcontractors or Suppliers for any part of the Contract, do not have any conflict of interest w.r.t common controlling shareholders/directors and legal representative of any other Bidder;
14. We agree to permit the Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by the Employer; and
15. We undertake that all the information and documents submitted with the Bid are genuine, and in case of incorrect information of fake documents we shall be liable for punitive action under the Applicable Law.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 2024

Signature \_\_\_\_\_ in the capacity of \_\_\_\_\_

duly authorized to sign bids for and on behalf of \_\_\_\_\_

\_\_\_\_\_

(Name of Bidder in Block Letters)  
(Seal)

Address \_\_\_\_\_

\_\_\_\_\_

Witness:

(Signature) \_\_\_\_\_

(Name) \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Occupation/Position in Firm \_\_\_\_\_

\_\_\_\_\_



**SCHEDULE - A TO BID**

**SPECIFIC WORKS DATA**

SPECIFIC WORK DATA HAS BEEN PRESCRIBED IN  
VOLUME - II OF TECHNICAL PROVISIONS

Initials of Signatory to Bid: \_\_\_\_\_

**SCHEDULE – B TO BID**

**WORK TO BE PERFORMED BY SUBCONTRACTORS**

The bidder will do the work with his own forces except the work listed below which he intends to sub-contract.

<u>Items of Work to be Sub-Contracted</u>	<u>Name and address of Sub-Contractor</u>	<u>Statement of similar works previously executed (attach evidence)</u>
---	---	---

Note:

1. No change of Sub-Contractor shall be made by the bidder without prior approval of the Employer.
2. The truthfulness and accuracy of the statement as to the experience of Sub-Contractors is guaranteed by the bidder. The Employer's judgment shall be final as to the evaluation of the experience of Sub-Contractors submitted by the bidder.
3. Statement of similar works shall include description, location & value of work, year completed and name & address of the clients.

Initials of Signatory to Bid: \_\_\_\_\_

## **SCHEDULE – C TO BID**

### **PROPOSED PROGRAMME OF WORKS**

Bidder shall provide a program, based on the latest relevant computer software, in a bar-chart/CPM/PERT form showing the sequence of work items by which he proposes to complete the Work of the entire Contract. The programme should indicate the sequence of Work items and the period of time during which he proposes to complete the Works. The work includes the activities like designing, schedule of submittal of drawings, ordering and procurement of materials, manufacturing, delivering, erection, testing and commissioning HVAC System Works to be supplied under the Contract.

Initials of Signatory to Bid: \_\_\_\_\_

## SCHEDULE – D TO BID

### DEVIATIONS FROM TECHNICAL PROVISIONS

It is presumed that the Bidder shall not take any deviation however if he intends to take deviation to the specified terms those must be listed in the space provided below

Sr. No	Clause No./Section No.	Deviations/Clarifications

**Note:** Attach additional sheets, if required.

Initials of Signatory to Bid: \_\_\_\_\_

**SCHEDULE – E TO BID**

**DEVIATIONS  
FROM  
CONTRACTUAL COMMERCIAL CONDITIONS**

It is presumed that the Bidder shall not take any deviation however if he intends to take deviation, the specified contractual/commercial conditions those must be listed in the space provided below

Sr. No	Clause No./Section No.	Deviations/Clarifications

**Note:** Attach additional sheets, if required.

Initials of Signatory to Bid: \_\_\_\_\_

## **SCHEDULE – F TO BID**

### **METHOD OF PERFORMING WORKS**

The Bidder is required to submit a narrative outlining the method of performing the Works. The narrative should indicate in detail and include but not be limited to:

- The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.
- A list of all major items of constructional and erection plant, tools and vehicles proposed to be used in carrying out the Works at Site, including number of each kind, make, type, capacity of all equipment, working condition, which shall be deployed by him for Civil Work and Erection, Testing and Commissioning of the Works, in sufficient detail to demonstrate fully that the equipment will meet all the requirements of the Technical Provisions.
- The procedure for installation of equipment and transportation of equipment and materials to the Site.
- Organization chart indicating head office & field office personnel involved in management, supervision and engineering of the Works to be done under the Contract.

Initials of Signatory to Bid: \_\_\_\_\_

**SCHEDULE – G TO BID**

**PROPOSED ORGANISATION**

The Bidder shall list in this Schedule the key personnel he will employ from Head office and from Site office to direct and execute the Works, together with their names, qualifications, experience, positions held and their nationalities.

Designation	Name	Summary of Qualifications Experience, Present, Position and Nationality
-------------	------	--

- Head Office:
  
- Site Office:
  - Contractor’s Representative
  - Supervising Engineer
  - Construction Supervisors
  - Other Key Staff

Initials of Signatory to Bid: \_\_\_\_\_

**LIST OF RECOMMENDED MANUFACTURERS FOR ITEMS/  
MATERIALS/EQUIPMENT OF HVAC SYSTEM WORKS**

The Bidder should note that only Equipment/materials from the following recommended or approved equivalent manufacturers shall be allowed to be used on this Project provided their products meet the specified requirements.

<b>SR. NO.</b>	<b>EQUIPMENT/ MATERIAL</b>	<b>RECOMMENDED MANUFACTURER/ SUPPLIER</b>	<b>COUNTRY (origin, manufacturing, assembly, testing &amp; supply)</b>
1.	AIR HANDLING UNITS	LANCER SPRING AIRE EUROCON SMART WAVE, SWIFT AIRE ECO KLIMA/COOLMAX OR APPROVED EQUAL	PAKISTAN
2.	Valves &Accessories		
	a) VALVES, STRAINER DRAIN COCKS	KITZ,ECONOSTO,HATTERSLEY TOZEN,SCON,DUYER,VIR, WATTS,FLOWCON, GALA	AS PER MANUFACTURER'S FACILITY
	b) BALANCING VALVES	DUYER,ECONOSTO,VIR OVENTROP,CALEFI,WATTS, FLOWCON, GALA	USA/WEST EUROPE
3.	G.I PIPE	IIL, JAMAL PIPES	PAKISTAN
4.	SEAMLESS BLACK STEEL PIPES (SCH-40)	HUFFAZ, ECONOSTO BAOSTEEL, LONTRIN, HEIBI SHENGTION, PROTEX	PAKISTAN/CHINA
5.	DUCT/PIPE INSULATION SOUND LINER	KIMMCO,AFICO,ODE OWENS CORNING, KNUAF	KUWAIT/SAUDI ARABIA/TURKEY/ EUROPE/USA



**SCHEDULE-H TO BID**

6.	G.I SHEETS	PAK STEEL MILLS KARACHI, ILL, IMPORTED MAKE AVAILBLE LOCALLY, APPROVED BY ENGINEER	PAKISTAN/ IMPORTED
7.	PRESSURE GUAGES & THERMOMETERS	WEISS INSTRUMENTS, INC,DWYER, WEKSELER, TRERICE, FEMIT	USA
8.	TESTING AND MAINTENANCE INSTRUMENTS	DWYER, FLUKE OR APPROVED EQUAL	USA
9.	VFD	SIEMENS , ABB DANFOSS	CHINA/WEST EUROPE
10.	Motor	SIEMENS , ABB	CHINA/WEST EUROPE
11.	DUCT SEALANT	DOW CORNING ZAHBIA	USA/TURKEY
12.	WHITE GLUE	FOSTER	USA/EUROPE
13.	AIR VENT	SPIRAZ-SACRO,VENN	USA/EUROPE
14.	SOUND ATTENUATOR	INDUSTRIAL, ACOUSTIC, CLIMATECH, AEROTECH AMEKSAN	MALAYSIA, AUSTRIA, TURKEY
15.	PVC CONDUIT, & ACCESSORIES	BETA, POPULAR GALCO	PAKISTAN
16.	STEELCONDUIT, CABLE TRAYS & ACCESSORIES	HILALL, INDUSTRIES, IIL, JAMAL, PIONEER, NIB ASHRAF INDUSTRIES	PAKISTAN

## SCHEDULE-H TO BID

NOTE 1: ALL EQUIPMENT/MATERIAL MUST BE SUPPLIED FROM AUTHORIZED/SOLE DISTRIBUTORS. MANUFACTURERS AUTHORIZATION CERTIFICATE IN ORIGINAL MUST BE PROVIDED.

NOTE 2: MINIMUM QUALIFICATION CRITERIA REQUIREMENT OF ALL HVAC EQUIPMENT MANUFACTURER IS MENTIONED BELOW

For all proposed equivalent equipment manufacturer shall meet the minimum following criteria:

- All equipment/ material must be supplied from authorized/sole distributors
- Manufacturers Authorization Certificate in original must be provided.
- Compliance to the mentioned country (origin, manufacturing, assembly, testing & supply) for offered/supplied equipment is mandatory.
- Any approved equivalent brand other than the above mentioned recommended manufacturer shall submit the following additional information in addition to qualification information with the technical bid.
- Compliance of equipment parts and their origin as mentioned in specifications.
- Compliance statement of specifications from the equipment manufacturer.
- Comparison of each part/system of proposed brand with one of the brands provided in suggested manufacturer's list along with the test reports.
- Approved equivalent brand shall clearly be mentioned in the technical bid along with above said information

Initials of signatory to Bid \_\_\_\_\_

## SCHEDULE-I TO BID

### BIDDER'S EQUIPMENT DATA

Technical catalogues are required only to substantiate the data provided in these forms. Catalogues of equipment not listed in these forms shall not be submitted and if submitted, will be ignored. Acceptance of Bid will not mean the acceptance of information given in those catalogues.

#### A. AIR HANDLING UNIT

**a)** (AIR HANDLING UNITS)AHU-1

1. Make \_\_\_\_\_
2. Name of Manufacture \_\_\_\_\_
3. Authorized Distributor in Pakistan \_\_\_\_\_
4. Nominal Capacity (MBH) \_\_\_\_\_
5. Power consumption at scheduled condition (KW) \_\_\_\_\_
6. Operating Weight Kg \_\_\_\_\_
7. Overall Dimensions FT-IN  
Length \_\_\_\_\_  
Width \_\_\_\_\_  
Height \_\_\_\_\_

**b)** (AIR HANDLING UNITS)AHU-2

1. Make \_\_\_\_\_
2. Name of Manufacture \_\_\_\_\_
3. Authorized Distributor in Pakistan \_\_\_\_\_
4. Nominal Capacity (MBH) \_\_\_\_\_
5. Power consumption at scheduled condition (KW) \_\_\_\_\_
6. Operating Weight Kg \_\_\_\_\_
7. Overall Dimensions FT-IN  
Length \_\_\_\_\_  
Width \_\_\_\_\_  
Height \_\_\_\_\_

## SCHEDULE-I TO BID

**c)** (AIR HANDLING UNITS)AHU-3

1. Make \_\_\_\_\_
2. Name of Manufacture \_\_\_\_\_
3. Authorized Distributor in Pakistan \_\_\_\_\_
4. Nominal Capacity (MBH) \_\_\_\_\_
5. Power consumption at scheduled condition (KW) \_\_\_\_\_
6. Operating Weight Kg \_\_\_\_\_
7. Overall Dimensions FT-IN  
Length \_\_\_\_\_  
Width \_\_\_\_\_  
Height \_\_\_\_\_

**d)** (AIR HANDLING UNITS)AHU-4

1. Make \_\_\_\_\_
2. Name of Manufacture \_\_\_\_\_
3. Authorized Distributor in Pakistan \_\_\_\_\_
4. Nominal Capacity (MBH) \_\_\_\_\_
5. Power consumption at scheduled condition (KW) \_\_\_\_\_
6. Operating Weight Kg \_\_\_\_\_
7. Overall Dimensions FT-IN  
Length \_\_\_\_\_  
Width \_\_\_\_\_  
Height \_\_\_\_\_

## SCHEDULE-I TO BID

**e) (AIR HANDLING UNITS)AHU-5**

1. Make \_\_\_\_\_
2. Name of Manufacture \_\_\_\_\_
3. Authorized Distributor in Pakistan \_\_\_\_\_
4. Nominal Capacity (MBH) \_\_\_\_\_
5. Power consumption at scheduled condition (KW) \_\_\_\_\_
6. Operating Weight Kg \_\_\_\_\_
7. Overall Dimensions FT-IN  
Length \_\_\_\_\_  
Width \_\_\_\_\_  
Height \_\_\_\_\_

**B. VALVES & ACCESSORIES**

1. Make \_\_\_\_\_
2. Country of Manufacture \_\_\_\_\_
3. Pressure Rating \_\_\_\_\_
4. Authorized Distributor in Pakistan \_\_\_\_\_

Initials of Signatory to Bid: \_\_\_\_\_

**SCHEDULE – J TO BID**

**HEALTH AND SAFETY PROCEDURES**

The Bidder shall describe hereunder his Health and Safety Procedures.

Initials of Signatory to Bid: \_\_\_\_\_

## SCHEDULE – K TO BID

### (INTEGRITY PACT)

#### **DECLARATION OF FEES, COMMISSIONS AND BROKERAGE ETC. PAYABLE BY THE SUPPLIER OF GOODS, SERVICES & WORKS IN CONTRACTS WORTH RS. 10.00 MILLION OR MORE**

Contract No. \_\_\_\_\_ Dated \_\_\_\_\_  
Contract Value: As per Price Bid \_\_\_\_\_  
Contract Title: \_\_\_\_\_

..... [name of Bidder] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan (GoP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GoP through any corrupt business practice.

Without limiting the generality of the foregoing, [name of Bidder] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.

[name of Bidder] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[name of Bidder] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, [name of Bidder] agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or

kickback given by [name of Bidder] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

Name of Employer: .....  
Signature: .....

**[Seal]**

Name of Bidder: .....  
Signature: .....

**[Seal]**

Initials of Signatory to Bid: \_\_\_\_\_



## SCHEDULE – L TO BID

### ESTIMATED PROGRESS PAYMENTS

Bidder's estimate of the value of work which would be executed by him during each of the periods stated below based on his Programme of Works and the Rates in the Schedule of Prices, expressed in %age of Bid Price..

Period	%age of Bid Price
1 <sup>st</sup> Month	_____
2 <sup>nd</sup> Month	_____
3 <sup>rd</sup> Month	_____
4 <sup>th</sup> Month	_____

Initials of Signatory to Bid: \_\_\_\_\_

# **GENERAL CONDITIONS OF CONTRACT**

**PART-I: GENERAL CONDITIONS OF CONTRACT**  
**(Notes on the Conditions of Contract)**

The Conditions of Contract part – I; General condition shall be those forming part I of the condition of contract for Electrical and Mechanical Work “third edition 1987, reprinted 1988 with editorial amendments” prepared by the *Federation Internationale des ingenieurs – Conseils* (FIDIC).

Bidders are advised to obtain originals of the FIDIC Condition of Contracts directly from:

FIDIC Secretariat  
World Trade Center II  
P.O. Box 311  
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**PREAMBLE**  
**TO**  
**CONDITIONS OF CONTRACT**

## PREAMBLE TO CONDITIONS OF CONTRACT

<b>Commencement Date</b>	Sub-Clause 1.1.1(i) The date for Commencement of the Works is the date of issuance of the Engineer's written "Notice to Commence" which shall be issued within fourteen (14) days of the signing of the Contract/Agreement.
<b>Defects Liability Period</b>	Sub-Clause 1.1.11 The Defects Liability Period is three hundred and sixty five (365) calendar days after the date certified in the Taking Over Certificate, but subject to extension as provided under Sub-Clause 30.4.
<b>The Employer</b>	Sub-Clause 1.1.12  Manager General Services Human Resource Division National Engineering Services (Pvt.) Limited ( NESPAK) NESPAK House,1-C, Block N, Model Town Extension Lahore-54700 Ph: 92-42-99231944/99090000, Ext: 545; Fax:92-42-99231950
<b>The Engineer</b>	Sub-Clause 1.1.15  National Engineering Services (Pvt.) Limited New Ventures Division IEEEP Building, 17-C-1, Civic Centre, Lahore Ph: 92-42-99232261-74 Fax:92-42-99232275
<b>Time for Completion</b>	Sub-Clause 1.1.35. The Time for Completion for whole of the Works is one hundred & twenty (120) calendar days from the Commencement Date.
<b>Warranty Period</b>	Sub-Clause 1.1.40. The Warranty Period is three hundred and sixty five (365) calendar days after the date certified in Taking Over Certificate for all equipment/material. The principal manufacturer's warranty shall be three hundred and sixty five (365) days after the date certified in Taking Over Certificate.
<b>Engineer's Duties &amp;</b>	Sub-Clause 2.1 Amount of Variation Order in emergency is upto $\pm 15\%$ of the

<b>Authorities</b>	Contract Price.
<b>Confirmation in Writing</b>	<p>Sub-Clause 2.6</p> <p>(i) If the Contractor shall require the confirmation it shall be notified to the Engineer within fourteen (14) days.</p> <p>(ii) The Engineer shall confirm the decision/instruction within fourteen (14) days.</p>
<b>Ruling Language</b>	<p>Sub-Clause 5.1.</p> <p>The version in English language (ruling language) shall prevail.</p>
<b>Day to Day Communications</b>	<p>Sub-Clause 5.2.</p> <p>The language for day to day communications is English.</p>
<b>As-Built Drawings</b>	<p>Sub-Clause 6.10</p> <p>As-Built Drawings shall be provided to the Engineer within fourteen (14) days from the date of issuance of Taking Over Certificate.</p>
<b>General Obligations</b>	<p>Sub-Clause 8.1</p> <p>No Employer's supplied equipment shall be provided.</p>
<b>Programme to be Furnished</b>	<p>Sub-Clause 12.1.</p> <p>The Programme must be submitted in the form of a bar chart depicting Critical Path Method and other details based on the latest relevant computer software.</p>
<b>Employer's Equipment</b>	<p>Sub-Clause 14.4.</p> <p>There will be no Employer's equipment available for use by the Contractor under the Employer's operation. The Contractor shall arrange all equipment at his own cost.</p>
<b>Working Hours</b>	<p>Sub-Clause 18.3.</p> <p>The normal working hours on the Site shall conform to applicable labor laws and existing customs of Pakistan.</p>
<b>Place of Project</b>	<p>Sub-Clause 25.1</p> <p>(i) Place of the Project is Lahore.</p> <p>(ii) Period of Completion for whole of the Works is one hundred &amp; twenty (120) calendar days from the Commencement Date.</p>
<b>Earlier Completion</b>	<p>Sub-Clause 26.3</p> <p>(i) No extra sum as Bonus will be paid to the Contractor for earlier completion of the Works.</p>
<b>Delay in Completion</b>	<p>Sub-Clause 27.1.</p> <p>Failure to meet the Time for Completion entitles the Employer to deduct from the Contract Price as follows:</p>

0.1% of the Contract Price per day; but upto a maximum of 10% of the Contract Price.

**Prolonged Delay** Sub-Clause 27.2.  
Maximum amount recoverable from the Contractor by the Employer is upto the extent of loss as worked out by the Engineer.

**Terms of Payment** Sub-Clause 33.1.  
In addition to the provisions under Clause 33, the terms of payment shall be as stated in Particular Conditions of Contract.

**Payment** Sub-Clause 33.5  
(i) Period of Payment by the Employer to the Contractor: The Employer shall approve the invoice and make payment within fourteen (14) days after receipt of Certificate of Payment from the Engineer.  
(ii) Period of Final Certificate of Payment: Time for payment by the Employer to the Contractor against Final Certificate of Payment shall be within fifty-six (56) days after receipt of Final Certificate of payment from the Engineer.

**Payment in Foreign Currencies** Sub-Clause 35.1.  
No payment shall be made in foreign currencies.

**Insurance of Works** Sub-Clause 43.1.  
The amount of Insurance shall be for full replacement value of the Works stated in Letter of Acceptance plus fifteen percent (15%). For the deductibles, if any, the Contractor shall submit an undertaking that he shall indemnify and keep indemnified the Employer for the amount of deductibles provided in the insurance policy.

Sub-Clause 43.1.(a)  
The additional risks to be insured are:

- (a) Fire, smokes, explosion, falling objects, earthquake, perils of the sea, tempest, impact by aircraft or land vehicle, aircraft and other aerial devices or articles dropped there from lightning, strike, riot, civil commotion, terrorism, escape of water, inundation, rain, snow, land slides, flood, act of God, vandalism or malicious damage, windstorm or hail storm, accidental damage to the plant during installation;
- (b) Collision, upset, overturn, derailment, stranding or sinking of an automobile or any conveyance of a common carrier by land, water or air in which the Plant or any part thereof is being carried including overland transportation in Pakistan from port of entry to the Site;

- (c) Theft, burglary or attempted theft or burglary;
- (d) Any loss or damage during pre-erection storage;
- (e) Faults in construction and erection, lack of skill, lack of experience, negligence, malicious act;
- (f) Any other sudden and unforeseen event such as loss or damage due to collapse etc., on site, transport of items to be erected; and
- (g) Actions of the Employer in the operation of plant or part thereof on behalf of the Contractor.

**Third Party** Sub-Clause 43.3.

**Liability** The amount of insurance against third party liability taken out by the Contractor shall not be less than PKR. 500,000/- (Rupees five hundred thousand only) per occurrence with number of occurrences unlimited.

**Payment on** Sub-Clause 46.3.

**Termination for** The additional amount payable by the Employer on termination shall not exceed the actual cost of Works executed as determined by the Engineer.

**Employer's Default**

**Labour,** Sub-Clause 47.1.

**Materials and** The rates and prices quoted by the Contractor in the Schedule of Prices shall not be subject to adjustments for changes in costs and shall remain fix and firm during the currency of the Contract.

**Transport**

**Notice to** Sub-Clause 49.2.

**Employer and** The address of the Employer for notices is the same as given in Sub-Clause 1.1.12 here above.

**Engineer**

The address of the Engineer for notices is the same as given in Sub-Clause 1.1.15 here above.

**Disputes &** Sub-Clause 50.4

**Arbitration** Venue of Arbitration shall be Lahore, Pakistan.

**Applicable Law** Sub-Clause 51.1.

The applicable law is the Laws of the Islamic Republic of Pakistan.

**Procedural Law** Sub-Clause 51.2.

**for Arbitration** The procedural law for arbitration is the Rules of Pakistan Arbitration Act 1940, as amended from time to time.



**Language** Sub-Clause 51.3.  
The language of arbitration is English language.  
The place of arbitration is Lahore, Pakistan.

**PART - II**  
**PARTICULAR CONDITIONS**  
**OF CONTRACT**

## **PART-II: PARTICULAR CONDITIONS OF CONTRACT**

### **1.1 Definitions**

The text of Sub-Clause 1.1.1 is deleted and substituted by the following:

“Commencement Date” means the date specified in the Preamble to Conditions of Contract.

The text of Sub-Clause 1.1.2 is deleted and substituted by the following:

“Conditions” means the Preamble to Conditions of Contract, General Conditions of Contract and Particular Conditions of Contract.

#### **Sub-Clause 1.1.3**

At the end of Sub-Clause the following is added:

“Any subsequent amendment to the Contract mutually agreed and signed by the Employer and the Contractor, shall be the part of the Contract.”

The text of Sub-Clause 1.1.5 is deleted and substituted by the following:

“Contract Price” means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works and remedying of any defect therein subject to such additions thereto or deductions therefrom as may be made under the provisions hereinafter contained in accordance with the provisions of the Contract.”

#### **Sub-Clause 1.1.11**

The Defects Liability Period is the period mentioned in the Preamble to Conditions of Contract.

#### **Sub-Clause 1.1.15**

The following is added at the end of Sub-Clause:

“or any other competent person appointed by the Employer at any time during the currency of the Contract as his replacement.”

#### **Sub-Clause 1.1.23**

The following paragraph is added:

The word “Goods” is synonymous with the word “Plant.”

#### Sub-Clause 1.1.27

The text of Sub-Clause is deleted and substituted by the following:

“Schedule of Prices” means the completed and priced Schedule of Prices, or any part or individual schedule thereof, submitted by the Contractor with his Bid or revised and mutually agreed and forming a part of the Contract Documents.

#### Sub-Clause 1.1.33

The word “Tender” is synonymous with the word “Bid” and the word “Tender Documents” with the word “Bidding Documents”.

The following Sub-Clauses are added:

#### Sub-Clause 1.1.38

The word “Month” means calendar month according to Gregorian calendar.

#### Sub-Clause 1.1.39

“Operation and Maintenance Manuals” has the meaning described in Sub-Clause 6.6 hereof.

#### Sub-Clause 1.1.40

“Warranty Certificate” means the certificate against specified goods/equipment, for the period mentioned in the Preamble to Conditions of Contract, to be issued by the Contractor that the goods/equipment supplied under the Contract are new, unused and incorporate all recent improvements in design and materials unless provided otherwise in the Contract and that the Contractor will be responsible for making good or replacing any defective goods/equipment during the Warranty Period specified in the Preamble to Conditions of Contract, which will commence after issuance of Taking Over Certificate.

#### Sub-Clause 1.1.41

The word “Part II” stated in FIDIC Conditions of Contract is synonymous with the word “Particular Conditions of Contract”.

#### Sub-Clause 1.1.42

“Project” means “Replacement, Supply, Installation, Testing & Commissioning of Five (5) Nos. Air Handling Units At NESPAK House, Lahore.”

#### Sub-Clause 2.1 Engineer’s Duties

The text of Sub-Clause 2.1 is deleted and substituted by the following:

“The Engineer shall carry out the duties specified in the Contract.

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. The Engineer is required to obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses of General Conditions of Contract:

- (a) approval of Subcontractor under Sub-Clause 4.1,
- (b) certifying additional sums under Sub-Clause 5.4,
- (c) certifying additional costs under Sub-Clauses 11.3 & 12.3,
- (d) certifying any cost under Sub-Clause 14.6,
- (e) approval of Extension of Time under Clause 26,
- (f) issuing a Taking-Over Certificate under Clause 29,
- (g) issuing a Defects Liability Certificate under Sub-Clause 30.11,
- (h) issuing a Variation Order under Clause 31 except in an emergency situation as stated here below or if such variation would increase the Contract Price by less than the amount stated in the Preamble to Conditions of Contract,
- (i) fixing rates or prices under Clauses 31 and 34,
- (j) certifying additional costs under Sub-Clause 44.5, and
- (k) certifying additional costs under Sub-Clause 47.2.

Except for such variations pursuant to Sub-Clause 31.1 of the GCC which may be necessary in an emergency affecting safety of life, the works or of adjoining property.

Except as expressly stated in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under this Contract.”

#### Sub-Clause 2.6 Confirmation in Writing

- (i) In line 3 after the words “undue delay” the following is added:  
“but not after the number of days mentioned in the Preamble to Conditions of Contract from the instruction or decision.”
- (ii) At the end of Sub-Clause 2.6, the following is added:  
"The Engineer shall confirm or otherwise within the period mentioned in the Preamble to Conditions of Contract from the receipt of requirement(s) from the Contractor.”

#### Sub-Clause 2.8 Replacement of Engineer

The text of Sub-Clause 2.8 is deleted and substituted by the following:

“If the Employer intends to replace the Engineer, the Employer shall, not less

than 14 days before the intended date of replacement, give notice to the Contractor, of the name, address and relevant experience of the intended replacement Engineer. The Employer shall not replace the Engineer with a person against whom the Contractor raises reasonable objection by notice to the Employer, with supporting particulars.”

#### Sub-Clause 2.9 Engineer Not Liable

Sub-Clause 2.9 is added as follows:

Approval, reviews and inspection by the Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of remaining materials and equipment for the Works and parts thereof and complete the remaining erection works and testing and commissioning in accordance with the Contract and neither the Engineer's authority to act nor any decision made by him in good faith as provided for under this Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any of the Works.

#### Sub-Clause 4.2 No Contractual Relation between Subcontractor and the Employer

Sub-Clause 4.2 is added as follows:

Nothing contained in the Contract Documents shall create any contractual relation between any Subcontractor and the Employer.

#### Sub-Clause 5.3 Priority of Contract Documents

Sub-Clause 5.3 is deleted and substituted by the following:

“Unless otherwise provided in the Contract, the priority of the Contract Documents shall be as follows:

1. The Contract Agreement;
2. The Letter of Acceptance;
3. The completed Letters of Bid (i.e. Letter of Technical Bid & Letter of Price Bid);
4. The Preamble to Conditions of Contract;
5. The Particular Conditions of Contract;
6. The General Conditions of Contract;
7. The priced Schedule of Prices;
8. The completed Schedules to Bid;
9. The Specifications comprising Special Provisions, Technical Provisions;
10. Any other document forming part of the Contract.

In case of discrepancies between drawings, those of larger scale shall govern unless they are superseded by drawing(s) of a later date regardless of scale.

All drawings and specifications shall be interpreted in conformity with the Contract Agreement and these conditions.”

#### Sub-Clause 5.4 Documents Mutually Explanatory

The text appearing in the last line after the words “the Contract Price” is deleted.

#### Sub-Clause 6.2 Consequences of Disapproval of Contractor's Drawings

Full stop is deleted and the following words are added at the end of Sub-Clause:

“for the approval of the Engineer. However, the Contractor shall not be entitled for time extension on this account.”

#### Sub-Clause 6.6. Operation and Maintenance Manuals

Paras 2 & 3 are deleted and the following text is added at the end of Para 1 of Sub-Clause:

“The Operation and Maintenance Manuals shall include full instructions for the operation, servicing and maintenance of the Plant, not only during the period of the Contractor's liability but more particularly during its operating life.

The directions shall be set out simply, clearly and systematically. This may be divided into two volumes if desirable, one for operation and the second for servicing and maintenance (in sub-volumes for major items of Plant).

The operational data shall include a complete physical and functional description of the Plant (in sub-volumes for major items of Plant) and step-by-step procedures for inspection, checking and adjustments for proper operation of the Plant.

The maintenance data shall include complete instructions for routine checks, servicing, maintenance and repair of all parts and for dismantling, handling and re-assembly of all equipment, sub-assemblies and all separate components. The maintenance data shall also include where possible parts catalogues. The lists shall provide all necessary information for identifying the parts and for re-ordering the parts including name of part, part number and catalogue references where applicable, name of manufacturer, size, capacity and other characteristics .

General arrangements, single line diagrams and detailed drawings shall be provided for ready reference in the operation and maintenance instructions.

The manuals shall be printed on ISO paper size A4 (210x297 mm) with offset or equivalent printing strongly bound in a durable stiff cover bearing the title in approved legend. Drawings shall be folded or reduced to 297 mm height. All

volumes shall bear on the spine an approved shortened version of the title.

The Contractor shall submit two (02) draft copies for approval of the Engineer prior to producing finished volumes.

The Contractor shall provide three (03) copies of the approved Operation and Maintenance Manuals prior to Taking Over by the Employer. Supplementary Operation and Maintenance Manual shall be provided by the Contractor, if required, to incorporate changes resulting from experience during the operation and maintenance period. The work shall not be considered to be completed for the purpose of taking over until such manual and drawings have been supplied to the Employer.”

#### Sub-Clause 6.9 Manufacturing Drawings

The words “Unless otherwise specified in Part-II” are deleted and the following is added at the end of Sub-Clause:

“However, the Contractor is required to disclose to the Engineer or the Employer any confidential information necessary to justify the reliability, the efficiency and the operation and maintenance of the Plant supplied by him.”

#### Sub-Clause 6.10 “As–Built” Drawings

The following Sub-Clause 6.10 is added:

The Contractor shall furnish to the Engineer three (3) copies and one (1) reproducible of approved quality of all “As–Built” drawings within the period mentioned in the Preamble to Conditions of Contract.

#### Sub-Clause 8.1 General Obligations

The text of Sub-Clause 8.1 is deleted and substituted by the following:

- “(a) The Contractor shall commence the works on the date specified in Sub-Clause 1.1.1(i) of the Preamble to Conditions of Contract and shall proceed with the same with due expedition and without delay.
- (b) The Contractor shall, in accordance with the Contract, with due care and diligence, complete the Works and test and commission the Plant within the Time for Completion. The Contractor shall also provide all necessary Contractors’ Equipment, superintendence, labour and all necessary facilities therefore.”



#### Sub-Clause 10.1 Performance Security

Sub-Clause 10.1 is deleted and substituted by the following:

“The Contractor shall provide a Performance Security in the prescribed Form annexed to these Documents. The said Security shall be furnished by the Contractor within fourteen (14) days after the receipt of Letter of Acceptance. The Performance Security shall be of an amount equal to ten (10%) percent of the Contract Price in the currency of the Contract, at the option of the bidder, in the form of Bank Guarantee from any Scheduled Bank in Pakistan or from a bank located outside Pakistan duly counter guaranteed by a scheduled Bank in Pakistan or an insurance company having atleast AA rating from PACRA/JCR-VIS.”

The cost of complying with the requirements of this Sub-Clause shall be borne by the Contractor.”

#### Sub-Clause 10.3 Claims under Performance Security

Sub-Clause 10.3 is deleted in its entirety.

#### Sub-Clause 10.4 Performance Security Binding on Variations and Changes

The following Sub-Clause 10.4 is added:

“The Performance Security shall be binding irrespective of variations and changes in the quantities of the Works or extensions in completion time of the Works, which are granted or agreed upon under the provisions of the Contract.”

#### Sub-Clause 12.1 Programme to be Furnished

Sub-Clause 12.1(a) is deleted and substituted by the following:

“(a) the order in which the Contractor proposes to carry out the Works (including preliminaries, required material ordering, delivery to Site, erection and rectifications work, testing, commissioning and taking-over by the Employer). The programme shall also include the following:

- (i) Employment of local and expatriate labour of various categories,
- (ii) Local material procurement,
- (iii) Material imports, if any,
- (iv) Schedule of Submittals.”

In Sub-Clause 12.1(c)(iv) the words “any import licenses” are deleted.

#### Sub-Clause 12.4 Monthly Progress Report

The following Sub-Clause 12.4 is added:

“During the period of the Contract, the Contractor shall submit six (06) sets of report to the Engineer not later than the 8th day of each month, including:

- (i) a construction/erection schedule indicating the progress achieved during the preceding month;
- (ii) description of all work carried out since the last report;
- (iii) description of the work planned for the next forty two (42) days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
- (iv) summary of daily job record for the preceding month; and
- (v) color photographs to illustrate progress.”

#### Sub-Clause 12.5 Daily Job Record

The following Sub-Clause 12.5 is added:

“During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Engineer as and when requested.

The daily record shall include particulars of weather conditions, number of personnel working in different categories, deliveries of materials, quantity, location and assignment of equipment.”

#### Sub-Clause 13.1 Contractor's Representative

At the end of the Sub-Clause the following is added:

“The Contractor's Representative shall be a competent and skilled person approved by the Engineer (which approval may at any time be withdrawn) and who shall be present on the Site during all working hours. He shall be fluent in the English language. He shall not be transferred from the Site without the consent of the Engineer. The Contractor's Representative shall be a Registered Professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976).”

#### Sub-Clause 13.3 Language Ability of Superintending Staff of Contractor

The following Sub-Clause 13.3 is added:

“A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language.”

#### Sub-Clause 13.4 Employment of Local Personnel

The following Sub-Clause 13.4 is added:

“The Contractor shall, to the extent practicable and reasonable, employ staff and labour from sources within Pakistan.”

#### Sub-Clause 14.1 Contractor's Equipment

Replace the word “or” at the end of Sub-paragraph (a) by the word “and” and insert the following at the end of Sub-paragraph (b):

“which shall not be unreasonably withheld.”

#### Sub-Clause 14.2 Safety Precautions

At the end of the Sub-Clause, the following is added:

“In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the safety requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose.

The Contractor shall make, maintain, and submit reports to the Engineer concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.”

#### Sub-Clause 14.3 Electricity, Water and Gas

The text of Sub-Clause 14.3 is deleted and substituted by the following:

“It shall be the sole responsibility of the Contractor to provide, operate and maintain in working condition all temporary services such as Water Supply, Electricity, Gas, Telephone connections, etc., required for the proper execution of Works under this Contract. The Contractor shall also be responsible for payment of the installation as well as consumption charges, directly to concerned agencies or any other charges or royalties levied by the concerned authorities or local governing agency or any other municipal body. The Contractor shall make all the necessary arrangements for a temporary electricity service, at site during the whole of the Construction period or if he is unable to arrange a temporary electrical connection then he shall arrange and furnish an Electric Power Generating set at Site and maintain the generating set in perfect working condition throughout the duration of the Contract.”

#### Sub-Clause 14.4 Employer's Equipment

The text of Sub-Clause is deleted in its entirety.

#### Sub-Clause 14.8 Information for Import Permits & Licenses

The text of Sub-Clause 14.8 is deleted and substituted by the following:

"The Contractor shall submit to the Employer in good time such details of all Plant and Contractor's Equipment as is to be imported into Pakistan and identify as to what assistance of the Employer is required for importation of Plant."

#### Sub-Clause 15.2 Compliance with Laws

The Sub-Clause 15.2 is deleted and substituted by the following:

"The Contractor shall comply with the Laws of country of manufacture and the Laws of Islamic Republic of Pakistan where the Plant is to be erected."

#### Sub-Clause 16.4 Photographs of Works and Advertisement Prohibited

The following Sub-Clause 16.4 is added:

"Except with the prior written authorization of the Employer, the Contractor shall not exhibit or permit to be exhibited any photographs or advertisement on the Works. Any authorized exhibition shall be immediately removed if the Employer so requires."

#### Sub-Clause 16.5 Training of Employer's Staff

The following Sub-Clause 16.5 is added:

"The Contractor shall provide such facilities for the training of such numbers of Pakistani engineers, engineering students, apprentices and trade apprentices on such sections of the Works at the Site or on the Contractor's premises or Contractor selected plant manufacturer's premises and factories, or wherever else work is in hand, as specified or directed by the Engineer. The Employer shall direct what sums by way of wages and allowances are to be paid by the Contractor to such persons and shall reimburse the Contractor for such sums as are so directed to be paid and are paid. The Contractor shall also provide medical expenses or medical insurance and travelling expenses for trainees if required by the Employer which shall be reimbursed by the Employer."

The language of training at the above stated premises shall be English and Urdu."

#### Sub-Clause 18.1 – Engagement of Labour

At the end of the Sub-Clause the following is added:

“in accordance with the regulations, orders and requirements of the Government of Pakistan.”

Sub-Clauses 18.5 to 18.12 are added:

#### “Sub-Clause 18.5 Employment of Persons in the Service of Others

The Contractor shall not recruit or attempt to recruit staff and labour from amongst the persons in the service of the Employer or the Engineer and vice-versa, unless mutually agreed between the Employer/Engineer and the Contractor.

#### Sub-Clause 18.6 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents, employees or labour.

#### Sub-Clause 18.7 Arms and Ammunition

The Contractor shall not give, barter or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

#### Sub-Clause 18.8 Festivals and Religious Customs

The Contractor shall in all dealings with his staff and labour have due regard to all recognized festivals, days of rest and religious or other customs.

#### Sub-Clause 18.9 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful riotous or disorderly conduct by or amongst his staff and labour and for the preservation of peace and protection of persons and property in the neighborhood of the Works.

#### Sub-Clause 18.10 Records of Safety and Health

The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.

#### Sub-Clause 18.11 Reporting of Accidents

The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition to appropriate action required under the law, notify the Engineer immediately by the quickest available means.

#### Sub-Clause 18.12 Compliance by Subcontractors

The Contractor shall be responsible for compliance by his Subcontractors of the foregoing provisions.

#### Sub-Clause 19.1 Manner of Execution

The following is added at the end of Sub-Clause:

“The Contractor shall submit for approval of the Engineer, his detailed method statement(s) for the execution of such items of work as may be desired by the Engineer. Approval of such method statement(s) shall neither relieve the Contractor of his responsibilities under the Contract nor form any basis for claiming additional costs.”

#### Sub-Clause 19.3 Uncovering Work

The following is added at the end of second paragraph of Sub-Clause 19.3:

“In any other case, all costs shall be borne by the Contractor.”

#### Sub-Clause 19.4 Use of Pakistani Materials

The following Sub-Clause 19.4 is added:

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

#### Sub-Clause 20.6 Witnessing of Factory Acceptance Tests

The following Sub-Clause 20.6 is added:

“Factory acceptance tests (within Pakistan) shall be witnessed by the personnel of the Employer/Engineer/Engineer’s Representative. All costs in connection with witnessing of the factory acceptance tests by the Employer/Engineer/Engineer’s Representative shall be borne by the Contractor. These shall include the costs of air travel from Pakistan to place of

inspection/testing and back, hotel accommodation/boarding/lodging, inland transportation for each visit of two (02) person to witness these tests.”

#### Sub-Clause 24.1 Cost of Suspension

At the end of the second paragraph after the word “Contractor”, the following is added:

“or for the proper execution or for the safety of the Works or Plant unless such necessity results from any act or default of the Engineer or the Employer or in consequence of any of the Employer's Risks under Sub-Clause 37.2.”

#### Sub-Clause 24.4 Resumption of Work

First paragraph of Sub-Clause 24.4 is deleted and substituted by the following:

“If the Contractor chooses not to treat prolonged suspension as an omission or termination under Sub-Clause 24.3, the Employer shall, upon the request of the Contractor, take over the responsibility for protection, storage, security and insurance of the suspended Works and of the Plant which has been delivered to the Site and which is affected by suspension and the risk of loss or damage thereto shall thereupon pass to the Employer.”

#### Sub-Clause 25.1 Time for Completion

The text of Sub-Clause 25.1 is deleted and substituted by the following:

“The Works at the place of the Project mentioned in the Preamble to Conditions of Contract shall be completed, tested and commissioned within the period mentioned in the Preamble to Conditions of Contract.”

#### Sub-Clause 26.1 Extension of Time for Completion

Sub-Clause 26.1(h) is deleted

##### Sub-Clause 26.1.1 Financial Compensation against Extension of Time

The following Sub-Clause 26.1.1 is added:

“The Contractor shall not be entitled for any financial compensation consequent upon the Extension of Time (EOT) for Completion granted to him under the provisions of Sub-Clause 26.1 of the General Conditions of Contract and he shall not have any further recourse or claim against the Employer, nor shall have any right of action against Employer for loss or damage suffered by the reasons of delay under which EOT is granted to him.”

#### Sub-Clause 26.3 Earlier Completion

Sub-Clause 26.3 (b) is deleted.

“Sub-Clause 26.4 Rate of Progress

The following Sub-Clause 26.4 is added:

“If for any reason, which does not entitle the Contractor to an Extension of Time, the rate of progress of the Works or any Section is at any time, in the opinion of the Engineer, too slow to comply with the Time for Completion, the Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary, subject to the consent of the Engineer, to expedite progress so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognized days of rest, he shall be entitled to seek the consent of the Engineer to do so. Provided that if any steps, taken by the Contractor in meeting his obligations under this Sub-Clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any moneys due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.”

Sub-Clause 27.1 Delay in Completion

Sub-Clause 27.1 is deleted and substituted by the following:

“If the Contractor fails to deliver the Works, or any part thereof, within the time stated in Sub-Clause 25.1, or fails to complete the whole of the Work, or, if applicable, any Section within the relevant time prescribed by Sub-Clause 25.1, then the Contractor shall pay to the Employer the relevant sum stated herein below as liquidated damages for such default (which sum shall be the only moneys due from the Contractor for such default) for every day or part of a day which shall elapse between the relevant time for Delivery or Time for Completion and the actual date of delivery at site or the date stated in a Taking-Over Certificate of the whole of the Works or the relevant Section, as the case may be, subject to the applicable limit stated herein below.

The Employer may deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations & liabilities under the Contract.

The liquidated damages for each day of delay and the maximum amount of liquidated damages shall be the amounts mentioned in the Preamble to Conditions of Contract.”



#### Sub-Clause 28.7 Consequences of Failure to Pass Tests on Completion

The words “by arbitration” appearing at the end of the Sub-Clause 28.7(c) are deleted and substituted by the words “by the Engineer”.

#### Sub-Clause 30.4 Extension of Defects Liability Period

At the end of 4th paragraph of Sub-Clause the following is added:

“or a mutually agreed period.”

#### Sub-Clause 30.5 Failure to Remedy Defects

In first line after the words “reasonable time” the following is added:

“fixed by the Engineer”.

#### Sub-Clause 30.13 Unfulfilled Obligations

The following Sub-Clause 30.13 is added:

“After the Defects Liability Certificate has been issued, the Contractor and the Employer shall remain liable for the fulfillment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force.”

#### Sub-Clause 31.1 Engineer's Right to Vary

The following is added at the end of second paragraph:

“No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 31. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of Contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.”

#### Sub-Clause 31.5 Record of Costs

The word “Engineer” in 4th line of Sub-Clause is deleted and substituted by “Engineer/Employer”.

#### Sub-Clause 31.6 Value Engineering

The following Sub-Clause 31.6 is added:

“The Contractor may, at any time, submit to the Engineer a written proposal which in the Contractor’s opinion will reduce the cost of constructing, maintaining or operating the works, or improve the efficiency or value to the

Employer of the completed Works or otherwise be of benefit to the Employer. Any such proposal shall be prepared at the cost of the Contractor. However, Employer is not bound to accept such proposal.”

#### Sub-Clause 31.7 Changes in Estimated Quantities

The following Sub-Clause 31.7 is added:

“For the removal of doubt, it is declared that any increase or decrease of the estimated quantities set out in the Price Schedule ascertained by measurement in accordance with the provisions of Sub-clause 33.8 of Particular Conditions of Contract is not a variation within the meaning of this Sub-Clause.”

#### Sub-Clause 33.1 Terms of Payment

The Total Contract Price shall be paid as follows:

A) Payment against Supply, Installation, Testing and Commissioning of Air Handling Units.

Payment to the Contractor against Supply, Installation, Testing and Commissioning, of Air Handling Units shall be made in the following manner:

- a. Ten percent (10%) of total amount as non-recoverable advance shall be paid after execution of contract Agreement on Prescribed form by the Parties hereto submission of acceptable performance security by the Contractor and receipt of Contractor's invoice for advance payment along with advance payment guarantee in the same amount of advance payment, from a schedule bank in Pakistan in the prescribed format.

In case the Contractor does not opt for this payment under a). then same will be paid under b), without the need for bank guarantee.

In case the contractor opt for payment under a). the bank guarantee against advance payment shall be valid until issuance of Taking Over Certificate (TOC) and shall be returned within fourteen (14) days after issuance of TOC.

- b. Twenty percent (20%) of total amount shall be paid after approval of Technical Submittal of Air Handling Units up to satisfaction the Engineer.
- c. Twenty Percent (20%) of the total amount shall be paid after inspection & Testing at factory.
- d. Twenty Percent (20%) of the total amount shall be paid after delivery of the Air Handling Units at site up to satisfaction of the Engineer

- e. Thirty Percent (30%) of the total amount shall be paid after inspection of Installation, Testing & Commissioning of AHU's at designated AHU rooms in all respect at site up to satisfaction of the Engineer.

**Terms of payment for Materials (Other than AHU)**

- a. Ten percent (10%) of SOP value of material (other than AHU) as non-recoverable advance shall be paid after execution of contract Agreement on Prescribed form by the Parties hereto submission of acceptable performance security by the Contractor and receipt of Contractor's invoice for advance payment along with advance payment guarantee in the same amount of advance payment, from schedule bank in Pakistan in the prescribed format.

In case the Contractor does not opt for this payment under a). then same will be paid under b), without the need for Bank guarantee.

In case the contractor opt for payment under a). the bank guarantee against advance payment shall be valid until issuance of Taking Over Certificate (TOC) and shall be returned within fourteen (14) days after issuance of TOC.

- b. Sixty percent (60%) of the Contract Value of local market goods shall be paid on pro-rata basis upon delivery at Site, submission of invoice and after issuance of inspection certificate by the Engineer or Engineer's Representative following inspection of such Plant up to his satisfaction.
- c. Fifteen percent (15%) of the Contract Value of local market goods shall be paid on completion of installation up to the satisfaction of Engineer or Engineer's Representative and submission of invoice duly certified by the Engineer or Engineer's Representative.
- d. Fifteen percent (15%) of the Contract Value of local market goods shall be paid on completion of testing and commissioning up to the satisfaction of Engineer or Engineer's Representative and submission of invoice duly certified by the Engineer or Engineer's Representative.

All above payments shall be made after, deduction of all applicable taxes and retention money of five percent (5%) as per Sub- Clause 33-13 hereof.

The following Sub-Clauses 33.1.1 to 33.1.5 are added:

**Sub-Clause 33.1.1 Retention of Payment**

If at any time any payment would fall due for Works or part of Works and, if there shall be any defect in part of such Works in respect of which such payment is proposed, the Employer may retain the whole or any part of such payment. Any sum retained by the Employer pursuant to the provisions of this Sub-Clause shall be paid to the Contractor after the said defect is removed.

Sub-Clause 33.1.2 Payment Where Taking-Over Certificate Issued for Section or Part of Works

If any section or part of the Works shall be taken-over separately under Clause 29 (Taking-Over) hereof, the payments herein provided for on or after Taking-Over shall be made in respect of the section or part taken-over and reference to the price shall mean such part of the price as shall, in the absence of agreement, be apportioned thereto by the Engineer.

Sub-Clause 33.1.3 Extra Payment

No extra payment in respect of overtime, additional materials, or special conditions or hardship shall be claimed by the Contractor unless otherwise provided in the Contract or such payments have been previously authorized in writing by the Engineer or the Employer.

Sub-Clause 33.1.4 Breakdown of Lump Sum Items

For the purposes of statements submitted in accordance with Sub-Clause 33.1 hereof, the Contractor shall submit to the Engineer, within twenty eight (28) days after the receipt of the Notice of Contract Award, a breakdown for each of the lump sum items contained in the Bid. Such breakdowns shall be subject to the approval of the Engineer.

Sub-Clause 33.1.5 Currency of Payment

All the payments shall be made in Pakistani Rupees.

Sub-Clause 33.5 Payment

Sub-Clause 33.5 is deleted and substituted by the following:

“The amount due to the Contractor under any Certificate of Payment issued by the Engineer, pursuant to this Sub-Clause, or to any other term is of the Contract shall, subject to Clause 27, be paid by the Employer to the Contractor within a period mentioned in the Preamble to Conditions of Contract after such Certificate of Payment has been delivered to the Employer by the Engineer, or in the case of the Final Certificate of Payment referred to in Sub-Clause 33.10 within a period mentioned in the Preamble to Conditions of Contract after such Final Certificate of Payment has been delivered to the Employer.

Deduction against liable taxes shall be made from the net amounts payable to the Contractor of any sum(s) in accordance with the prevalent Federal and/or Provincial laws, provided that no such deduction shall be made from those payments in respect of which the Contractor has obtained exemption under the Law.”

#### Sub-Clause 33.8 Payment by Measurement

The Works shall be measured for the units mentioned in the Schedule of Prices according to the Contract as determined by the Engineer from approved drawings, Specifications and Contract Documents.

#### Sub-Clause 33.12 Withholding of Payment

The following Sub-Clause 33.12 is added:

If the Works or any part thereof is not being carried out to the Engineer's satisfaction and in order to protect the Employer from loss on account of:

- (a) Defective work not rectified
- (b) Guarantees not met
- (c) Claims filed against the Contractor
- (d) Failure of the Contractor to make payments due for Plant procured or labour employed by him
- (e) Damage to any other contractor employed by the Employer
- (f) Contractor's non-compliance with the Contract
- (g) Any Government dues recoverable from the Contractor if notified by the Government.

The Engineer may notify withholding of such payments or part thereof as may, in his opinion, be related to the aforesaid reasons/grounds. When the reasons/grounds for withholding the payment are removed by the Contractor, the Engineer shall upon being satisfied to that effect issue Certificate of Payment in respect of withheld amounts.

#### Sub-Clause 33.13 Retention Money

The following Sub-Clause 33.13 is added:

The Employer shall be entitled to retain five percent (5%) from each payment made by it to the Contractor under the Agreement. The sums so retained (or the balance thereof, if any, after any deduction as the Employer may make) (the "Retention") shall be released as under:

Upon the expiration of the of Defects Liability Period for the Works, complete amount of the Retention Money after certified by the Engineer shall be released for payment to the Contractor. Provided that, in the event of different Defects Liability Periods having become applicable to different Sections or parts of the Permanent Works pursuant to Clause 29, the expression "expiration of the Defects Liability Period" shall, for the purposes of this Sub-Clause, be deemed to mean the expiration of the latest of such periods. Provided also that, if at such time, there shall remain to be executed by the Contractor any work ordered, during the Defects Liability Period in respect of the works, the Engineer shall be entitled to withhold certification until completion of such work of the Balance of the Retention Money as shall, in

the opinion of the Engineer, represent the cost of the Work remaining to be executed.

#### Sub-Clause 34.1 Claims Procedure

In the second line, after the words 'additional payment', the following text is added:

"Provided further that the Contractor shall not be entitled to claim additional payment/financial compensation against Extension of Time as per PCC Sub-Clause 26.1.1"

#### Sub-Clause 35.1 Payment in Foreign Currencies

The text of Sub-Clause is deleted in its entirety.

#### Sub-Clause 35.2 Currency Restrictions

The text of Sub-Clause is deleted in its entirety.

#### Sub-Clause 35.3 Rates of Exchange

The text of Sub-Clause is deleted in its entirety.

#### Sub-Clause 36.4 Payment against Provisional Sums

The text of Sub-Clause 36.4 is deleted and substituted by the following:

"Provisional Sum, if any, will be expended on the direction of the Engineer through Variation Orders which would be valued in accordance with the provisions of Clause 31 of the Conditions of Contract."

#### Sub-Clause 37.2 Employer's Risks

The text of Sub-Clause 37.2 is deleted and substituted by the following:

"The Employer's Risks are:

- (a) (Insofar as they relate to Pakistan) war and hostilities (whether war be declared or not), invasion, act of foreign enemies;
- (b) (Insofar as they relate to Pakistan) rebellion, revolution, insurrection, military or usurped power or civil war;
- (c) ionizing radiation or contamination by radioactivity from any nuclear fuel, radio-active toxic explosives or other hazardous properties of any explosive nuclear assembly or nuclear components thereof;
- (d) pressure waves caused by aircraft travelling at sonic or

supersonic speed;

- (e) (Insofar as they relate to Pakistan) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors;
- (f) use or occupation of the Works or any part thereof by the Employer;
- (g) fault, error, defect or omission in the design of any part of the Works by the Engineer, Employer or those for whom the Employer is responsible for which the Contractor has disclaimed responsibility in writing within a reasonable time after the receipt of such design;
- (h) the use or occupation of the Site by the Works or any part thereof, or for the purposes of the Contract: or interference, whether temporary or permanent with any right of way, light, air or water or with any easement, wayleaves or right of a similar nature which is the inevitable result of the construction of the Works in accordance with the Contract;
- (i) the right of the Employer to construct the Works or any part thereof on, over, under, in or through any land;
- (j) damage (other than that resulting from the Contractor's method of construction) which is the inevitable result of the construction of the Works in accordance with the Contract; and
- (k) the act, neglect or omission or breach of contract or of statutory duty of the Engineer, the Employer or other contractors engaged by the Employer or of their respective employees or agents."

#### Sub-Clause 39.2 Loss or Damage Before Risk Transfer Date

The words "by arbitration under Clause 50" are deleted and substituted by the words "by the Engineer".

#### Sub-Clause 39.4 Duty to Minimize Delay

The following Sub-Clause 39.4 is added:

"Each Party shall at all times use all reasonable endeavors to minimize any delay in the performance of the Contract as a result of Risks.

The Contractor shall give notice to the Employer and vice versa the Employer shall give notice to the Contractor in case of foreseeable delay by the Risks."

#### Sub-Clause 40.2 Employer's Liability

The text of Sub-Clause 40.2 from the words “or of death or personal injury” to the end of the Sub-Clause is deleted and substituted by the following:

“..... (other than the Works) or of death or personal injury to the extent caused by any of the Employer's Risks listed in paragraphs (f), (g), (h), (i), (j), and (k) of Sub-Clause 37.2 but not otherwise.”

#### Sub-Clause 42.2 Maximum Liability

The words “the sum stated in the Preamble to Conditions of Contract or if no such sum is stated” appearing in 2nd line of Sub-Clause are deleted.

#### Sub-Clause 42.6 Foreseen Damage

The text of Sub-Clause is deleted in its entirety.

#### Sub-Clause 43.1: The Works (Insurance)

The following is added at the end:

“The Contractor shall be obliged to place all insurances relating to the Contract with either National Insurance Company of Pakistan or any other insurance company operating in Pakistan having at least AA rating from PACR/JCR-VIS and acceptable to the Employer”.

#### Sub-Clause 43.2 Contractor's Equipment

Sub-Clause 43.2 is deleted and substituted by the following:

“The Contractor shall insure the Contractor's Equipment for its full replacement value while on the Site against all loss or damage caused by any of the Contractor's Risks from insurance companies as listed in Sub-Clause 43.1 herein above.”

#### Sub-Clause 43.7 Remedies on the Contractor's Failure to Insure

In 3rd line after the word, “purpose”, the expressions “and reasonable costs including the man-hours costs of Employer's Personnel” are added.

#### Sub-Clause 43.9 Currency of Insurance

The following Sub-Clause 43.9 is added:

“All policies of Insurance of the Plant shall provide for payment of indemnity to be made in such amounts as will allow making good of loss of or damage to the whole or any part of the Works.”

#### Sub-Clause 43.10 Contractor to Notify



The following Sub-Clause 43.10 is added:

“It shall be the responsibility of the Contractor to notify the insurance company of any changes in nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times in accordance with the provisions of the Contract.”

The following Sub-Clause 43.11 **is added**:

Sub-Clause 43.11 Procurement of Insurance Policies

“The Contractor shall procure and submit the insurance cover under this Sub-Clause within a period of twenty eight (28) days from the date of receipt of Letter of Acceptance from the Employer.”

Sub-Clause 44.6 Damage Caused by Force Majeure

At the end of the Sub-Clause 44.6 the following is added:

“However the Contractor shall put up his claim to the Employer/ Engineer with full details and justification.”

Sub-Clause 44.8 Payment on Termination for Force Majeure

Text in sub-para (c) is deleted and para (d) and (e) are re-numbered as (c) and (d) respectively.

Sub-Clause 44.10 Force Majeure Affecting Engineer's Duties

Sub-Clause 44.10 is deleted in its entirety.

Sub-Clause 45.2 Contractor's Default

The following paragraph is added at the end of Sub-Clause 45.2:

“The Employer or such other contractor may use for such completion any Contractor's Equipment which is upon the Site as he or they may think proper, and the Employer shall pay the Contractor a reasonable compensation for such use”.

Sub-Clause 45.6 Integrity Pact

The following Sub-Clause 45.6 is added as follows:

“If the Contractor or any of his Subcontractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Schedule-M to his Bid, then the Employer shall be entitled to:

- (a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;
- (b) terminate the Contract; and
- (c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 45.2 to 45.5 and the payment under Sub-Clause 45.4 shall be made after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause."

#### Sub-Clause 46.1 Employer's Default

The comma and the word "or" at the end of paragraph (d) of Sub-Clause 46.1 are deleted and substituted by period (.) Paragraph (e) of Sub-Clause 46.1 is deleted.

#### Sub-Clause 46.3 Payment on Termination for Employer's Default

The words "including loss of profit" in the second paragraph of Sub-Clause 46.3 are deleted.

#### Sub-Clause 48.2 Clearance Through Customs

Sub-Clause 48.2 is deleted in its entirety.

#### Sub-Clause 49.1 Notice to Contractor

The following is added at the end of Sub-Clause 49.1:

"For the purposes of Sub-Clause 49.1 the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract."

#### Sub-Clause 50 Disputes & Arbitration

Clause 50 is deleted and in its place the following Sub-Clauses 50.1 to 50.5 are inserted:

"50.1 If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion,

instruction, determination, certificate or valuation of the Engineer, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other Party. Such reference shall state that it is made pursuant to this Clause. No later than the fifty sixth (56) day after the day on which he received such reference, the Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Work with all due diligence, and the Contractor and the Employer shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided in an amicable settlement or in an arbitral award.

In any case where the Conditions of Contract provide that the decision of the Engineer is to be final and conclusive, such decision shall not be referable to arbitration under this Clause nor shall the same be questioned in any other form of proceedings whatsoever.

- 50.2 If either the Employer or the Contractor be dissatisfied with a decision of the Engineer or if the Engineer fails to give notice of his decision on or before the fifty sixth (56) day after the day on which he received the reference, then either the Employer or the Contractor may, on or before the twenty eighth (28) day after the day on which the said period of fifty six (56) days expired, as the case may be, give notice to the other Party to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the Party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 50.5, no arbitration in respect thereof may be commenced unless such notice is given.

If the Engineer has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notification of intention to commence arbitration as to such dispute has been given by either the Employer or the Contractor on or before the twenty eighth (28) day after the day on which the Parties received notice as to such decision from the Engineer the said decision shall become final and binding upon the Employer and the Contractor.

- 50.3 Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 50.2, arbitration of such dispute shall not be commenced unless an attempt has first been made by the Parties to settle such dispute amicably through mutual negotiation within ninety (90) days from the date of notification of Engineer's decision.

- 50.4 Any dispute in respect of which:

- (a) the decision, if any, of the Engineer has not become final and binding pursuant to Sub-Clause 50.1 and
- (b) amicable settlement has not been started/reached within the period stated in Sub-Clause 50.3

shall be finally settled, unless otherwise specified in the Contract, under the Pakistan Arbitration Act, 1940 (Act No. X of 1940) and Rules made thereunder as amended, by one or more arbitrators appointed under such Rules.

The said arbitrator(s) shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Engineer for the purpose of obtaining said decision pursuant to Sub-Clause 50.1. No such decision shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.

The venue of arbitration proceedings shall be the place in Pakistan as mentioned in the Preamble to Conditions of Contract.

50.5 Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 50.1 or 50.2 and the related decision has become final and binding, either party may, if the other Party fails to comply with such decision, and without prejudice to any other rights it may have, refer the failure to arbitration in accordance with Sub-Clause 50.4. The provisions of Sub-Clauses 50.1 to 50.2 shall not apply to any such reference.”

The following Sub-Clauses 51.4 to 51.10 are added:

Sub-Clause 51.4: Warranty

The Contractor warrants that the Goods, supplied under the Contract are new, unused and incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The Contractor further warrants that the Goods shall have no defect arising from design, materials or workmanship or from any act or omission of the Contractor that may develop under normal use of the Goods in the conditions existing at the Site. The Contractor also warrants for making good any defect of the specified Goods during the Warranty Period as specified in the Preamble to Conditions of Contract, commencing from the date certified in Taking Over Certificate. The Contractor shall also give warranty, which shall cover all items against materials, fabrication workmanship, installation and all other associated deficiencies for a period as specified in the Preamble to Conditions of Contract, commencing from the date certified in Taking Over Certificate. Warranty shall be signed by both the Contractor and the Manufacturer whose work is involved.

#### Sub-Clause 51.6: Local Taxation

The prices quoted by the Contractor for items of Schedule of Prices shall include all custom duties, excise duties, duty and other surcharges, sales and other taxes, import license fees, business taxes, income and other taxes that may be levied according to the laws and regulations of Pakistan on the Contractor's equipment, materials and supplies (both permanent, temporary and consumable) acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in the country on profits made by him in respect of the Contract. All payments to be made to the Contractor shall be subject to deductions of Income Tax or other Taxes as levied by the Government at the time of payment to the Contractor.

#### Sub-Clause 51.7: Payment of Income Tax

The Employer shall deduct taxes from all interim payments made to the Contractor as per prevailing Government regulations unless the Contractor obtain an exemption under the state laws from appropriate Government authorities.

#### Sub-Clause 51.9: Liability of Contractor

The Contractor shall strictly follow all relevant labor laws including the workman's compensation Act and the Employer shall be fully indemnified for all claims, damages etc. arising out of any dispute in between Contractor or assign & the labor employed by them.

#### Sub-Clause 51.10: Lighting works at night

In the event of Work being carried out at night hours, the Contractor shall at his own cost provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without dangers, similarly the work being carried out shall be sufficiently lighted. All arrangements adopted of such lighting shall be to the satisfaction of the Engineer.

## **STANDARD FORMS**

## FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the \_\_\_\_\_ day of \_\_\_\_\_ (month) 2024 between National Engineering Services (Pvt.) Ltd. (NESPAK) (the "Employer") (hereafter called the "Employer") of the one part and \_\_\_\_\_ (hereafter called the "Contractor") of the other part. (Both of the above collectively called "Parties and individually called "Party")

WHEREAS the Employer is desirous that certain Works, viz; Replacement, Supply, Installation, Testing & Commissioning of Five (5) Nos. Air Handling Units at NESPAK House, Lahore. should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein

NOW this Agreement witnessed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents after incorporating addenda, if any except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement, viz:
  - (a) The Contract Agreement;
  - (b) The Letter of Acceptance;
  - (c) The completed Letters of Bid (i.e., Letter of Technical Bid & Letter of Price Bid);
  - (d) The Preamble to Conditions of Contract;
  - (e) The Particular Conditions of Contract;
  - (f) The General Conditions of Contract;
  - (g) The priced Schedule of Prices;
  - (h) The completed Schedules to Bid;
  - (i) The Specifications comprising Special Provisions, Technical provisions;
  - (j) Equipment Schedule;
  - (k) Any other document forming part of the Contract.
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the Parties hereto have caused this Agreement to be executed on the day, month and year first before written in accordance with their respective laws.

Signature of the Employer

Signature of the Contractor

Name: \_\_\_\_\_

Name: \_\_\_\_\_

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

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

Seal: \_\_\_\_\_

Seal: \_\_\_\_\_

Signed, Sealed and Delivered in the presence of

Witness:

Witness:

Signature: \_\_\_\_\_

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

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

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

Address: \_\_\_\_\_

Address: \_\_\_\_\_



**FORM OF PERFORMANCE SECURITY  
(Bank Guarantee)**

Guarantee No. \_\_\_\_\_  
Executed on \_\_\_\_\_  
Expiry date \_\_\_\_\_

Name of Guarantor (Bank) with address: \_\_\_\_\_

Name of Principal (Contractor) with address: \_\_\_\_\_

Penal Sum of Security (express in words and figures) \_\_\_\_\_  
\_\_\_\_\_

Letter of Acceptance No. \_\_\_\_\_ Dated \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the "Documents") and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the **National Engineering Services (Pvt.) Ltd. NESPAK**, (hereinafter called the "Employer") in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has accepted the Employer's above said Letter of Acceptance for \_\_\_\_\_ (Name of Contractor) for Replacement, Supply, Installation, Testing & Commissioning of Five (5) Nos. Air Handling Units at NESPAK House, Lahore.

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 30, Defects after Taking Over, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, \_\_\_\_\_ (the Guarantor), waiving all objections and defenses under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above-bounden Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

\_\_\_\_\_  
Guarantor (Bank)

Witness:

1. \_\_\_\_\_

Signature \_\_\_\_\_

\_\_\_\_\_  
Corporate Secretary (Seal)

Name \_\_\_\_\_

Title \_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_  
Name, Title & Address

\_\_\_\_\_  
Corporate Guarantor (Seal)

## FORM OF BANK GUARANTEE FOR ADVANCE PAYMENT

Guarantee No. \_\_\_\_\_  
Executed on \_\_\_\_\_  
Expiry date \_\_\_\_\_

[Letter by the Guarantor to the Employer]

WHEREAS the National Engineering Services Pakistan (Pvt.) Ltd. (NESPAK), Lahore (hereinafter called the "Employer") has entered into a Contract for Replacement, Supply, Installation, Testing & Commissioning of Five (5) Nos. Air Handling Units at NESPAK House, with \_\_\_\_\_ (hereinafter called the "Contractor").

AND WHEREAS the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Rupees \_\_\_\_\_ (Rs. \_\_\_\_\_) which amount shall be advanced to the Contractor as per provisions of the Contract.

AND WHEREAS the Employer has asked the Contractor to furnish Guarantee to secure advance payment for performance of his obligations under the said Contract.

AND WHEREAS \_\_\_\_\_ (Bank) (hereinafter called the Guarantor) at the request of the Contractor and in consideration of the Employer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW THEREFORE the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails, and commits default in fulfillment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the Employer shall be the sole and final judge, as aforesaid, on the part of the Contractor, shall be given by the Employer to the Guarantor, and on such first written demand payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This guarantee shall come into force as soon as the advance payment has been credited to the account of the Contractor.

This guarantee shall expire not later than \_\_\_\_\_  
by which date we must have received any claims by registered letter, telegram, telex  
or telefax.

It is understood that you will return this Guarantee to us on expiry or after settlement  
of the total amount to be claimed hereunder.

\_\_\_\_\_  
Guarantor (Bank)

Witness:

1. _____	Signature _____
_____	Name _____
Corporate Secretary (Seal)	
	Title _____
2. _____	
_____	_____
Name, Title & Address	Corporate Guarantor (Seal)



# **NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED**

## **REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**



### **BIDDING DOCUMENT**

#### **VOLUME I-B**

- **Letter of Price Bid**
- **Schedule of Prices**

**February, 2024**



National Engineering Services Pakistan (Pvt) Limited  
1C, Block N, Model Town Ext, Lahore 54700, Pakistan  
Phone: +92-42-99090000 Ext 545 Fax: +92-42-99231950  
Email: [coord@nespak.com.pk](mailto:coord@nespak.com.pk), [info@nespak.com.pk](mailto:info@nespak.com.pk)  
<http://www.nespak.com.pk>

Clearance Code		Doc No.		Rev No.	00
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# **LETTER OF PRICE BID**

## LETTER OF PRICE BID

Bid Reference No. \_\_\_\_\_

Replacement, Supply, Installation, Testing & Commissioning of Five (5) Nos. Air Handling Units at NESPAK House, 1-C, Block-N, Model Town Extension, Lahore.

To  
Manager General Services  
Human Resource Division  
National Engineering Services (Pvt.) Limited ( NESPAK)  
NESPAK House, 1-C, Block N, Model Town Extension Lahore-54700  
Ph: 92-42-99231944/99090000, Ext: 545;  
Fax: 92-42-99231950

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Drawings, Schedule of Prices and Addenda Nos. \_\_\_\_\_ for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address \_\_\_\_\_ and being duly incorporated under the laws of \_\_\_\_\_ hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto for the Total Bid Price comprising of only local currency component of PKR \_\_\_\_\_ (Pak Rupees \_\_\_\_\_) or such other sum as may be ascertained in accordance with the said Documents.
2. We understand that all the Schedule of Prices attached hereto form part of this Bid.
3. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the whole of the Works comprised in the Contract within the time(s) stated in Preamble to the Conditions of Contract.
4. We agree to abide by this Bid for the period of one hundred twenty (120) days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
5. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
6. We undertake, if our Bid is accepted to execute the Performance Security referred to in Clause 10 of Conditions of Contract for the due performance of the Contract.



7. We understand that you are not bound to accept the lowest or any Bid you may receive.
8. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a Bid for the Works.
9. We confirm, if our Bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer. (Please delete in case of Bid from a single firm).

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 2024

Signature \_\_\_\_\_ in the capacity of \_\_\_\_\_  
duly authorized to sign bids for and on behalf of \_\_\_\_\_

\_\_\_\_\_

(Name of Bidder in Block Letters)  
(Seal)

Address \_\_\_\_\_

\_\_\_\_\_

Witness:

(Signature) \_\_\_\_\_

(Name) \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Occupation/Position in Firm \_\_\_\_\_

\_\_\_\_\_

## **PREAMBLE TO SCHEDULE OF PRICE**

## **SCHEDULE OF PRICES**

### **PREAMBLE TO SCHEDULE OF PRICES**

#### **1. General**

- 1.1 The Schedule of Prices shall be read in conjunction with the Conditions of Contract together with the Specifications.
- 1.2 The Contract shall be for the whole of the Works as described in these Bidding Documents. Bids must be for the complete scope of Work.

#### **2. Description**

- 2.1 The general directions and descriptions of work and materials are not necessarily repeated nor summarized in the Schedule of Prices. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the Schedule of Prices.
- 2.2 The quantities shown in the Schedule of Prices are estimated quantities only as an indication of the Scope of Work to enable the bidder to bid for different items of the Works for his estimate of costs. The estimated quantities shall be used for comparing the bids. It is, however, to be noted that in the event of any increase or decrease in the quantity of any item of Works and subject to provisions of the Conditions of Contract herein, the actual quantities executed will be paid.

#### **3. Units & Abbreviations**

- 3.1 Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply with the System International d'Unites (SI Units).

The following abbreviations shall be used in the Schedule of Prices:

#### **Abbreviation**

Pakistani Rupees	PKR
Number	No.
Provisional Sums	PS

#### **4. Rates and Prices**

- 4.1 Except as otherwise expressly provided under the Conditions of Contract, the rates and amounts entered in the Schedule of Prices shall be the rates at which the Contractor shall be paid and shall be the full inclusive value of the work set forth or implied in the Contract;

except for the amounts reimbursable, to the Contractor under the Contract.

- 4.2 Unless otherwise stipulated in the Conditions of Contract, the rates and prices entered by the bidder shall not be subject to adjustment during the performance of the Contract.
- 4.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date twenty eight (28) days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a Bidder.

Additional/reduced duties, taxes (except income tax) and levies due to subsequent additions or changes in legislation shall be reimbursed/deducted as per provisions of the Conditions of Contract.

- 4.4 The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Schedule of Prices, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works and no separate payment will be made for those items.

The rates, prices and amounts shall be entered against each item in the Schedule of Prices. Any item against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates and prices for other items in the Schedule of Prices.

- 4.5 The bidder shall be deemed to have obtained all information as to port clearance facilities and charges, loading and unloading facilities and charges, storage facilities and charges, transportation facilities and charges, congestion and/or other conditions to be expected at Karachi Port and or any other seaport of Pakistan and all requirements related thereto.

The Contractor shall be responsible to make complete arrangements for the transportation of the Plant to the Site.

The bidder shall be deemed to have included all clearing, forwarding and other incidental costs in this regard in his bid. The Contractor will have the option to use either Karachi Port or any other seaport of Pakistan.

- 4.6 The Contractor shall provide for all parts of the Works to be completed in every respect for commercial operation. Notwithstanding that any details, accessories, etc., required for the complete installation and satisfactory operation of the Plant, are not specifically mentioned in the Specifications, such details shall be considered as included in the Contract Price.

## **5. Bid Prices**

### **5.1 Break-up of Bid Prices**

The various elements of Bid Prices shall be quoted as detailed by the Employer in the format of Schedule of Prices.

The bidder shall recognize such elements of the costs, which he expects to incur in the performance of the works and shall include all such costs in the rates and amounts entered in the Schedule of Prices.

### **5.2 Total Bid Price**

The total of Bid Prices in the Schedule of Prices shall be entered in the Summary of Bid Prices. The unit rates and prices and lumpsum amount entered in the Schedule of Prices will be the rates at which the Contractor will be paid, and shall be deemed to be the full inclusive value of the work including all costs of performing the Works such as all duties and taxes, overheads, income tax, super tax, sales tax on services and other taxes, profits, costs of accepting the general risks, liabilities and obligations set forth or implied in the Contract. The rates shall also includes contractor's cost for providing performance security and other bank and or insurance guarantee required for performance of the contract.

## **6. Provisional Sums**

6.1 Provisional Sums included and so designated in the Schedule of Prices if any, shall be expended in whole or in part at the direction and discretion of the Employer/Engineer. The Contractor will only receive payment in respect of Provisional Sums if he has been instructed by the Employer/Engineer to utilize such sums.

## **7. Miscellaneous**

7.1 No qualifying phrases are to be added within the description of items mentioned in the Schedule of Prices.

## **SCHEDULE OF PRICES**

**REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF  
FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**

**HVAC WORKS**

**SUMMARY**

<b>Item no.</b>	<b>Item Description</b>	<b>Total Amount</b>
1	SCHEDULE OF PRICES (1) (SOP-1)	
2	SCHEDULE OF PRICES (2) (SOP-2)	
3	TOTAL ((SOP-1)-(SOP-2))	
4	DISCOUNT ( IF ANY)	
5	TOTAL BID PRICE (3-4)	

**IN WORDS : RUPEES** \_\_\_\_\_

**Signature of Signatory to Bid** \_\_\_\_\_

**REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**

**HVAC WORKS**

**SCHEDULE OF PRICES (1)**

ITEM NO.	DESCRIPTION OR CODE		UNIT	QTY	UNIT RATES (PKR)	TOTAL AMOUNT (PKR) COL 4 x COL 5
1	2		3	4	5	6
1		SUPPLY, INSTALLATION & ELECTRICAL CONNECTIONS OF AIR HANDLING UNITS AS PER SCHEDULE ,SPECIFICATIONS COMPLETE IN ALL RESPECT. SAFE HANDLING & SHIFTING TO DESIGNATED AHU ROOM INCLUDING ALL APPLICABLE TAXES				
	a)	AHU-1	EACH	1		
	b)	AHU-2	EACH	1		
	c)	AHU-3	EACH	1		
	d)	AHU-4	EACH	1		
	e)	AHU-5	EACH	1		
2		SUPPLY & INSTALLATION OF SHEET METAL DUCT WORK, ACCESSORIES, HANGERS SUPPORTS AND FITTING AS PER SEPCIFICATIONS, INCLUDING ALL APPLICABLE TAXES.				
	a)	U.S GUAGE 24	SFT	4174		
	b)	U.S GUAGE 22	SFT	1432		
	c)	U.S GUAGE 20	SFT	253		
3		SUPPLY & INSTALLATION OF FLEXIBLE RECTANGULAR DUCT CONNECTORS FOR COMPLETE SYSTEM WITH ACCESSORIES & FITTINGS AS PER SPECIFICATION (COMPLETE IN ALL RESPECTS). INCLUDING ALL APPLICABLE TAXES.				
	a)	FLEXIBLE DUCT CONNECTION (RECTANGULAR)	SFT	1274		
4		SUPPLY & INSTALLATION OF INSULATION FOR INDOOR SUPPLY/FRESH/RETURN AIR DUCT EXPOSED TO VISION WITH ACCESSORIES & FITTINGS AS PER SPECIFICATION (COMPLETE IN ALL RESPECTS). INCLUDING ALL APPLICABLE TAXES.	SFT	5860		



**HVAC WORKS**  
**SCHEDULE OF PRICES (1)**

ITEM NO.	DESCRIPTION OR CODE		UNIT	QTY	UNIT RATES (PKR)	TOTAL AMOUNT (PKR) COL 4 x COL 5
1	2		3	4	5	6
5		SUPPLY & INSTALLATION OF ACOUSTIC SOUND LINER INSULATION FOR INDOOR SUPPLY/RETURN AIR DUCT PLENUMS WITH ACCESSORIES & FITTINGS AS PER SPECIFICATION (COMPLETE IN ALL RESPECTS). INCLUDING ALL APPLICABLE TAXES.	SFT	1100		
6		SUPPLY & INSTALLATION OF INSULATION FOR CHILLED/HOT WATER PIPING FITTING INCLUDING FITTING & ACCESSORIES INCLUDING ALL APPLICABLE TAXES.				
	a-1)	DIA 50	RFT	230		
	a-2)	DIA 65	RFT	140		
7		SUPPLY & INSTALLATION OF DAMPERS FOR COMPLETE SYSTEM WITH ACCESSORIES & FITTINGS AS PER SPECIFICATION (COMPLETE IN ALL RESPECTS). INCLUDING ALL APPLICABLE TAXES				
	a)	Volume Control Damper	SFT	83		
8		SUPPLY AND INSTALLATION OF PIPE, FITTINGS INCLUDING HANGERS, ANCHOR BOLTS, RUBBER VIBRATION MOUNTS ETC. COMPLETE IN ALL RESPECT, INCLUDING ALL APPLICABLE TAXES				
		PIPPING, FITTING AND ACCESSORIES SEAMLESS STEEL (SCHEDULE 40)				
	a-1)	DIA 50	RFT	230		
	a-2)	DIA 65	RFT	140		
	b)	<b>GALVANISED STEEL (DRAIN)</b>				
		DIA 25	RFT	36		
9		SUPPLY & INSTALLATION OF VALVES AND SPECIALTIES AS PER SPECIFICATION COMPLETE IN ALL RESPECT, INCLUDING ALL APPLICABLE TAXES.				
		<b>GATE VALVES</b>				
	a-1)	DIA 50	Each	6		
	a-2)	DIA 65	Each	4		
		<b>BALANCING VALVES</b>				

**HVAC WORKS**  
**SCHEDULE OF PRICES (1)**

ITEM NO.	DESCRIPTION OR CODE		UNIT	QTY	UNIT RATES (PKR)	TOTAL AMOUNT (PKR) COL 4 x COL 5
1	2		3	4	5	6
	b-1)	DIA 50	Each	3		
	b-2)	DIA 65	Each	2		
		<b>DRAIN COCKS</b>				
	c)	DIA 32	Each	15		
		<b>STRAINER</b>				
	d-1)	DIA 50	Each	3		
	d-2)	DIA 65	Each	2		
10		<b>SUPPLY &amp; INSTALLATION OF INSTRUMENTS AND GAUGES AS PER SPECIFICATIONS COMPLETE IN ALL RESPECT, INCLUDING ALL APPLICABLE TAXES.</b>				
	a)	Temperature Guage	Each	10		
	b)	Pressure Guage	Each	10		
11		<b>ADJUSTMENT IN EXISTING CIVIL WORKS OF FOUNDATION OF AHU's AS PER MANUFACTURER DRAWINGS. ALL RELATED CIVIL WORKS / ADDITIONAL SUPPORT ARE INCLUSIVE.</b>	LOT	1		
12		<b>STARTUP, ADJUSTMENT, BALANCING, TESTING AND COMMISSIONING OF OVERALL SYSTEM</b>	LOT	1		

\*TOTAL (SOP-1) RS = -

IN WORDS : RUPEES \_\_\_\_\_

**REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**

**HVAC WORKS  
SCHEDULE OF PRICES (2)**

ITEM NO.	DESCRIPTION OR CODE		UNIT	QTY	UNIT RATES (PKR)	TOTAL AMOUNT (PKR) COL 4 x COL 5
1	2		3	4	5	6
1		DISMENTALLING, REMOVAL & BUY BACK OF EXISTING AIR HANDLING UNITS				
	a)	AHU-1 (5665 CFM) (S-1)	EACH	1		
	b)	AHU-2 (6326CFM) (S-4)	EACH	1		
	c)	AHU-3 (10265 CFM) (F-3)	EACH	1		
	d)	AHU-4 (10859 CFM) (F-4)	EACH	1		
	e)	AHU-5 (6495CFM) (G-2)	EACH	1		
2		DISMENTALLING, REMOVAL & BUY BACK OF EXISTING ALL GI DUCTING & ACCESSORIES. ASSOCIATED WITH ABOVE MENTIONED AHU'S IN AIR HANDLING UNIT ROOMS ONLY.	LOT			
3		DISMENTALLING, REMOVA & BUY BACK OF EXISTING DAMPERS FOR COMPLETE SYSTEM WITH ACCESSORIES & FITTINGS. ASSOCIATED WITH ABOVE MENTIONED AHU'S IN AIR HANDLING UNIT ROOMS ONLY.	LOT			
4		DISMENTALLING, REMOVAL & BUY BACK OF EXISTING MS PIPE ( SCHEDULE 40). ASSOCIATED WITH ABOVE MENTIONED AHU'S IN AIR HANDLING UNIT ROOMS ONLY.	LOT			
5		DISMENTALLING, REMOVAL & BUY BACK OF EXISTINF PIPPING, FITTING AND ACCESSORIES SEAMLESS STEEL (SCHEDULE 40). ASSOCIATED WITH ABOVE MENTIONED AHU'S IN AIR HANDLING UNIT ROOMS ONLY.	LOT			
6		DISMENTALLING, REMOVAL & BUY BACK OF EXISTING OF VALVES AND SPECIALTIES AS PER SPECIFIATION COMPLETE IN ALL RESPECT. ASSOCIATED WITH ABOVE MENTIONED AHU'S IN AIR HANDLING UNIT ROOMS ONLY.	LOT			
7		DISMENTALLING, REMOVAL & BUY BACK OF EXISTING OF INSTRUMENTS AND GAUGES AS PER SPECIFICATIONS COMPLETE IN ALL RESPECT. ASSOCIATED WITH ABOVE MENTIONED AHU'S IN AIR HANDLING UNIT ROOMS ONLY.	LOT			

\*TOTAL (SOP-2) RS =

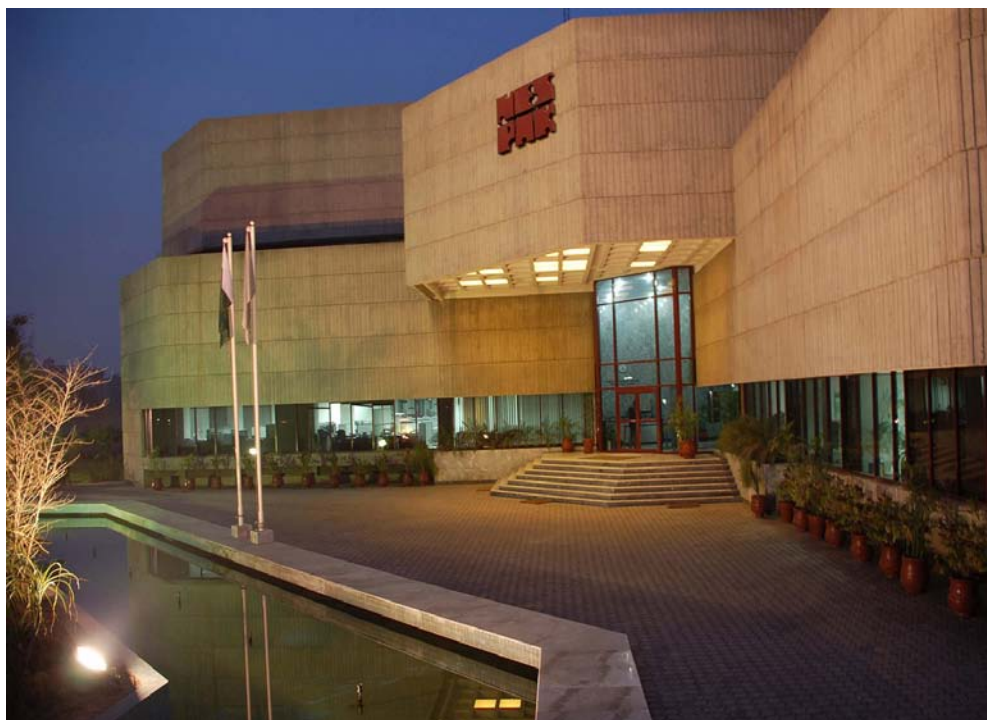
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IN WORDS : RUPEES \_\_\_\_\_



# **NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED**

## **REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**



### **BIDDING DOCUMENT**

#### **VOLUME II**

- **SPECIAL PROVISIONS**
- **TECHNICAL PROVISIONS**
- **EQUIPMENT SCHEDULE**

**February, 2024**



National Engineering Services Pakistan (Pvt) Limited  
1C, Block N, Model Town Ext, Lahore 54700, Pakistan  
Phone: +92-42-99090000 Ext 545 Fax: +92-42-99231950  
Email: [coord@nespak.com.pk](mailto:coord@nespak.com.pk), [info@nespak.com.pk](mailto:info@nespak.com.pk)  
<http://www.nespak.com.pk>

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## **SPECIAL PROVISION**

## SPECIAL PROVISIONS

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## **SPECIAL PROVISIONS**

### **SP-01      GENERAL**

#### **SP-01.1      Location of Project**

The new AHU's shall be replaced with existing AHU's at NESPAK (National Engineering Services Pakistan Pvt Ltd) House, Lahore.

#### **SP-01.2      Building for the Project**

The Building is old building already constructed and the Contractor shall be responsible to intimate to Engineer any omission in civil construction with respect to provisions of space, openings in walls, floors, roof slabs, false ceilings, drain points and electrical requirements for HVAC Works. All civil work mentioned in Bidding documents and relevant electrical work is in scope of contractor.

#### **SP-01.3      Service Conditions for Auxiliaries**

a)      Power Supply

Electrical Circuit Voltages:

Nominal, 3-Phase: 415 volts

1-Phase: 240 volts

For equipment ratings, 3-Phase: 400 volts

1-Phase: 230 volts

Fluctuation in voltage applied (+/-) 10% to equipment rated voltage.

Frequency: 50 HZ.

#### **SP-01.4      Units**

The units used in these specifications are as under:

Unit System:      SI/British/FPS

Gauge:              US Gauges as per ASTM

TR:                  Tons of refrigeration equivalent to 12000 BTU/H (12 MBH)  
or 3516 W

### **SP-02      WORK BY THE CONTRACTOR**

#### **SP-02.1      Scope of Work**

- a)      The work under this Contract comprises of replacement, supply, installation, balancing, testing and commissioning of brand new five (05) nos. Air Handling Units, complete in all respect covering all the

features as mentioned in the Technical Specifications, equipment schedule and Schedule of prices as per terms and conditions mentioned in the bidding documents.

- b) The work under this Contract also includes the dismantling, safe handling, removal and buy back of existing five (5) nos. Air Handling Units.
- c) The Contractor shall furnish all labor, materials, equipment tools, appurtenances, services, temporary work and storage necessary to completely supply, install, test, commission, the new AHU's all in the perfect operating conditions in accordance with these Specifications. The Contractor shall also test, adjust, balance, re-adjust all the air and water systems as specified and shown.
- d) The complete civil work as mentioned in schedule of price and any relevant civil work require to complete the job is included in contractor's scope of work.
- e) The contractor shall plan and coordinate his activities and schedules so as not to interfere with the work of other contractors and Client office work. Also interference with other building associated work shall be totally avoided and contractor shall prepare the schedule of work accordingly. It shall also be his responsibility to maintain the facility constructed by him till the end of the Contract period.

Any problem of interface with other contractor, associated proceedings shall be brought to the notice of the Engineer/Employer whose decision in this respect shall be final and binding on all parts.

The contractor shall inform for the schedule of any construction activity well in advance.

If any part of the work is damaged or has to dismantle or redone due to negligence/omission/incorrect position of the embedment etc. as part of the contractor, all such loses/expenses shall be borne by the Contractor.

- f) The Specifications are only general guidelines and by no means cover details of each equipment. These only spell out the intent of the requirements. The details have to be provided by the Contractor along with details of performance, construction and technical literature with the Bid.

All equipment and materials shall be brand new, bearing stamped ratings as required by Equipment Schedules and must be approved by the Engineer prior to their use. Any doubts about the practicability and implementation of Specifications must be

expressed along with submission of Bid. Inability of the Contractor to implement these specifications after the acceptance of the Contract shall be considered breach of Contract.

- g) The Contractor is to schedule a visit and make himself familiar with the site. The Contractor is to verify the dimensions of the existing AHU rooms to confirm that new AHUs could be placed in that room or required to be customized accordingly.

#### **SP-02.2 Services by the Contractor**

- a) Erection Supervisor

The Contractor shall provide competent Erection Supervisor to direct and be responsible for the erection, starting and operation of the Equipment supplied by the Contractor until issue of Substantial Completion Certificate. Further details concerning Erection Supervisors are covered in Clause SP-17, "Erection Supervisors and Operating Staff". In addition, the Contractor shall also provide services of Factory Engineer authorized by manufacturer to direct and supervise the installation, testing & commissioning.

- b) Training of Employer's Operative Personnel.

The Contractor shall arrange for free of cost on-site training of operative personnel, nominated by the Employer, in the operations and maintenance of all HVAC equipment and system. The period of training shall not be less than fifteen (15) days.

The group of operative personnel will comprise of Engineers/Supervisors and Technicians. The training shall be delivered by a qualified Engineer having at least ten (10) years experience in the operation and maintenance of similar HVAC systems.

The Trainer shall fully orient the group with the actual system and impart thorough training in the operations and maintenance of the system and equipment with the help of drawings, charts, hand-outs, diagrams, video aids, lectures, etc. Details and time of training shall be approved by the Employer/Engineer before training is commenced.

#### **SP-02.3 Erection Plant**

Under this clause the Contractor shall provide erection plant and tools for his own use during erection period only; he would take back these tools on completion.

The Contractor shall furnish special erection plant and tools in accordance with the requirements of Clause SP-15, "Fabrication, Erection Testing and

Maintenance Tools Plant and Instruments.

#### **SP-02.4      Related Works**

The Contractor shall provide all works related to HVAC system, whether specifically mentioned or not, except those specifically stated in exclusion Clause SP-03, "Work Not Included". These related works shall include, but not be limited to:

- a) Power supply and earthing shall be provided by the Employer and incoming power feeders and earth continuity conductors shall be terminated at locations as stated in the Technical Provisions, Section 7.
- b) Water supply shall be provided by others from overhead tank or city water main supply, in the central plant room, each AHU room and near cooling tower at roof. Plumbing works from the points indicated on the drawing to make-up water point shall be the responsibility of the Contractor.
- c) All works related to water and cooling coil condensate disposal from HVAC system up to nearest floor drains shall be the responsibility of the Contractor.
- d) Cutting, patching and repairing in accordance with Section 1.0 of the Technical Provisions.
- e) Providing written information regarding location and sizes of door louvers, where required, to the persons responsible for door louvers, through the Engineer. This information shall be provided within thirty (30) days of issue of the Engineer's Order to Commence Work.
- f) Providing shop drawings at scale (1:50) and other written information regarding Concrete Pads and foundations for HVAC equipment to the Civil Contractor through the Engineer. Catalogue cuts showing foundation details will not be accepted.
- g) Providing steel frames for inertia pads and cork sheet/neoprene sheet for other pad.
- h) All foundations for HVAC equipment including concrete foundations, housekeeping pads and concreting for inertia pads (where required) shall be provided by the HVAC Contractor.
- i) Coordinating HVAC installation with other trades work, by way of study of other trades drawings and pointing out the areas of conflict to the Engineer before installing items of HVAC system.

**SP-03      WORK NOT INCLUDED**

**(NOT USED)**

**SP-04      DESIGN CONDITIONS**

HVAC System has been designed with conditions listed hereunder.

**SP-04.1      Outside Design Conditions**

- |      |   |                  |
|------|---|------------------|
| a)   | Summer dry Bulb Temp: (Max.)  | 111.9 °F         |
| b)   | Dry Bulb Temp:  | 108 °F           |
|      |   |                  |
| c)   | Coincident Wet Bulb Temp:   | 84 °F            |
| d)   | Daily range: (Max.)   | 22 °F            |
| e)   | Winter Dry Bulb Temp:   | 35.1 °F          |
|      |   |                  |
| g)   | Climate: Tropical with dust storms in April-May-June and torrential Rains in July - August - September. |                  |
|      |   |                  |
| i)   | Latitude:   | 32 Degrees North |
| ii)  | Longitude   | 74 Degrees East  |
| iii) | Elevation   | 702 ft           |

**SP-04.2      Inside Design Conditions**

- |    |  |               |
|----|--|---------------|
| a) | Office Room  |               |
|    | • Summer dry bulb  | 74 °F – 78 °F |
|    | • Summer RH bulb   | 50% - 60%     |
|    | • Winter dry bulb  | 70 °F – 74 °F |
|    |  |               |
| b) | Conference Room  |               |
|    | • Summer dry bulb  | 74 °F – 78 °F |
|    | • Summer RH bulb   | 40% - 60%     |
|    | • Winter dry bulb  | 68 °F – 74 °F |
|    |  |               |
| c) | Noise Criteria:  |               |
|    | Air inlets/outlets shall be selected by the Contractor to obtain the following noise criteria: |               |
|    | • Office   | NC 35 – 45    |
|    | • Conference Room  | NC 35 – 45    |

**SP-04.3      Air Filtration**

Air filtration based on ANSI/ASHRAE Filter Test Standards 52.2-2017, "Atmospheric Dust Spot Efficiency". Filter efficiencies are stated in AHU Equipment Schedules.

**SP-05      DRAWINGS, EQUIPMENT SUBMITTALS, INFORMATION MANUALS, SAMPLES & CONTRACTOR'S OTHER SUBMISSIONS**

**SP-05.1      General**

All drawings, other information and samples must be supplied to the Engineer as laid down in these Specifications and as and when agreed during site meetings, in the Progress Chart or as instructed by the Engineer.

The Contractor shall submit, for approval, detailed submittals as specified and no material or equipment may be delivered to the job site or installed until the Contractor has in his possession with the approved Data Sheet, Catalogue cuts or samples of particular material. Approval rendered on submittals shall not be considered as a guarantee of measurements or building conditions.

Where submittals are approved, said approval does not in any way relieve the Contractor from his responsibility for necessity of furnishing material or performing work as required by the Drawings and Specifications.

Failure of the Contractor in providing submittals in ample time for checking shall not entitle him to an extension of the Contract time and no claim for extension by reason of such default will be allowed.

**SP-05.2      Omitted Particulars**

All works and matters omitted from the Contract but which may reasonably be implied or inferred from them and in the opinion of the Engineer obviously are necessary for the efficiency, stability, completion and maintenance of the works and which are ordered by the Engineer to be carried out shall be executed by the Contractor accordingly as if they had been expressively described in or shown on the Contract documents and the costs thereof shall be deemed to be included in and covered by the Contract Price.

**SP-05.3      Drawings Supplied by Engineer**

The Engineer may supply to the Contractor after signing the contract working drawings/detail drawings and instructions as may be necessary for preparing shop drawings and for the guidance of the Contractor in the construction, completion and maintenance of the works, and the Contractor shall execute, obey and be bound by the same.

The Contractor shall not be entitled to any payment in addition to the Contract Price in respect of any work shown or directed to be done by such working/detail drawings or instructions unless the Engineer shall have given and approved a variation order for the same.

Any additional drawings found necessary or desirable by the Contractor to show different combinations of drawings supplied by the Engineer shall be prepared by the Contractor at his own expense. The Contractor shall carefully check all drawings and advise the Engineer of any errors or omissions discovered. The Contractor shall be furnished with one copy of all detail drawings and graphic instructions prepared by the Engineer. Additional copies, within reasonable quantity, will be furnished to the Contractor, upon request, at cost.

The Contractor shall be furnished with one copy of all textual instructions as may be issued by the Engineer.

#### **SP-05.4      Shop Drawings**

The Contractor shall make detailed analysis of the requirements of the works. Based upon such analysis and working drawings supplied by the Engineer, he shall revise and amplify the Drawings and shall prepare detailed Shop Drawings at his own cost for complete HVAC System and Equipment. Initially he shall submit 3 preliminary copies each of all such Shop Drawings to the Engineer for obtaining approval. Once basic agreement is reached with the Engineer regarding the details then the Contractor shall submit 6 copies each of all such Shop Drawings and one copy to the Engineer for obtaining approval of the Engineer. After obtaining approval and after having in possession these approved Shop Drawings, the Contractor shall use these Shop Drawings for fabrication, construction and installation.

The work described on any shop drawing submitted shall carefully be checked by the Contractor for all clearances, field conditions, maintenance of architectural conditions and proper coordination with all trades on the job. To this end, the Contractor during the shop drawing stage, shall ensure that he receives drawings of all other trades that might interfere with the proper installation of his work. No payment shall be made for any variations or alterations on site due to lack of knowledge of other trades. Any unresolved conflict between trades shall be referred to the Engineer for decision.

Equipment layout is to be detailed on shop drawings, showing the exact method of installing and clearly illustrating components to be used in making all connections.

The Contractor shall submit shop drawings of all sheet metal work for approval, before work is fabricated and installed. Ductwork drawings must show clearances between ductwork and masonry. All dampers, splitter

dampers, fresh air inlets, exhaust air outlets, connections to equipment and methods of support and any other details necessary for the satisfactory installation of the system must be indicated. Each type of grill, register, diffuser and louver is to be referenced in a schedule and the type and size clearly indicated at each location. Taper and flat sides of ductwork at all transitions must be indicated, and all equipment piping and ductwork must be located exactly by showing exact dimensions with column lines or other reference lines.

Duct bottom and piping centre-line height from finished floor level shall be marked with every change in level

Position of hangers and supports with type and method of installation of each hanger shall be given, detailing the type of hanger fixing with a reference number for each type

Piping drawings must be fully detailed, showing all piping in double line and indicating the precise size of fittings, valves and equipment. Positions of hangers and supports with reference numbers must be given showing the type and method of installation of each hanger detailing the type of hanger fixings with a reference number for each type.

All general layout drawings shall be drawn to 1:50 (1':1/4") scale. Details of hangers, methods of fixing of pipes and ducts, detailed cross section of pipe, ducts and risers, details of control and piping hook-ups to equipment shall be drawn to 1:10 (1':1") scale.

The Contractor shall prepare Drawings and Schedules showing precise details of holes in concrete, masonry, etc. and necessary sleeves required for passage of ducts and pipes and fitting of grills, registers, diffusers, louvers, plant, plant supports etc. Drawings and Schedules, approved by the Engineer must be available before any structural work requiring holes or other modifications, is constructed.

Signed and approved drawings shall not be departed from unless a signed variation order or site instruction is issued in writing by the Engineer. Drawings returned to the Contractor for alteration or amendments are to be resubmitted for approval.

Amended or altered drawings shall show the nature of the amendment or alteration in a revision block on the drawing, together with revision number or letter and the date of the revision.

The Contractor shall be responsible for any discrepancies, errors or omissions in the drawings and other particulars supplied by him whether such drawings and particulars have been approved by the Engineer or not, provided that such discrepancies, errors, or omissions are not due to inaccurate information or particulars furnished in writing to the Contractor by the Engineer.



#### **SP-05.5 As-Built Drawings**

The Contractor shall supply to the Engineer a set of "As-Built" drawings showing the Contract works as installed, together with any other information necessary for operation and maintenance. Six copies of each drawing (scale as per shop drawing) and other information shall be supplied, along with a reproducible and a soft copy.

#### **SP-05.6 Manufacturer's Data**

Manufacturer's performance data, certified factory drawings and/or curves of apparatus giving full information as to capacity, performance at different operating and ambient conditions, dimensions, materials, electrical data and all information pertinent to the adequacy of the submitted equipment shall be submitted for approval. One original and 5 copies of catalogues and other information shall be submitted.

Manufacturer's names, sizes, catalogue numbers and/ or samples of all materials shall also be submitted for approval.

Orders for equipment submitted for approval must be accompanied by relevant drawings, curves, technical data, catalogues and samples. Where data, certified drawings or other required information is not available until after orders have been placed, the Engineer shall give provisional approval until all requested drawings and information have been supplied to the Engineer and approved by him. It is the Contractor's responsibility to ensure that all necessary information is supplied to the Engineer in accordance with the progress of works.

Should the Engineer give provisional approval only for an order due to lack of complete information and should the missing information not eventually meet with the approval, the Engineer shall not be held responsible for any delay incurred. For equipment where information from the manufacturers is likely to be delayed, it is essential that the Contractor places provisionally approved orders at the earliest possible date so as to ensure approval of orders in complete conformity with the progress of the works.

Submittals and shop drawings should, as far as possible, be complementary so that drawings and submittals can be cross-checked.

#### **SP-05.7 Samples**

Contractor shall provide at his cost, samples of materials, 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:

- i) G.I. sheet (Each Gauge to be used)

- ii) Pipes and fittings
- iii) Valves (all types), strainers, air vents, pressure gauges and thermometers
- iv) Duct insulation, liner and covering
- v) Pipe insulation and covering
- vi) Insulation adhesive and tapes
- vii) Diffusers, grilles and registers
- viii) Outside Air/Exhaust Air louvers
- ix) All types of dampers
- x) Power and control cables
- xi) Electrical items; push buttons, HOA & toggle switches, pilot lamp, contactor, relays, circuit breakers and isolating switches
- xii) Vibration isolating springs, pipe hangers and rollers
- xiii) Flexible duct connections
- xiv) Pipe flexible connection/expansion joints (when specified local)
- xv) Air filters
- xvi) Electrical conduits and fittings
- xvii) Paints
- xviii) Anchor bolts, studs, etc. for hanging arrangements
- xix) Round insulation flexible duct
- xx) Any other item required by the Engineer

#### **SP-05.8 Copies of Drawings and Specifications**

One set of Bidding Documents and two (02) sets of Drawings will be issued by the Employer to the Contractor free of cost after award of Contract. Additional sets will be provided at cost upon written request to the Engineer by the Contractor.

#### **SP-05.9 Sound Absorption Data**

The Contractor shall provide data for sound absorption from HVAC machinery, air terminals, etc. to ensure NC ratings as specified in SP-04.2 and TP-1.12.

#### **SP-05.10 Photographs and Progress Reports**

The Contractor shall arrange, at his cost, color photographs of Works in progress at Site. At least six photographs per month shall be taken from approved locations, commencing with the first month up to the completion of the Works. A professional camera shall be used. The Contractor shall submit, not later than seventh of each month, a negative and six prints of 10x8 inch of each photograph taken during the previous month, with a brief report indicating progress of Works to date.

#### **SP-06 APPROVAL OF MATERIALS AND EQUIPMENT**

As soon as practicable after the award of Contract, the Contractor shall submit for the approval of the Engineer specifications, drawings, catalogue - cuts, diagrams and other descriptive data for all materials,

components and equipment which the Contractor proposes for use under this Contract. For certain materials and equipment, data may be required to be submitted in accordance with a detailed form furnished by the Engineer. Items submitted shall be properly labeled to indicate the Contract number, project, manufacturer, source of supply, Contract Item number, and other data required by the Specifications. All items shall be submitted in sufficient time to permit proper consideration and action thereon without delaying the construction schedule. These data shall include original copies of proforma invoices for placing orders, a type written specification sheet of each SOP item, and technical literature (complete bound published catalogue) with relevant portions highlighted by a marker. Accessories to be included shall clearly be marked in catalogue and indicated in specification sheet.

**SP-07            TIME FOR DELIVERY**

All equipment plant and machinery shall be delivered at Site on such dates so as to ensure adherence to scheduled dates stated in Programs of works submitted by the Contractor and approved by the Engineer subsequent to the award of contract. The Contractor shall keep the Engineer informed of the progress of the shipment and notify them approximately 3 weeks in advance, in writing, as to when the equipment will be ready for inspection at Site by the Engineer and shall supply lists covering each consignment in sufficient detail to enable Engineer to check the contents of the packages, if he so desires.

**SP-08            STANDARDS AND CODE REQUIREMENT**

SP-08.1        All equipment and materials under HVAC Scope of Works shall be furnished in conformity with the latest edition of Applicable Standards of ASME, ASHRAE, ARI, SMACNA, TIMA, AMCA and applicable Government and Local Codes governing the same. In case of conflict, the strict requirements shown/specified shall govern. All equipment shall be rated and tested as per standards listed in ASHRAE Handbook (latest Edition).

SP-08.2        Abbreviations for Codes and Standards referred in the Contract are as under:

- 1)     ASME - American Society of Mechanical Engineers
- 2)     ASTM - American Society for Testing & Materials
- 3)     ASHRAE - American Society of Heating, Refrigerating and Air-conditioning Engineers
- 4)     NFPA - National Fire Protection Association, USA
- 5)     AHRI - Air-conditioning and Refrigeration Institute, USA
- 6)     SMACNA - Sheet Metal and Air-conditioning Contractors National Association, USA
- 7)     CTI – Cooling Tower Institute
- 8)     EUROVENT – European Committee of Ventilating Equipment Manufacturers

- 9) GOVERNMENT - Government of Pakistan
- 10) LOCAL - Local authorities of the city where the Project is located
- 11) I.E.E. - Institute of Electrical Engineers, London
- 12) NEMA - National Electrical Manufacturers Association, USA
- 13) AMCA - Air Moving and Control Association Inc., USA
- 14) P.S. - Pakistan Standards.
- 15) B.S. - British Standards.
- 16) TIMA - Thermal Insulation Manufacturer's Association, US

## **SP-09 STANDARDS OTHER THAN THOSE SPECIFIED**

Where the specifications provide requirements for material or equipment by specifying a standard such as for example, one of the American Society of Heating, Refrigerating and Air Conditioning Engineers which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standards, including standards of other countries, will be accepted provided the requirements thereof, in the sole opinion of the Engineer are atleast equal to the requirements of the standards specified. The Contractor may propose to the Engineer an equivalent standard other than that specified, in which case he shall submit the proposed standards and all other information to demonstrate and prove his proposed standard is equivalent in all significant respects to the standard specified. All submissions must be made in the English language.

## **SP-10 PERMIT**

The Contractor shall secure and pay for any necessary approvals, permits and inspections from Government or other controlling agencies where applicable as required by law, before commencing any work so as to avoid all delays during erection and turn over the official records of granting of permits to the Engineer. No reimbursements shall be made for such payments.

## **SP-11 SHOP INSPECTION, DAMAGES AND MATERIAL ORDER**

### **SP-11.1 Inspection**

#### **SP-11.1.1 Inspection at Factory Premises**

As per clause no. 2-02.1.1 (TESTING) given in Technical Provision.

### **SP-11.2 Material Orders**

Triplicate copies of material or equipment orders required in this Contract shall be furnished to the Engineer. All orders shall state the specification designation under which the material is to be furnished and shall bear reference to the drawing number, if any, pertinent thereto. Orders shall also state that material is subject to inspection and testing and shall show the required date of delivery of the material to destination.

**SP-11.3      Acceptance of Materials**

The acceptance of any material or equipment prior to shipment shall in no way relieve the Contractor of any of his responsibilities for meeting all of the requirements of the specifications and shall not prevent subsequent rejection if such material or equipment is later found to be defective.

**SP-11.4      Damages, During Transportation, Storage and Installation**

The Contractor shall be responsible for any damage of the Equipment/ material during transportation to site, storage and until satisfactory handling over the works. The Contractor shall replace any damaged equipment/ materials at his own cost.

**SP-12          NAMEPLATES**

The Contractor shall provide and attach to each major piece of equipment, a metal name and rating plate to be approved by the Engineer, giving the name and address of the manufacturer, the date and rating data. All ratings shall be in the British system. Large lettering on any of the parts will not be permitted. All ratings shall be in the unit system adopted for the project, unless otherwise authorized by the Engineer.

**SP-13          DIRECTED AND REQUIRED ETC.**

Unless otherwise stated, wherever in the Specifications or upon the Drawings the words, "directed", "required", "permitted", "ordered", "designated", "prescribed" or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended, and similarly the words "approved", "accepted", "satisfactory", or words of like import shall mean approved by, or acceptable or satisfactory to the Engineer unless otherwise indicated.

**SP-14          SEQUENCE OF ERECTION**

The sequence of erection of the Equipment shall conform to the requirements of the civil construction and of the Erection Instructions. Such information will be furnished to the Contractor by the Engineer upon request.

**SP-15          FABRICATION, ERECTION, TESTING AND MAINTENANCE TOOLS  
PLANT & INSTRUMENTS**

SP-15.1      The Contractor shall furnish special plant and tools for the complete and proper fabrication, erection and maintenance tools, plant & instruments of

the HVAC Equipment. Tools shall include the type of tools not normally available in the market as standard tools and is generally manufactured especially for use with the HVAC Equipment. All lifting devices shall be accurately machined to fit the parts to be handled. The wrenches and tools for maintenance, insofar as practicable, shall be mounted on a suitable hardwood or steel board arranged for wall mounting and provided with means for ready identification. The Contractor shall also provide refrigerant charging Plant if and when required. No separate payment shall be made for providing Plant and Tools and the Contractor may withdraw the Plant and Tools after its use.

SP-15.2 The Contractor shall furnish and install sign board showing information about the project, name of Employer, Engineer and the Contractor, as directed by the Engineer.

## **SP-16 ERECTION SUPERVISORS AND OPERATING STAFF**

### **SP-16.1 General**

The Contractor shall provide the services of Erection Supervisors and Operating Staff in accordance with the requirements of the Conditions of Contract, of sub-clause SP-02.2 Services by the Contractor, and as specified herein.

### **SP-16.2 Work by Erection Supervisor**

- a) The Erection Supervisor shall direct the activities of Contractor's employees as they concern the installation, commissioning balancing and testing of the Equipment furnished under this Contract. The Contractor through his Erection Supervisor shall cooperate with other Contractors to whatever extent is necessary to produce an installation satisfactory to the Engineer in accordance with the requirements of the time schedule, the Drawings and the Specifications.
- b) Erection Supervisor shall be present from the Commencement of Work and remain on Site until the substantial completion.
- c) Should a disagreement arise between other Contractors and the Erection Supervisor, the matter shall be submitted without delay to the Engineer for his decision. Upon such decision, the Erection Supervisor shall proceed with the work in accordance therewith, immediately.
- d) Erection Supervisor shall be a graduate HVAC or mechanical engineer, registered with Pakistan Engineering Council, having at least 7-8 years of experience in HVAC installation works of similar nature.
- e) If the Contractor fails to fulfill his obligations under clause SP-

02.2(a) and also fails to provide the Services of the Erection Supervisor having the minimum qualifications as stated in sub-clause (d) of this Clause then the Contractor would be obligated to pay to the Employer an amount of Rs.1500 per day for the number of days when the services of such Erection Supervisor are not provided. The Employer would be entitled to deduct the amount due from the Contractor in this regard from his running Bill/any payable sums.

- f) Provision of (e) above shall not apply when the Erection Supervisor is on authorized legal leave (casual), sick leave and official holidays only. His absence up to a period of ten (10) days will also be allowed when the contractor intends to replace the Erection Supervisor with the consent of the Engineer.

## **SP-17            RIGHT TO OPERATE PLANT**

The Employer reserves the right to operate any and all Equipment after it has been Commissioned and prior to substantial completion of whole Works. All repairs or alterations found to be necessary during such operation, and required of the Contractor, shall be made by the Contractor at such time as directed by the Engineer. The repairs or alterations shall be made in such a manner and at such a time as will cause the minimum interruption in the use of the Equipment by the Employer.

## **SP-18            ERECTION INSTRUCTIONS**

Erection Instructions in form of published installation manual, as furnished by the manufacturer of each HVAC equipment listed hereunder shall be provided by the Contractor.

### **1.            Air handling units**

These instructions shall include full and detailed instructions for the guidance of the Erection Supervisor as to all procedures and precautions to be observed in erecting, assembling and adjusting the Equipment and as to the use of the Erection Plant. It shall include or be accompanied by drawings, clearly showing erection marking and particularly any matchmaking and shall embody in particular a full statement as to erection tolerances to be observed.

These shall also include full instructions for the maintenance of the Equipment not only during the period of Contractor's liability but more particularly during its operating life. The directions shall be set out simply, clearly and systematically. In particular, this section shall include a full list of all routine checks and their timing, directions as to fault finding, detail of all routine attentions (such as greasing), in the form of check sheets for daily, weekly, monthly, quarterly, half-yearly, yearly and any other periodic checks recommended by the manufacturer. This section should also

provide detailed and complete instructions for trouble shooting, maintenance and all necessary adjustments to the Equipment Technical leaflets and brochures in respect of all equipment supplied under this Contract including all relays, instruments, switches, controllers, regulators etc., should be supplied with the erection instruction. This should also include complete catalogue of spare parts with exploded views of the equipment and relevant part numbers to facilitate identification and ordering of spares throughout the operating life of the Equipment.

The Contractor shall submit 6 copies to the Engineer for approval.

**SP-20 WATER, POWER AND GAS DURING ERECTION AND TESTING**

Water and power supply for Erection and Preliminary Tests shall be the responsibility of the Contractor. Water, power and gas supply for Balancing & Commissioning, Performance Tests and Reliability Trial Tests and operation during Defects Liability Period will be provided by the Employer.

**SP-21 APPROVAL FROM GOVERNMENT**

The Contractor shall arrange and be responsible for all tests, test reports and approvals regarding electrical works under this contract, any other works under this Contract requiring tests/Government approvals. All the requirements to be completed for this purpose, whether specified or not shall be at the cost of the Contractor. The Contractor shall handover all test results and approval certificates to the Engineer within one week of obtaining such approval.

**SP-22 PERFORMANCE GUARANTEE**

The Contractor shall be required to furnish a Performance Guarantee in accordance with Conditions of Contract.

**SP-23 SITE FACILITIES**

Except for the Site facilities specifically stated in Conditions of Contract and/or Special Provisions, no other site facility shall be provided by the Employer to the Contractor.

**SP-24 SUFFICIENCY OF RATES AND CURRENCY FOR PAYMENT**

All rates and amounts filled in the SOP by the Contractor for equipment/material whether locally procured or imported shall be deemed to include, but not limited to, the cost of items, custom duties, sales tax and surcharges, freight, marine insurance, local duties, sales tax and surcharges, clearance charges, inland transport and insurance, *octroi*, L/C



opening charges, bank charges, etc. Payments to the Contractor shall be made in local currency.

**SP-25      IMPORT LICENSE**

The Contractor will arrange the import licenses if required for all the imported Equipment, Plant, Tools and Machinery to be incorporated in permanent works. All the costs and charges for arranging import licenses will be paid by the Contractor. The Contractor shall be responsible to arrange foreign exchange for import of all equipment and materials.

**SP-26      GUARANTEES AND WARRANTIES**

**SP-26.1      Performance Guarantee**

The contractor shall guarantee the performance of the complete HVAC system, viz.-a viz. his workmanship for the work executed at site, and quality of material, as specified. He shall replace the material/workmanship, whenever found not meeting the specified requirements, at his own cost.

**SP-26.2      Manufacturer's Warranties**

The contractor shall obtain manufacturer's standard warranties for all equipment extended for a period up to one year from the date of completion at his own cost. In case the completion is delayed, the contractor should obtain further extension of warranties. The contractor shall be responsible for cost of such extension, if the delay is due to his fault.

**SP-27      PACKING OF EQUIPMENT AND MATERIALS**

All equipment and material shall be adequately packed at the manufacturer's works to protect them against damage, scratching, corrosion, dust, rain and moisture during handling, transportation and storage. The packaging shall be rigid enough to withstand normal service incidental to shipping and handling. Wherever necessary, crates/boxes shall be provided with lifting hooks attached by means of vertical rods or plates to strong bottom supports to enable rigging.

The following information shall appear inside all packages:

- a)      Stock or identification number
- b)      Description of contents/packing list
- c)      Quantity of each item
- d)      Invoice number
- e)      Year of manufacture

## **SP-28            INSPECTIONS AND TESTS**

### **SP-28.1        Inspection by Engineer at Site**

The Engineer shall inspect the works in progress at site as and when considered necessary by the Engineer and the Contractor shall provide full access and assistance to the Engineer for carrying out inspection to verify the conformity of works to general lay-out of HVAC System as designed and as shown on Drawings and as specified. Such inspection if made shall not relieve the Contractor from any obligations under the Contract.

### **SP-28.2        Tests**

#### **A)        General**

- i)        All Tests as specified shall be carried out unless otherwise specified. The Engineer shall witness the tests.
- ii)       The Contractor shall give the Engineer at least seven days notice in writing of the date on which any equipment will be ready for inspection and/or testing as provided in the Specifications and unless the Engineer shall attend within seven days of the date which the Contractor has stated in his notice the Contractor may proceed with the tests in the Engineers absence and shall forthwith forward to the Engineer five duly certified copies of test readings, on the forms prescribed by the Engineer. The Engineer shall give twenty-four hours' notice in writing of his intention to attend any test.
- iii)       The Contractor shall provide all labor, materials, electricity, fuel, stores, apparatus machines and instruments as may be necessary to carry out tests, unless otherwise specified.
- iv)       The cost of all tests carried out by the contractor under this Clause shall be borne by the Contractor if such tests are clearly intended by or provided for in the Specifications or Schedule of Prices.
- v)        As and when any equipment or HVAC System or part thereof shall have passed any inspection/test the Engineer shall furnish to the Contractor a certificate in writing to that effect.
- vi)       The Engineer may reject any part or parts of Equipment, and HVAC System which he shall after inspection/ testing decide is not in accordance with the Specifications and Drawings and he shall give to the Contractor within fourteen (14) days of such inspection/ testing notice in writing of such

rejection stating therein the grounds upon which his decision is based.

- vii) The test results shall be filled out by the Contractor in the forms proposed by the Contractor and approved by the Engineer. Six copies of filled out forms shall be submitted to the Engineer for review and approval.

- B) Once the inspection/test certificate has been obtained by the contractor, as stated in A (v) above, the contractor shall test and balance the system in accordance with NEBB (National Environmental Balancing Bureau), USA, code of practices. The Contractor shall be responsible for all remedial measures if any, required. The Contractor shall be responsible for the following:

Supply and fixing of any test hole covers, paint, gauges, gadgets, testing and balancing instruments, or any such thing which is necessary to carry out this work.

To provide all supervision, labor and materials required to carry out these balancing works.

- C) Preliminary Inspection & Tests

Preliminary Inspection/Tests as specified in Technical Specifications shall be carried out on all or any major HVAC equipment and such other equipment as the Engineer may require, on completion of installation of that equipment or at such time which the Engineer may require.

- D) Balancing & Commissioning

Balancing and Commissioning shall be carried out on all or any major equipment, as Specified in Technical Specifications, when such is ready for operation. The Engineer must witness the Balancing and Commissioning procedures and Contractor shall proceed further after Engineer's written satisfactory approval.

- E) Performance Tests

These tests as specified in Technical Provisions shall be carried out on each equipment of HVAC system after successful completion of Commissioning of that equipment, during appropriate season, on the dates proposed by the Contractor and approved by the Engineer. The Engineer keeping in view the weather conditions may fix the test date on any equipment of HVAC system within 6 months of Completion of Commissioning of that equipment.

- F) Reliability Trial Tests

- i) During the Defects Liability Period the Contractor shall

inform the Engineer in writing of his readiness to commence the Reliability Trial Test of HVAC System or part thereof. Cooling or Heating Tests shall be carried in appropriate season and the Engineer shall, within fourteen (14) days of receipt of such information shall forward his consent for commencement of Reliability Trial Test as specified in Technical Specifications, after having satisfied that all the requirements for such Tests have been completed.

- i) If any Reliability Trial Test be not fulfilled to the satisfaction of the Engineer, such test shall be repeated at such time as the Engineer.

## **TECHNICAL PROVISION**

# TECHNICAL PROVISIONS

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**TECHNICAL PROVISIONS**  
**SECTION 1 - GENERAL REQUIREMENTS**

**1-01 MATERIALS**

All materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and of the classification and grades designated, conforming to the requirements of the latest issue of the appropriate specifications cited herein. All materials, supplies, and articles forming part of major equipment and not fabricated by the manufacturer of the equipment shall be the products of the recognized reputable manufacturers.

**1-02 WORKMANSHIP**

Workmanship and general finish shall be of the highest grade, in accordance with the requirements specified herein, and the best modern standard practice.

**1-03 EQUIPMENT**

- a) For ratings and characteristics of manufactured equipment, Equipment Schedule as appended to Technical Provisions shall be followed.
- b) All equipment shall be manufactured by companies, which have had at least ten years previous experience in the design and manufacture of equipment of comparable type, capacity and operating conditions. Unless otherwise approved by the Engineer.
- c) Where the requirement of this Clause make any equipment proprietary or non-obtainable, the Engineer reserves the right to waive any portion or portions of it as required to obtain the intent of the technical provisions.
- d) When a manufacturer's product is specified by name, or equivalent, it shall be in the sole judgment of the Engineer as to acceptability of any product, which is offered as equal to that specified.
- e) Where two or more units of the same class of equipment are furnished, product of the same manufacturers shall be used component parts of entire system need not be product of same manufacturer.

**1-04 CHASSES AND OPENINGS**

The Contractor shall provide shop drawings, templates or details for chases and openings to be left in concrete walls, concrete partitions, and floor or roof slabs to accommodate work under HVAC scope of works.



## **1-05 PROTECTION**

The Contractor shall keep pipe, duct and other openings closed to prevent entry of foreign matter. All fixtures, equipment and apparatus shall be covered and protected against dirt, water, chemical or mechanical damage, before and during the construction period. All fixtures, apparatus, or equipment damaged including damaged shop coats of paint shall be restored to original conditions prior to Commissioning and also again prior to Final Acceptance. All bright finished shafts bearing housings and similar items shall be protected until in service: no rust will be permitted.

## **1-06 CUTTING, PATCHING AND REPAIRING (EXCEPT CUTTING IN CONCRETE)**

Required for proper installation and completion of HVAC works, including masonry work, concrete work, and carpentry work, painting and re-painting shall be performed by skilled craftsmen in respective trades, at expense of the Contractor. Construction shall be cut only after obtaining written permission from the Engineer.

## **1-07 LINES, LEVELS AND SPACES**

The Contractor shall check dimensions at the building site and establish lines and levels for work specified in Specifications. The Contractor shall check with work of other trades to ensure proper clearance of piping, ductwork, conduit and other items. Any deviations observed between drawings and actual construction shall be brought to the notice of the Engineer. The erection supervisor shall regularly inspect, during progress of civil works, the areas allocated for installation of HVAC equipment and any conflict observed shall immediately be reported to the Engineer.

## **1-08 MACHINERY GUARDS**

All moving parts of machinery are to be protected by strong guards to adequately protect all personnel working on or in the vicinity of equipment.

Wherever possible, moving parts should be protected by guards supplied by the equipment manufacturer. All guards must be strongly attached to equipment and should be designed for easy removal for access, servicing, adjustment and maintenance.

## **1-09 TOOLS**

The Contractor shall supply in a toolbox, full sets of tools suitable for maintenance of all components of the plant furnished by him including the electrical equipment, for use by the Employer after completion of Defects Liability Period. List of Tools shall be subject to approval by the

Engineer.

**1-10 OIL AND GREASES**

Not Used

**1-11 SPARE PARTS**

Not Used

**1-12 ACOUSTIC TREATMENT**

Sound measurements will be made at approximately five (5) feet above floor level in the occupied area served and not more than five (5) feet from the grills, diffusers or other air devices being tested. Instruments for sound measurement shall be provided by the Contractor.

Provision is to be made to minimize noise and vibration. However, different manufacturers equipment have varying sound and vibration characteristics and it is, therefore, the responsibility of the Contractor to ensure that the requirements in these specifications are fully met by the equipment he is offering. If the Contractor has any requirements for additional vibration or sound isolation, these must be incorporated into the price quoted.

All equipment installed should not be audible inside the occupied areas and the Contractor must ensure that all equipment he is offering is quiet and have satisfactory sound levels. Where silencers are required, these must be incorporated into the price quoted.

**1-13 ACCESS PANELS**

The Contractor shall mark locations of, and give sizes of, access panels required in false ceiling and wall paneling for adjustment and maintenance of HVAC Equipment, such as Dampers, Fire Dampers, valves, ceiling-hung equipment, etc. This information shall be provided to the Engineer before commencement of false ceiling work by the concerned persons.

**1-14 SEALING OF OPENINGS**

The contractor shall seal all openings in external walls and roof where HVAC ducts/pipes penetrate in external membrane. The sealing shall be air tight to prevent penetration of outside air and water into building. The method and materials for sealing shall be subject to Engineer's approval.

## **SECTION 2 – EQUIPMENT**

### **2-01 GENERAL**

All equipment shall be of such overall dimensions, operating weights, service area requirements and configuration that it can be located where shown on the plans without any adverse effect on its performance and clearance requirements. Any change in other trades work, anticipated by offering alternate equipment, shall be estimated by the Contractor and its cost shall be included in the quoted price for HVAC Works.

Provision for clearance and service spaces shall be made around all mechanical equipment as recommended by equipment manufacturers.

All equipment supplied under this section shall be brand-new, factory manufactured and factory assembled (unless otherwise specified) and complete in all respects. The type, characteristics, capacity ratings, component sections of all equipment shall be as Scheduled.

All equipment furnished by the Contractor shall include vibration isolation mounting pads, anchor bolts, frames or any other mounting or supporting accessories.

All power driven equipment shall include drives, motors and adjustable motor foundation bases and accessories including machinery guards where applicable.

All equipment shall be complete with all accessories necessary to serve the intended purpose, whether specified or not.

All equipment installed on roof or intermediate floors shall include suitable vibration isolators to prevent any vibration traveling to building structure.

### **2-02 EQUIPMENT**

#### **2-02.1 AIR HANDLING UNITS**

The air-handling units shall be package type sectionalized construction having filter section, control/mixing section, cooling coil section, eliminators, fan section, suction plenum section and drain pan. Capacity (TR), Airflow & External Static Pressure of the air-handling unit has been indicated in the air handling unit schedule. AHU design shall be robust & as per requirements.

AHUs shall be locally manufactured as approved by the Engineer.

For purpose of calculation of motor BHP, specified external SP and AHU manufacturer's internal SP should be added. Filter pressure drop shall

be part of internal SP, which shall be calculated on average of clean (initial) and filter manufacturer's-recommended dirty (final) pressure drop. Published recommendation of filter manufacturer shall be furnished along with technical submittal. In case published recommendation is not available, a recommendation on the printed stationery of filter manufacturer shall be acceptable provided the manufacturer certified that no such published data is available. The AHU shall be equipped with Access Doors(Sight Glass is compulsory as per Access requirement) for each section.

The AHUs Shall be equipped with mixing Box Section & Sections required as per requirement mentioned in the equipment schedule. AHU manufactured with thermal Break Aluminum Profile with Plasticized/Powder Coated G.I. sheet on outside and 0.63mm (24 SWG) pre coated GI sheet on inside and insulation in between two sheets. Dampers to be of G.I./Aluminum Blades with Gas ket (To Avoid leakage rate) for regulating fresh Air and return air requirements

AHU shall be selected for the lowest operating noise level, and operating noise level should not exceeding 85 DB at 2 M distance.

#### **2-02.1.1 CONSTRUCTION**

These shall be factory assembled draw-through Modular air handling units (AHU's) of capacities and characteristics as scheduled. Air handling units shall be horizontal or vertical with component and configuration as scheduled

##### **Casing& Drain Pan:**

The housing /casing of AHUs shall be of double skin compact construction. The framework shall be of extruded aluminum hollow sections filled with preformed insulation. The entire frame shall be assembled using mechanical joints to make a sturdy & strong framework for various joints. Double skin panels shall be made of minimum 24 SWG(0.6mm) Plasticized/Powder Coated G.I. sheet on outside and 0.6 mm. SWG 24 pre coated GI sheet on inside with minimum 50 mm thick polyurethane foam insulation in between and panel sheets. These panels shall be bolted from inside on to the framework with soft rubber gasket in between to make the joints airtight. All necessary hardware/fasteners shall be of Stainless Steels (304). Suitable doors with SS-304/PVC hinges and latches shall be provided for access to various panels to facilitate removal of cooling/heating coils and fans for maintenance. The entire housing shall be mounted on steel channel framework.

Drain pan shall be constructed of 3mm SS-304 sheet with necessary slope to facilitate fast removal of condensate. Drain outlet shall be provided as per site actual conditions or according to the provided schematics layout. Drain connection should be raised from drain pan of AHU & left near the floor drain trap with a "U" shape.

Drain-pan shall be at least 150 mm wider than the width of respective cooling/heating coils. Between drain-pan and Eliminator pan of bottom surface shall be made of 3mm SS-304 sheet.

#### **COIL SECTION:**

The coil shall be designed as heavy duty type and inlet water temperature and outlet water temperature as per mentioned requirement on the equipment schedule for cooling and similarly for the heating Coils. Cross flow process of heat Transfer shall be used for cooling coil design. Number of fins in the cooling coil shall be restricted to maximum 8 fins/in for the coil. Each coil shall be complete with drain and vent connections. Chilled water coil shall be constructed of 99.9% pure seamless Copper tubes with minimum 24G (0.6 mm) thick and with (0.13 mm) thick aluminum fins firmly bonded to tubes assembled in zinc coated steel frame. The Tube shall be hydraulically/Mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested to 500 PSI of Nitrogen Pressure for minimum 48 Hours. Flanges of cooling coils shall be of galvanized Mild Steel plates of thickness as per ANSI B 16.5 class 150 lb. Supply and return headers shall be given two coats of rust inhibiting paint on either side.

AHU shall be provided with PVC eliminator to be provided after coil to avoid water carry over having suitable depth as per requirement. Eliminator pan shall be constructed of sandwich type construction with both the skin made of 1mm SS-304/ Aluminum sheet, necessary slope to facilitate fast removal of water.

#### **FAN SECTION:**

Fan shall be double inlet centrifugal (Backward Curve) mounted on a common shaft. Fan impeller shall be statically and dynamically balanced and shall have permanently lubricated bearings. Fan shall be belt driven with adjustable sheaves. Fan shall have spring isolation from the casing. The fan shall be selected for a speed not exceeding 1450 RPM. Fan shall be AMCA Certified. The Make of fans shall be "NICOTRA, YILIDA OR COMEFRI" as approved by the engineer.

#### **FILTER SECTION:**

Flat filters installed in Air Handling Units, shall be permanent, impingement, dry type, washable, all metal, panel type, at least 2 inch thick unless otherwise scheduled. Media shall be aluminum screen, arranged in alternate layers of flat and herringbone-crimp, 4 layers of each per one inch reinforced and enclosed in a frame of 16 gauge galvanized steel with flush mitered corners. Initial pressure drop at 500 FPS shall not exceed 0.1 inch WG. Holding frame shall be factory-built of 16-gauge steel; with felt air seal. Filters shall have at least 35% efficiency on 0-5 microns range. Filter Media shall be upon International Standards.

### **Variable Frequency Drive (VFD):**

The VFD shall be enclosed in a UL/NEMA Type enclosure, completely assembled and tested by the manufacturer. The VFD shall provide full rated output from a line of  $\pm 10\%$  of nominal voltage. The VFD shall continue to operate without faulting from a line of +30% to -35% of nominal voltage.

VFDs shall be capable of continuous full load operation under the following environmental operating conditions:

- a. -5 to 45 °C ambient temperature. Operation to 50 °C shall be allowed with a 10% reduction from VFD full load current.
- b. Humidity less than 95%, non-condensing.

All circuit boards shall be coated to protect against corrosion. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating.

The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate “bumpless transfer” of speed reference when switching between “Hand” and “Auto” modes.

VFD programming shall be held in non-volatile memory and shall not be dependent on battery power. The VFD's shall utilize pre-programmed application macros specifically designed to facilitate start-up.

The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start).

The VFD shall have the ability to automatically restart after over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.

The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds every minute. The input current rating of the VFD shall not be greater than the output current rating. Input and output current ratings must be shown on the VFD nameplate.

The VFD shall have programmable “Sleep” and “Wake up” functions to allow the drive to be started and stopped from the level of a process feedback signal.

All VFDs to have the following adjustments:

- Two (2) programmable analog inputs shall accept current or voltage signals.
- Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage and other data.
- Two (2) programmable digital inputs for maximum flexibility in interfacing with external devices. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC.
- One (1) programmable digital output

The voltage/frequency ratio shall be suitable for speed control of fans. It should not be possible to set a constant voltage/frequency ratio to prevent damage to connected equipment and to optimize energy consumption. The converter shall regulate the output to adapt it continuously to the current flow so as to minimize energy consumption

### **MOTORS:**

All motors shall be totally enclosed fan cooled, of squirrel cage construction and shall be equipped with VFD. All motors shall be of Siemens or ABB make only.

Insulation on all motors shall be equal to Class F (IP 55). The efficiency of motors shall not be less than IE-3. All motors shall be designed for continuous operation in the ambient temperature of 105 °F (40 °C). All Motors shall be properly de-rated for operation in an ambient temperature of 105 °F (40 °C).

All motors and accessories such as protection and control devices etc. shall comply in all respects with NEMA, current B.S. Standards and I.E.E. Regulations. Single phase motors shall be capacitor-start induction run construction, unless otherwise indicated or specified.

All motors shall be quiet operating guaranteed to fulfill specified requirements without producing any sound audible outside of plant rooms. All belt- driven motors shall have adjustable bases and set screws to maintain proper belt tension, with proper belt guards. Motors installed in the building should be super silent sleeve bearing type.

The starting current of all motors above 10 hp. shall not exceed twice its rated full load current. For motors of rating 10 hp. and below the starting current shall not exceed 7 times its rated full load current or one hundred amps, per line, whichever is larger. Motors rating ampere chart shall be provided with the supplied motor.

## **TESTING:**

All material for the AHU's shall be checked/quality assured by AHU manufacturer before starting the manufacturing process. Material of Copper tubes of coil and G.I Sheets to be checked and verified as per standard method approved by the Engineer. Coil test report shall be submitted on minimum 500 psi for 48 hours. The material test will be performed before equipment manufacturing.

FAT shall be performed before equipment supply to the site, After completion of manufacturing process, the supplier shall offer Factory Acceptance Test (FAT) to the Engineer/ Engineer representative. The Following tests shall be witnessed during FAT:

- I. CFM & Static pressure as per equipment schedule.
- II. Fan RPM
- III. Sound Level
- IV. Motor Ampere
- V. Motor RPM
- VI. Any other test as required or approved by the Engineer.

Only after satisfactory FAT of AHU's the supplier shall be allowed to deliver AHUs to Project site.



## **SECTION 3 - FOUNDATIONS AND SUPPORTS**

### **3-01**

#### **GENERAL**

All equipment, piping and ductwork where used shall be mounted on or suspended from foundations and supports, all as specified, as shown and as required. All concrete foundations where required, including thickened structural slab, housekeeping pads and concrete for inertia pads will be provided by the Employer or other Contractor appointed by the Employer.

Shop drawings, other information and templates for all concrete foundations where used, shall be provided by Contractor as per recommendations of the manufacturer of the equipment. Necessary integral steel framings, concrete reinforcing rods welded to frame, required anchor bolts, spring mountings, and neoprene pads, shall be provided by the Contractor. The Contractor shall cooperate with those doing the flooring work to ensure proper installation of all these elements.

Foundations and vibration isolation mountings for various equipment, piping, and ductwork where used shall be as per requirements specified. Vibration isolators where used shall be of approved make.

Springs used for vibration isolation shall be single, open coil type and laterally stable, having a ratio of loaded height to mean coil diameter not greater than 1.25. To preclude possibility of spring coils "shortening" when motor starts or slows down, the springs shall be selected so that there remains when the spring is design loaded, a reserve deflection of between 25 and 30% of maximum deflection of free spring. When fully compressed, maximum stress in steel should not exceed yield stress of spring material. Springs shall be unhoused and held well clear of any part of suspended mass. Isolated system if supported on a flat slab type base, shall be held clear of supporting structure or pad by the minimum distance thought necessary for efficient housekeeping or 1 inch. Lower end of each spring shall be supported on a rigid, square steel base plate sufficiently thick to withstand a bearing pressure of 427 kPa. This plate should be complete with 3 thickness of type W neoprene waffle pad between under inside of plate and supporting structure. A 16 gauge steel shim plate bonded to pad surfaces shall separate adjacent thicknesses. Spring base plate shall also be bounded to top layer of pad. Pad area should be chosen to suit hardness of neoprene. For 40 durometer neoprene, bearing pressure on supporting structure shall be 276-352 kPa when spring is design loaded. Waffle pads may have to be cut away in the middle of pads since pads shall have same overall dimensions as spring base plate.

All pipe hangers must be insulated from the building by cork inserts between the hanger bar fixing and the connection to the structure. Details of the Contractor's method of achieving this shall be submitted to the Engineer for approval. All ceiling hung equipment having fans and

motor as integral part of equipment shall have adequate vibration isolators.

Flexible duct connections, as specified elsewhere, shall be fitted wherever ducts cross building expansion joints, at suction and discharge end of each air handling unit and fan wherever ducts are connected to such unit, and/or wherever shown on the drawings. Details of all vibration isolators, flexible connections and bases shall be submitted to the Engineer for approval.

## **3-02 MOUNTING OF EQUIPMENT**

### **3-02.1 Floor Mounted Equipment**

All floor or roof mounted equipment shall be generally placed on at least 4 inch concrete house keeping pads, unless otherwise indicated. The pads shall be constructed on 1 inch thick cork-sheet. Protective curbs shall be provided on all sides of the pad to protect the cork sheet edges. Special attention shall be given to the equipment at roof and intermediate floors and heavy equipment shall be mounted on spring isolators / inertia pads. The spring isolators shall preferably be supplied by equipment manufacturer and shall be from manufacturers specializing in manufacturing of vibration isolators. Manufacturer's recommendations for prevention of vibration and noise travel to the structure shall be adopted. The foundation details shall be subject to the approval of the Engineer

## **SECTION 4 - DUCTING AND SHEET METAL WORK**

### **4-01 GENERAL**

#### **4-01.1 Ducting Material**

All duct work shall be of galvanized steel sheet unless otherwise indicated on Drawings. Galvanized steel shall be of lock forming quality (LFQ) and shall have a galvanized coating of 8 oz total for both sides of one square meter of a sheet. The GI sheet shall conform to ASTM A-525 and ASTM-90.

Galvanized steel sheet shall be Cut Lengths coated by the Hot-Dip Method and manufactured per ISO Standard 3575-76 zinc coating designation Z-275, and base metal quality 02.

#### **4-01.2 Structural Steel**

Structural Steel shall be M.S. members rolled from Pakistan Steel billets or equivalent conforming to ASTM designation A-36 standard specifications for structural steel.

#### **4-01.3 Canvas Cloth**

Canvas Cloth shall have specified weight with flame retardant quality.

#### **4-01.4 Painting**

All steel work in connection with supports for ductwork etc. exposed to the elements is to be painted with two coats of an approved rust preventive paint.

All exposed metal surface of hangers, brackets, etc. must be painted with two under-coats and two finishing coats of enamel paint of approved colour. G.I. sheet is not to be painted. However, all uninsulated pipe work and valves are to be painted as stated above.

Identification bands shall be painted on uninsulated ducting, or on insulation at frequent intervals. Lettering shall be agreed with the Engineer.

All duct hangers in concealed locations shall be given one coat of black asphalt paint before being concealed.

### **4-02 DUCT CONSTRUCTION**

All sheet metal duct work shall be of a standard construction and erected in a first class workmanlike manner. The duct work shall be constructed as per SMACNA Low Velocity Duct Construction Standards.

Where specified, duct work shall be provided with interior insulation. Ducts shall be straight and smooth on the side, with joints neatly finished. Where ducts are lined with interior insulation, the dimensions required shall be for the net free area after insulation is applied. Ducts shall be anchored securely to the structure in an approved manner and shall be installed so as to be completely free from vibration under all conditions of operation.

Sheet metal ducts shall be properly braced and reinforced with steel angles, or other structural members approved by the Engineer Unless otherwise required, the internal ends of all slip joints shall be installed in the direction of flow.

Finished work shall show no flaking or peeling within 1/4" of a cut edge. The construction and gauge of material, size and spacing of stiffeners for duct work shall be as follows:

Larger Dim. of Duct (in.)	Gauge (US)	Traverse Joint Type/Size (Inch)	Interm Bracing, Angle Size (Inch)	Max. Spacing between Traverse Joint &/or Interm Reinforcement
Thru 12	26	Drive slip/-	-	-
13 thru 18	24	Drive slip/-	-	
19 thru 30	24	Pocket lock/1	1x1x1/8	5
31 thru 42	22	Pocket lock/1	1x1x1/8	5
43 thru 54	22	Pocket lock/1-1/2	1-1/2x1-1/2x1/8	5
55 thru 60	20	Pocket lock/1-1/2	1-1/2x1-1/2x1/8	5
61 thru 84	20	Angled reinforced standing seam	1-1/2x1-1/2x1/8	5
85 thru 96	18	Angled reinforced standing seam	1-1/2x1-1/2x1/4	2.5
Over 96	18	Angled reinforced standing seam	1-1/2x1-1/2x1/4	2.5

Other types of Traverse joints allowed as per ASHRAE/ SMACNA Standards shall be acceptable, subject to Approval of Engineer, in places where pocket lock is not possible due to tight space.

All angles for bracing shall be painted with one coat of approved rust-inhibitive paint before fixing to duct.

All duct work in the finished areas shall be run parallel to the beams wherever possible. All outlet opening and open ends shall be kept closed with sheet metal caps during construction. Rectangular duct shall be constructed by breaking the corners and grooving the longitudinal seams. Elbows and transformation sections may be formed with Pittsburgh corner seams but complicated fittings shall be constructed with double seams. Angle bracing shall be of steel and shall be carried out on all four sides of the ducts. All bracing is to be in accordance with the current

addition of the ASHRAE Hand Book/ SMACNA Standards.

#### **4-03 ELBOWS**

Ducts shall be built with curves and bends, where required, to affect an easy flow of air. Curved elbows shall have a centre line radius at least equal to 150% of the width of the duct unless otherwise indicated. All duct curves having an inside radius smaller than the width of the curve shall be equipped with approved single thickness vanes.

Vertical ducts shall have full size bends where horizontal branches are taken off unless otherwise indicated, and/or approved.

Where square elbows are used in changing directions, approved and aerodynamically correct vanes as per latest SMACNA Duct Construction Standards shall be used.

These turning vanes must be free from vibration when the system is in operation.

#### **4-04 HANGERS**

Hangers and supports shall be fastened to the structure in a manner approved by the Engineer. All fastening shall be such as to ensure permanent stability and to be capable of supporting at least three times the applied load.

Galvanized sheet metal ducts less than 20" in width (larger dimension) may be suspended by means of galvanized iron straps extended along the bottom of the duct to form a trapeze, only if hanger length above the duct is not more than 12".

All other ducts shall be suspended by means of iron bars securely fastened to the angle iron bracing or angle iron placed under the duct. Bars shall be fastened to bracing only on un-insulated ducts.

Bars shall be welded to angles at ceiling, attached therein by anchor screws and heavy iron washers. Where horizontal ducting is fixed to walls, columns, supported from floor slabs, etc. angle iron frames are to be fabricated and fitted to support rectangular ductwork and associated equipment.

Vertical ducts are to be supported by steel angles bolted to at least two sides of the duct and on the complete circumference of the ducts where the larger duct dimension is greater than 24 inch.

Angle iron extensions shall be either grouted or bolted to the structure. Hangers spacing and sizes shall be as follows.

Larger Duct Dim. (Inch)	Strap Size (Inch)	Bar Dia (Inch)	Bottom Angle Size (Inch)	Maximum Spacing (Feet)
Thru 12	1" x 22 ga.	3/8	1x1x1/8	8
14 thru 18	1" x 22 ga.	3/8	1-1/4x1-1/4x1/8	8
19 thru 30	1" x 18 ga.	3/8	1-1/2x1-1/2x1/8	8
31 thru 42	1" x 18 ga.	3/8	1-1/2x1-1/2x1/8	8
43 thru 54	1" x 16 ga.	3/8	1-1/2x1-1/2x1/8	7
54 over	1" x 16 ga.	1/2	2x2x1/4	6

Hanger rods shall be cross-braced whenever the length of rod above duct work is more than 3 ft. to prevent swing of ducts.

All structural steel including hanger rods and angle iron shall be painted with one coat of approved rust- inhibitive paint before installing.

#### **4-05            QUADRANTS FOR VOLUME DAMPERS**

All dampers other than dampers behind registers and diffusers shall be fitted with substantial locking quadrants, mounted outside the duct in an accessible position. On insulated ducts the quadrants shall be fastened to bearing plates flush with the outside finish of the insulation.

#### **4-06            DAMPERS**

##### **4-06.1        Volume Dampers (V.D)**

A substantially constructed manual volume damper of the butterfly or multiple blade type as per latest SMACNA Duct Construction Standards shall be fitted where shown on the Drawings and at all branch entries or exits with main ducts for balancing purposes. Dampers shall have galvanized or painted steel interlocking blades of 8" maximum blade width. Blades shall be fabricated from 16 gauge steel with seamed edges and a maximum length of 4 ft. It should be noted that these dampers, shall be separate and independent from the dampers, hereinafter specified. Volume Dampers are not required where splitters Dampers, as specified hereinafter, are installed.

##### **4-06.2        Splitter Dampers (S.D)**

At each point of division in a supply trunk duct where a branch is taken off a trunk duct, an adjustable splitter or deflecting damper, one gauge heavier than the duct with operating rod and locking quadrant as above, shall be installed. These deflecting dampers shall be permanently set and locked in position after completion of the installation and adjustment with fans running.

Operating rods are to be full blade length extending through the duct to externally mounted bearing plates. Construction shall be as per latest

**4-07 ACCESS DOORS AND PANELS**

Wherever necessary, suitable access openings, doors and frames to permit inspection, operation and maintenance of all filters, controls, dampers, bearings or other apparatus shall be provided in ducting. Doors shall be of double construction, of not lighter than 20 gauge metal sheet and shall have sponge rubber gaskets around their entire perimeter. On insulated duct work the space between the inner and outer door sheets shall be insulated as specified for the ductwork. All access doors in sheet metal shall have air tight seal, shall be hung on heavy flat hinges and shall be secured in the closed position by means of wing type nuts and screws or coin operated catches.

**4-08 SLEEVES**

Where ducts pass through walls, partitions, or floors, wooden sleeves shall be provided by the Contractor and these sleeves shall remain in place permanently. Sleeves shall be packed with non-combustible glass-fibre insulation, minimum of 1.5 lbs/cu.ft. density and sealed with sealant.

**4-09 TEST WELLS**

The Contractor shall provide test wells for measurement of air velocity and static pressure for balancing purpose. These wells made up of a brass nipple with screwed caps are to be fixed into the duct or casing on the downstream sides of each fan. The design of test well shall be subject to Engineer's approval.

## **SECTION 5- HVAC PIPING, FITTINGS, VALVES & SPECIALTIES**

### **5-01**

#### **GENERAL**

Each part of the piping system shall be complete in all details and provided with all control valves and accessories necessary for satisfactory operation. Valves from local manufacturer shall have additional warranty of three (03) years with complete replacement of parts or whole valves.

The Bidding Drawings indicate generally the routes of all main piping and sizes are shown on Drawings for quotation purpose. The Engineer reserves the right to change the runs and sizing of piping to accommodate conditions during construction.

All piping shall comply with the requirements of the ANSI B31.1 Code for Power Piping. The other pressure vessels shall comply with ASME Boiler and Pressure Vessel Code Section VIII.

All piping shall be grouped wherever practicable and shall be erected to present a neat appearance. Pipes shall be parallel to each other and parallel or at right angles to structural members of the building and shall give maximum possible headroom.

All pipe drops shall be truly vertical. No joints shall be formed in the thickness of walls, floors or ceilings. The Contractor is responsible for ascertaining the thickness of plaster and other wall finishes, skirting heights, sill lengths and floor finishes.

Piping shall not pass in front of doorways or windows and shall be generally arranged so that it is at least 3" above finished floor level and at least 1" from finished wall faces. Sufficient space is to be allowed for accessibility for servicing.

Piping shall be pitched for proper circulation and drainage. Run outs shall be graded in such a manner as to prevent air traps being formed within them when the mains expand or contract. Automatic or manual vents are to be provided at high points. All automatic vents shall be piped to suitable drains.

All drain piping shall pitch down in direction of flow. All drains from items such as drip pans of air conditioners and air handlers shall be piped to spill over an open sight drain, floor drain, roof gutter or other acceptable discharge points and shall be terminated with a plain end unthreaded G.I. Pipe, 6" above the drainage. Drain piping from all air handling units except fan coils shall have 3" water seal unless indicated otherwise.

All low points of the system must be fitted with drain valves to permit the complete drainage of the system. Bottoms of all risers must have dirt pocket the size of the riser of at least 12" long with a drain valve fitted.



All water piping to equipment and valves shall be connected with either flanges or unions for dismantling and removal. All piping shall be reamed after cutting to remove all burrs.

Approved pipe fittings shall be used and bending of pipes will not normally be allowed except for black steel pipe 2" diameter and under which shall be permitted where space conditions allow for a bending radius of at least 10 times the diameter of the pipe. A hydraulic pipe bender shall be used to bend all pipes. Bends showing kinks, wrinkles, or other malformations, will not be acceptable.

Piping shall not be installed passing through ductwork or directly under electric light fixtures, unless indicated otherwise.

In placing pipes through sleeves, near walls, partitions or in chases, care must be taken to provide sufficient space for pipe fittings and covering.

Where pipes are held in vices, as when screwing, care shall be taken to ensure that the pipe surface is not damaged. Any pipe work so damaged shall not be fitted.

All pipes stored on site shall be kept clean and off the ground and where possible stored under cover. Pipes corroded beyond normal "stock-rust" condition shall not be used. Special care should be taken to prevent dirt entering into pipes. The Contractor shall note that a valve fitted to the open ends of a disconnected pipe is not considered satisfactory to prevent entry of foreign matter. Screwed iron caps or plugs or plastic covers shall be used to seal pipe ends. Wood, rag, paper or other inadequate plugs will not be permitted.

Before connecting up to return mains, the system of piping must be blown and flushed out. After flushing, all strainers shall be opened and baskets cleaned.

Liberal allowance shall be made for expansion and contraction of pipes by means of changes in direction or by the inclusion of expansion joints in the piping system. Flexible connections shall also be provided whenever piping cross building expansion joints. Not less than 2 Pipe Guides as approved by the Engineer shall be used on both sides of expansion joint/loop.

All steel work in connection with supports for pipes exposed to the elements is to be painted with two coats of an approved rust preventive paint.

All exposed metal surface of hangers, brackets, etc. must be painted with two under-coats and two finishing coats of enamel paint of approved color. G.I. sheet is not to be painted. However, all un-insulated pipe work

and valves are to be painted as stated above.

Identification bands shall be painted on piping or on insulation at frequent intervals. Lettering shall be agreed with the Engineer. All steel pipes supplied when delivered at site, shall have factory manufacturing date not older than two (02) month for local pipes and three (03) months for imported pipes.

All pipe hangers in concealed locations shall be given one coat of black asphalt paint before being concealed.

## 5-02 PIPING, FITTINGS & ACCESSORIES

Pipe Schedule			
Sr. No.	Service	Size	Specifications
(a)	Seamless Steel		
(i)	Chilled/hot & condenser water	All sizes	Schedule 40 black seamless steel, ASTM A 106 Grade B or equivalent
(ii)	Chemical Feed	All sizes	Schedule 40 black seamless steel, ASTM A 106 Grade B or equivalent
(b)	Galvanized steel		
(i)	Cooling Coil condensate drain	All sizes	Galvanized steel, Light Quality BSS 1387
(ii)	Make-up water, and drain copper	All sizes	Galvanized steel, Light Quality BSS 1387
(c)	Piping for auto vents discharge	1/4"	Copper, Type K

### 5-02.1 FITTINGS

Fittings shall conform to following Schedule; in piping 6" and larger, "stub-in" type connections will be permitted when branch line is at least four pipe sizes smaller than main run.

Fittings Schedule			
Sr. No.	Service	Size	Specifications
(a)	Seamless Steel Piping		

<b>Fittings Schedule</b>			
Sr. No.	Service	Size	Specifications
(i)	Chilled/hot & condenser water	2.5" & smaller	150 lb black steel threaded fittings, ANSI B 16.11, ASTM-A105.
(ii)	Chilled/hot and condenser water	3" & larger	Schedule 40 black welded steel, welding fittings to ANSI B 16.9
(iii)	Chemical feed	All sizes	150 lb black cast iron screwed fittings to ANSI B 16.4
(b)	Galvanized Steel Piping		
(i)	Cooling coil condensate drain	All sizes	150 lb malleable iron galvanized screwed fittings to ANSI B16.3
(ii)	Make-up water/drain	All sizes	150 lb malleable iron galvanized screwed fittings to ANSI B16.3

## 5-03 Unions and Flanges

### GENERAL

Unions and flanges shall be provided where indicated and/or required for proper installation and maintenance of the system. They shall conform to the respective schedule given hereunder.

Flanges shall have bolt holes drilled and raised faced and fitted with black mild steel bolts, nuts and washers.

If equipment has different flanges to the type specified then mating flanges must be supplied of the same rating to connect to this equipment. Extend flange bolts through nut at least four full threads when made up.

<b>Union Schedule</b>			
Sr. No.	Services	Size	Description
a)	All services using black steel pipe	All sizes	150 lb malleable iron screwed, conical seat type
b)	All services using galvanized steel pipe	All sizes	150 lb malleable iron, galvanized screwed, conical seat type

Flange Schedule			
Sr. No.	Services	Size	Description
a)	Services using black steel pipe	All sizes	ANSI 150 lb weld-neck or slip-on as indicated or required.
b)	All services using galvanized steel pipe	All sizes	ANSI 125 lb galvanized cast iron screwed pipe

#### 5.04 PIPE SUPPORTS AND ANCHORS:

All supports for steel piping shall be ferrous. Brackets or supports shall be set out so that they do not obstruct the access to valves, flanges or other fittings requiring maintenance.

All pipe work shall be supported by means of approved clips or hangers at centres as specified. In the event of two or more pipes being carried by a single support the spacing shall be for the shorter interval.

All vertical drops shall be supported so as to prevent sagging or swinging. Unless otherwise indicated, pipe hangers are to be spaced as follows:

Pipe Hanger Spacing's		
Nominal Pipe Size (Inch)	Maximum Span (Feet)	Minimum Rod Dia (Inch)
1 and smaller	6	3/8
1 ¼ - 1 ½	8	3/8
2 – 2 ½	10	3/8
3	10	1/2
4	12	1/2
5	14	5/8
6	16	5/8
8	20	7/8
10	20	7/8
12	20	7/8
14	20	1
18	20	1

Piping at all equipment, and control valves shall be supported to prevent strains or distortions in the connected equipment, valves and control valves. Piping shall be supported to allow for removal of equipment valves and accessories with a minimum of dismantling and without requiring additional supports after these items are removed.

All channels, angles, plates, clamps etc. necessary for the fastening

hangers shall be furnished by Contractor. All hangers shall be properly sized for the pipe to be supported. Oversized hangers shall not be permitted, without Engineer's approval.

All hangers shall be provided with lock nuts and have provisions for vertical adjustment of pipes.

Individual horizontal piping shall be supported by hangers consisting of malleable split rings with malleable iron sockets, or steel clevis type hangers, or roller hangers as directed by the Engineer. Pipe stands with base flanges and adjustable type yokes shall be used for pipes supported from the floor.

Vertical piping shall have heavy wrought iron or steel clamps securely bolted on the piping with the end extensions bearing on the structure of the building. Piping shall be anchored where required to localize expansion to prevent undue strain on piping and branches. Anchors shall be entirely separate from hangers and shall be heavy forged or welded construction of approved design. Hangers for cold piping shall have hardwood inserts or high density insulation capable of withstanding the compression and allowing the hanger to support the pipe without any metal contact. Upper ends of iron rods shall be welded to angles attached to ceiling (concrete slab) by anchor screws and heavy iron washers.

#### **5-05 PIPE SLEEVES:**

All pipe penetrating through walls, partitions and slabs shall have sleeves having an internal diameter at least 1" larger than the outside diameter of the pipe or of the insulation passing through the sleeves. Pipes passing through interior masonry or concrete floor shall be provided with sleeves of galvanized standard wrought steel pipe flush with walls and ceilings and extending 1" beyond external surface of wall or above finished floor.

On the exposed pipes, passing through floors, wall, partitions plaster furrings, split type nickel plated circular steel plates, 3" larger in outside diameter than the outside diameter of the pipe or pipe covering, shall be provided.

#### **5.06 VALVES AND SPECIALTIES GENERAL:**

Valve and piping specialties shown on drawing are only schematic and all required valves and specialties are not necessarily shown on drawings.

The Contractor shall furnish all shut-off valves, check valves, drain cocks, dirt traps, automatic vents, manual vents, relief valves, strainers and

other specialties as are required for proper operation of the whole system.

All valves of size 2" and larger shall have cast iron body and renewable bronze seal rings, bronze spindles and self-packing feature so that they can be packed while open and under pressure.

All valves smaller than 2" shall be of brass body with threaded connection.

All valves shall be of design and construction to conform to the 1.5 time the maximum design pressure (minimum 150 psi at 250 OF) of the system, but not less than PN-16. All valves shall be provided with epoxy/ powder coating as per standards. The valve rings/ cope shall be made of Teflon.

#### **5-06.1      BALANCING VALVE:**

Circuit setter type valves as specified hereunder shall be used for balancing purpose where shown on drawings.

Globe valves shall be used for balancing purpose where shown on drawings.

Shut-off valves shall be installed on both sides of all equipment. Balancing valves shall be installed where required for flow balancing. Make of valves shall be subject to Engineer's approval.

#### **5-06.2      GATE VALVES:**

Gate valves shall be used for shut-off purposes. All valves shall be designed for packing under pressure when fully open.

#### **5-06.3      RELIEF VALVES:**

Relief valves shall be provided for over-pressure protection. Valves shall have flanged-end connections except for valves 1" and smaller.

#### **5-06.4      CIRCUIT SETTER TYPE VALVES:**

These valves shall be calibrated cast iron with bronze disc valve equipped with readout valves. Each readout valve shall be fitted with an integral check valve designed to protect the user from being wetted when setting up to monitor flow. An integral pointer shall register degree of valve opening. Each balance valve to be constructed with internal seals to prevent leakage around rotating element.

The Contractor shall arrange for the Read-out kit specified by the manufacturer for balancing flow through the valves without any additional cost.

#### **5-06.5 STRAINER:**

Approved strainers shall be fitted in the suction line of pumps, at make-up connections and at each automatic control valve of all apparatus of an automatic character whose proper functioning would be interfered by dirt on the seat, or by scoring of the seat. All strainers shall be pressure tested at works.

All strainers shall be cast iron or bronze bodies of ample strength for the pressure to which they shall be subjected and with suitable flanges or tapings to connect with the piping they serve.

Strainer basket screens shall be stainless steel and shall be of ample strength to prevent collapsing the basket under shock loading. Perforations shall be in accordance with the following table:

Table 1: Strainer Basket Perforations		
Pipe Size	Perforation Size ( inch )	Number of Perforations per sq. in.
All Sizes	3/64	225

Valve dirt blow-out connection suitably piped to the nearest floor drain.

#### **5-07 AIR VENTS:**

Wherever possible, all water pipe work systems shall have manual venting at all high points in the system. Where this is not possible an automatic air vent shall be fitted and connected to the nearest drain. Air vents shall be of the flat type, and of appropriate sizes and working pressures. They shall be fitted with a suitably sized gate type lock shield valve. Manual vents shall be fitted with hose-nozzles.

#### **5-08 FLEXIBLE PIPE CONNECTORS:**

Flexible connectors shall be provided wherever pipes cross building expansion joints, at suction and discharge side of each pump and at connections to chillers, and/or wherever shown on the Drawings. These connectors shall be such that the working pressure, temperature and movement encountered will not be more than 75% of that allowable for the joint. One side of joints must have all piping and/or adjacent equipment adequately anchored. The other side must be supported, aligned and guided so as to allow free movement without imposing unnecessary stresses on the joints.

Connectors shall have integral duck and rubber flanges. They shall have individual solid steel ring reinforced with a carcass of highest grade

woven cotton or acceptable synthetic fiber. Joints shall be constructed to pipeline size and to meet working pressures, conditions and face measurements as designated. They shall be of archetype construction with the number of arches (corrugations) dependent of the projected movement. All joints must be finish- coated with suitable paint to prevent ozone attack. Split back-up (or retaining) rings shall be furnished and fitted.

#### **5-09 THERMAL EXPANSION JOINT:**

Thermal expansion joint bellows shall be fully annealed type 321 stainless steel sheet stock rolled into a tube and seam welded with latest technology in forming the corrugations. The bellows shall be designed to take linear thermal expansion as well as axial load.

The end connections will be fixed flanged type and shall be of stainless steel conforming to ANSI dimensions welded directly to the integral ends of the bellows.

The thermal expansion bellows shall be designed to absorb the thermal expansion of at least +50 mm and working pressure of 16 bars.



## SECTION 6 - INSULATION

### 6-01 GENERAL

**6-01.1** The Contractor shall provide insulation for the services and equipment specified hereafter. Insulation shall be as per following Insulation Schedule.

**6-01.2** Insulation material shall be complete with vapor barrier protection covering and jacketing (where specified), adhesives, insulation tape, duct sealer and/or sealing tape, fastening material and jacketing.

**6-01.3** Identification bands shall be painted on insulation at frequent intervals. Lettering shall be agreed with the Engineer.

All exposed insulation is to be painted to approve colors with one undercoat and one finishing coat of enamel paint. All steel work and other steel equipment specified to be insulated shall be thoroughly wire brushed to the satisfaction of the Engineer and painted with one coat black cold asphalt paint before insulation is applied.

### 6-02 INSULATION SCHEDULE

Insulation Schedule					
Sr. No.	Services	Thick-ness (Inch)	Insulation Type	Vapour Barrier	Protection
a)	Indoor supply/return duct				
i)	Exposed to vision and plant rooms	2	Glass fiber blanket	Reinforced aluminum foil	4-Oz canvas with water proof paint. GL. sheet metal jacketing.
ii)	AHU rooms	2	Glass fiber blanket	Reinforced aluminum foil	4-Oz canvas with water proof paint.
b)	Supply ducts, up to 10 feet from fan discharge and sheet metal air plenums	1	Acoustic liner applied inside with outside insulation as 6-02 (a)	Same as 6-02 (a)	
c)	Chilled/hot water piping, fitting valves & specialties				

Insulation Schedule					
Sr. No.	Services	Thick-ness (Inch)	Insulation Type	Vapour Barrier	Protection
i)	AHU rooms	See 6-02(d)	Sectional glass fiber	Reinforced aluminum foil	4-Oz canvas with water proof paint.
d)	Insulation thickness if not specified above shall be as under:				
i)	Water pipe	Up to 2"  2-1/2" to 5"  6" and above	--	--	1" thick  2" thick  2-1/2" thick
ii)	Valves and other specialties	Thickness shall be same as applied to connected pies.			--

## 6-03 INSULATION MATERIALS

### 6-03.1 Duct Insulation

Insulation material for ducts and sheet metal air plenums shall be flexible glass fiber, 1.0 lbs/cu.ft. Density and maximum conductivity of 0.27 Btu/hr.sq.ft./inch at 75 deg F

### 6-03.2.1 Piping Insulation

Piping insulation shall be sectional glass fiber as specified above in Insulation Schedule, bounded to conform to the pipe. All glass fiber pipe insulation shall have a density at least 4 lb/cu.ft. and maximum conductivity of 0.27 Btu/hr.sq.ft.oF/inch at 75 Deg F.

### 6-03.2.2 Vapour Barrier for Duct and Pipe Insulation

Vapour barrier when specified shall be factory applied flame retardant reinforced aluminum foil, 0.02 mils thick

### 6-03.2.3 Acoustic liner Material

Acoustic liner shall be 1.5 lbs/cu.ft. Density fiber-glass with neoprene scrim on inside surface and thermal conductivity value shall not exceeding 0.27 Btu/hr.sft oF /inch at 75 Deg F. Material shall conform to TIMA Standard AHC-101-1975 with latest revisions

### 6-03.2.4 Canvas

4 Oz or 8 Oz per square yard as specified in Insulation Schedule.

**6-03.2.5 Jacket**

24 gauge (US) galvanized steel sheet or aluminum sheet.

**6-03.2.6 Water & Rat Proof Paint**

As approved by the Engineer.

**6-03.2.7 Wire Netting**

1" hexagonal mesh, 20 gauge (US), galvanized.

**6-03.2.8 Banding**

1/2" x 1/48" galvanized steel or aluminum bands.

**6-03.2.9 Insulation Tape**

Insulation tape for joints shall be of aluminum foil type, 2 inch wide, equivalent to Scotch No.473.

**6-03.2.10 Adhesive**

Adhesive for thermal insulation shall comply with ASTM Standard C 916-79 or equivalent. Adhesive for acoustic liner shall comply TIMA Standard AHC-101-1975 or equivalent.

**6-03.2.11 Duct Sealer**

Sealer for duct joints shall be butyl rubber caulking, weather proof and water resistant, conforming to U.S. Federal Specification TT-S-001657 Type 1, as manufactured by Woodmont Products, INC, USA, or approved equal.

**6-03.2.12 Duct Sealing Tape**

Duct sealing tape shall be 3 inch wide self-adhesive vinyl cloth tape.

**6-04 INSULATION APPLICATION**

**6-04.1 General**

All Thermal and acoustic insulating materials shall be installed as specified hereinafter.

Insulation shall be installed in a smooth, clean, workmanlike manner and joints shall be tight and finished smooth.

All surfaces to be insulated shall be dry and free from loose scale, dirt,

oil or water when insulation is applied. Insulation shall be applied in such a manner that there will be no air circulation within the insulation or between the insulation and the surface to which it is applied.

Surface imperfections in the insulation such as clipped edges, small joints or cracks and small voids, or holes not over 1 inch square shall be filled with like insulating material.

Where a vapour barrier is fixed on site it shall be fixed in such a manner as to obviate the possibility of moisture penetration. It shall be fixed where required by means of an approved type bituminous compound or approved equal for tightness.

Insulation for all services shall only be applied until after testing and approval for tightness obtained from the Engineer, unless otherwise instructed in writing by the Engineer.

Insulation for all services shall be continued through sleeves. The insulation on exposed risers shall extend through the floor. Where insulated pipes are indicated on drawings as embedded in the thickness of walls, the insulation thickness may be reduced to 1 inch only.

Insulation is to be applied where indicated on the drawings or called for in these specifications.

## **SECTION 7-INSPECTION TESTING AND COMMISSIONING**

### **7-01 GENERAL**

- 7-01.1** The whole of the works supplied under this Contract shall be subject to inspection and tests by the Employer and/or Engineer should he so require, during manufacturing erection and after completion. The inspection and tests shall include, but not be limited to, the requirements of this Section of the Specifications.
- 7-01.2** For this purpose the Engineer shall, at all reasonable times, be allowed free and ready access to the Contractor's shop and the shops of his suppliers for the purpose of inspecting the specified equipment components, or any other parts, and obtaining information as to the progress of the work. Failure on the part of the Engineer at this or any other time, to discover or reject materials or work which do not meet specified requirements shall not be deemed an acceptance thereof nor a waiver of defects therein.
- 7-01.3** Specific tests required by the various items of the Plant, Parts, materials and equipment shall be treated in accordance with the specifications of the corresponding clauses of the Specifications.
- 7-01.4** The Contractor shall submit to the Engineer, one month prior to the date of commencement of the balancing and performance tests, six (6) copies of the complete test procedure. The procedure, method and points of measurement as well as the method of calculation shall be approved by the Engineer before any test is carried. Six (6) copies of the test results shall be furnished to the Engineer for his approval.
- 7-01.5** The Contractor shall supply all necessary testing and balancing instruments, which shall include the instruments to carry out any test of any kind on a piece of equipment, apparatus part of system or on a complete system if the Engineer requests such a test for determining specified or guaranteed data, as given in the Specifications or in the Schedule of Equipment. Necessary skilled staff shall be provided by Contractor.
- 7-01.6** Any damage resulting from the test shall be repaired and/or damaged material replaced with intimation to the Engineer, all to the satisfaction of the Engineer, and at no extra cost to the Employer. Skilled staff shall again be provided by the Contractor.
- 7-01.7** In the event of any repair or any adjustment having to be made, other than normal running adjustment, the tests shall be void and shall be recommenced after the adjustment or repairs have been completed.
- 7-01.8** All testing, balancing and final adjustment shall be in accordance with the provision of the applicable ASHRAE Standards, or other approved relevant standards.

**7-01.9** The Contractor shall test a piece of equipment, apparatus, parts of system or a complete system in accordance with method and Schedule of Tests provided by the Engineer to determine Specified or Guaranteed data, given in the Specifications, Schedule of Equipment and Contractor's Data Sheets.

**7-01.10** The contractor shall be responsible for carrying out tests on the material/equipment/installation furnished by him.

**7-02 PRELIMINARY INSPECTION & TESTS**

**7-02.1 General**

All equipment shall be inspected and tested to determine the completeness and general conformance to specified requirements, when operated independent of overall HVAC System, for noise, vibration and electrical data.

**7-02.2 Equipment**

All HVAC equipment shall be inspected for visible damage, operation of moving parts, noise and vibration. Tests shall be carried out with readings of RPM, ampere, voltage, etc. to verify the name plate data.

**7-03 BALANCING AND COMMISSIONING**

**7-03.1 Commissioning**

Upon completion of air balancing and when the whole or part of HVAC System is substantially complete and ready for operation as specified, the Contractor shall carry out Commissioning. Appropriate Seasons are not necessary and the purpose of the commissioning is to start-up the whole or part of HVAC System with manual and/or automatic controls and to put the whole or part of HVAC system in operation to make it ready to provide cooling and/or heating.

**7-04 PERFORMANCE TESTS**

Each equipment of HVAC system shall be tested for performance after successful completion of Commissioning of that equipment to determine the Specified and Guaranteed Data at Specified Operating Conditions as shown in Equipment Schedule and Specifications. These tests shall be carried out in appropriate seasons.

The test data shall not deviate by more than five percent (5%) from the guaranteed capacity data.

Should any part of the apparatus or system fail to meet the specification requirements, it shall be adjusted, repaired or replaced to the satisfaction

of the Engineer by the Contractor at his own cost. The complete Performance Test shall than be repeated.

#### **7-05 RELIABILITY TRIAL TEST**

After completing the above Preliminary Tests, adjustments, Commissioning and Performance Tests, the Contractor shall carry out Reliability Trial Tests for the whole or part of system.

The trial tests, both for summer and winter, shall last for a period of 5 consecutive days during which time the whole or part of the system, as the case may be, shall operate continuously without major adjustment or repair to the satisfaction of the Engineer.

Should any part of the apparatus or system fail to operate continuously as specified, it shall be adjusted, repaired or replaced to the satisfaction of the Engineer and the Reliability Trial Tests shall be repeated for another 5 consecutive days for continuous operation without major adjustment or repair.

## **EQUIPMENT SCHEDULE**



**REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE**

**AIR HANDLING UNITS (GENERAL)**

EQUIPMENT SCHEDULE  
SHEET 01 OF 02

CODE	TYPE	SECTION CONFIGURATION	SUPPLY FAN			OUTDOOR AIR (OA)  (CFM)	RETURN AIR (RA)  (CFM)	DISC ARR.	CONNECTION SIDE (FACING SUPPLY END) SEE NOTE 3			REFER TO SCHEDULE OF CCHC.  CCHC NO.	REF TO SCH. MXB.  MXB. NO.	OPERATING WT.INCL. ALL SECTIONS LBS
			CFM	EXT SP (IN)	MAX OV. (FPM)				POWER	COIL	FILTER REMOVAL			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
AHU-1 (S-1)	DOUBLE SKIN SINGLE ZONE, HDT, FLOOR MOUNTED,	MXB-FF-CCHC-FAN	6345	1.5	2000	952	5393	TD	-	-	-	1	1	
AHU-2 (S-4)	DOUBLE SKIN SINGLE ZONE, HDT, FLOOR MOUNTED,	MXB-FF-CCHC-FAN	7086	1.5	2000	921	6165	TD	-	-	-	2	2	
AHU-3 (F-3)	DOUBLE SKIN SINGLE ZONE, HDT, FLOOR MOUNTED,	MXB-FF-CCHC-FAN	10455	1.5	2000	1150	9305	TD	-	-	-	1	1	
AHU-4 (F-4)	DOUBLE SKIN SINGLE ZONE, HDT, FLOOR MOUNTED,	MXB-FF-CCHC-FAN	11055	1.5	2000	995	10060	TD	-	-	-	2	2	
AHU-5 (G-2)	DOUBLE SKIN SINGLE ZONE, HDT, FLOOR MOUNTED,	MXB-FF-CCHC-FAN	7275	1.5	2000	946	6329	TD	-	-	-	1	1	

**LEGEND:**

CFM = CUBIC FEET/MINUTE  
HDT = HORIZONTAL DRAW THRU  
TH = TOP HORIZONTAL  
UB = UP BLAST  
VDT = VERTICAL DRAW THRU  
OV = OUTLET VELOCITY  
FD = FRONT DISCHARGE  
TD = TOP DISCHARGE

CC = COOLING- COIL  
HUM = HUMIDIFIER  
MXB = MIXING BOX  
EC = ELECTRIC HEATING COIL  
F.F = FLAT FILTER BOX WITH HIGH VELOCITY FILTER  
FPM = FEET PER MINUTE  
WS = WATER SPRAY (NOZZLE) WITH REVERSE OSMOSIS SYSTEM  
S = STEAM HUMIDIFIER

**NOTES:**

- FAN SHOULD BE SELECTED FOR TOTAL SP= ESP+AHU SP  
+ FILTER PRESSURE LOSS (AVG. OF MFR RECOMMENDED  
DIRTY & CLEAN FILTER)
- MOTOR HP SHALL BE AT LEAST 120 % OF REQUIRED BHP.
- ALL AHU'S SHALL BE SUPPLIED WITH FACTORY ASSEMBLED VFD'S.

# REPLACEMENT, SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIVE (5) Nos. AIR HANDLING UNITS AT NESPAK HOUSE, LAHORE

## AIR HANDLING UNITS (COILS)

### EQUIPMENT SCHEDULES

SHEET 02 OF 02

CODE	INSTALLED IN	MAX. COIL FV FPM	COOLING (AIR SIDE)				COOLING (WATER SIDE)				HEATING (AIR SIDE)	HEATING (WATER SIDE)			
			TH (MBH)	EDB deg F	EWB deg F	SH (MBH)	EWT deg F	LWT deg F	MAX.FLOW RATE USGPM	MAX. PD FT.WG	TH (MBH)	EWT deg F	LWT deg F	MAX.FLOW RATE USGPM	MAX. PD FT.WG
1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
CCHC-1	AHU-1	500	227.0	76.9	65.0	193.0	44.0	54	45	20	102.2	140	-	10	20
CCHC-2	AHU-2	500	236.0	76.9	65.0	200.6	44.0	54	47	20	106.2	140	-	11	20
CCHC-3	AHU-3	500	293.0	76.9	65.0	249.1	44.0	54	59	20	131.9	140	-	13	20
CCHC-4	AHU-4	500	299.0	76.9	65.0	254.2	44.0	54	60	20	134.6	140	-	13	20
CCHC-5	AHU-5	500	233.0	76.9	65.0	198.1	44.0	54	47	20	104.9	140	-	10	20

#### LEGEND:

CCHC COMBINATION COOLING-HEATING  
COIL  
CFM CUBIC FEET PER MINUTE  
FPM FEET PER MINUTE  
SH COIL SENSIBLE HEAT  
TH COIL TOTAL HEAT  
USGPM UNITED STATES GALLON PER MINUTE

EAT ENTERING AIR TEMPERATURE  
EDB ENTERING DRY BULB TEMPERATURE  
EWB ENTERING WET BULB TEMPERATURE  
EWT ENTERING WATER TEMPERATURE  
LAT LEAVING AIR TEMPERATURE  
LWT LEAVING WATER TEMPERATURE

#### NOTES:

1. THE COIL ROWS SHALL BE MAXIMUM 8 NOS.