



UNIVERSITY OF AGRICULTURE, FAISALABAD

SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM FOR NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD



BIDDING DOCUMENTS

VOLUME – IA

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

October 2020



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UNIVERSITY OF AGRICULTURE, FAISALABAD

SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF HEATING, VENTILATION AND AIR CONDITIONING (HVAC) WORKS FOR NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD

CONTENTS OF BIDDING DOCUMENTS

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VOLUME - IB

- Letter of Price Bid
- Schedules (M&N) to Bid
- Schedule of Prices

VOLUME - II

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

VOLUME - III

- Drawings

INVITATION TO BID

SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM FOR NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD

Date: _____

Bid Reference No.: _____

1. University of Agriculture, Faisalabad (the "Employer") invites sealed Bids through "Single Stage Two Envelope Bidding Procedure" (as specified in the Punjab Procurement Rules 2014) from eligible firms licensed by Pakistan Engineering Council in category C-05 (ME-01) or higher, registered with Income Tax and Sales Tax Departments and who are on Active Tax Payers List of Federal Board of Revenue for "Supply, Installation, Testing & Commissioning of Heating, Ventilation and Air Conditioning (HVAC) System for New Library Building at University Of Agriculture, Faisalabad."
2. Bidding Documents containing detailed terms and conditions, etc; are available from the office of the Employer at the address given hereunder. Price of the Bidding Documents is PKR 2,000 (Rupees two thousand only) which may be purchased by an interested Bidder on submission of a written application to the above office. The Bidding Documents can also be downloaded from websites of University of Agriculture, Faisalabad (www.uaf.edu.pk) and PPRA Punjab (www.ppra.punjab.gov.pk) free of cost.
3. The Bids prepared in accordance with instructions in the Bidding Documents must reach Incharge Tender Cell on or before 11:00AM hours on November 5th, 2020. All Price Bids must be accompanied by a Bid Security of amount @ 3% of Quoted Bid by the Bidder in favor of The Treasurer, UAF in the form of Bank CDR or Pay Order.
4. Technical Bids will be opened on the same day at 11:30AM hours, in the presence of bidders' representatives who choose to attend at the same address. Price Bids of the Bidders whose Technical Bids are determined substantially responsive, will be opened at a later stage in the presence of the Bidders representatives who choose to attend, at the time which will be notified in advance.

Executive Engineer,
ECD-P,
University of Agriculture,
Faisalabad
Ph: 041-9200897

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Standard Forms include the followings

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- Form of Bid Security (Bank Guarantee)
- Form of Contract Agreement
- Form of Performance Security (Bank Guarantee)
- Form of Bank Guarantee for Advance Payment

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CA-1
PS-1
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INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 Scope of Bid and Source of Funds

1.1 Scope of Bid

University of Agriculture, Faisalabad (which expression shall include the successor, legal representatives and permitted assignees) hereinafter called "the Employer" wishes to receive Bids for Supply, Installation, Testing & Commissioning for Heating, Ventilation and Air Conditioning (HVAC) System of New Library Building at University of Agriculture, Faisalabad.

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 Punjab Public Procurement Rules, 2014.

1.2 Source of Funds

The Project shall be financed through funding provided by Higher Education Commission (HEC).

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-05 (ME-01)** or higher;
- b) registered with Income Tax and Sales Tax Departments and is on Active Taxpayers List of Federal Board of Revenue (FBR);
- c) the firms or companies dealing in the similar works and which have not, been blacklisted or in litigation with any government department, autonomous body or any other organization. The bidder will provide this statement on a stamp paper of Rs. 100/-.

2.2 The eligible Bidders shall meet the qualification criteria as per Sub-Clause IB 13.3.

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) – (Not Used)
2. Letter of Technical 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: List of Construction Plant and Equipment
 - x) Schedule J: Bidder's Equipment Data
 - xi) Schedule K: Essential and Recommended Spare Parts
 - xii) Schedule L: Tools, Oils & Greases (Not Used)
3. Letter of Price Bid & following Schedules to Bid
 - i) Schedule M: Integrity Pact
 - ii) Schedule N: Estimated Progress Payments
4. Schedule of Prices
5. Preamble to Conditions of Contract
6. General Conditions of Contract
7. Particular Conditions of Contract
8. 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

- 9. Specifications - Special Provisions
- 10. Specifications - Technical Provisions
- 11. Drawings

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 Consultants / Engineer's Representative in writing or by fax at the address:

a) The Employer:

University of Agriculture, Faisalabad

The Employer's Representative:

Executive Engineer,
ECD-P,
University of Agriculture, Faisalabad
Ph: 041-9200897

b) The Engineer:

National Engineering Services Pakistan (Pvt.) Limited
1-C, Block-N, Model Town Extension, Lahore 54700, Pakistan
Ph: 92-42-99090000
Fax: 92-42-99231950

or any Person/firm/authority replaced by the Employer.

The Consultants/Engineer's Representative:

Project Manager,
Building Services Division
IEEEP Building, 17-C-1 Civic Centre, Faisal Town, Lahore
Ph: 92-42-99232261-74 (Ext. 112)
Fax: 92-42-9232275

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 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,
 - (iii) Appendix C [*Domestic Goods (value added in Pakistan)*] to ITB, (Not Used);

- (d) Undertaking on non-judicial stamp paper that acceptable Bid Security is accompanied with Price Bid. The value of stamp paper shall be PKR 50 or more.
 - (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) 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;
 - (h) 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
 - (i) Any other documents prescribed in Particular Conditions of Contract or Technical Provisions to be submitted with the Technical Bid; and
 - (j) Signed and stamped Volume IA, Volume II and Volume III.
- (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) Bid Security furnished @3% in favor of The Treasurer, UAF in accordance with Clause IB. 15;
 - (c) Schedules M & N to Bid duly filled and signed, in accordance with the instructions contained therein;
 - (d) Schedule of Prices completed in accordance with Clauses IB.11 and IB.12; and
 - (e) 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 N, 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/Consultant/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.

- 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, satisfactory to the Employer of his capability and adequacy of resources to carry out the Contract effectively. Bid shall include the following information which shall include but not limited to:
- (i) Evidence of access to financial resources;
 - (ii) Financial predictions for the current year and the two following years including the effect of known commitments;
 - (iii) Current Contract commitments;
 - (iv) Current litigation information; and
 - (v) Availability of critical equipment, if any.
- 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 and the bidders shall have to meet the minimum qualifying criteria as mentioned herein below;
- a) Copies of original documents defining the constitution or legal status, place of registration and principal place of business written power of attorney of the signatory of the Bid to commit the Bidder.

- b) Information regarding any current litigation in which the Bidder is involved, the parties concerned, and disputed amount
 - c) Bidder must possess and provide evidence of Completed minimum five (05) projects of Supply, Installation, Testing and Commissioning, of HVAC Works of similar nature and volume i.e. HVAC Works of 150 TR or above over the last eight years.
 - e) Minimum Liquid Assets: The Bidder must have cash liquidity of Rs. 30 Million (Documentary Evidence to be furnished in the shape of bank statement showing Rs. 30 Million at least on any single day during the last 6 month period preceding the date of Tender Notice.
 - f) Reports on the financial soundness of the Bidder including profit and loss statements, balance sheets and auditor's reports for the past three years, and annual turn. The annual turnover shall be at least Rs. 70 Million.
 - g) The minimum qualifications and experience of key personnel proposed for administration and execution of the Contract, both on and off site shall be as follows. The relevant CVs and Degrees shall be provided as evidence.
 - At least 01 no. of B.Sc. Engineer with relevant experience of HVAC Works equal to minimum three (03) years.
 - Minimum 02 no. HVAC Technicians having similar HVAC Works experience of four (04) years or above.
 - h) Proposal of work methods and program, in sufficient detail to demonstrate the adequacy of the Bidder's proposals to meet the technical specifications and the completion time; and
 - i) Equipment shall be from authorized distributor from Manufacturer as mentioned in Schedule H to Bid. Provide Authorization Letter from the principal manufacturer.
- 13.4 The bidder shall furnish documentary evidence of qualification on the Form Appendix B "Evidence of Bidder's Capability" to ITBs.
- 13.5 Bids submitted by a joint venture of two or more firms as partners is not allowed.

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) Standard Certification Details
 - (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 his Price Bid, a Bid Security @ 3% of total quoted bid in favor of The Treasurer, UAF in shape of CDR or a Pay Order issued by a scheduled bank in Pakistan.
- 15.2 The Bid Security shall be, at the option of the Bidder, in the form of CDR or a Pay Order issued by a Scheduled Bank in Pakistan in favour of The Treasurer, UAF 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 The Bid securities of unsuccessful Bidders 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 180 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 N) 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 COPY) and Price Bid (ORIGINAL and 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, the ORIGINAL and COPY of "Technical Bid" and the ORIGINAL and 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 of Incharge Tender Cell, UAF.
- 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 Incharge Tender Cell, UAF 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 the Consultants/Employer's Representative 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, 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) Presence or absence of Bid Security;
 - (d) The Bid Prices, including any discounts; and
 - (e) 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 Consultant/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 Technical Bids

24.1 Prior to the detailed evaluation of the Technical/Price Bids, pursuant to Clause IB.26,

- (a) the Employer/Consultants/Engineer's Representative 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/Manufacturer 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) Price Bid is not accompanied with Bid Security and/or Technical Bid is not accompanied with requisite undertaking on non-judicial stamp paper,
 - (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/manufacturer does not meet the requisite qualification criteria as per clause IB.13,
 - (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/stamped Letter of Technical Bid and/or Letter of Price Bids
 - (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 Schedule of Prices Summary,

the amounts stated in the Letter of Price Bid will be corrected by the Consultants/Engineer's Representative in accordance with Corrected Schedule of 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 Consultants/Engineer's Representative 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 Representative 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's representative 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

- 25.1 Not Used.

IB.26 Detailed Evaluation of Bids

- 26.1 The Employer/Consultants/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 works.
- (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 Design and Goods offered by the bidder comply with the Technical Provisions/Specifications of the Bidding Documents. For this purpose, the bidder's data submitted with the bid will compare with the specific work data prescribed by the Employer and technical features/criteria of the Goods detailed in the Technical Provisions/Specifications. 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 Documents. It is expected that no major deviation/stipulation shall be taken by the bidders.

The consultant will submit his evaluation report with recommendation to the Client.

(e) Evaluated Bid Price

In evaluating the bids, the Employer will determine for each bid in addition to the Bid Price, any correction for errors pursuant to Sub-Clause 24.2, to determine the Evaluated Bid Price:

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 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 item. In case of non-availability of price from other bidders, the price will be estimated.

In case of omission in the scope of the 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 any deficiency resulting from any quantifiable variations and deviations from the Bid 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 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.

IB.28 Process to be Confidential

28. 1 Subject to Clause 23 heretofore, no Bidder shall contact Employer and/or Consultant/Engineer's Representative on any matter relating to its Bid from the time of the Bid opening to the time the Bid evaluation result is announced by the Employer. The evaluation result shall be announced at least ten (10) 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 Consultant/Engineer's 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 fifteen (15) days after the announcement of the 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

Not Used.

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 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 Schedule of Prices 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 Bidder in consideration of the execution and completion of the Works by the Bidder 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 (5% of the Agreement Amount) 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 Employer will send to the successful Bidder the Form of Contract Agreement provided in the Bidding Documents, duly filled in and incorporating all agreements between the parties for signing and return it to the Employer.
- 35.2 The formal Agreement between the Employer and the successful Bidder shall be executed within seven (07) days of the receipt of such Form of Contract Agreement by the successful Bidder from the Employer.

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 and of the rates and prices entered in the Schedule of Prices. Except insofar as it is otherwise expressly provided in the Contract, the rates and prices entered in the Schedule of Prices 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, Islamabad, Pakistan.
- (b) Inquiries on customs duties and other import taxes, to the concerned authorities of Customs and Excise Department.
- (i) Information regarding port clearance facilities, loading and unloading facilities, storage facilities, transportation facilities and congestion at Pakistan seaports.
- (a) 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-M 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

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

[Note: Bidders to provide the following information with the bid separately and indicate herein its references where this information is available.]

Sr.No.	Information to be Supplied	Bid References
1.	Name of bidder, business address and country of incorporation.	
2.	Type of firm whether individually owned, partnership, corporation or joint venture and the names of its owners or partners.	
3.	Affidavit on non-judicial stamp paper stating that the firm has not been blacklisted from any Government/Semi Government Agency/Department till date.	
4.	license by Pakistan Engineering Council (PEC) in category C-05 (ME-01) or higher;	
5.	Reference lists of similar works done as mentioned in IB 13.3 (c) by the bidder in its country and abroad indicating the name of customer, description and quantity of product, year of supply and the approximate value.	
6.	Minimum Liquid Assets: The Bidder must have cash liquidity of Rs. 30 Million (Documentary Evidence to be furnished in the shape of bank statement showing Rs. 30 Million at least on any single day during the last 6 month period preceding the date of Tender Notice.)	
7.	The annual reports or qualification statements giving general description of the firm, sort of business carried out, balance sheets, profit and loss statements, turn over and business done by the firm, duly authenticated, for the last three (3) years. Audited Balance Sheets for the preceding 3 years and projected assets and liabilities for the next 2 years shall be provided.	
8.	Names, qualifications and experience of the key technical personnel as mentioned in the IB 13.3 (g).	

9. Proposal of work methods and program, in sufficient detail to demonstrate the adequacy of the Bidder's proposals to meet the technical specifications and the completion time.
10. Information regarding any current litigation in which the Bidder is involved, the parties concerned, and disputed amount;

Domestic Goods (Value added in Pakistan)

NOT USED

**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: List of Construction Plant and Equipment
- Schedule J: Bidder's Equipment Data
- Schedule K: Essential and Recommended Spare Parts
- Schedule L: Tools, Oils & Greases

LETTER OF TECHNICAL BID

Bid Reference No. _____

Supply, Installation, Testing & Commissioning for Heating, Ventilation and Air Conditioning (HVAC) Works of New Library Building at University of Agriculture, Faisalabad.

To:

Executive Engineer,
ECD-P,
University of Agriculture, Faisalabad
Ph: 041-9200897

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Drawings, 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 hereto form part of this Bid.
3. Undertaking of acceptable Bid Security to be accompanied with Price Bid is enclosed.
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 Eighty (180) 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.

Dated this _____ day of _____ 2020

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 _____

SPECIFIC WORKS DATA

SPECIFIC WORK DATA HAS BEEN PRESCRIBED IN
VOLUME - II OF SPECIFICATIONS

Initials of Signatory 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: _____

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, construction of civil works, erection, testing and commissioning of HVAC Works to be supplied under the Contract.

Initials of Signatory to Bid: _____

DEVIATIONS
FROM
TECHNICAL PROVISIONS

Not Used

Initials of Signatory to Bid: _____

**DEVIATIONS
FROM
CONTRACTUAL COMMERCIAL CONDITIONS**

Not Used

Initials of Signatory 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: _____

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
 - Site Superintendent
 - Supervising Engineer
 - Plant Erectors
 - Construction Supervisors
 - Other Key Staff

Initials of Signatory to Bid: _____

LIST OF RECOMMENDED MANUFACTURERS

The Bidder should note that Equipment/materials from the following recommended manufacturers or approved equivalent shall be allowed to be used on this Project provided their products meet the specified requirements given in the Bidding Documents and in the notes given hereunder. All equipment shall be supplied from Manufacturer's own Plant/Facility.

All Major HVAC equipment shall be supplied from manufacturer with international experience of 20+ years and local experience of 05 years and have sole/authorized Distribution in Pakistan. The equipment/ material manufacturer shall also have successful experience of 10 or more local projects and 05 years or more successful experience of O&M through same authorized Distributor. All approved equivalent material/equipment shall fulfill the hereinbelow mentioned criteria.

SR. NO.	EQUIPMENT/ MATERIAL	RECOMMENDED MANUFACTURER/ SUPPLIER	COUNTRY (Origin, Manufacturing, Assembly, Testing & Supply)
1.	VRF Units	TOSHIBA DAIKIN HITACHI TRANE SAMSUNG GENERAL HISENSE LG GREE CARRIER MEDIA YORK HAIER MITSUBISHI McQUAY STULZ	As per Manufacturing Facility of Manufacturer/Supplier for EUROVENT/AHRI/SASO/JIS Certified Models
2.	Propeller Fans	PAK FANS, CLIMAX, MILLAT, LAHORE, ROYAL	PAKISTAN

SCHEDULE - H TO BID

3.	Copper pipe	MULLER WEDNESBURY CRANE GOLDEN DRAGON HALCOR	USA/EUROPE/ KOREA/CHINA
4.	PVC Pipe	BETA DADEX TURKPLAST MASTER	PAKISTAN
5.	Duct/pipe insulation	KIMMCO AFICO, ODE, OWENS CORNING, KNAUF, ARMAFLEX, DURKFLEX, AEROFOAM, ISOPIPE	KUWAIT / SAUDI ARABIA/ TURKEY / EUROPE / USA
6.	G.I. Sheets	PAK STEEL MILLS KARACHI, ILL, NIPPON	PAKISTAN / JAPAN
7.	Air Inlets/Outlets	MEHRAN, THERMEC, AIR CONTROL STEELCRAFT, SA INDUSTRIES, PAK PRIEMER, EAP	PAKISTAN
8.	Paint	ICI, NIPPON, BERGER	PAKISTAN
9.	Fasteners, Hanging Rods, Rawal Plugs etc.	FISHER, HILTI, SPIT, SIKLA INKA	AS PER MANUFACTURER'S FACILITY
10.	White Glue	FOSTER	USA/EUROPE
11.	Duct Sealant	DOW CORNING ZAHBIA	USA/TURKEY
12.	Low Voltage Panel, ACP	SA ELECTRIC CONCERN, SIEMENS, ELMETEC, PEL, BILAL SWITCHGEAR MESI	PAKISTAN

SCHEDULE - H TO BID

13.	LV and Control Cables and Wires (600/1000V)	PAKISTAN CABLES PIONEER CABLES NEWAGE CABLES FAST CABLES	PAKISTAN
14.	PVC Conduit and Accessories	BETA POPULAR GALCO	PAKISTAN
15.	Steel Conduit, Cable Trays and Accessories	HILALL INDUSTRIES, IIL, JAMAL, PIONEER, NIB ASHRAF INDUSTRIES	PAKISTAN
16.	MCCBs, MCB and Magnetic Contactors	SCHNEIDER, SIEMENS ABB, LEGRAND, TERASAKI PANASONIC GREEN POWER TELEMECANIQUE	FRANCE/GERMANY/ ITALY/JAPAN
17.	ACBs, ELCBs	ABB, SIEMENS, SCHNEIDER, TERASAKI, LEGRAND	FRANCE/ITALY/JAPAN
18.	Relays and Timers	FINDER INTER	ITALY/TURKEY
19.	PFI Relays	NOKIAN ENTES	FINLAND/TURKEY
20.	Voltmeters/Ammeters	CIRCULOR REVALCO INTER ENTES	ITALY/TURKEY
21.	Current Transformer/ Voltage Transformer	CIRCULOR REVALCO FICO	ITALY/PAKISTAN
22.	Selector Switches/ Push Button	LEGRAND KRAUS & NAIMER ABB, BOSCH, CLIPSAL REVALCO	SWEDEN/FRANCE/ ITALY

SCHEDULE - H TO BID

23.	Indication Lamps	LEGRAND BRETER ABB TELEMECANIQUE	FRANCE/ITALY
24.	Terminal Blocks	LEGRAND ABB PHOENIX CABOUR	FRANCE/ITALY/JAPAN
25.	Programmable Logic Controller	SEIMENS, ABB	GERMANY/ITALY
26.	Photoelectric EE Switch	NATIONAL PHOTOELECTRIC EE SWITCHES	JAPAN
27.	LV Change over Switch Capacitors	SOCOMEK, ABB, AMBER, NOKIAN, DUCATI	FRANCE/GERMANY/ JAPAN/PAKISTAN
28.	Isolators Switches	BRETTER SIEMENS	ITALY GERMANY

NOTE:

1. All Equipment/Material Must Be Supplied from Authorized/Sole Distributors.
2. Manufacturers Authorization Certificate in Original Must Be Provided.
3. Compliance to The Mentioned Country (Origin, Manufacturing, Assembly, Testing & Supply) For Offered/Supplied Equipment Is Mandatory
4. Any Approved Equal Brand Other Than the Above-Mentioned Recommended Manufacturer, the bidder Shall Submit the Following Additional Information in Addition to Prequalification Information with The Technical Bid.
 - A. Compliance of Equipment Parts and Their Origin as Mentioned in Technical Specification.
 - B. Compliance Statement of Technical Specification/ Standards from The Equipment Manufacturer.
 - C. Comparison of Each Part/System of Proposed Brand with One of The Brands Provided in Suggested Manufacturer's List Along with The Test Reports.
 - D. Approved Equal Brand Shall Clearly Be Mentioned in The Technical Bid Along with Above Said Information.

LIST OF CONSTRUCTION PLANT AND EQUIPMENT

As a pre-requisite to this bid we undertake to furnish an Electric Power Generating set as and when required at site. The generating set will be in perfect working condition. The generating power of the set shall be sufficient to operate our plant and equipment during construction at Site. Should the set fail to meet the required demand at Site or fail to function or operate, that shall immediately be replaced with other generating set/s to the satisfaction of the Engineer as well as the Employer. In addition to the generating set the following Construction Plant and Equipment owned and hired will be furnished and maintained by us and shown to the Engineer on demand at the Site for fulfillment of the Contract.

Construction Plant and Equipment:

Quantities	Name of Equipment including the name of manufacturer	Description, size and capacity	Whether new or used and Date of Manufacture	Value of each item of equipment and rate description	Date of arrival at Site	Hire rate for Day work per item per Hour
1	2	3	4	5	6	7

(A) Owned Equipment

(B) Hired Equipment

The above hire rates under Column 7 include fuels and consumable stores, overhead charges, profit maintenance servicing and all other costs, expenses and charges.

Initials of Signatory to Bid: _____

BIDDER'S EQUIPMENT DATA

Note: Data provided hereunder will be scrutinized for general conformity with requirements of Bidding Documents. Acceptance of Bid will not mean acceptance of these data. The Contractor will have to submit detailed equipment submittals for approval of the Engineer in accordance with Special Provisions of Specifications later after award of Contract. Failure to complete these forms may make the Bid non-responsive.

Typewritten technical data on loose sheets if submitted by the Bidder will not be considered and will be simply ignored.

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. Model Number and Technical Specifications mentioned in Technical Bid are considered for reference only. The Bidder/Contractor will submit Technical Submittal of the proposed model after award of work with full compliance of Bidding Documents for the Engineer's review and approval. No reference model and technical specifications accompanied with the Bid are supposed to be final until Engineer's approval of the Technical Submittal.

Variable Refrigerant Flow (VRF) Units (Eurovent/AHRI/Saso/JIS)

- | | | |
|----|------------------------------------|-------|
| 1. | Make | _____ |
| 2. | Country of Manufacture | _____ |
| 3. | Authorized Distributor in Pakistan | _____ |
| 4. | Model Series | _____ |

Initials of Signatory to Bid: _____

RECOMMENDED SPARE PARTS

1. Recommended spare parts are those considered by the Bidder to be necessary for a normal operation of three (3) years beyond Defects Liability Period.
2. Firm price valid for twenty (20) months from the latest date of opening of Bids.
3. Delivery period after receipt of order shall be three (3) months.

(Bidder to complete Description and Pricing in Part-I and Part-II attached.)

Initials of Signatory to Bid: _____

RECOMMENDED SPARE PARTS

I. LOCAL

Sr. No.	Description	For Equipment (Give Equip. Code)	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1	2	3	4	5	6	7

Total: _____

II. IMPORTED

Sr. No.	Description	For Equipment (Give Equip. Code)	Unit	Qty.	Currency	Unit Rate	Amount (Rs.)
1	2	3	4	5	6A	6B	7

Total: _____

Initials of Signatory to Bid: _____

TOOLS, OILS & GREASES

Not Used

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 comprise two parts:

- (a) General Conditions of Contract**
- (b) Particular Conditions of Contract**

Over the years, a number of “model” General Conditions of Contract have evolved. The one used in these Standard Bidding Documents was prepared by the International Federation of Consulting Engineers (Federation Internationale des Ingenieurs-Conseils, or FIDIC), and is commonly known as the FIDIC Conditions of Contract. (The used version is the 1987 edition, reprinted in 1988 with editorial amendments.)

The FIDIC Conditions of Contract have been prepared for an ad measurement (unit price or unit rate) type of contract, and cannot be used without major modifications for other types of contract, such as lump sum, turnkey, or target cost contracts.

The standard text of the General Conditions of Contract chosen must be retained intact to facilitate its reading and interpretation by bidders and its review by the Employer. Any amendments and additions to the General Conditions, specific to the contract in hand, should be introduced in the Particular Conditions of Contract.

The use of standard conditions of contract for all electrical/mechanical Works will ensure comprehensiveness of coverage, better balance of rights or obligations between Employer and Contractor, general acceptability of its provisions, and savings in time and cost for bid preparation and review, leading to more economic prices.

The FIDIC Conditions of Contract are copyrighted and may not be copied, faxed, or reproduced. Without taking any responsibility of its being accurate, Pakistan Engineering Council with prior consent of FIDIC Secretariat, has reproduced herein the FIDIC General Conditions of Contract for reference purpose only which cannot be used by the users for preparing their bidding documents. The bidding document may include a purchased copy, the cost of which can be retrieved as part of the selling price of the bidding document. Alternatively, the FIDIC Conditions of Contract can be referred to in the bidding documents, and the bidders are advised to obtain copies directly from FIDIC.*

“Copies of the FIDIC Conditions of Contract can be obtained from:

FIDIC Secretariat
P.O. Box 86
1000 Lausanne 12
Switzerland (fidic.pub@fidic.org – FIDIC.org/bookshop)

PREAMBLE
TO
CONDITIONS OF CONTRACT

PREAMBLE TO CONDITIONS OF CONTRACT

Commencement Date 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.

Defects Liability Period Sub-Clause 1.1.11
The Defects Liability Period is Three hundred and sixty five (365) calendar days after the date of issuance of the Taking Over Certificate, but subject to extension as provided under Sub-Clause 30.4.

The Employer Sub-Clause 1.1.12

University of Agriculture, Faisalabad

Employer's Representative:
Executive Engineer,
ECD-P,
University of Agriculture, Faisalabad
Ph: 041-9200897

The Engineer Sub-Clause 1.1.15

National Engineering Services Pakistan (Pvt.) Limited
1-C, Block-N, Model Town Extension, Lahore 54700, Pakistan
Ph: 92-42-99090000
Fax: 92-42-99231950

or any Person/firm/authority replaced by the Employer

The Engineer's Representative Sub-Clause 1.1.16
Project Manager,
Building Services Division
IEEEP Building, C-1 Civic Centre, Faisal Town, Lahore
Ph: 92-42-99232261-74 (Ext. 112)
Fax: 92-42-9232275

Time for Completion Sub-Clause 1.1.35.
The Time for Completion for whole of the Works is One Hundred and Fifty (150) calendar days from the Commencement Date.

Warranty Period Sub-Clause 1.1.40.
The Warranty Period is Three hundred and sixty five (365) calendar days after issuance of Taking Over Certificate.

Engineer's Duties & Authorities Sub-Clause 2.1
Amount of Variation Order in emergency is upto $\pm 10\%$ of the

Contract Price.

Confirmation in Sub-Clause 2.6

Writing (i) If the Contractor shall require the confirmation it shall be notified to the Engineer within fourteen (14) days.

(ii) The Engineer shall confirm the decision/instruction within fourteen (14) days.

Ruling Language Sub-Clause 5.1.

The version in English language (ruling language) shall prevail.

Day to Day Sub-Clause 5.2.

Communications The language for day to day communications is English.

As-Built Sub-Clause 6.10

Drawings As-Built Drawings shall be provided to the Engineer within fourteen (14) days from the date of issuance of Taking Over Certificate.

General Sub-Clause 8.1

Obligations No Employer's supplied equipment shall be provided.

Programme to be Sub-Clause 12.1.

Furnished 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.

Electricity Water, Sub-Clause 14.3.

Gas and Other Supplies on the Site are as described in the Particular Conditions of
Services Contract/Special Provisions.

Employer's Sub-Clause 14.4.

Equipment 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.

Working Hours Sub-Clause 18.3.

The normal working hours on the Site shall conform to applicable labor laws and existing customs of Pakistan.

Place of Project Sub-Clause 25.1

(i) Place of the Project is Faisalabad.

(ii) Period of Completion for whole of the Works is One Hundred and Fifty (150) calendar days from the Commencement Date.

Earlier Sub-Clause 26.3

Completion (i) No extra sum as Bonus will be paid to the Contractor for earlier completion of the Works.

Delay in Sub-Clause 27.1.

Completion Failure to meet the Time for Completion entitles the Employer to deduct from the Contract Price as follows:

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 Sub-Clause 33.1.

Payment 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 thirty (30) calendar 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 Sub-Clause 35.1.

Foreign No payment shall be made in foreign currencies.

Currencies

Insurance of Sub-Clause 43.1.

Works 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)

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.

Labour, Materials Sub-Clause 47.1.

and Transport 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.

Notice to Sub-Clause 49.2.

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

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 Faisalabad, 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 Faisalabad, 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 “Supply, Installation, Testing & Commissioning for Heating, Ventilation and Air Conditioning (HVAC) System of New Library Building at University of Agriculture, Faisalabad.”

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. But Engineer will confirm the completion and handing over of project."

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. However Engineer is also responsible for his approval, reviews, inspection and verifications etc.

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. Equipment Schedule;
11. The Drawings; and
12. 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 five (5%) percent of the Contract Price in the currency of the Contract in the form of Bank Guarantee from any Scheduled Bank in Pakistan”.

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 three (03) 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:

“The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site with Cost. The Contractor shall at his own cost provide any apparatus necessary for such use. In case of emergency, the Contractor shall furnish an Electric Power Generating set at Site.”

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 training of such numbers of University Employees as nominated by UAF at the Site so that UAF dedicated staff will become familiar of Operating and Troubleshooting of Plant.

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

Sub-Clause 17.4 Consents and Way Leaves

The Sub-Clause 17.4 is deleted and substituted by the following:

“The Employer shall issue permissions, letters, certificates and provide such other assistance to the Contractor for his obtaining permits-to-work, way leaves and approvals from any other department/authority and right of way from private owners, if required. The Contractor will bear the cost of logistics, fees, etc., for such activities. The Employer, will reimburse the Contractor only the payments made by him in respect of any land compensation for obtaining such way leaves, required for the Works.”

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 Factory Acceptance Tests

The following Sub-Clause 20.6 is added:

“The Employer and Engineer/Engineer’s Representative shall witness all the equipment upon reaching at site. The Engineer/Engineer’s Representative shall evaluate/examine/verify all the Performance Tests Reports performed by the Manufacturer performed at the manufacturing factory. The Engineer/Engineer’s Representative should be satisfied with the results. However, the Contractor will be responsible for the performance of plant and complete Installation and Commissioning as per specifications upto the satisfaction of Engineer/Engineer’s Representative and the Employer.”

Sub-Clause 24.1 Cost of Suspension

The Sub-Clause 24.1 is deleted in its entirety.

Sub-Clause 24.2 Payment in the Event of Suspension

The Sub-Clause 24.2 is deleted in its entirety.

Sub-Clause 24.4 Resumption of Work

The Sub-Clause 24.4 is deleted in its entirety.

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 in consultation with Employer",

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 33.1 Terms of Payment

The Total Contract Price shall be paid as follows:

- A) Payment to the Contractor against Supply, Installation, Testing and Commissioning of imported Plant shall be made in the following manner:
- 1) Twenty five percent (25%) of agreement Amount shall be paid upon following;
 - i) approval of technical submittal of imported plant;
 - ii) submission of L/C document from the manufacturer's authorized representative for imported items;
 - iii) submission of Letter of confirmation that the imported equipment supplied under L/C documents is for HVAC Works at University of Agriculture, Faisalabad; and
 - iv) upon submission of Bank Guarantee of the same amount to Client. Such Guarantee shall be valid until the delivery of equipment at site and shall be returned within Fourteen (14) days after issuance of Taking Over Certificate.
 - 2) Thirty Percent (30%) of the Agreement Amount upon delivery of Plant at Site, submission of invoice duly certified by the Engineer or Engineer's Representative and after issuance of Inspection Certificate by the Engineer or Engineer's Representative after inspection of such Plant upto his satisfaction.
 - 3) Thirty Percent (30%) of the Agreement Amount shall be upon completion of installation upto the satisfaction of the Engineer or Engineer's Representative and submission of invoice duly certified by the Engineer or Engineer's Representative.
 - 4) Ten Percent (10%) of the Agreement Amount shall be paid on completion of testing and commissioning of all Works upto the satisfaction of the Engineer and after issuance of Taking Over Certificate and submission of invoice duly certified by the Engineer or Engineer's Representative.
 - 5) Five Percent (5%) of the Agreement Amount shall be paid after issuance of Defects Liability Certificate and submission of invoice duly certified by the Engineer or Engineer's Representative.

All above payments shall be made after deduction of applicable income tax and all other taxes and retention money of five percent (5%) pursuant to Sub-Clause 33.13 hereof.

The following Sub-Clauses 33.1.1 to 33.1.4 are added:

Sub-Clause 33.1.1 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 33.1.2 Extra Payment

No extra payment in respect of overtime, additional materials, or special conditions or hardship shall be claimed by the Contractor.

Sub-Clause 33.1.3 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 33.1.4 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 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 33.6 Delayed Payment

The sub-clause 33.6 is deleted in its entirety.

Sub-Clause 33.8 Payment by Measurement

The Works shall be done in accordance with the approved drawings, Specifications and Contract Documents. No measurement shall be done, however works against each item in Schedule of Prices shall be verified. The payment of works shall be made in accordance with Sub-Clause 33.1.

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 Sub-Clause 26.1"

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 36.1 Use of Provisional Sums

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

Sub-Clause 36.2 Ordering Work against Provisional Sums

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

Sub-Clause 36.3 Invoices and Receipts

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

Sub-Clause 36.4 Payment against Provisional Sums

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

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,
- (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 is deleted in its entirety.

Sub-Clause 42.2 Maximum Liability

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

Sub-Clause 42.6 Foreseen Damage

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

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 48.1 Customs and Import Duties

Sub-Clause 48.1 is deleted and substituted by the following:

“The customs, import duties and other fees/levies in respect of importation of different material and equipment required for the Works shall be paid by the Contractor”.

Sub-Clause 48.3 Port Charges and Port Congestion

The following Sub-Clause 48.3 is added:

“The Contractor shall be deemed to have obtained all the information regarding facilities and charges, in respect of port clearance, loading and unloading, storage, transportation, congestion and confirmed the requirements thereof at his own responsibility and all such costs and charges are deemed to be included in the rates and prices of the Schedule of Prices.”

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:

All proceedings to settle a dispute will be governed by the rules and regulations of Pakistan Arbitration Act 1940.

“50.1 DECISION OF ENGINEER 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., the Engineer shall give his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to suitable Clause of the contract within Three (03) working days.

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.

50.2 COMMITTEE: 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 Tenth (10) day after the day on which he received the reference, then either the Employer or the Contractor may, proceed to the Committee for the settlement of dispute.

The committee will be comprised of following members.

- | | |
|----------------------------------|------------|
| 1- The Treasurer, UAF | (Convener) |
| 2- Project Director, UAF | (Member) |
| 3- Executive Engineer, UAF | (Member) |
| 4- Representatives of Engineer | (Members) |
| 5- Representatives of Contractor | (Members) |

ARBITRATOR: Any of the parties not satisfied with the decision of the committee may request to The Arbitrator, The Vice Chancellor, UAF, to review for settlement of the dispute. The decision of the arbitrator shall be final and binding on both parties.

COURT JURISDICTION: Only the Courts of Law in Faisalabad City shall

have exclusive jurisdiction to adjudicate upon the decision of arbitrator brought by Contractor in relation to this particular contract.

The following Sub-Clauses 51.4 to 51.12 are added:

Sub-Clause 51.4: Warranty

The Contractor warrants 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. The Contractor further warrants that the Goods/equipment 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 of issuance of 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 of issuance of Taking Over Certificate. Warranty shall be signed by both the Contractor and the Manufacturer whose work is involved.

Sub-Clause 51.5: 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 51.6: 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 51.7: Co-operation with other contractors

During the execution of the Works, the Contractor shall fully co-operate with other contractors working in the vicinity of the Site and also shall provide adequate precautionary facilities not to make himself a nuisance to local residents and other contractors in the vicinity of the Site.

Sub-Clause 51.8: 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 51.9: 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.

Sub-Clause 51.10: Emergency Electrical Power Generator Set

As a pre-requisite to this Bid, the Contractor shall furnish an Electric Power Generating set whenever required. The power of the set shall be sufficient to operate the plants and equipment

STANDARD FORMS

FORM OF BID SECURITY
(Bank Guarantee)

Guarantee No. _____
Executed on _____
Expiry date _____

Executive Engineer,
ECD-P,
University of Agriculture, Faisalabad
Ph: 041-9200897

Name of Guarantor (Bank) with address: _____

Name of Principal (Bidder) with address: _____

Penal Sum of Security (express in words and figures): Rs. _____
(Rupees _____)

Bid Reference No. _____ Date of Bid _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal, we the Guarantor above-named are held and firmly bound unto the University of Agriculture, Faisalabad (hereinafter called the "Employer") the sum stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Bid numbered and dated as above for Supply, Installation, Testing & Commissioning for Heating, Ventilation and Air Conditioning (HVAC) Works of New Library Building at University of Agriculture, Faisalabad.

WHEREAS, the Employer has required as a condition for considering the said Bid that the Principal furnishes a Bid Security in the above said sum to the Employer, conditioned as under:

- (1) that the Bid Security shall remain valid for a period 28 days beyond the period of validity of the Bid;
- (2) that in the event of;
 - (a) the Principal withdraws his Bid during the period of validity of Bid, or
 - (b) the Principal does not accept the correction of his Bid Price, pursuant to Sub-Clause 24.2 of Instructions to Bidders, or
 - (c) failure of the successful bidder to
 - (i) furnish the required Performance Security, in accordance with Clause 34 of Instructions to Bidders, or
 - (ii) sign the proposed Contract Agreement, in accordance with Clause 35 of Instructions to Bidders,

then the entire sum be paid immediately to the said Employer as liquidated damages and not as penalty for the successful bidder's failure to perform.

NOW THEREFORE, if the successful bidder shall, within the period specified therefor, on the prescribed form presented to him for signature enter into a formal Contract with the said Employer in accordance with his Bid as accepted and furnish within twenty one (21) days of his being requested to do so, a Performance Security with good and sufficient surety , as may be required, upon the form prescribed by the said Employer for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified for its validity then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

PROVIDED THAT the Guarantor shall forthwith pay to the Employer the said sum stated above upon first written demand of the Employer without cavil or argument and without requiring the Employer to prove or to show grounds or reasons for such demand notice of which shall be sent by the Employer by registered post duly addressed to the Guarantor at its address given above.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal has duly performed his obligations to sign the Contract Agreement and to furnish the requisite Performance Security within the time stated above, or has defaulted in fulfilling said requirements and the Guarantor shall pay without objection the sum 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 the instrument under its seal on the date indicated above, the name and 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: _____

Signature _____

1. _____

Name _____

Corporate Secretary (Seal)

Title _____

2. _____

(Name, Title & Address)

Corporate Guarantor (Seal)

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____ (month) 2020 between University of Agriculture, Faisalabad (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; for Supply, Installation, Testing & Commissioning for Heating, Ventilation and Air Conditioning (HVAC) Works of New Library Building at University of Agriculture, Faisalabad 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) The Drawings and;
 - (l) 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 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 _____

Executive Engineer,
ECD-P,
University of Agriculture, Faisalabad
Ph: 041-9200897

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 University of Agriculture, Faisalabad, (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 the Supply, Installation, Testing & Commissioning for Heating, Ventilation and Air Conditioning (HVAC) Works of New Library Building at University of Agriculture, Faisalabad.

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)~~



UNIVERSITY OF AGRICULTURE, FAISALABAD

SUPPLY, INSTALLATION, TESTING & COMMISSIONING FOR HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM OF NEW LIBRARY BUILDING BLOCK AT UNIVERSITY OF AGRICULTURE, FAISALABAD



BIDDING DOCUMENTS

VOLUME – IB

- Letter of Price Bid
- Schedules (M & N) to Bid
- Preamble to Conditions of Contract
- General Conditions of Contract
- Particular Conditions of Contract
- Standard Forms

October 2020



National Engineering Services Pakistan (Pvt) Limited
Building Services Division
IEEEEP Building, 17-C-1, Civic Center, Faisal Town, Lahore 54700 – Pakistan
Phone: +92-42-99232261-74, Fax: +92-42-99232275
<http://www.nespak.com.pk>

Clearance Code		Doc. No.	2	Rev. No.	
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UNIVERSITY OF AGRICULTURE, FAISALABAD

SUPPLY, INSTALLATION, TESTING & COMMISSIONING FOR HEATING, VENTILATION AND AIR CONDITIONING (HVAC) WORKS OF NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD

CONTENTS OF BIDDING DOCUMENTS

VOLUME - IA

- Invitation to Bid
- Instructions to Bidders with Appendices
- 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 - IB

- Letter of Price Bid
- Schedules (M&N) to Bid
- Schedule of Prices

VOLUME - II

- Specifications - Special Provisions
- Specifications - Technical Provisions

VOLUME - III

- Drawings

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2.	Schedule-M to Bid: Integrity Pact	M-1
3.	Schedule-N to Bid: Estimated Progress Payment	N-1
4.	Preamble to Schedule of Prices	S-1
5.	Schedule of Prices	S-4

LETTER OF PRICE BID

AND

SCHEDULES TO BID

LETTER OF PRICE BID

Bid Reference No. _____

Supply, Installation, Testing & Commissioning for Heating, Ventilation and Air Conditioning (HVAC) Works of New Library Building at University of Agriculture, Faisalabad.

To:

Executive Engineer,
ECD-P,
University of Agriculture, Faisalabad
Ph: 041-9200897

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 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 for the Total Bid Price of PKR _____, (Rupees _____) or such other sum as may be ascertained in accordance with the said Documents.
2. We understand that all the Schedules attached 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 @ 3% of Quoted Bid by the bidder (amount PKR _____, Rupees _____) drawn in favor of The Treasurer, UAF in the form of Bank CDR or Pay order, 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 eighty (180) 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).

Dated this _____ day of _____ 2020

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 – M 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: _____
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:

Name of Bidder:
Signature:

[Seal]
Initials of Signatory to Bid: _____

[Seal]

SCHEDULE – N 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 based on his Programme of Works and the Rates in the Schedule of Prices, expressed in thousands of Pakistani Rupees.

Period	Amount (Rs.) (000)
1 st Month	_____
2 nd Month	_____
3 rd Month	_____
4 th Month	_____
5 th Month	_____

Initials of Signatory to Bid: _____

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 and Drawings.

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 no measurement of the items shall be carried out. The payment shall be made on the total amount.

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:

	<u>Abbreviation</u>
Pakistani Rupees	Rs.
Provisional Sum	PS
Percent	%
Lot	Lot
Each	Each
Square Feet	Sft
Running Feet	Rft
Lump Sum	Lump Sum
Ton of Refrigeration	TR

4. Rates and Prices

4.1 Except as otherwise expressly provided under the Conditions of Contract, the amounts entered in the Schedule of Prices shall be the amounts 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 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 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.

5.3 Rate/TR

The total of bid prices per HVAC Load of building shall be entered in the Schedule of Prices. This item is only for reference. The same shall be used in case of any deletion or addition of any non-scheduled items.

5.4 Breakup of Total Bid Price

The bidder shall not only quote the Item Wise bid rates but shall also provide the breakup of Total Bid Price in the Summary of Bid Prices

The breakup shall include the following;

- a) Total Cost of Imported Items including all Taxes
- b) Total Cost of Local Items including all Taxes
- c) Total Cost of Labor, Installation Charges and all other allied charges including all Taxes

6. Provisional Sums

Not Used

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

SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF HEATING, VENTILATION AND AIR CONDITIONING (HVAC) WORKS OF NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD

SUMMARY OF TOTAL COST

ITEM NO.	DESCRIPTION	TOTAL AMOUNT (PKR)
1	2	3
1	SOP: HVAC WORKS AT LIBRARY BUILDING a) Total Cost of Imported Items including all Taxes b) Total Cost of Local Items including all Taxes c) Total Cost of Labor, Installation Charges and all other allied charges including all Taxes d) Total (a+b+c)* (Refer Note 3)	

TOTAL BID PRICE = Rs.

*RATE/TR FOR LIBRARY = Rs.

TOTAL BID PRICE FOR LIBRARY BUILDING/137

*Notes: The total HVAC capacity (Nominal) for New Library Building is 137 TR.

1 The capacities mentioned in equipment schedule are final. When outdoor units with specified exact capacity is not available next higher capacity unit shall be provided. However, no extra payment shall be made to Contractor.

2 The building wise total cost at Sr. No (d) mentioned in summary above shall match with the corresponding total cost as mentioned in respective Schedule of Prices (SOPs) of the building.

3

Initials of Signatory to Bid: _____

**SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF HEATING, VENTILATION AND AIR CONDITIONING (HVAC) WORKS OF
NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD**

SCHEDULE OF PRICES (SOP)

SOP- LIBRARY BUILDING

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, Testing and Commissioning of Decorative cooling/heating high ambient DC Inverter Type DX-VRF air conditioners with Ceiling Cassette (SAC) indoor units, Ceiling Concealed Ducted (DAC) indoor units and Treated Fresh Air Units (TFU) including distributors, thermostats, expansion valve with all indoor units, hangers, Centralized Control and controllers etc. (complete in all respect) as per specification/drawings.				
	a) SAC-1-1, SAC-1-2, SAC-1-2, SAC-1-3, SAC-1-4, SAC-2-1, SAC-2-2, SAC-2-3, SAC-3-1, SAC-3-2, SAC-3-3, SAC-3-4, TFU-1-1 / CU-2	EACH	1		
	b) SAC-1-5, SAC-3-5, SAC-3-6, DAC-11-1, DAC-1-2, DAC-1-3, DAC-1-4, DAC-1-5, DAC-1-6, DAC-1-7, TFU-1-2 / CU-4-1	EACH	1		
	c) SAC-1-6, SAC-2-4, 2-5, SAC-3-7, SAC-5, TFU-1-3 / CU-1	EACH	1		
	d) SAC-2-6, SAC-2-7, SAC-2-8, SAC-3-8, SAC-3-9, SAC-3-10, SAC-3-11, SAC-3-12, SAC-3-13, SAC-3-14, SAC-3-15, TFU-2-1 / CU-3	EACH	1		
	e) SAC-2-9, SAC-2-10, SAC-3-16, SAC-3-17, SAC-3-18, SAC-4-1, SAC-4-2, SAC-4-3, SAC-4-4, SAC-4-5, SAC-4-6, SAC-4-7, SAC-4-8, TFU-2-2 / CU-4-2	EACH	1		
2	Supply and installation of refrigerant piping and fitting, insulation including all accessories (Complete in all respect).				
	a) Refrigerant Piping and Fittings of various sizes	RFT	1,846		
	b) Insulation of various sizes	RFT	1,846		
3	Supply and installation of UPVC Drain Piping, insulation and fittings including all accessories (Complete in all respect).				
	a) UPVC Drain Piping and Fittings				
	i) Dia 3/4"	RFT	40		
	ii) Dia 1"	RFT	655		
	iii) Dia 1 1/4"	RFT	120		
	b) Insulation				
	i) Dia 3/4"	RFT	50		
	ii) Dia 1"	RFT	960		
	iii) Dia 1 1/4"	RFT	120		
4	Supply & installation of exhaust & ventilation fans at site as per specification/drawings including all accessories & fitting and complete in all respects.				
	a) EF-1 (Air Flow: 500 CFM)	EACH	1		
5	Supply and installation of Sheet Metal Ducting and insulation as per schedule specification & drawings with accessories & fitting complete in all respects.				
	a) U.S GAUGE 26	SFT	820		
	b) U.S GAUGE 24	SFT	1,130		
	c) Indoor Supply Air Duct Concealed to vision and Outdoor Air Duct passing through conditioned space	SFT	1,820		
	d) Indoor Supply Air Duct Exposed to vision	SFT	130		
6	Supply and installation of Flexible Duct Connector for complete system as per specification/ drawings with accessories & fitting and complete in all respects.	SFT	15		
7	Supply and installation of Volume Damper (VD) for complete system as per specification/ drawings with accessories & fitting and complete in all respects.	SFT	10		
8	Supply and installation of Air devices for complete AC system as per specification & drawing with all accessories & fitting and complete in all respects including GST as approved by consultant and engineer in charge.				
	a) CODE A : Four Way Ceiling Supply Air Diffuser Square / Rectangular Face	SFT	15		
	b) CODE B : Outdoor/Fresh Air Louver	SFT	10		
	c) CODE D : Four Way Ceiling Return Air Diffuser With G4 1" Thick Filter Square / Rectangular Face	SFT	15		

**SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF HEATING, VENTILATION AND AIR CONDITIONING (HVAC) WORKS OF
NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD**

SCHEDULE OF PRICES (SOP)

SOP LIBRARY BUILDING

ITEM NO.	DESCRIPTION OR CODE	UNIT	QTY	UNIT RATES (PKR)	TOTAL AMOUNT (PKR) COL 4 x COL 5
1	2	3	4	5	6
9	Supply and Installation of Electrical Equipment and Controls with all accessories (Complete in all respect).				
	a) A.C.Ps				
	i) ACP-01	EACH	1		
	i) ACP-02	EACH	1		
	i) ACP-03	EACH	1		
	i) ACP-04	EACH	1		
	(Detail to be supplied by the Contractor)				
	b) All Electrical and Controls Works including cables and cable trays of various sizes (complete in all respect)	RFT	13,000		
	Except ACPs mentioned under Item (a) above				
10	Supply and Installation of Hanger and Supports with all accessories (Complete in all respect).	LOT	1		
11	Associated Ceiling and Civil Works				
	a) Foundation including Civil Works. Civil Works including cutting, patching, repairing, masonry works required for proper installation and completion as per specifications and drawings. Complete in all respect.	LOT	1		
	b) Supply and installation of Concealment of piping and ducts with boxing including all accessories. Complete in all respects.	LOT	1		
	c) Dismantalling, Safe Handling, Re-installation of False Ceiling and Installation of New False Ceiling of same specifications to replace damaged parts of false ceiling (if any)	LOT	1		
	TOTAL (SUM OF COL-6) = RS				
	RATE/TR = Rs		Total (sum of Col-6)/137		

IN WORDS : RUPEES _____

***Notes:**

- The total HVAC capacity for Library Block is 137 TR (Nominal).
- The capacities mentioned in equipment schedule are final. When outdoor units with specified exact capacity is not available next higher capacity unit shall be provided. However, no extra payment shall be made to Contractor.
- The rate of each item will be including of Income Tax, Sales Tax, Import duty and all other charges levied by Government.
- The rate of each item will be including of Material Cost, Shipping & Transportation Cost, Installation & Labor Cost, Testing & Commissioning Cost and all other allied charges.
- The quantities are provided for reference only. No measurement of the items shall be carried out. The payment shall be made on the basis of total amount as per Sub-Clause 33.1 of PCOC.



UNIVERSITY OF AGRICULTURE, FAISALABAD

SUPPLY, INSTALLATION, TESTING & COMMISSIONING FOR HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM OF NEW LIBRARY BUILDING AT UNIVERSITY OF AGRICULTURE, FAISALABAD



BIDDING DOCUMENTS

VOLUME – II

- **Special Provisions**
- **Technical Provisions**
- **Equipment Schedule**

October 2020



National Engineering Services Pakistan (Pvt) Limited
Building Services Division
IEEEP Building, 17-C-1, Civic Center, Faisal Town, Lahore 54700 – Pakistan
Phone: +92-42-99232261-74, Fax: +92-42-99232275
<http://www.nespak.com.pk>

Clearance Code		Doc. No.	2	Rev. No.	
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SPECIAL PROVISIONS

SPECIAL PROVISIONS

SP-01 GENERAL

SP-01.1 Location of Project

The HVAC system will be installed in an already constructed buildings of University of Agriculture, Faisalabad.

SP-01.2 Building for the Project

The project includes one building;

- Library

The building consist of Ground Floor and two (02) upper floors (1st and 2nd Floor). The Contractor is advised to visit the site and study architectural, structural, electrical and plumbing System to familiarize himself with the Building Plans/Layout.

SP-01.3 Use of Building

The Library block house the facilities such as offices, reference section, IT Labs, Data Center and reading halls, etc.

Toilets are located in each floor of both buildings.

SP-01.4 HVAC System Concept

a) Type of System:

Unitary System with Variable Refrigerant Flow (VRF) reversible (heat pump type) air conditioning system has been adopted for this project. Same HVAC system shall be used for cooling and heating in summer and winter season respectively as per requirement.

b) Plant Operation during Power Failures

As the cooling/heating will be required continuously during power break down or load shedding so all HVAC equipment shall be connected to emergency power.

SP-01.5 Service Conditions for Auxiliaries

a) Power Supply

Electrical Circuit Voltages:
Nominal, 3-Phase: 415 volts

1-Phase: 240 volts
Frequency: 50 Hz.

For equipment ratings:
3-Phase: 400 volts
1-Phase: 230 volts
Frequency: 50 Hz.

- b) Floor drains will be connected to sewerage system of the Building.

SP-01.6 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 all HVAC works including supply, installation, balancing, testing and commissioning.
- b) The Contractor shall furnish all labor, materials, equipment tools, appurtenances, services, temporary work and storage necessary to completely supply, install, test, commission, and operate & maintain the HVAC system, all in the perfect operating conditions in accordance with these Specifications and Drawings. The Contractor shall also test, adjust, balance, re-adjust all the air and water systems as specified and shown.
- c) The complete civil work as mentioned in schedule of prices and any relevant civil work required to complete the job is included in Contractor's scope of work.
- d) The Contractor shall plan and coordinate his activities and schedules so as not to interfere with the work of other Contractors. 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(s), associated proceedings shall be brought to the notice of the Engineer/ Employer whose decision in this respect shall be final and binding on all parties.

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 losses/expenses shall be borne by the Contractor.

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

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 and details shown in the Drawings 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.

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 issuance of Substantial Completion Certificate. Further details concerning Erection Supervisor 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) Operation during Defects Liability Period.

Not Used

- c) Training of Employer's Operative Personnel.

The Contractor shall arrange 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 training shall be delivered by a qualified personal having at least seven (07) 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.

Tools for maintenance after completion are to be provided under Clause TP-10-05.

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, 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 shown on the Drawings and/or as stated in the Technical Provisions, Section 6, Electrical Equipment and Controls. All electrical works from these points onward shall be the responsibility of the Contractor.
- b) All works related to water and cooling coil condensate disposal from HVAC system upto nearest floor drains shall be the responsibility of the Contractor.
- c) Insulation work as per specifications of the Project.
- d) Cutting, patching and repairing in accordance with Section 1.0 of the Technical Provisions.
- e) Door Louvers is required. The written information regarding location and sizes of door louvers, where required, to the Engineer. This information shall be provided within thirty (30) days of issue of the Engineer's Order to Commence Work.
- f) All wood-work required for satisfactory completion of the project as specified except decorative wood work provided to conceal HVAC equipment.
- g) Providing shop drawings at scale (1:50) and other written information regarding Concrete Pads and foundations for HVAC equipment to the Engineer. Catalogue cuts showing foundation details will not be accepted.
- h) Providing steel frames for inertia pads and cork sheet/neoprene sheet for other pad.
- i) All foundations for HVAC equipment including concrete foundations, housekeeping pads and concreting for inertia pads (where required) shall be provided by the HVAC Contractor.
- j) 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.

- i) Decorative Concealment
- j) Protection fencing (if required)
- k) Any repair work of structure and false ceiling which was dismantled by the Contractor during installation and commissioning 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.) 112 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 F
- e) Maximum condition for equipment rating: 118 F
- f) Wind Velocity:
 - Summer 13 KPH
 - Winter 19 KPH
- g) Climate: Tropical with dust storms in April-May-June and torrential Rains in July - August.
 - i) Latitude: 32 Degrees North
 - ii) Longitude 74 Degrees East
 - iii) Elevation 700 ft

SP-04.2 Inside Design Conditions

Category	Inside Design Temperature		Sound Levels (Noise Criteria)	Humidity (RH) %
	Winter °C	Summer °C		
Lecture Theater	72	74	30 to 35	50 to 60

Class Rooms	72	74	25 to 30	50 to 60
Library	72	74	25 to 35	50 to 60
Offices/Conference Rooms	72	74	25 to 35	50 to 60
Data Center	68	68	35	40 to 50

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 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

The Bidding Drawings show the Scope of Work to be performed by the Contractor. These Drawings shall not be used as a basis for fabrication, construction or installation but shall be used for estimation for bidding purpose only. These drawings are not to be considered defining the design of HVAC

equipment to be furnished or defining the exact details of the installation under this Contract, but are only illustrative of the Specifications and HVAC System and show the general layout of the equipment forming part of HVAC System and schematic diagrams explaining the system flow, controls and sequence of operation. These drawings are not to be scaled.

These Drawings do not show every offset, bend or elbow which may be required in the piping or ductwork for installation in the space provided. The routes and sizes (if shown) of ductwork, piping, air inlets and outlets shown on these Drawings are subject to change depending upon the make of major HVAC equipment to be provided by the Contractor. These design parameters shall be adjusted at the shop drawing stage.

Work shown on the HVAC Drawings and not mentioned in the Specifications, or described in the Specifications without being shown on the HVAC Drawings, shall nevertheless be held to be included in the contract in the same manner as if they had been specifically shown upon the Drawings and described in the Specifications.

SP-05.4 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 inform 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-05.5 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 3 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 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 fitting of grills, registers, diffusers, louvers, equipment 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-05.6 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. Three copies of each drawing (scale as per shop drawing) and other information shall be supplied, along with a reproducible and a soft copy.

SP-05.7 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 2 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-05.8 Samples

Contractor shall provide at his cost, samples of materials, instruments, gauges

and electrical items, for approval by the Engineer and Employer before order is placed for the same. These samples shall include, but not limited to:

- i) Pipes and fittings
- ii) Pipe insulation and covering
- iii) Insulation adhesive and tapes
- iv) OA/EA louvers
- v) Power and control cables
- vi) Electrical items; push buttons, HOA & toggle switches, pilot lamp, contactor, relays, circuit breakers and isolating switches
- vii) Vibration isolating springs, pipe hangers and rollers
- viii) Electrical conduits and fittings
- ix) Paints
- x) Anchor bolts, studs, etc. for hanging arrangements
- xi) Any other item required by the Engineer and Employer.

SP-05.9 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-05.10 Sound Absorption Data

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

SP-05.11 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 and Employer

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 after consulting Employer. No reimbursements shall be made for such payments.

SP-11 SHOP INSPECTION, DAMAGES AND MATERIAL ORDER

SP-11.1 Inspection

The following equipment/material shall be inspected and tested prior to deliver at site.

- 1) Electrical Control Panels (Manufacturing Facility)
- 2) Electrical Cables (Manufacturing Facility)
- 3) Copper Pipe (Local Warehouse)
- 4) GI Sheet (Local Warehouse)
- 5) Insulation (Local Warehouse)

The Contractor shall make necessary arrangements and provide all the facilities required for such inspection.

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 MATERIALS AND EQUIPMENT TO BE IMPORTED

Imported materials and equipment, whether procured from local market or imported especially for this project by the Contractor shall include, but not limited to the items listed hereunder after approval from Engineer and Employer

- a. Variable Refrigerant Flow (VRF) Air Conditioning units.
- b. Pipes, fittings and specialties.
- c. Vibration Isolators for fans and VRF/Split units.
- d. Piping Insulation, insulation tape, sealing tape, duct sealer and adhesive.
- e. Electrical circuit breakers, contractors, relays, indications and measuring instrument, for electrical panel.

SP-17 ERECTION SUPERVISORS AND OPERATING STAFF

SP-17.1 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-17.2 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 three (03) year diploma holder from Government College of Technology in HVAC Technology 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-17.3 Operating Staff

Not Used

SP-18 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-19 ERECTION INSTRUCTIONS

Erection Instructions in form of published installation manual, as furnished by the manufacturer of VRF Units shall be provided by the Contractor.

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 3 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 SPARE PARTS

. The Contractor shall also furnish recommended spare parts along with its price

with the recommendation of manufacturer of equipment and provide a list of such spares. The spare parts listed shall serve all Equipment furnished.

Payment for recommended spare parts will be made from the amount set out in Schedule K to Bid.

The Contractor shall ensure the supply of any spare parts required during the Defects Liability Period at cost mentioned in its Bid.

SP-22 DEFECTS LIABILITY PERIOD

During Defects Liability Period shall provide the free cost trouble shooting and maintenance service to Employer.

SP-23 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-24 PERFORMANCE GUARANTEE

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

SP-25 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-26 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-27 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-28 GUARANTEES AND WARRANTIES

SP-28.1 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-28.2 Manufacturer's Warranties

The contractor shall obtain manufacturer's standard warranties for all equipment extended for a period up to completion of Defects Liability Period at his own cost. In case the completion of Defects Liability Period 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, otherwise the cost of such extension shall be reimbursed to him on production of acceptable documentary evidence of such costs.

SP-29 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-30 INSPECTIONS AND TESTS

SP-30.1 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-30.2 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.
- 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. Three copies of filled out forms shall be submitted to the Engineer for review and approval.

B) 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.

C) 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.

D) 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.

- ii) 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 PROVISIONS

TECHNICAL PROVISIONS

SECTION 1 - GENERAL REQUIREMENTS

1-01 MATERIAL

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.
- c) 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

Required for proper installation and completion of HVAC works, including masonry work, concrete work, 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 Maintenance Period. List of Tools shall be subject to approval by the Engineer.

1-10 OIL AND GREASES

As approved by Engineer with consent of Employer.

1-11 SPARE PARTS

The Contractor shall ensure the supply of any spare parts required during the Defects Liability Period at cost mentioned in its Bid.

1-12 ACOUSTIC TREATMENT

The noise criteria for different areas stated in Special Provisions is to be obtained.

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 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. The Engineer will propose the method of sealing of the opening.

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 completed 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 VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR-CONDITIONING UNITS (R-410A REFRIGERANT TYPE)

Unit(s) shall be variable refrigerant flow (VRF) high ambient type (48°C operable), remote, air cooled condensing unit, factory assembled, tested, cooling/heating, all DC inverter type, with multiple units connected through distributors/Y-connectors to outdoor unit as specified and shown. The unit shall be Eurovent/AHRI/SASO/JIS Certified.

The unit shall have one or more compressors that shall be all DC inverter driven, so their speed can be varied by changing the frequency of the power supply to the compressor. As the compressor speed changes, so does the amount of refrigerant delivered by the compressor.

i) Air Cooled Condensing Units (CU)

The condensing unit shall be of the vertical/horizontal discharge, air cooled type, suitable for outdoor installation and sized to deliver the required capacity matched to relevant DX-type indoor unit at specified ambient

temperature. The condensing unit shall be of same manufacturer as the Indoor AC Unit and shall be suitable for operation at 118°F (48°C) ambient temperature conditions.

The unit casing shall be constructed from galvanized sheet steel, zinc phosphate and with a stoved enamel finish. All access panels and the unit casing shall be provided with thermal and acoustic insulation. All moving components such as compressors and condenser fan motors shall be anti-vibration mounted to minimize the transmission of vibration and noise. The Condensing unit shall be of same manufacturer as the Indoor AC unit.

Condenser coils shall be made of seamless copper tubes mechanically expanded into aluminum fins.

Condenser fans shall be of direct drive, statically and dynamically balanced propeller type. Weatherproof fan motors suitable for outdoor use, permanently lubricated and provided with built-in thermal overload protection shall be used. Fans shall be mounted on rubber vibration dampers. All condensing units shall be weatherproof and capable of operating satisfactorily at high and low outdoor temperatures at full load.

Hermetically sealed scroll compressors shall be fitted with internal and external shock absorbers to minimize vibration and noise transmission. The compressor shall be fitted with a discharge line silencer and charged with the required quantity of oil for adequate lubrication circulated by means of an internal oil pump.

Internal overload protection located in the motor windings shall be provided.

Suction and discharge pipes shall be equipped with pipe vibration dampers. Condensing units shall be factory pressure tested, evacuated and dehydrated. Insulation shall be Class-O type Elastomeric extruded Nitrile Rubber tubing to fit standard diameters of copper tubing 10 OZ (280 gm) canvas with sealing adhesive coat.

The units shall be installed on steel brackets of adequate strength fixed to the walls with expansion bolts or on concrete foundation on roof as shown on the drawings.

All indoor units shall have built in expansion valve/pulse motor valve to be controlled by the room thermometer and control output of DC inverter compressor.

ii) Indoor Unit (SAC- Unit)

The DX-type Indoor units shall be elegant, ceiling concealed fresh air ducted type and decorative ceiling recessed (cassette) type as specified. All units are Heat Pump type. All component parts shall be selected, manufactured and assembled by the same manufacturer as for outdoor Condensing unit.

Each unit shall be constructed so as to prevent drumming, distortion and vibration and shall enable ease of handling and replacement of sections.

All indoor units shall have built in expansion valve/pulse motor valve to be

controlled by the room thermometer and control output of DC inverter compressor.

All indoor units shall be individually ON/OFF by remote control.

The units shall include the following sections:

- Washable filters
- DX-type cooling/heating coil
- Supply air fan and motor
- Thermostat microprocessor type with cooling & heating mode
- Automatic air swing mechanism
- Supply air adjustable grille
- Expansion Valve/Pulse Motor Valve (Built In)

The casing shall comprise of galvanized sheet steel, zinc phosphate, with a stoved enamel finish or as approved by the engineer and shall include supply and Return air grilles. For cassette type, AC units, the colour of the front grille shall be approved by the Engineer.

Fan shall be statically and dynamically balanced centrifugal type with backwardly or airfoil blades to suit the pressure and operating characteristics specified.

Fan housings shall be constructed from galvanized steel sheet. The casing shall be constructed to a truly volute form.

Shafts shall be cold finished, turned, and polished steel. Bearings shall be self-aligning, permanently lubricated ball bearings.

All parts of fans and motors liable to deterioration shall be protected by paint or grease before delivery to site.

Filters with dust arresstance of 35% as per ASHRAE standards shall be provided. The filter media shall be washable, cleanable, reusable, chemical and moisture resistant, non-perishable, and flame resistant.

Cooling coils shall be manufactured from solid drawn seamless copper tube staggered in the direction of air flow. Tube return bends shall be copper and brazed to tube ends.

Fins shall be of continuous aluminum having extended collars for spacing and bonding mechanically to the tube.

Coils shall be air pressure tested to 20.6 bar while immersing the coil in a tank of water after completion.

Tubes shall be expanded onto the fin collar by hydraulic pressure only.

No part of the coil tube ends or headers shall be external to the section. Coils shall be suitably sealed with grommets where connections pass through the unit casing.

The air-cooler shall incorporate a galvanized drain pan with integral

insulation. The pan shall be fitted with galvanized drain socket connections for attachment to drain points. A manometric trap should be supplied and installed by the installing contractor.

The coil shall be easily removable from the unit for maintenance and cleaning purposes.

The coil shall include a thermostatically controlled built in expansion valve.

In case of Cassette type unit condensate drain pump shall be provided with unit.

A LCD type wired controller shall be provided with each indoor VRF at each floor with option of fan speed, time schedule, temperature settings, mode selection, automatic storage of all settings when power off, etc.

Refrigerant Piping

The refrigerant piping from indoor to outdoor shall be Type-L copper pipes and shall conform to ASTM B280 standard for ASTM sizes (For other sizes, equivalent HVACR standards shall be complied). The insulation for refrigerant piping shall be as per schedule in Section-5.

Condensate Drain

All cooling coil condensate drain shall be uPVC class D. The fittings for the cooling coil condensate drain shall be uPVC class D.

iii) Controls and PC Based Controller

A multi-functional centralized controller shall be supplied VRF units. The units shall be equipped with Auto Restart function, which allows the unit to start in the same mode prior to the power failure. Digital thermostat: Units shall be controlled with user friendly, wall mounted microprocessor based LCD, wired remote controller. The wired remote controller shall have the following features:

- a) 24 hour ON / OFF timer in 1-hour interval.
- b) Self-diagnosis function.
- c) Operation indication.
- d) Room temperature display
- e) Weekly programming.
- f) 3 speed fan control.
- g) Auto swing (indoor unit).
- h) Clean filter indication (indoor unit). Start/stop operation, set point control, cool/heat mode selection and enabling/disabling operation of the remote.
- i) Monitoring of operation status of the indoor units and error code of the group or the zone.
- j) Comprehensive timer function to start/stop the air conditioning systems. This can be set for year, month, day of week, hour and minute. This will enable normal day-to-day time clock functions as well as yearly holiday set up.

Computerized control shall be used to maintain a correct room temperature either at the fan coil or from a sensor in the remote controller. The system shall be equipped with a self-diagnostic feature for easy service and maintenance. The LCD remote controller shall be able to control multiple indoor units as a group. It shall also be possible to select cooling, heating, fan only or automatic change over mode for heat recovery systems.

2-03 FANS

2-03.1 General

The characteristics and capacity of all fans be as schedule.

All fans shall be rated as per AMCA standards or ASHRAE standard 51-75 or equivalent. Wheels shall be heavily rigidly constructed and accurately balanced both statically and dynamically, and be free from objectionable vibration or noises. Actual brake horsepower of fan and drive shall not exceed nameplate rating of motor driving fan. Motor shall be included.

2-03.2 Propeller Fans

Propeller fans shall be direct driven type complete with motor, angle iron frame, back draft dampers and mounting accessories. Blades shall be of steel and factory adjusted for pitch. Blades of back draft damper shall have a link rod and the design shall be such that damper remains in fully open position without rattling when the fan is operating.

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 shall be provided by HVAC Contractor as described in Special Provisions Clauses SP-02.

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 baseplate.

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.

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. Supply outlet of concealed ceiling-mounted fan coil unit shall also be connected to Fan-coil with flexible connection.

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 or Roof Mounted Equipment

All floor or roof mounted equipment shall be generally placed on at least 4 inch concrete housekeeping 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 like Pumps and Chillers 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.

3-02.2 Wall Mounted Equipment

All equipment installed through wall shall have 20 gauge galvanized sheet metal which shall remain in place permanently. Sleeves shall be packed with non combustible glass fiber insulation minimum of 1.5 lb/cu.ft density and sealed with sealant. Equipment installed through walls shall have supporting wall brackets.

3-02.3 Air Inlets/Outlets

All wall grilles/EA-OA louvers shall be fixed to wooden frames and not to the ceiling material/wall masonry. Metallic frames may be used with metallic frame false ceilings. Wooden wall frames shall be grouted and finished by Contractor.

3-02.4 Ceiling-Hung Equipment

All ceiling-hung equipment shall be hung from ceiling (concrete slab) and shall not rest on false ceiling.

3-02.5 Floor Mounted Equipment

All floor-mounted equipment shall be resting directly on the raised floor pad (or supported from wall when approved by the Engineer).

3-03 VIBRATION ISOLATION

Vibration isolation bases shall be provided and installed under all pumps, to prevent the transmission of vibration to the building structure, as shown on

Drawings.

Where fans and motors are integral parts of factory assembled air handling units and the fans and motors are not spring isolated from the air handling unit, the entire unit shall be mounted on vibration isolators.

Inertia pads where indicated shall be reinforced cement concrete pad, at least 4 inch thick with 4 inch steel channel all around to protect concrete edges. Reinforcing rods shall be welded to channel frame.

Floor mounted Fans with belt drives shall be mounted on continuous rails with sliding base for motor adjustment and fan-rails shall be mounted on vibration isolators as specified above. When shown on Drawings, continuous rails shall be mounted on Inertia pads and pads shall be mounted on vibration isolators.

Flexible pipe connectors shall be installed in piping to prevent vibration and noise travel.

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). 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 or as specified in current Market Schedule of Faisalabad issued by Finance Department, Govt. of Punjab.

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 SMACNA Duct Construction Standards.

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 – INSULATION

5-01 GENERAL

5-01.1 The Contractor shall provide insulation for the services and equipment specified hereafter. Insulation shall be as per following Insulation Schedule.

5-01.2 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 for outdoor ducting and piping.

5-01.3 Identification bands shall be painted on insulation at frequent intervals. Lettering shall be agreed with the Engineer.

5-02 Insulation Schedule

Sr. No.	Services	Thick-ness (Inch)	Insulation Type	Vapour Barrier	Protection
a)	Indoor supply/return duct				
i)	Concealed to vision outdoor-air duct passing through conditioned space	1	FM approved closed cell foam etc or Glass fiber blanket or EPDM/NBR	Reinforced aluminum foil	8-Oz canvas
ii)	Exposed to vision	2" for fiber glass or 1" for closed cell foam/EPDM /NBR	FM approved closed cell foam etc or Glass fiber blanket or EPDM/NBR	Reinforced aluminum foil	4-Oz canvas with water proof paint. GI/Al. sheet metal jacketing.
b)	Refrigerant Piping				
i)	Indoor	3/4 (min.) Final shall be as per manufacturer selection/ recommendation	Class-O type Elastomeric extruded Nitrile/EPDM Rubber tubing to fit standard diameters of copper tubing	Reinforced aluminum foil	Approved tape weather proof type

ii)	Outdoor	3/4 (min.) Final shall be as per manufacturer selection/ recommend ation	Class-O type Elastomeric extruded Nitrile//EPD M Rubber tubing to fit standard dia meters of copper tubing	Reinforce d aluminum foil	Approved tape weather proof type
c)	Cooling coil condensate drain piping	1/2	Nitrile Rubber	Reinforce d aluminum foil	--

5-03 INSULATION MATERIALS

5-03.1 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 or closed cell foam/EPDM/NBR type 3.5 lbs/cu.ft Density and maximum conductivity of 0.27 Btu/hr.sq.ft./inch at 75 °F.

5-03.2 Vapour Barrier for Duct Insulation

Vapour barrier when specified shall be factory applied flame retardant reinforced aluminum foil, 0.02 mils thick.

5-03.3 Cooling Coil Condensate Pipe Insulation

Shall be 1/2" thick insulation as mentioned above with aluminum foil self adhesive tape 3" wide.

5-03.4 Insulation Protection Material and Accessories

5-03.4.1 Canvas

4 Oz or 8 Oz per square yard as specified in Insulation Schedule.

5-03.4.2 Jacket

24 gauge (US) galvanized steel sheet or aluminum sheet.

5-03.4.3 Water & Rat Proof Paint

As approved by the Engineer.

5-03.4.4 Wire Netting

1" hexagonal mesh, 20 gauge (US), galvanized.

5-03.4.5 Metal Lathe

Expanded metal lathe with 1/2 inch diamond mesh.

5-03.4.6 Banding

1/2" x 1/48" galvanized steel or aluminum bands.

5-03.4.7 Insulation Tape

Insulation tape for joints shall be of aluminum foil type, 2 inch wide, equivalent to Scotch No.473.

5-03.4.8 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.

5-03.4.9 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.

5-03.4.10 Duct Sealing Tape

Duct sealing tape shall be 3 inch wide self-adhesive vinyl cloth tape.

5-04 INSULATION APPLICATION

5-04.1 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.

5-04.2 Duct Insulation

Before applying insulation, either sealing tape or duct sealer shall be applied on all corners of traverse joints for air tightness.

The insulation shall be fixed on ducts with a suitable adhesive as specified. Adhesive shall be applied on at least 75% surface area. In addition to the fixing by adhesives, insulation on the underside of ducts exceeding 18 inch width must have mechanical fasteners of an approved pattern to prevent insulation sagging, or alternatively bands as specified above shall be used at intervals not exceeding 4 feet.

All joints on the insulation shall be sealed with 2 inch aluminum foil tape. The tape shall only be fixed to the vapour seal and not to the bare insulation and, therefore, joints in the insulation shall not occur longitudinally at corners of ducts. If it is unavoidable to have joints at longitudinal corners then the insulation must be cut back and the vapour seal folded over the bare edge of the insulation so that the tape adheres only to the vapour seal.

5-04.3 Duct Insulation Protection

Indoor Exposed Duct: Insulation shall be covered over the vapour seal with a single layer of canvas with generous overlaps. The canvas shall be fixed with an approved adhesive.

5-04.4 Condensate Drain Piping

Self adhesive pipe insulation tape, as specified above, shall be spiral-wrapped around pipe, with 50% overlap.

SECTION 6 - ELECTRICAL EQUIPMENT AND CONTROLS

6-01 SCOPE

- a) The Contractor shall supply all panel boards, starting equipment, circuit breakers, busses, isolators, conducting cables, wiring, conduits, earth conductors, etc., for the entire HVAC system.
- b) The earthing system shall consist of supply and installation of earth continuity conductor and running earth conductor all along the cable length. All material such as earth continuity conductors, earth connecting points, including the installation material and accessories shall be supplied and installed by the Contractor as specified.
- c) For further details refer to Clause 6-02, "Distribution and Control Scheme".

6-02 DISTRIBUTION & CONTROL SCHEME

HVAC Contractor shall furnish and install electrical panel ACPs as specified.

All HVAC equipment shall be served by ACPs.

The HVAC Contractor will furnish and install incoming cables with circuit breaker from building electrical panels sized to handle total HVAC connected to these panels.

All electrical works downstream of ACPs shall be in HVAC Contractor's Scope of Work.

6-03 GENERAL

All electrically operated equipment shall comply in all respects with the relevant B.S Standards including dimensional standards where these exist, except in so far as this Specification is at variance therewith.

All electrically operated equipment shall be so designed that it will continue to function without damage to itself or otherwise, if the voltage and/or frequency vary within the following tolerances.

- Voltage plus or minus TEN percent.
- Frequency plus or minus SIX percent.

The entire installation shall be in accordance with the requirements and to the entire approval of the Electricity Department of the Government and the approval of the Engineer.

In general, all electrically operated equipment shall be suitable for continuous and prolonged operation in an ambient temperature of 40 C. This temperature makes no allowance for local rises in air temperatures due to the operation of the equipment itself or of heat produced in or by adjacent equipment such as compressors, condensers or heaters. The maximum operating temperature in standards specified shall be observed. Allowance for local high ambient temperature shall be made by reducing the permitted

risers of temperature above ambient.

6-04

ELECTRICAL MOTORS

Unless otherwise indicated in these Specifications or in the Schedules, all motors which are not factory supplied by equipment manufacturer shall be totally enclosed fan cooled, of squirrel cage construction and of approved manufacturer. All such local manufactured motors shall be of Siemens make or approved by the Engineer.

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 as mentioned in the respective equipment schedule or specifications.

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.

6-05

MOTOR STARTERS AND ISOLATION

Each three phase motor shall be provided with a protective automatic starter to disconnect the supply in case of:

- Failure of the supply
- Serious drop in voltage
- Flow of excess current
- Failure of any phase (single phasing)

All starters shall be properly de-rated for operation in an ambient temperature of 105 F (40 C).

Manual starters may be used for motors 1/2 hp and less and shall include thermal overload protection and disconnect switch. These should only be used when no automatic switching is intended.

DOL starters shall be used only on motors of 10 HP and less.

All motors, control gear and ancillary equipment shall be protected by H.R.C. fuses or circuit breakers in addition to the protective starter mentioned above. Such fuses shall be part of the control gear. The isolator shall be integral with control gear.

Single phase motors shall be protected by circuit breakers with overload protection. Where several starters are mounted in a panel rack or bank, each starter shall have separate H.R.C. fuses or circuit breaker isolator. Manual starters for single phase motors should only be used when no automatic switching is intended.

Where starter operating circuits and ancillary apparatus are energized by an auxiliary supply other than the main power circuit to the motor the isolator shall incorporate auxiliary contacts to effectively isolate all poles of phases of such auxiliary supplies. Where necessary, two isolators shall be used.

All starters not in a central panel shall have a sheet metal enclosure with a removable lid and cover and necessary brackets for mounting on panel or wall. A clear schematic diagram of the starter circuit shall be fixed inside the cover of each starter.

All magnetic starters subject to manual start shall have momentary contact start and stop buttons built into cover. All magnetic starters subject to electrical interlock or automatic control shall have hand-off automatic switches built into cover.

All coils, cores, insulation, contacts and trippers to starters and relays and all parts subject to wear and arcing shall be renewable.

6-06

POWER AND CONTROL WIRING

All power wiring from the point of supply as described in previous sections to each equipment shall be carried out by the HVAC Contractor. All control wiring from each equipment to applicable control panels and Control System shall also in scope of HVAC contractor.

All conduits supplied by the Contractor for power and control wiring shall be of heavy gauge 16 SWG steel, manufactured and tested in accordance with BS 31.

The conduit shall be protected by two base coats of red oxide antirust paint and finished in first quality black enamel paint.

The conduit accessories, such as sockets, elbows, bushings, bends, etc., required for installation of conduit shall be furnished by the Contractor. The accessories shall conform to the same quality and specifications as for the conduits. All outlet boxes, inspection boxes, junction boxes, saddles, clamps etc., wherever required shall be provided by the Contractor.

Flexible steel conduits shall be installed at termination to equipment which is subjected to vibration. The flexible conduit shall consist of single-strip galvanized steel which shall be spirally wound, dust tight, mechanically continuous and strong. Where necessary, flexible conduit shall be adequately supported. All accessories for installation of flexible metal conduit shall be provided with an overall rubber covering. At all terminations, the conduit shall be held firmly in position by approved type of glands.

All LT cables for power and control system shall be copper conductor, PVC

insulated for single core and PVC insulated PVC sheathed for multicore. All cables shall be of specified voltage grade complying with BS 6346 and/or BS 6004. The PVC insulation shall comply with BS 6746. Conductor shall be stranded or solid high conductivity soft annealed copper complying with BS 6360.

All multicore and single core sheathed cables for circuits operating up to 250 volts shall be 300/500 volts grade. All single core unsheathed cables shall be of 450/750 volt grade.

All power cables for main feeders, main to sub-main feeders, power equipment, etc., shall be multi-core copper conductor, armored or unarmored and shall be of 600/1000-volt grade.

All cables shall have phase identification colours on insulation of each core. The colour code for three phase circuits shall be red, yellow and blue for phase conductors and black for neutral conductor. Where insulated earth conductor is installed, it shall have green or green and yellow insulation.

Single-phase circuits shall have red for phase and black for neutral conductor.

All DC circuits shall have red for positive and black for negative conductor.

6-07

APPARATUS CONTROL PANELS (ACPs)

The panel shall be of sufficient size and dimensions to house various equipment for the installation. The panel shall be provided with lock and double set of keys. The panel shall be minimum of 14 gauge steel painted with powder coating inflammable paint. It shall be of the unit construction single fronted or double fronted type. It will be constructed such that doors are interlocked, preventing access to the devices installed inside without switching off the Main Circuit Breaker on incoming line.

This panel will contain the following equipment (but not limited to)

Circuit breaker on incoming line.

Circuit breakers, one for each outgoing line.

Starters with thermal overload protection for equipment which does not have factory supplied and/or equipment-mounted starter.

Relays, toggle switches, push button stations, hand-off-auto (HOA) switches - Labels on all components.

Terminal strip.

Relays and other devices for Temperature and Automatic Controls furnished by Controls Manufacturer for field installation.

Pilot lights, one for each starter, red for equipment operating.

All internal wiring and accessories clipped individually to the panel and arranged parallel or at right angles.

All indications shall be visible from the front of the panel. Prior to installation, the contractor shall submit for approval of the Engineer the electrical diagram of the whole installation and the suggested electric panel layout showing samples of instruments and components.

6-08 LOCAL ISOLATING SWITCHES (LIS)

The Contractor shall provide local isolating switches moulded-case type enclosed in metal boxes for disconnecting all power to the equipment in emergency and during maintenance, for all equipment controlled by remote MCC or ACP. These switches shall be installed near the equipment within visual range and shall be weather proof for outdoor installation.

6-09 COMPONENTS

The HVAC panels shall be provided with all components as specified and as necessary for the satisfactory operation of the HVAC system. Typical specifications are given hereunder:

6-09.1 Bus Bars

The bus bars shall be made of high conductivity electrolytic copper and shall be completely isolated and mechanically braced for the specified fault level. The phase identification of bus bars shall be by colours applied on full length of bus bars and these shall be red, yellow and blue for phases and black for neutral. The earth bus bar shall be green.

The bus bars shall be triple pole. The neutral and earth shall be of appropriate size to meet the electrical and mechanical requirements of the system. The temperature rise shall not exceed 30oC at rated current.

6-09.2 Circuit Breakers

The circuit breaker shall be triple pole, moulded case, manually operated type with front drive grip handle. ON-TRIP-OFF indication shall be provided on all circuit breakers. The circuit breakers shall have the following protections and setting range unless otherwise shown on the drawings:

- Adjustable three poles, manual reset thermal overload release of setting range 80 to 100% of rated current.
- Magnetic triple pole short circuit release having range according to manufacturer's standard range.
- The incoming circuit breaker shall have two numbers each of potential free normally open and closed auxiliary contacts rated for 2 Amp, 230 VAC. The incoming circuit breaker shall also have ON, TRIP and OFF indicating lamps. The circuit breaker shall have specified rupturing capacity, without the use of back-up fuses. Auxiliary release and trip coils shall be provided for desired operation and/or interlocking as required.

6-09.3 Push Buttons

Push Buttons shall be momentary make/brake contact type (normally open/normally close). These shall be suitable for flush mounting. Push Buttons shall have round/square head. These shall have red and green colors for 'ON' 'OFF' switching operation respectively.

6-09.4 Ammeters and Voltmeters

All ammeters and voltmeters shall be flush mounting, moving iron, spring controlled type. The front dimensions shall be 96 x 96 mm.

The Ammeters shall have appropriate measuring scales to suit the rated currents of connected equipment and shall indicate an accurate and readable value of the measured current. The Ammeters shall have appropriate over scale range to cater for the initial transient high starting currents.

The meters shall be of accuracy class 1.5 according to BS-89 and 90 and suitable for connection to 5 Amps secondary of current transformers or directly through shunt. A red mark shall be provided at the working voltage on the scale of all voltmeters.

6-09.5 Selector Switches

Ammeter and voltmeter selector switches shall be complete with front plate, grip handle, and R-Y-B and OFF position for ammeters and RY-YB-BR-RN and OFF position for voltmeter.

6-09.6 Air Break Contactors

The contactor shall be air break, triple pole, 400V AC suitable for the type of duty to be performed. The main contacts shall be silver tipped, butt type with double break per pole. Each contactor shall be provided with 230 VAC single phase operating coil, and minimum two normally open and two normally closed auxiliary contacts wired upto terminals. The number of working auxiliary contacts shall be provided according to the system requirements.

6-09.7 Indicating Lamps

Indicating lamps shall be suitable for flush mounting, complete with base, 230 volt incandescent lamp and shall have rosettes of suitable colour (green for ON, Red for OFF and Amber for TRIP).

6-09.8 Line up Terminals

Line up terminals wherever provided for control or power circuits shall be suitable for voltage and size of conductors.

The line-up terminals for controls shall be suitable for channel mounting. All necessary accessories such as end-plates, fixing clips, transparent label holder caps and label sheets with marking shall be provided.

6-09.9 Current Transformers

Air cooled, ring type current transformers shall be provided having transformation ratio as required. The current transformers shall be of suitable burden having accuracy class 1.0 and have 5 amps secondary.

6-09.10 Load Break Switches

Triple pole rotary 500 Volts AC on-load isolating switches of current rating as

specified shall be provided complete with front drive grip handle and front plate.

6-09.11 HRC Fuses

HRC fuses shall be provided complete with fuse bases, fuse etc. The fuses shall have a fusing factor as specified for class QI.

6-09.12 Control Selector Switches

The selector switches for lights and other controls shall be rotary cam type, having required number of positions, complete with knob and front plate with position indication.

6-09.13 Labels

Each equipment on the panel shall be identified by a nameplate. Metallic nameplate with 6mm high etched letters shall be attached to the panel or integral with it. Lettering shall be cut into the plate to a depth of not less than 0.4 mm and shall show a contrasting colour produced by filling with enamel or lacquer. Painting of lettering directly on the surface of the plate or panel will not be permitted.

6-09.14 Outdoor Installation

All ACPs mounted outdoor or on roof shall be of weather proof construction minimum IP 54 rated suitable for operation at 50°C ambient temperature condition.

6-10 EARTHING

6-10.1 General

For scope of work refer to **clauses 6-01 and 6-02.**

All HVAC equipment with electricity connection and all ACPs and LISs panels shall have their frames, carcasses and all metal parts not normally carrying current, effectively and continually connected to the general mass of the earth. Each equipment and panel shall be separately connected to a main earth continuity conductor.

6-10.2 Earth Continuity Conductors

Earth continuity conductor shall be round, hard drawn, bare electrolytic copper wire of appropriate sizes as approved by the Engineer. All fixing accessories, earthing clips, sweating sockets, lugs, thimbles, etc., shall be provided for a complete earthing installation.

6-11 CONDUITS AND CONDUIT ACCESSORIES

6-11.1 Material Description

The conduit for wiring shall be of polyvinyl-chloride material for use in concealed to vision locations and G.I. pipe in exposed locations including vertical shafts. All other accessories shall be subject to Engineer's Approval.

6-11.2 Application of PVC Conduit

Manufactured smooth bends shall be used where conduit changes direction. Bending of conduit by heating or otherwise shall be allowed at special situation only, for which approval of Engineer shall be necessarily required. The use of sharp 90 degree bend and tees shall not be allowed. The bends shall have enlarged end to receive conduit without any reduction in the internal diameter at joint. Round Junction Boxes shall be provided with one piece PVC Cover plate which shall be installed on the box by means of galvanized screws. Pull box shall be installed in conduit runs, wherever required to limit the pulling length of cables. Pull Boxes should be installed in conduit runs to limit the pulling lengths as required. The rectangular inspection or pull boxes shall be 16 S.W.G. thick sheet steel having nipples to receive PVC conduit with force fit. The sheet steel box shall be painted inside and outside with black enamel paint over a base coat of red oxide antirust paint, as approved by Engineer. The minimum length of inspection box shall not be less than four times the cables manufacturer's recommended bending radius of the cable. Bushes shall be used at pipe terminations and PVC solution for jointing of pipes.

6-11.3 Application of G.I. Conduit

Application of G.I. conduit shall be similar to PVC conduit as specified above, except that pipes shall have threaded socket connections. Pipes and fittings shall be as specified in Piping Section, finished with 2 coats of aluminum paint.

SECTION 7 - AIR INLETS AND OUTLETS

7-01

GENERAL

Before placing orders for these items, the Contractor shall check that all items to be supplied by the manufacturer comply for spread, throw, drop and noise, with capacities and characteristics as indicated on the drawings and schedules. All outlets shall be specifically selected for their particular application and designed for quiet operation. All items are to be approved by the Engineer.

All air inlets/outlets shall be of material as indicated on the Drawings and Schedules, and/or as specified.

Colour and finish shall be subject to Engineer's approval. Ceiling diffuser face and margin sizes and styles shall be coordinated with false ceiling/boxing type. All devices shall have substantial approved gaskets to completely prevent streaking on walls or ceilings due to leakage.

Where ceiling panels and ceiling diffusers are of different size, ceiling diffuser shall be centered in ceiling panel. Duct routing may slightly be adjusted, if necessary, for this purpose or duct drops for diffuser necks may be offset up to a max. of 30 degrees. or diffuser locations having requirement of greater than 30 degrees offset, flexible round insulated duct connection shall be used.

All wooden frames for wall inlets/outlets (where not mounted directly on the duct) shall be 3/4" thick set permanently in the walls. These frames shall be provided by the Contractor. The Contractor shall be responsible for all cuttings of walls, fixing of wooden frames in walls and repair of masonry/plaster required for fixing side-wall inlets/outlets. The Contractor shall furnish wooden frames for wall inlets/outlets to those responsible for civil construction for installation at locations indicated on shop drawings prepared by the Contractor for this purpose.

Ceiling inlets/outlets shall not be supplied on false-ceiling. Cutting of false ceiling (tiles) shall be the responsibility of the HVAC Contractor.

Manufacturer's certified free area for each type and size of grille, register, linear/square diffuser and louver shall also be provided for the purpose of air balancing.

All air inlets/outlets shall be manufactured as per Tuttle & Bailey standards of air inlets/outlets.

7-02

GRILLES

All side wall outlets and inlets shall be of sizes and characteristics as scheduled and shown on the Drawings.

Double deflection type grilles shall have vertical front bars and horizontal back bars.

All supply outlets shall have opposed blade dampers, finished in black paint, fixed to the outlet and shall be operatable with a removable key inserted from front of the grille.

All return and/or exhaust inlets shall have similar dampers if scheduled.

7-03

CEILING DIFFUSERS

Ceiling diffusers shall be of the sizes and characteristics as scheduled and shown on the Drawings.

Ceiling diffusers shall be furnished with volume dampers as furnished by the diffuser manufacturer, finished in black paint.

Volume control for these diffusers shall be accessible through the diffuser from below the ceiling and shall maintain their setting when adjusted. Each diffuser shall be provided with sponge rubber or felt gasket. Return diffusers shall be similar to supply diffusers unless otherwise indicated. Inner core shall be removable and shall be mounted on outer frame. (Throw pattern for supply diffusers shall be as shown on Drawings by arrows or as shown in schedule).

Ceiling diffusers intended for use with flexible round insulated duct shall have suitable inlet box.

7-05

EA/OA LOUVERS

All louvers shall be of approved construction as per AMCA standard 500-74. All louvers shall be fitted with aluminum mesh bird and anti vermin screens. The design of the OA inlet louver blades shall be suitable to arrest rainwater, sand and dust from incoming outdoor air. Sizes are to be as given on the Drawings. Louvers shall be complete in all respects with mounting accessories. Louvers shall be of Scheduled material and finish. Design of OA and EA louvers shall be similar. All EA louvers shall have back draft dampers upstream of louvers.

SECTION 8- INSPECTION TESTING AND COMMISSIONING

8-01 GENERAL

- 8-01.1** The whole of the works supplied under this Contract shall be subject to inspection and tests by the Employer and 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.
- 8-01.2** 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.
- 8-01.3** 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.
- 8-01.4** The Contractor shall submit to the Engineer, one month prior to the date of commencement of the balancing and performance tests, three (03) 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. Three (03) copies of the test results shall be furnished to the Engineer for his approval.
- 8-01.5** The Contractor shall supply all necessary testing and balancing instruments, which shall include the instruments to carryout 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.
- 8-01.6** 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.
- 8-01.7** 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.
- 8-01.8** All testing, balancing and final adjustment shall be in accordance with the provision of the applicable ASHRAE Standards, or other approved relevant standards.
- 8-01.9** 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.
- 8-01.10** The contractor shall be responsible for carrying out tests on the material/equipment/installation furnished by him.

8-02 PRELIMINARY INSPECTION & TESTS

8-02.1 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.

8-02.3 Ductwork

Inspection on ductwork shall be carried out by Contractor's supervisor in the presence of Engineer's representative to the satisfaction of the Engineer.

All joints in ducts and at outlets shall be physically inspected for air leakage. All dampers shall be tested for proper operation.

Ducts, plenums and casing shall be inspected and made substantially air tight before covering with insulation or concealing in the masonry. The terms substantially airtight shall be construed to mean that no air leakage will be noticeable through the senses of feeling or hearing.

8-02.4 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.

8-02.5 Electrical Equipment

All electrical panels shall be cleaned and adjusted on site before application of power. The following tests shall be carried out:

- 1) Wire and cable continuity tests.
- 2) Insulation resistance tests, phase to phase and phase to earth, on all circuits and equipment, using 500 volts megger. The megger reading shall not be less than one meg.ohm.
- 3) Earth resistance between metallic conduit systems and earth must not exceed half (1/2) ohm.
- 4) Phasing out and phase rotation tests.
- 5) Operating tests on all protective relays to prove their correct operation before energizing the main equipment.
- 6) Operating tests on all starters, circuit breakers, etc.

8-03 BALANCING AND COMMISSIONING

8-03.1 Commissioning

Upon completion of 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.

8-04 PERFORMANCE TESTS

Each equipment of HVAC plant 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 then be repeated.

8-05 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. Reliability Trial Tests should be carried out during appropriate seasons in Defects Liability Period.

The trial tests, both for summer and winter, shall last for a period of 14 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 14 consecutive days for continuous operation without major adjustment or repair.

Reliability Trial Tests should be carried out during appropriate seasons in Maintenance Period.

SECTION 9 - MEASUREMENTS AND PAYMENTS

9-01 GENERAL

Unless expressly excluded, the cost of all materials, equipment and works required by Special Provisions and Technical Provisions of Specifications, acceptably furnished, installed and tested as Specified, shall be considered to be included in the amounts tendered against the item listed in the Schedule of Prices.

The Engineer shall measure the works only to regularize and verification as per specifications and standardizations. The payment shall be made as per Sub-Clause 33.1 [*Terms of Payment*] of Particular Conditions of Contract (Volume-I).

9-02 SOP ITEM NO. 1 & 4

9-02.1 Measurement

Measurement will be made of each item and all associated accessories and work acceptably furnished, installed and tested as individual units.

9-03 SOP ITEM NO. 2, 3, 5, 6, 7, 8, 9, 10 & 11

9-03.1 Measurement

No measurement will be made of the items mentioned above.

EQUIPMENT SCHEDULE

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VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS

EQUIPMENT SCHEDULE

Sheet 1 of 3

SK. NO.	INDOOR UNIT CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY/ UNIT (MBH)	QTY.	OUTDOOR UNIT CODE	NOMINAL OUTDOOR UNIT CAPACITY/ UNIT (MBH)	QTY.	REFERENCE MAKE	INSTALLED IN	POWER SUPPLY V/M/HZ (INDOOR UNITS)	POWER SUPPLY V/M/HZ (OUTDOOR UNITS)
1	SAC-1-1	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	CU-2	246.00	1	SEE NOTE-3	GF - Server Room	220/1/50	400/3/50
	SAC-1-2	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1					GF - Electrical Room	220/1/50	
	SAC-1-3	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1					GF - Asst. Librarian Office	220/1/50	
	SAC-1-4	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1					GF - Librarian Office	220/1/50	
	SAC-2-1	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	1					GF - Deputy Librarian Office	220/1/50	
	SAC-2-2, 2-3	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2					GF- Magazine Shop	220/1/50	
	SAC-3-1	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	1					GF - Acquisition Section	220/1/50	
	SAC-3-2, 3-3	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	2					GF - Conference Room	220/1/50	
	SAC-3-4	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	1					GF - Secretarial Staff Room	220/1/50	
	TFU-1-1	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	48.00	1					GF	220/1/50	
2	SAC-1-5	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	CU-4-1	444.00	1	SEE NOTE-3	GF - NOC	220/1/50	400/3/50
	SAC-3-5, 3-6	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	2					GF - Office	220/1/50	
	DAC-1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	48.00	7					GF - Data Center	220/1/50	
	TFU-1-2	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	48.00	1					GF	220/1/50	
2	SAC-1-6	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	12.00	1	CU-1	156.00	1	SEE NOTE-3	FF - Attendant	220/1/50	400/3/50
	SAC-3-7	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	1					FF - Computer and Reference Section	220/1/50	
	SAC-5	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	36.00	1					FF - IT Lab	220/1/50	
	SAC-2-4, 2-5	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2					FF - IT Lab	220/1/50	
	TFU-1-3	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	48.00	1					FF	220/1/50	
3	SAC-2-6, 2-7, 2-8	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	3	CU-3	342.00	1	SEE NOTE-3	FF - Librarian Hall	220/1/50	400/3/50
	SAC-3-8, 3-9, 3-10, 3-11, 3-12, 3-13, 3-14, 3-15	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	8						220/1/50	
	TFU-2-1	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	96.00	1					FF	220/1/50	
4	SAC-2-9, 2-10	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	18.00	2	CU-4-2	444.00	1	SEE NOTE-3	SF - A/C Room	220/1/50	400/3/50
	SAC-3-16, 3-17, 3-18	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	24.00	3					SF - Reference Section & Librarian Hall	220/1/50	
	SAC-4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8	DECORATIVE CEILING CASSETTE HEAT PUMP TYPE	30.00	8						220/1/50	
	TFU-2-2	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	96.00	1					SF	220/1/50	

NOTES:

- ALL VRF UNITS SHALL BE COMPATIBLE TO OPERATE AT 118° F (48° C).
- ALL VRF UNITS SHALL BE OF R-410A REFRIGERANT TYPE OR BETTER ENVIRONMENT FRIENDLY REFRIGERANT.
- THE NOMINAL CAPACITIES ARE RATED AT 95° F (35° C); AHRI 1230:2010
- FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE SCHEDULE H TO BID "LIST OF APPROVED MANUFACTURERS FOR ITEMS/MATERIALS/EQUIPMENT OF HVAC WORKS."
- OFFERED UNITS SHALL BE AHRI OR EUROVENT CERTIFIED.
- FOR TFU SCHEDULE REFER SHEET 5 of 6

UNIVERSITY OF AGRICULTURE, FAISALABAD

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VARIABLE REFRIGERANT FLOW (VRF) TYPE AIR CONDITIONERS

SCHEDULE OF TREATED FRESH CEILING CONCEALED DUCTED HEAT PUMP UNIT

EQUIPMENT SCHEDULE

Sheet 2 of 3

SR. NO.	CODE	TYPE	INDOOR UNIT NOMINAL COOLING CAPACITY (MBH)	ENTERING AIR CONDITIONS		SUPPLY AIR (CFM)	POWER SUPPLY V/PH/HZ	REFERENCE MAKE
				DEG.F	DEG.F			
1	TFU-1	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	48.00	118	83	650	220/1/49	SEE NOTE-2
2	TFU-2	TREATED FRESH AIR CEILING CONCEALED DUCTED HEAT PUMP TYPE	96.00	118	83	1250	220/1/50	SEE NOTE-3

NOTES:

- ALL VRF UNITS SHALL BE OF R-410A REFRIGERANT TYPE OR BETTER ENVIRONMENT FRIENDLY REFRIGERANT.
- FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE SCHEDULE H TO BID "LIST OF APPROVED MANUFACTURERS FOR ITEMS/MATERIALS/EQUIPMENT OF HVACWORKS."

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LIBRARY BUILDING

AIR INLETS/OUTLETS

EQUIPMENT SCHEDULE
SHEET 3 OF 3

CODE	TYPE	DESCRIPTION	SERVICE	MATERIAL	REFERENCE MAKE/MODEL	WITH DAMPER	FINISH	COLOUR	ACCESSORIES	REMARKS
A	CEILING DIFFUSER	FOUR-WAY CEILING SUPPLY AIR DIFFUSER SQUARE/ RECTANGULAR FACE.	SUPPLY	ALUMINUM EXTRUDED	T&B* SEE NOTE - 1	YES	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	
B	LOUVER	OUTDOOR AIR LOUVER	OA	ALUMINUM EXTRUDED	T&B* SEE NOTE - 1	NO	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	
C	GRILLE	RETURN AIR GRILLES DOUBLE DEFLECTION 'ADJUSTABLE BARS	RETURN	ALUMINUM EXTRUDED	T&B* SEE NOTE - 1	YES	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	
D	CEILING DIFFUSER	RETURN AIR DiFFUSER WITH G4 1" THICK FILTER DOUBLE DEFLECTION 'ADJUSTABLE BARS	RETURN	ALUMINUM EXTRUDED	T&B* SEE NOTE - 1	YES	ANODIZED	AS REQUIRED BY ENGINEER	AS SPECIFIED	

NOTE:

- FOR "MAKE" AND "COUNTRY" OF MANUFACTURE SEE SCHEDULE H TO BID"LIST OF APPROVED MANUFACTURERS FOR ITEMS/MATERIALS/EQUIPMENT OF HVAC WORKS".

* TUTTLE & BAILEY

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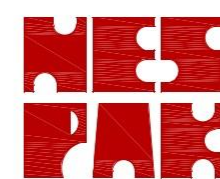


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HEATING VENTILATION AND AIR CONDITIONING (HVAC) WORKS

VOLUME III
BIDDING DRAWINGS



OCTOBER, 2020



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LIST OF DRAWINGS

SR. NO.	DRAWING NO.	TITLE
HEATING, VENTILATION AND AIR CONDITIONING (HVAC) WORKS		
01	4131/04/TD/K00	HVAC - LIST OF DRAWINGS
02	4131/04/TD/K01	HVAC - GENERAL NOTES, ABBREVIATIONS & LEGENDS
03	4131/04/TD/K02	HVAC - GROUND FLOOR PLAN (ICT BUILDING)
04	4131/04/TD/K03	HVAC - FIRST FLOOR PLAN (ICT BUILDING)
05	4131/04/TD/K04	HVAC - SECOND FLOOR PLAN (ICT BUILDING)
06	4131/04/TD/K05	HVAC - ROOF PLAN (ICT BUILDING)
07	4131/04/TD/K06	HVAC - GROUND FLOOR PLAN (NEW LIBRARY)
08	4131/04/TD/K07	HVAC - FIRST FLOOR PLAN (NEW LIBRARY)
09	4131/04/TD/K08	HVAC - SECOND FLOOR PLAN (NEW LIBRARY)
10	4131/04/TD/K09	HVAC - ROOF PLAN (NEW LIBRARY)
11	4131/04/TD/K10	HVAC - ELECTRICAL DISTRIBUTION DIAGRAM (ICT BUILDING)
12	4131/04/TD/K11	HVAC - ELECTRICAL DISTRIBUTION DIAGRAM (NEW LIBRARY)
13	4131/04/TD/K12	HVAC - STANDARD DETAILS

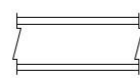
<div>CLIENT</div> <div></div> <div>UNIVERSITY OF AGRICULTURE FAISALABAD</div>	<div>CONSULTANT</div> <div></div> <div>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.</div>	04				DRAWN	WAQAR	PROJECT	UNIVERSITY OF AGRICULTURE FAISALABAD	HVAC - LIST OF DRAWINGS		REVISION
		03				SUBMITTED						
		02				RECOMMENDED						
		01				CHD./VER.						
		HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.										
	REV.	DATE	DESCRIPTION		APPROVED	APPROVED		DATE	DRAWING No.			
										OCTOBER, 2020	4131/04/TD/K00	

NOTES

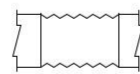
1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
2. THESE DRAWINGS ARE ONLY FOR BIDDING PURPOSE. THE LAYOUTS SHOWN ON THESE DRAWINGS ARE INDICATIVE ONLY. CONTRACTOR WILL PREPARE SHOP DRAWINGS AFTER COORDINATE OF ALL SERVICES AND SITE CONDITIONS AND SUBMIT FOR APPROVAL.
3. READ THIS DRAWING IN CONJUNCTION WITH ALL RELEVANT PROJECT DRAWINGS.
4. FOR ELEVATIONS AND SECTION OF THE BUILDING REFER TO RELEVANT ARCHITECTURE DRAWINGS.
5. AIR INLETS/OUTLETS SHOULD BE INSTALLED AFTER CO-ORDINATION WITH REFLECTED CEILING PLAN AND ELECTRICAL PLAN.
6. PIPES & DUCTS PASSING THRU BUILDING EXPANSION JOINTS SHALL HAVE FLEXIBLE PIPE CONNECTORS & FLEXIBLE DUCT CONNECTIONS RESPECTIVELY.
7. EXACT ROUTE AND LOCATION OF EACH PIPELINE SHALL BE DETERMINED IN COORDINATION WITH OTHER SPECIALITIES PRIOR TO INSTALLATION.
8. PIPE ROUTE AND CONNECTIONS WILL BE AS PER SITE CONDITIONS/MANUFACTURER STANDARD.
9. CONDENSATE DRAIN FROM ALL SAC's WILL BE TERMINATED AT NEAREST DRAIN WHICH IS INCLUDED IN HVAC SCOPE OF WORK.
10. FOR SCOPE OF WORK AND ELECTRICAL SPECIFICATIONS REFER SECTION-6 OF CONTRACT DOCUMENT.
11. INCOMING CABLES TO ALL ACP's AND TO EQUIPMENT ARE IN THE SCOPE OF HVAC CONTRACT.

SYMBOL

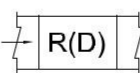
DESCRIPTION



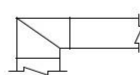
ACCOUSTIC LINING SIZE SHOWN IS CLEAR INSIDE DIMENSIONS



FLEXIBLE DUCT CONNECTION



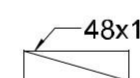
INCLINED RISE (DROP) IN THE DIRECTION OF FLOW



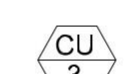
ELBOW WITH TURNING VANES



SECTION THRU SUPPLY / O.A. DUCT



SECTION THRU EXHAUST/RETURN DUCT ARROW SIZE WRITTEN FIRST



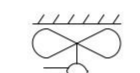
EQUIPMENT IDENTIFICATION CONDENSING UNIT NO.3



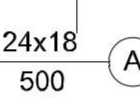
REFER TO DETAIL 3 OF DRAWING NO.2



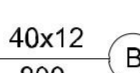
EXHAUST FAN



EXHAUST FAN WITH BACK DRAFT DAMPER



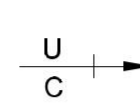
SUPPLY AIR OUTLET, 24x18 INCH CORE SIZE-500 CFM CODE "A" AS LISTED IN EQUIPMENT SCHEDULE



RETURN/EXHAUST AIR INLET, 40x12 INCH CORE SIZE 800 CFM CODE "B" AS LISTED IN EQUIPMENT SCHEDULE



DOOR LOUVRE AREA IN SQUARE FEET



UNDER CUT-1 INCH (25mm) MIN.



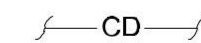
SECTION LINE, SECTION DRAWN AS 4 OF DRAWING NO.5

SYMBOL

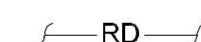
DESCRIPTION



SECTION THRU PIPE



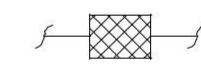
CONDENSATE DRAIN



REFRIGERANT DISCHARGE



REFRIGERANT SUCTION



FLEXIBLE CONNECTION IN PIPE



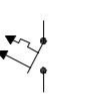
VIBRATION ISOLATOR



APPARATUS CONTROL PANEL



CIRCUIT BREAKER (3 PHASE)



CIRCUIT BREAKER (1 PHASE)



CONTACTOR



RELAY



BUS BAR



LOCAL ISOLATING SWITCH



VOLTAGE STABILIZER



POWER FACTOR IMPROVEMENT



AIR VENT

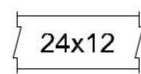
ABRV.

DESCRIPTION

SYMBOL

DESCRIPTION

CU CONDENSING UNIT (OUT DOOR UNIT)



AIR DUCT FIGURE IS DIMENSION OF SIDE SHOWN

CD TO FD CONDENSATE DRAIN TO FLOOR DRAIN



DUCT TURNING UP (SUPPLY)

EA EXHAUST AIR



DUCT TURNING UP (RETURN/EXHAUST)

FA FRESH AIR



DUCT TURNING DOWN (FRESH AIR)

TFU FRESH AIR UNIT



SECTION THRU SUPPLY / O.A. DUCT

SAC SPLIT AIR CONDITIONER (INDOOR UNIT)



DUCT TURNING DOWN (EXHAUST)

(TYP.4) QUANTITY 4 OF TYPICAL CHARACTERISTICS



VOLUME DAMPER

CLIENT



UNIVERSITY OF AGRICULTURE
FAISALABAD

CONSULTANT



NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N,
MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

04

03

02

01

REV.

DATE

DESCRIPTION

APPROVED

DRAWN

SUBMITTED

RECOMMENDED

CHD/VER.

APPROVED

WAQAR

PROJECT

UNIVERSITY OF AGRICULTURE
FAISALABAD

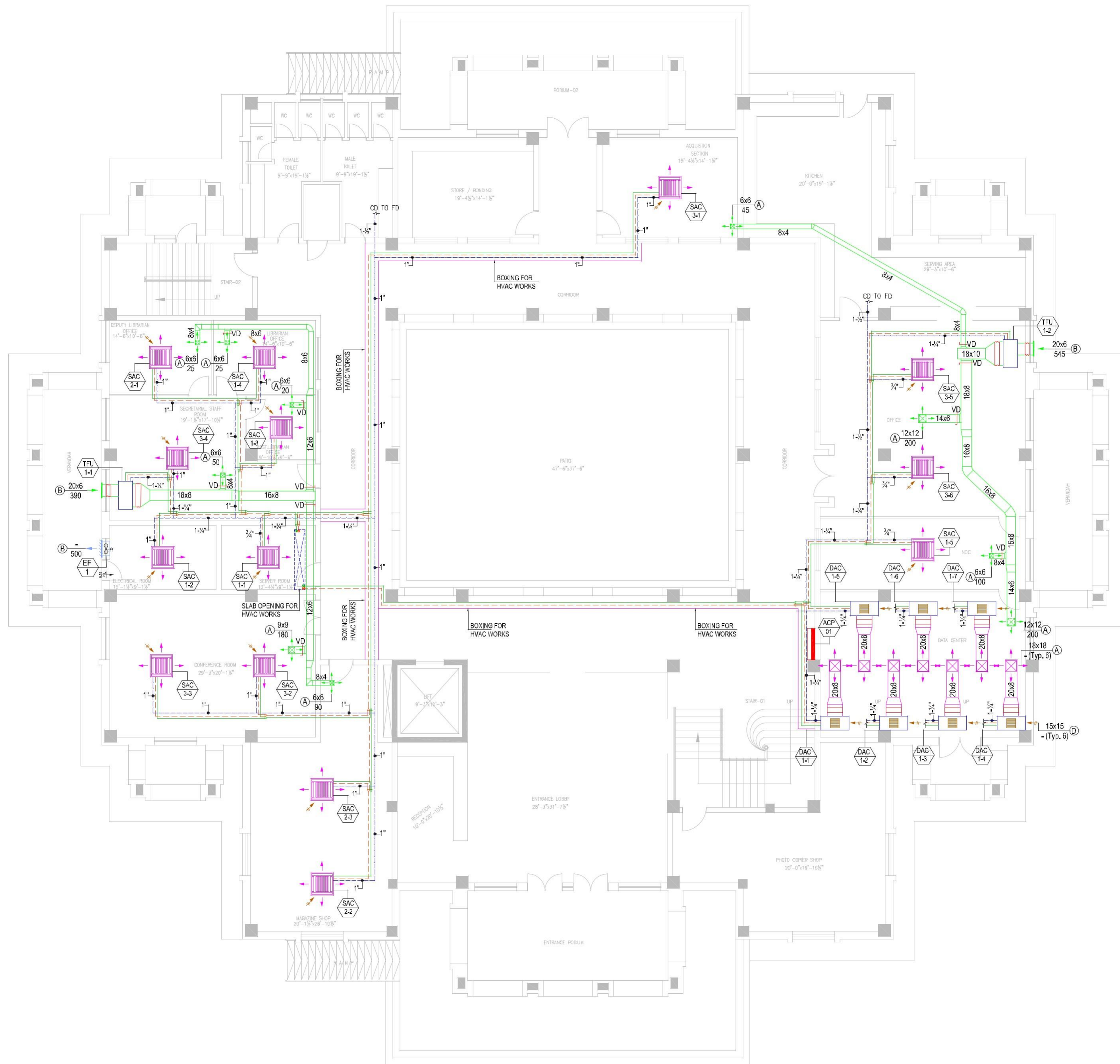
HVAC - GENERAL NOTES,
ABBREVIATIONS & LEGENDS

DATE

OCTOBER, 2020



DRAWING No.

4131/04/TD/K01



NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
2. FOR LEGEND AND GENERAL NOTES REFER DRAWING NO. 4131.
3. DATA CENTER UNITS SHALL BE FINALIZED ACCORDING TO LAYOUT.

<div>CLIENT</div> <div></div> <div>UNIVERSITY OF AGRICULTURE FAISALABAD</div>	<div>CONSULTANT</div> <div></div> <div>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.</div> <div>HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.</div>	04				DRAWN	WAQAR	PROJECT	UNIVERSITY OF AGRICULTURE FAISALABAD	HVAC - GROUND FLOOR PLAN (NEW LIBRARY)		
		03				SUBMITTED						
		02				RECOMMENDED						
		01				CHD/VER.						
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	DATE			DRAWING No.		
										OCTOBER, 2020	4131/04/TD/K06	



NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
2. FOR LEGEND AND GENERAL NOTES REFER DRAWING NO. 4131.

CLIENT
UNIVERSITY OF AGRICULTURE
FAISALABAD

CONSULTANT
NESPAC NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LTD.
HEAD OFFICE:- NESPAC HOUSE, I-C, BLOCK-N,
MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

04					
03					
02					
01					
REV.	DATE	DESCRIPTION	APPROVED	APPROVED	



DRAWN
SUBMITTED
RECOMMENDED
CHD./VER.
APPROVED

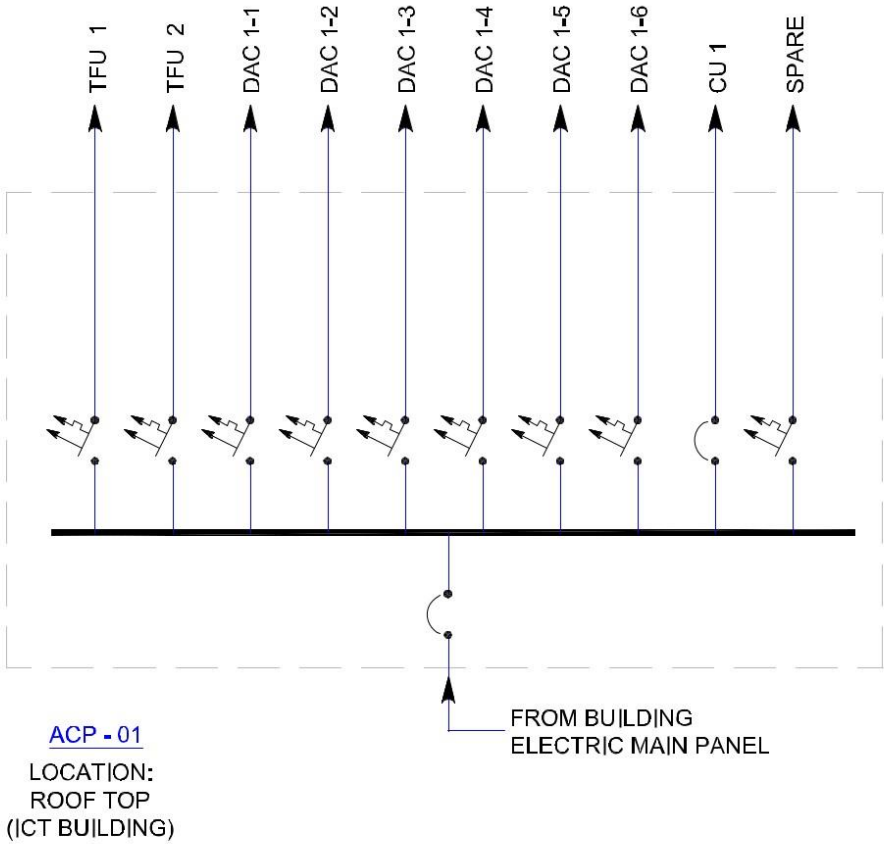
PROJECT
UNIVERSITY OF AGRICULTURE
FAISALABAD

HVAC - FIRST FLOOR PLAN
(NEW LIBRARY)
DATE
OCTOBER, 2020
DRAWING No.
4131/04/TD/K07





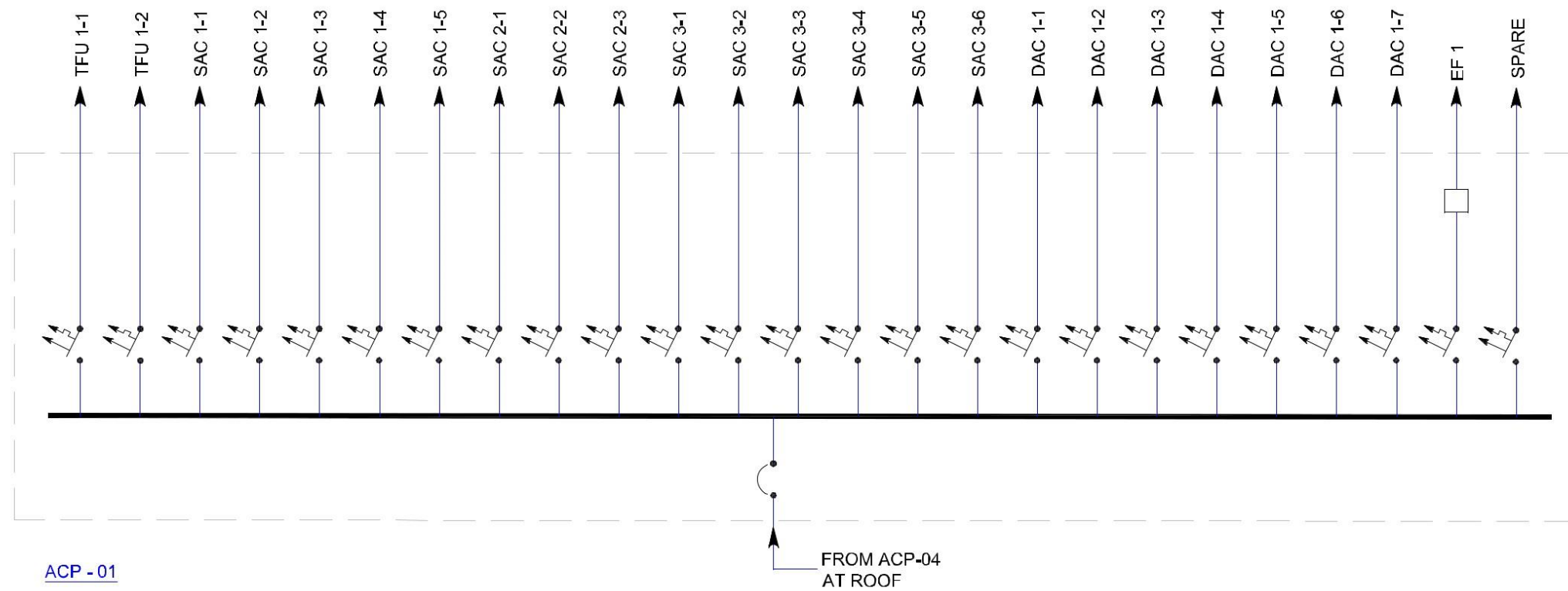
- NOTES**
1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
 2. FOR LEGEND AND GENERAL NOTES REFER DRAWING NO. 4131.

<div>CLIENT</div> <div>UNIVERSITY OF AGRICULTURE FAISALABAD</div>		<div>CONSULTANT</div> <div>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.</div> <div>HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.</div>		<div><div>04</div><div>03</div><div>02</div><div>01</div></div> <div><div>REV.</div><div>DATE</div><div>DESCRIPTION</div><div>APPROVED</div></div>		<div><div>DRAWN</div><div>WAQAR</div></div> <div><div>SUBMITTED</div><div></div></div> <div><div>RECOMMENDED</div><div></div></div> <div><div>CHD./VER.</div><div></div></div> <div><div>APPROVED</div><div></div></div>		<div>PROJECT</div> <div>UNIVERSITY OF AGRICULTURE FAISALABAD</div>		<div>HVAC - SECOND FLOOR PLAN (NEW LIBRARY)</div> <div><div>DATE</div><div>OCTOBER, 2020</div></div> <div><div>DRAWING No.</div><div>4131/04/TD/K08</div></div>	
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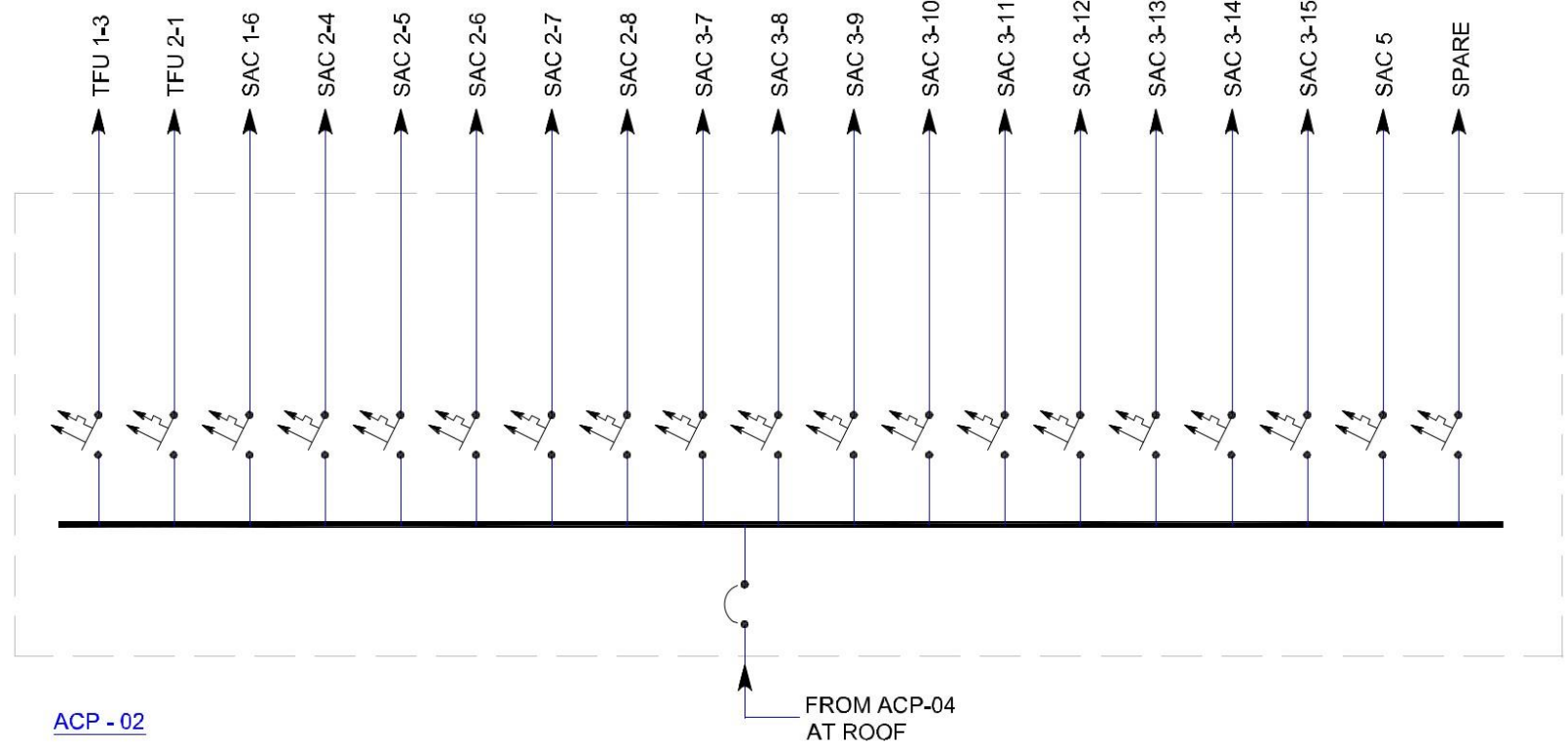


- NOTES**
- 1. FOR LEGEND AND GENERAL NOTES REFER DRAWING NO. 4131.
 - 2. READ THIS DRAWING IN CONJUNCTION WITH ALL RELEVANT DRAWINGS.
 - 3. FOR SCOPE OF WORK AND ELECTRICAL SPECIFICATIONS REFER TO THE TECHNICAL SPECIFICATIONS.
 - 4. LOCAL ISOLATING SWITCHES SHALL BE PROVIDED FOR ALL MENTIONED EQUIPMENT.
 - 5. INCOMING CABLES AND CIRCUIT BREAKERS TO ALL ACP's FROM ELECTRICAL PANELS TO EQUIPMENT ARE IN THE SCOPE OF THE CONTRACTOR.

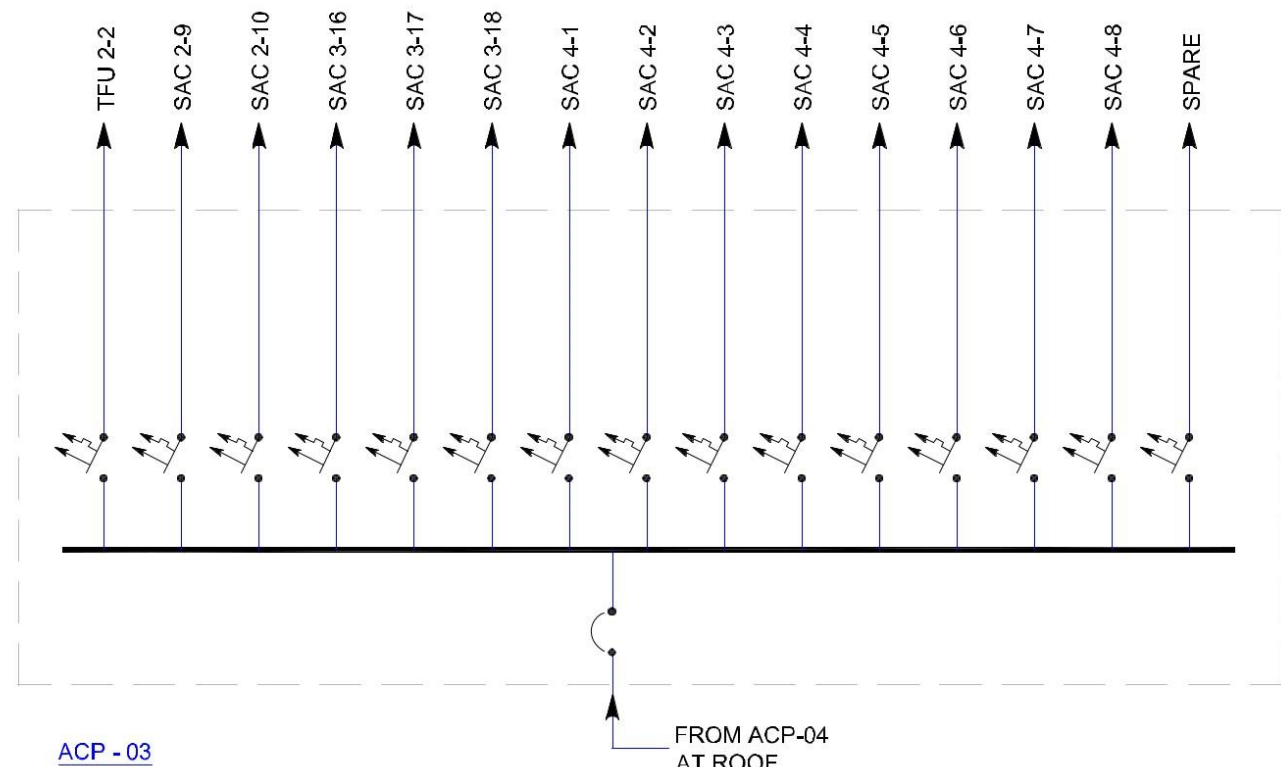
<div>CLIENT</div> <div></div> <div>UNIVERSITY OF AGRICULTURE FAISALABAD</div>	<div>CONSULTANT</div> <div></div> <div>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.</div>	04				DRAWN	WK	PROJECT	UNIVERSITY OF AGRICULTURE FAISALABAD		HVAC - ELECTRICAL DISTRIBUTION DIAGRAM (ICT BUILDING)		SC	
		03				SUBMITTED	HA							RE
		02				RECOMMENDED	AK							
		01			MUD	CHD./VER.	MHF							
		HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.		REV.	DATE	DESCRIPTION	APPROVED							
											OCTOBER, 2020	4131/04/TD/K10		



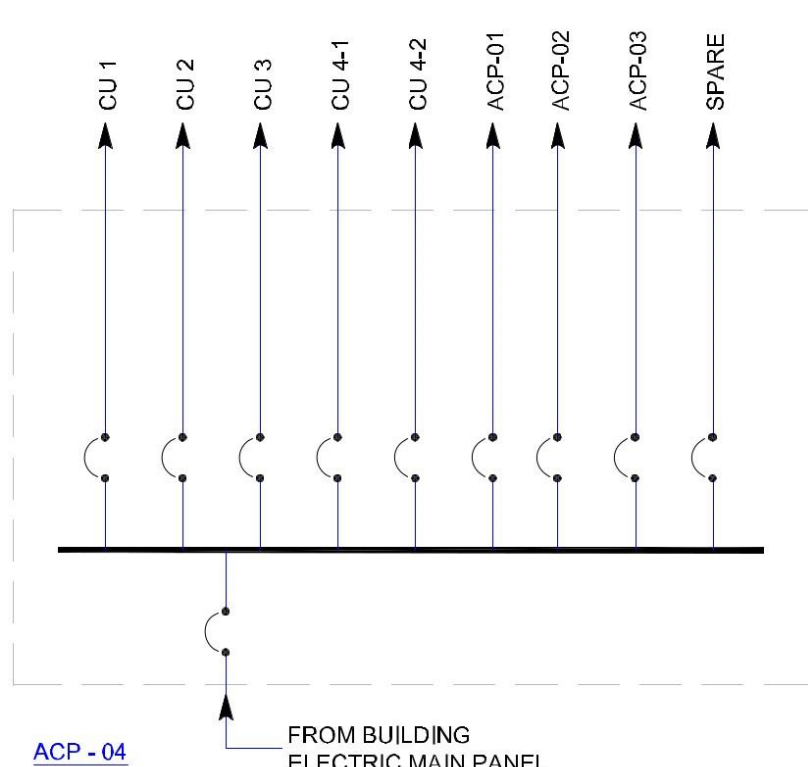
ACP - 01
LOCATION:
GROUND FLOOR
(NEW LIBRARY)



ACP - 02
LOCATION:
FIRST FLOOR
(NEW LIBRARY)





ACP - 03
LOCATION:
SECOND FLOOR
(NEW LIBRARY)



ACP - 04
LOCATION:
ROOF PLAN
(NEW LIBRARY)

NOTES

1. FOR LEGEND AND GENERAL NOTES REFER DRAWING NO. 4131.
2. READ THIS DRAWING IN CONJUNCTION WITH ALL RELEVANT DRAWINGS.
3. FOR SCOPE OF WORK AND ELECTRICAL SPECIFICATIONS REFER TO THE TECHNICAL SPECIFICATIONS.
4. LOCAL ISOLATING SWITCHES SHALL BE PROVIDED FOR ALL EQUIPMENT MENTIONED.
5. INCOMING CABLES AND CIRCUIT BREAKERS TO ALL ACPs FROM ELECTRICAL PANELS TO EQUIPMENT ARE IN THE SCOPE OF THE CONTRACTOR.

<div>CLIENT</div> <div></div> <div>UNIVERSITY OF AGRICULTURE FAISALABAD</div>	<div>CONSULTANT</div> <div></div> <div>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.</div>	04				DRAWN	WAQAR	PROJECT	HVAC - ELECTRICAL DISTRIBUTION DIAGRAM (NEW LIBRARY)	
		03				SUBMITTED				
		02				RECOMMENDED				
		01				CHD./VER.				
		HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.		REV.	DATE	DESCRIPTION	APPROVED			
			OCTOBER, 2020		DRAWING No.		4131/04/TD/K11			

