

Indian Institute of Technology Kanpur

Office of Infrastructure and Planning

INDEX

Name of Work: Repairing and replacement works of central AC system in IWD AC Plant and PKK Library

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NIT amounting to Rs. 10,89,167/- is preferred.

[Certified that this N.I.T. contains 50 [Fifty Pages only].

PART-A

Indian Institute of Technology Kanpur
Office of Infrastructure and Planning

E-TENDER NOTICE

NIT No. EandM/09/06/2023-1

Dated: 09.06.2023

The Dean, Infrastructure and Planning, IIT Kanpur, on behalf of Board of Governors of IIT Kanpur invites online percentage rate tenders for the following works from eligible HVAC Contractors/ Original Equipment Manufacturers or their eligible authorized dealers:

Sl. No	Name of work and location	Estimated cost put to tender (In Rs.)	Earnest Money (In Rs.)	Period of Completion (in Month)	Last date & time of submission of tender	Time & date which EMD Declaration, and other technical bid Documents shall be open online on	Time & date of opening of technical bid
1	Repairing and replacement works of central AC system in IWD AC Plant and PKK Library	Rs. 10,89,167/- exclusive of GST	NIL with Bid Security Declaration (see Page 23)	4 weeks	As per CPP Portal	As per CPP Portal	As per CPP Portal

The E-tender documents is available on <http://eprocure.gov.in/eprocure/app>

Officer in Charge
Office of Infrastructure and Planning

Information and e-Tendering for Contractors

1. The intending tenderer must read the terms and conditions of FORM-6 for e-Tendering carefully. He should only submit his tender if he considers himself eligible and he is in possession of all the documents required.
2. Information and Instructions for tenderer posted on website shall form part of tender document.
3. The tender document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen and downloaded from website <http://eprocure.gov.in/eprocure/app> free of cost.
4. But the tender can only be submitted after uploading the mandatory scanned documents as per list given below.
5. Those contractors not registered on the website mentioned above, are required to get registered beforehand. If needed they can be imparted training on online bidding process as per details available on the website.
6. The following condition pertains to GST of General Condition of contracts and corresponding amendments should be read as follows:-
 - a) The quoted rate should be exclusive of GST
 - b) The GST as applicable shall be paid extra. The total bid price quoted shall be inclusive of all statutory liabilities, taxes, cess, duties, levies as applicable under the prevailing statutes or levy by the statutory authorities/State/Central Government and payable by the bidder under the contract. All the GST benefits and credits on inputs as available to the bidder shall be taken into consideration in the quoted price and pass on the benefits/credits to the Corporation. Bidder shall also comply with the provision of Anti-Profiteering under GST act.)

BID DOCUMENT

Online bids (Technical & Financial) from eligible bidders which are valid for a period of 90 days from the date of Technical/financial Bid opening are invited for and on behalf of the Board of Governors, IIT, Kanpur for “**Repairing and replacement works of central AC system in IWD AC Plant and PKK Library.**”

Notice Inviting Tender No.	<i>EandM/09/06/2023-1</i> dated <i>09.06.2023</i>
Name of Work	<i>Repairing and replacement works of central AC system in IWD AC Plant and PKK Library</i>
Estimated Cost	<i>Rs. 10,89,167/-</i>
Earnest Money	<i>Nil with Bid Security Declaration page no. 23 (Attached)</i>
<i>Non-refundable Tender Processing fee (inclusive of GST@18%) through online transfer (NEFT/RTGS).</i>	<i>Tender Processing fee Rs. 5000/ -</i>
	<i>Tender Processing fee Rs. 1500/- for having MSME/NSIC/Startup registration</i>
<i>Details of Institute Account for submitting tender processing fees</i>	<i>Bank Name: SBI IIT Kanpur Beneficiary Name: The Registrar IIT Kanpur A/C No. 30632766814 IFSC Code: SBIN0001161</i>
<i>Date of Publishing</i>	<i>As per CPP Portal</i>
<i>Clarification Start Date and Time</i>	<i>As per CPP Portal</i>
<i>Clarification End Date and Time</i>	<i>As per CPP Portal</i>
<i>Queries (if any)</i>	<i>No queries will be entertained after clarification end date and time</i>
<i>Bid Submission Start Date</i>	<i>As per CPP Portal</i>
<i>Pre Bid Meeting Date and Time</i>	<i>NA</i>
<i>Last Date and time of uploading of Bids</i>	<i>As per CPP Portal</i>
<i>Last Date and time of submitting, Bid Security Declaration and other documents online</i>	<i>As per CPP Portal</i>
<i>Date and time of opening of Technical, Bids</i>	<i>As per CPP Portal</i>
<i>Date and time of opening of Financial Bids</i>	<i>As per CPP Portal</i>

Interested parties may view and download the tender document containing the detailed terms & conditions from the website <http://eprocure.gov.in/eprocure/app>.

(The bids have to be submitted online in electronic form on www.eprocure.gov.in only. No physical bids will be accepted. No hardcopy of any documents will be accepted)

INSTRUCTION FOR ONLINE BID SUBMISSION

The bidders are required to submit soft copies of their bids electronically on the Central Public Procurement (CPP) Portal ie <http://eprocure.gov.in/eprocure/app> , using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

REGISTRATION

- (i) Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL:<https://eprocure.gov.in/eprocure/app>)by clicking on the link “Online Bidder Enrollment” option available on the home page. **Enrolment on the CPP Portal is free of charge.**
- (ii) During enrolment/ registration, the bidders should provide the correct/ true information including valid email-id & mobile no. All the correspondence shall be made directly with the contractors/ bidders through email-id provided.
- (iii) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- (iv) For e-tendering possession of valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) is mandatory which can be obtained from SIFY /nCode/eMudra or any Certifying Authority recognized by CCA India on eToken/ SmartCard.
- (v) Upon enrolment on CPP Portal for e-tendering, the bidders shall register their valid Digital Signature Certificate with their profile.
- (vi) Only one valid DSC should be registered by a bidder. Bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse and should ensure safety of the same.
- (vii) Bidders can then log into the site through the secured login by entering their userID/ password and the password of the DSC/ eToken.

SEARCHING FOR TENDER DOCUMENTS

- 1) There are various search options built in the CPP Portal to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords, etc., to search for a tender published on the CPP Portal.
- 2) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective ‘My Tenders’ folder.

This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

- 3) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

PREPARATION OF BIDS:

- (i) For preparation of bid Bidders shall search the tender from published tender list available on site and download the complete tender document and should take into account corrigendum if any published before submitting their bids.

After selecting the tender document same shall be moved to the 'My favourite' folder of bidders account from where bidder can view all the details of the tender document.

- (ii) Bidder shall go through the tender document carefully to understand the documents required to be submitted as part of the bid. Bidders shall note the number of covers in which the bid documents have to be submitted, the number of documents – including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- (iii) Any pre-bid clarifications if required, then same may be obtained online through the tender site, or through the contact details given in the tender document.
- (iv) Bidders should get ready in advance the bid documents in the required format (PDF/xls/rar/ formats) to be submitted as indicated in the tender document/schedule. **Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.**
- (v) Bidders can update well in advance, the documents such as experience certificates, annual report, PAN, EPF & other details etc., under "My Space/ Other Important Document" option, which can be submitted as per tender requirements. This will facilitate the bid submission process faster by reducing upload time of bids.

SUBMISSION OF BIDS:

- (i) Bidder should log into the site well in advance for bid submission so that he/ she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay.
- (ii) Bidder should prepare the **Bid Security Declaration** as per the instructions specified in the NIT/ tender document. Otherwise, the uploaded bid will be rejected.
- (iii) While submitting the bids online, the bidder shall read the terms & conditions (of CPP portal) and accepts the same in order to proceed further to submit their bid.

- (iv) Bidder shall digitally sign and upload the required bid documents one by one as indicated in the tender document.
- (v) Bidders shall note that the very act of using DSC for downloading the tender document and uploading their offers is deemed to be a confirmation that they have read all sections and pages of the tender document without any exception and have understood the complete tender document and are clear about the requirements of the tender document.
- (vi) Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document. For the file size of less than 1 MB, the transaction uploading time will be very fast.
- (vii) **If price quotes are required in XLS format, utmost care shall be taken for uploading Schedule of quantities & Prices and any change/ modification of the price schedule shall render it unfit for bidding.**

Bidders shall download the Schedule of Quantities & Prices i.e. Schedule-A, in XLS format and save it without changing the name of the file. Bidder shall quote their rate in figures in the appropriate cells, thereafter save and upload the file in financial bid cover (Price bid) only.

If the template of Schedule of Quantities & Prices file is found to be modified/corrupted in the eventuality by the bidder, the bid will be rejected and further dealt as per provision of clause no 23.0 of ITB.

The bidders are cautioned that uploading of financial bid elsewhere i.e., other than in cover 2 will result in rejection of the tender.

- (viii) Bidders shall submit their bids through online e-tendering system to the Tender Inviting Authority (TIA) well before the bid submission end date & time (as per Server System Clock). **The TIA will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders at the eleventh hour.**
- (ix) After the bid submission (i.e. after Clicking “Freeze Bid Submission” in the portal), the bidders shall **take print out of system generated acknowledgement** number and keep it as a record of evidence for online submission of bid, which will also act as an entry pass to participate in the bid opening.
- (x) Bidders should follow the server time being displayed on bidder’s dashboard at the top of the tender site, which shall be considered valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system.
- (xi) All the documents being submitted by the bidders would be encrypted using PKI (Public Key Infrastructure) encryption techniques to ensure the secrecy of the data. The data entered cannot

be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology.

ASSISTANCE TO BIDDERS:

- (i) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contract person indicated in the tender. For any query, please write to: tender_doip@iitk.ac.in.

Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24X7 CPP Portal Helpdesk. The 24 x 7 Help Desk Number 0120-4200462, 0120-4001002 and 0120-4001005. The helpdesk email id is support-eproc@nic.in

INSTRUCTION FOR e-PROCUREMENT

1. PREPARATION AND SUBMISSION OF BIDS :

- a. The detailed tender documents may be downloaded from <http://eprocure.gov.in/eprocure/app> till the last date of submission of tender. The Tender may be submitted online through CPP Portal <http://eprocure.gov.in/eprocure/app>
- b. The bidder should submit the bid online in two parts viz. Technical Bid and Financial Bid. Technical Bid should be upload online in cover- 1 and Financial Bid in “.Xls” should be upload online in cover-2

2. SUBMISSION OF THE BID : All interested eligible bidders are requested to submit their bids online on CPP Portal: <http://eprocure.gov.in/eprocure/app> as per the criteria given in this document:

- a. Technical Bid should be upload online in cover-1.
- b. Financial Bid should be upload online in cover-2

Both Technical and Financial Bid covers should be placed online on the CPP Portal (<http://eprocure.gov.in/eprocure/app>).

3. TECHNICAL BID: Signed and Scanned copies of the Technical bid documents as under must be submitted online on CPP Portal: <http://eprocure.gov.in/eprocure/app> .

List of Documents to be scanned and uploaded (Under Cover-1) within the period of bid submission:-

- a. **Optional:** Enlistment of contractor with CPWD or others or proof of specialized agency with similar work experience, in case enlistment is claimed.
- b. Experience/ completion certificates of similar nature of works.

The certificates submitted by the bidder should clearly indicate:

- 1) The completion certificate cost of the executed air-conditioning works.
- 2) Actual date of completion of the above air-conditioning work.

- c. Scanned copy of Registration of EPF & ESIC
- d. Scanned Copy of GST Registration & PAN card
- e. Scanned copy of Bid security Declaration certificate (Annexure A) must be uploaded
- f. Scanned copy of proof of tender fee submission as per the format (Annexure B) must be upload along with transaction slip with due mentioned NIT No.

Note: No hardcopy of documents will be accepted.

Please note that no indication of the rates/amounts be made in any of the documents submitted with the TC-BID.

4. Financial Bid

- a. The currency of all quoted rates shall be Indian Rupees. All payment shall be made in Indian Rupees.
- b. In preparing the financial bids, bidders are expected to take into account the requirements and conditions laid down in this Tender document. The financial bids should be uploaded online as per the specified “.Xls” format i.e. Price Bid in Excel sheet attached as ‘.Xls’ with the tender and based on the scope of work, service conditions and other terms of the Tender document. It should include all costs associated with the Terms of Reference/Scope of Work of the assignment.
- c. Being an individual work contract no other tax is payable other than GST. The GST shall be paid extra as applicable.

5. Last Date for Submission of Tender:

- a. Online bids complete in all respects, must be submitted on or before the last date and time specified in the schedule of events.
- b. The IIT, Kanpur may, at its own discretion, alter/extend the last date for submission of tenders.

6. Bid Validity

- a. All the Bids must be valid for a period of 90 days from the date of financial bid opening of the tender for execution of Contract. However, the quoted rates should be valid for the initial/extended period of the Contract from the effective date of the Contract. No request will be considered for price revision during the original Contract period.
- b. A bid valid for a shorter period shall be declared as non-responsive.
- c. In exceptional circumstances, prior to expiry of the original time limit, the IIT may request the bidders to extend the period of validity for a specified additional period beyond the original validity of 90 days. The request and the bidders' responses shall be made in writing. The bidders, not agreeing for such extensions will be allowed to withdraw their bids without forfeiture of their Bid Security.

7. Modification / Substitution/ Withdrawal of bids:

a. No Bid shall be modified, substituted, or withdrawn by the Bidder after the Bid's due Date.

8. **Rejection of the Bid:** The bid submitted shall become invalid if: -

- a) The tenderer is found ineligible.
- b) The tenderer does not upload all the documents as stipulated in the tender document.
- c) If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies required after tender opening, then the tender will be rejected.

FORM -6 FOR e-Tendering

The Dean, Infrastructure and Planning, IIT Kanpur, on behalf of Board of Governors of IIT Kanpur invites online percentage rate tenders for the following works from eligible HVAC Contractors/ Original Equipment Manufacturers or their eligible authorized dealers: “Repairing and replacement works of central AC system in IWD AC Plant and PKK Library.”

Criteria of eligibility

1. Having satisfactorily completed 3 (three) similar works each of value 40% of the estimated cost or two similar works each of value 60% of the estimated cost or one similar work of value 80% of estimated cost during last seven years.

Out of the above at least one work must be in the Central Govt. /Central autonomous bodies/central PSU/State PSU/State Govt./ Private establishment of repute in last 7 years (Not earlier than 01-04-2016)

- a. Similar nature of work means: “*SITC of VRF AC system, AHU, FCU and Chilled water pipeline, control valves and associated central air conditioning work*” etc.

1. Having GST, ESI & EPF registration certificate of government authorities.
 2. Scanned copy Bid security Declaration certificate ‘Annexure-A’.
 3. Scanned copy of proof of tender fee submission as per the format (Annexure B) must be upload along with transaction slip with due mentioned NIT No.
-
1. *Agreement shall be drawn with the successful tenderers on prescribed Form No. CPWD 7 (or other Standard Form as mentioned) which is available as a Govt. of India Publication and also available on website www.iitk.ac.in Tenderers shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.*
 2. *The time allowed for carrying out the work will be **4 weeks** from the date of start as defined in schedule ‘F’ or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the tender documents.*
 3. *The site for the work is available as and when notified by Engineer In Charge for the new requirement.*
 4. *The tender document consisting of the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents except Standard General Conditions of Contract Form can be seen on website <http://eprocure.gov.in/eprocure/app>, <https://eprocure.gov.in/cppp/latestactivetenders> or www.iitk.ac.in.*
 5. *After submission of the tender the contractor can re-submit revised tender any number of times but before last time and date of submission of tender as notified.*

6. *While submitting the revised tender, contractor can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of tender as notified.*
7. When tenders are invited in three stage system and if it is desired to submit revised financial tender then it shall be mandatory to submit revised financial tender. If not submitted then the tender submitted earlier shall become invalid.
8. Copy of Enlistment Order and certificate of work experience **wherever applicable** and other documents as required and specified in this bid document shall be scanned and uploaded to the e-Tendering website within the period of tender submission.
9. Online tender documents submitted by intending tenderers shall be opened only of those tenderers, whose Bid Security Declaration Document and other documents as mentioned are found in order.
10. The financial bid of only pre-qualified eligible bidders shall be opened at the time as provided in CPP Portal

Non Refundable E-tender Processing Fees is required to be submitted through online transfer (NEFT/RTGS) to the Institute account. Proof of submission as per the format (Annexure B) must be upload along with transection slip with due mention of NIT No. : in the CPP portal for valid tender submission. Details of Bank Account details can be found in (Annexure-C).

Annexure B

Format for proof of submission to be upload along with transaction slip.

NIT No.	Name of Agency	GST Number of the Agency	Date of Transaction	Total Amount Transferred	UTR Number

Annexure C

Details of Institute Bank Account for submitting tender processing fees.

Bank Name	Beneficiary Name	A/C No.	IFSC Code
SBI IIT Kanpur	The Registrar IITK	30632766814	SBIN0001161

11. The tender submitted shall become invalid and cost of tender & e-Tender processing fee shall not be refunded if:

- a. The tenderers is found ineligible.
 - b. The tenderers do not upload all the documents as stipulated in the tender document.
12. If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies required after opening of the tender.
13. The contractor whose tender is accepted will be required to furnish performance guarantee of 5% (Five Percent) of the tendered amount within the period specified in Schedule F. This guarantee shall be in the form of cash (in case guarantee amount is less than Rs.10,000/-) or Deposit at Call receipt of any scheduled bank/Banker's cheque of any scheduled bank/Demand Draft of any scheduled bank/Pay order of any Scheduled Bank of any scheduled bank (in case guarantee amount is less than Rs. 1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule 'F', the contract would be liable to rejection by competent authority along with other procedures.
14. The competent authority on behalf of the Board of Governors, IIT Kanpur does not bind itself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the tenders received without the assignment of any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderers shall be summarily rejected
15. The competent authority on behalf of the Board of Governors, IIT Kanpur does not bind itself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the tenders received without the assignment of any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderers shall be summarily rejected.
16. On opening date, the contractor can login and see the bid opening process. After opening of bids, he/she will receive the competitor bid sheets.
17. Certificate of Financial Turn over: At the time of submission of bid, contractor has to upload Affidavit/Certificate from CA mentioning Financial Turnover on similar work of last 5 years or for the period as specified in the bid document and further details if required may be asked from the contractor after opening of technical bids containing pre-qualification documents. The balance sheet in case of private public limited company shall include its standalone finance statement and consolidated financial statement both. There is no need to upload entire voluminous balance sheet
18. Canvassing whether directly or indirectly, in connection with tenderers is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable for rejection.
19. Competent authority on behalf of Board of Governors, IIT Kanpur reserves to himself the right of accepting the whole or any part of the tender and the tenderers shall be bound to perform the same at the rate quoted.

20. The contractor shall not be permitted to tender for works in the IIT Kanpur responsible for award and execution of contracts, in which his near relative is posted a Divisional Accountant or as an officer in any capacity in Institute works department or Office of Dean of Infrastructure and Planning. He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazetted officer in the IIT Kanpur. Any breach of this condition by the contractor would render him liable to be removed from the preferred list of contractors of this Department.
21. No Engineer of Gazetted Rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the prior permission of the Government of India in writing. This contract is liable to be canceled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractor's service.
22. The tender for the works shall remain open for acceptance for a period of ninety (90) days from the date of opening of tenders if any tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the tenderers shall not be allowed to participate in the retendering process of the work.
23. This Notice Inviting Tender shall form a part of the contract document. The successful tenderers/contractor, on acceptance of his tender by the Accepting Authority shall within 15 days from the stipulated date of start of the work, sign the contract consisting of:-
24. The Notice Inviting Tender, all the documents including additional conditions, specifications and drawings, if any, forming part of the tender as uploaded at the time of invitation of tender and the rates quoted online at the time of submission of tender and acceptance thereof together with any correspondence leading thereto.
25. Standard C.P.W.D. Form 7 or other Standard C.P.W.D. Form as applicable.
26. The EPF & ESI contribution paid to the contract workers shall be reimbursed on actual basis.
27. **Construction equipment proposed to be deployed for the project and proof of its availability; equipment proposed to be purchased or leased.**
28. **Key personnel available and proposed to be engaged for management and supervision of the Project, their qualifications and experience. Valid certificates by a recognized University, technical Board, or Ministry of Government of India would only be taken cognizance of.**

Dean, Infrastructure and Planning
For & on behalf of the Board of Governors, IIT, Kanpur

PERCENTAGE RATE TENDER AND CONTRACT FOR WORK

- | | |
|-----------------------------|---|
| (A) Tender for the work of: | Repairing and replacement works of central AC system in IWD AC Plant and PKK Library |
|-----------------------------|---|

TENDER

I/We have read and examined the Notice Inviting tender, schedule, A,B,C,D, E&F. Specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, Special conditions, Schedule of Rate & other documents and rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the Board of Governors, IIT Kanpur within the time specified in Schedule 'F', viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.

We agree to keep the tender **open for (90) ninety days from the date of opening of tender** and not to make any modifications in its terms and conditions.

If I/we, fail to furnish the prescribed performance guarantee or fail to commence the work within prescribed period I/we agree that the said Board of Governors, IIT, Kanpur or his successors in office shall without prejudice to any other right or remedy be at liberty to be debarred for participation in the re-tendering process of the work. Further, if I/we fail of commence work as specified, I/we agree that Board of Governors, IIT Kanpur or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the performance guarantee absolutely and security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, up to maximum of the percentage mentioned in Schedule 'F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form..

Further, I/We agree that in case of forfeiture of earnest money or both Earnest Money & Performance Guarantee as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work.

I/We undertake and confirm that eligible similar work(s) has/ have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for tendering in IIT, Kanpur in future forever. Also, if such a violation comes to the notice of Institute before date of start of work, the Engineer In shall be free to forfeit the entire amount of Performance Guarantee/take action as per Earnest Money Declaration

I/We hereby declare that I/we shall treat the tender documents and other records connected with the work as secret/confidential documents and shall not communicate information derived there from to any person other than a person to whom I/we am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the Institute.

Dated _____**_____

**
Signature of contractor
Postal Address **

Witness: **
Address: **
Occupation: **

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the Board of Governors, IIT Kanpur for a sum of Rs. _____(Rupees _____)

The letters referred to below shall form part of this contract Agreement:-

- a) _____
- b) _____
- c) _____

For & on behalf of the Board of Governors, IIT Kanpur

Dated _____

Signature _____
Designation _____

Operative schedules shall be supplied separately to each intending tenderer)

SCHEDULE ‘A’

Schedule of Quantities: Attached as Part C

SCHEDULE ‘B’

Schedule of materials to be issued to the contractor:

S. No.	Description of item	Quantity	Rates in figures & words at which the material will be charged to the contractor	Place of issue
1	2	3	4	5
-----NIL -----				

SCHEDULE ‘C’

Schedule of Tools and Plants to be hired to the contractor

S. No.	Description	Hire charges per day	Place of issue
1	2	3	4
-----NIL -----			

SCHEDULE ‘D’

Extra schedule for specific requirements/document for the work, if any: **As attached in tender form.**

SCHEDULE ‘E’

Schedule of component of other Materials, Labour, POL etc. for price escalation: **N.A.**

SCHEDULE ‘F’

Reference to General Conditions of contract.

Name of Work:	<i>Repairing and replacement works of central AC system in IWD AC Plant and PKK Library</i>		
Estimated cost of the work:	Air-conditioning Items of Work		Rs. 10,89,167/-
Earnest money	Bid Security Declaration		
Performance Guarantee	5% of the tendered value of the work valid up to defect liability period, has to be submitted post		

	award of work within stipulated time period as per Schedule-F
Retention Money.	2.5% of the tendered value of the work, will be deducted from the bill. Same would be released after successful completion of one (1) year defect liability period.
General rules and direction :	

Definitions:

2(v)	Engineer-in-Charge	
	For E& M items of work	Engineer authorized by Dean, Infrastructure and Planning
2(vi)	Accepting Authority	Dean of Infrastructure and Planning, IIT Kanpur
2(vii)	Percentage on cost of materials and labor to cover all overheads and profits	15%
2(viii)	Standard Schedule of Rates:	
	Electrical/Mechanical Items of Work:	D.S.R. (E & M), 2022 with up-to-date correction slips
2(ix)	Department:	Central Public Works Department
2(x)	Standard CPWD contract Form:	GCC 2020, CPWD form-7 as modified & corrected up to 31.05.2023 (Whether correction vide latest circulars are incorporated or not in this document).
Clause 1	i) Time allowed for submission of Performance Guarantee from the date of issue of letter of acceptance	7 Days
	ii) Maximum allowable extension beyond the period as provided in i) above	7 Days
Clause 2	Authority for fixing Compensation under Clause 2	Dy. Director/ Director, IIT Kanpur
Clause 2 A	Whether Clause 2A shall be applicable	YES
Clause 5	i) Number of days from the date of issue of letter of acceptance for reckoning date of start	15 Days
	ii) Mile stone :	Time allowed for execution of work along with the amount to be withheld in case of non-achievement of milestone are shown in Table -1
Authority to decide	Extension of time	Dy. Director/Director, IIT Kanpur

Clause 6			Applicable
Clause 7	Gross work to be done together with net payment/Adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment		Not applicable
Clause 10A	Material to be provided by the contractor.		Applicable
Clause 10B (ii), (iii)	Whether clause 10-B (ii) and 10-B (iii) shall be applicable.		Not Applicable
Clause 10 C	Component of labour expressed as percentage of value of work		---
Clause 10 CA	Materials covered under this clause.	Nearest material(other than cement, reinforcement bars and structural steel) for which All India Whole sale price Index is to be followed.	NA
Clause 10 CC	Increase/Decrease in Price of materials/wages		Not Applicable
Clause 11	Specification to be followed for execution of work:		
For electrical works	CPWD specifications 2014 internal and 2014 external electrical works		
For Air conditioning & Refrigeration item of works	CPWD Specifications 2014 Electrical & HVAC for Air-conditioning & refrigeration works , 2017 with up to date correction slips.(Hereinafter called CPWD specifications also)		
Clause 12			
12.2 & 12.3	Deviation limit beyond which clause 12.2 & 12.3 shall apply for building work		---
Clause 16	Competent Authority for Deciding reduced rates:		
	<i>For electrical/civil/Air-conditioning & refrigeration items of work</i>	<i>Dy. Director/ Director, IIT Kanpur</i>	
Clause 18	<i>List of mandatory machinery, tools & plants to be deployed by the contractor at site.</i>	<i>Ladders, Multimeter, drill machine, crimping tools, spanner set, blower, Gas Charging line with equipment, welding torch etc as applicable</i>	
Clause 32		<i>Requirement of technical Representative(s)</i>	

Requirement of technical Representative(s)

Requirement of Technical Representative (S) and recovery Rate

Sl. No.	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical representative)	Minimum Experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36(i)	
						Figures	Words
1.	B.E./B.Tech	Electrical /Mechanica l/Allied Areas	Project Manager/Site Engineer	5	1	Rs. 21,000/- p.m	Twenty One Thousand per month

For supervision of air-conditioning/refrigeration activities throughout the period of supply, testing and installation, technical representatives of the respective disciplines will be required to be deployed.

Table 1

Major Milestones for the Work

Sl. No.	Description of Milestone (Physical)	Time allowed from date of start	Maximum Duration of work	Amount to be withheld in case of non - achievement of milestone (% of tendered amount)

1.	Replacement of butterfly valves NRV, gear box and making arrangement for water storage at IWD AC plant.	4 weeks	4 weeks	5
2.	Rejuvenation of old single skin AHU/LLD Blower with double skin 5500 cfm /Higher CFM AHU at reserve section of Library.	4 weeks	4 weeks	5

Annexure A

Performa of Bid Security Declaration

(To be submitted by bidder on its Company Letterhead (scanned copy) on <http://eprocure.gov.in/eprocure/app>)

It is here by submitted that if I/We ----- (Name of bidder/firm/company) withdraw or modify the bids during period of validity, or if I/We ----- (Name of bidder/firm/company) are awarded the contract and I/We ----- (Name of bidder/firm/company) fail to sign the contract or to submit a performance security before the deadline defined in the tender documents, I/We ----- (Name of bidder/firm/company) will be suspended to take part in IIT Kanpur’s tendering process for the period of two years from the date of occurrence of the above mentioned default.”

Date:

Authorized Signatory

PART-B

QUALITY ASSURANCE OF THE WORK

1. The contractor shall procure all the materials at least in advance so that there is sufficient time to testing and approving of the materials and clearance of the same before use in work.
2. All materials brought by the contractor for use in the work shall be got checked from the Engineer-in-Charge or his authorized representative of the work on receipt of the same at site before use.
3. The contractor shall be fully responsible for the safe custody of the materials issued to him even if the materials are in double lock and key system.
4. There shall be pre dispatch factory inspection for all major equipment.
5. The testing charges shall be borne by the bidder.
6. The visiting & lodging expenses shall be borne by the Institute and not to be loaded into the contract except the testing charges. The contractor shall only facilitate the inspection at manufacturing works. However, any transportation, freight, loading & unloading and for testing at the manufacturing location/ institute shall be included in the price quote.
7. Quality standards shall conform to latest IS/ ISO-9001:2015.
8. Unless otherwise provided in the Schedule of Quantities/Specifications, the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the work and nothing extra shall be payable to him on account of the same.
9. Other agencies doing works related with this project may also simultaneously execute their works and the contractor shall afford necessary facilities for the same. The contractor shall work with the agencies who is providing the electrical connection for the AC units. The contractor should drill necessary holes, openings etc. as required as per direction of Engineer In Charge and provide any conduits, clamps, boxes and hooks etc. as may be required for the satisfactory completion of work. Nothing extra over the Agreement rates shall be paid for doing these.
10. Some restrictions may be imposed by the security staff etc. on the working and for movement of labor, materials etc. The contractor shall be bound to follow all such restrictions/instructions and nothing extra shall be payable on account of the same.
11. The contractor shall fully comply with all legal orders and directions of the Public or local authorities or municipality and abide by their rules and regulations and pay all fees and charges for which he may be liable in this regard. Nothing extra shall be paid/reimbursed for the same.
12. For the purpose of recording measurements and preparing running account bills, the abbreviated nomenclature indicated in the publications Abbreviated Nomenclature of Items of DSR 2022 shall be accepted. The abbreviated nomenclature shall be taken to cover all the materials and operations as per the complete nomenclature of the relevant items in the agreement and relevant specifications.
13. In case of items for which abbreviated nomenclature is not available in the aforesaid publication and also in case of extra and substituted items for which abbreviated nomenclature are not provided for in the agreement, full nomenclature of item shall be reproduced in the measurement books and bill forms for running account bills.
14. For the final bill, however, full nomenclature of all the items shall be adopted in preparing abstract in the measurement books and in the bill forms.

15. The contractor shall take instructions from the Engineer-in-charge for stacking of materials. No packing / other materials etc. shall be stacked /collected in areas where other buildings, roads, services, compound walls etc. are to be constructed and should be removed immediately once work is complete.
16. It shall be ensured by the contractor that no electric live wire is left exposed or unattended to avoid any accidents in this regard.

GENERAL TERMS & CONDITIONS

1. Safety at the Work Site

The contractor will identify one of the supervisors for taking care of implementation of Safety systems.

The Contractor should follow the following General Guidelines governing the safety rules as laid down under:

- a. Smoking is strictly prohibited at workplace.
- b. Nobody is allowed to work without wearing safety helmet. Chinstrap of safety helmet shall be always on. Drivers, helpers and operators are no exception.
- c. No one is allowed to work at or more than three meters height without wearing safety belt and anchoring the lanyard of safety belt to firm support preferably at shoulder level.
- d. No one is allowed to work without adequate foot protection.
- e. Usage of eye protection equipment shall be ensured when workmen are engaged for grinding, chipping, welding and gas-cutting. For other jobs as and when site safety co-coordinator insists eye protection has to be provided.
- f. All safety appliances like Safety shoes, Safety gloves, Safety helmet, Safety belt, Safety goggles etc. shall be arranged before starting the job.
- g. Adequate illumination at workplace shall be ensured before starting the job at night.
- h. All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded.
- i. Ladders being used at site shall be adequately secured at bottom and top. Ladders shall not be used as work platforms.
- j. Material shall not be thrown from the height. If required, the area shall be barricaded and one person shall be posted outside the barricading for preventing the tre-passers from entering the area.
- k. Other than electricians no one is allowed to carry out electrical connections, repairs on electrical equipment or other jobs related thereto.
- l. All electrical connections shall be made using 3 or 5 core cables, having an earth wire.
- m. Inserting of bare wires for tapping the power from electrical sockets is completely prohibited.

- n. A tools and tackles inspection register must be maintained and updated regularly.
 - o. Debris, scrap and other materials to be cleared from time to time from the workplace and at the time of closing of work every day.
 - p. All the unsafe conditions, unsafe acts identified by contractors, reported by site supervisors and / or safety personnel to be corrected on priority basis.
 - q. No children shall be allowed to enter the workplace.
 - r. All the lifting tools and tackles shall be stored properly when not in use.
 - s. Clamps shall be used on Return cables to ensure proper earthing for welding works.
 - t. Return cables shall be used for earthing.
 - u. All the pressure gauges used in gas cutting apparatus shall be in good working condition.
 - v. Proper eye washing facilities shall be made in areas where chemicals are handled.
 - w. Connectors and hose clamps are used for making welding hose connections.
 - x. Tapping of power by cutting electric cables in between must be avoided. Proper junction boxes must be used.
2. The contractors shall make his own arrangements for the store storage of materials, accommodation for his staff etc. and no claim for the temporary accommodation from the contractor shall be entertained.
3. The contractor shall carry out and complete the said work in every respect in accordance with the contract and as per the directions and to the satisfaction of the Engineer-in-charge. Issue of further drawings and /or written instructions, detailed directions and explanations which are hereinafter referred to as instructions of the engineer-in-charge in regards to: -
- a. The variation or modification of the design, quality, or quantity of works or the addition or omission or deletion of any work.
 - b. Any discrepancy in the drawings or between the schedule of quantities and /or drawings and/or specifications.
 - c. The removal from the site of any materials brought there by the contractor and the substitution of any other material thereof.
 - d. The dismissal from the works of any persons employed there upon.
 - e. The opening up for inspection of any work covered up.
 - f. The amending /making good of any defects.
4. The contractor shall forth with comply with and duly execute any instructions of work comprised in such engineers-in-charge instructions, provided always that the verbal instructions and explanations given to the contractor or his representative upon the works shall, if involving a variation , be confirmed in writing

by the contractor within seven days and is not dissented in writing within a further seven days by the Engineer-In-Charge, such shall be deemed to be instructions of the Engineer-In-charge within the scope of the contract.

5. The several documents, forming the contract, are to be taken as mutually explanatory of one another and in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer-In-Charge who shall thereupon issue to the contractor its interpretation directing in what manner the work is to be carried out. In case the contractor feels aggrieved by the interpretation of the Institute then the matter shall be referred to the Superintending Engineer and his decision shall be final, conclusive and bind on both parties.
6. The Engineer-in-charge shall have full powers and authority to supply the contractor from time to time during the progress of the work such drawings and instructions as shall be necessary for proper execution and the contractor shall carry out and be bound by the same.
7. The successful tenderer shall be required to enter into an agreement with the Institute. The Bill of Quantities & rates filled by the successful tenderer in, the General Condition of the Contract for CPWD works 2020, CPWD specifications for Civil, Electrical & Air-conditioning works, the special conditions, additional specifications, negotiation letter and the award letter etc. shall form part of the agreement to be signed by the successful tenderer. The cost of stamp paper and stamp duty, required for the agreement, shall be borne by the contractor.
8. The contractor shall, when called upon to do so, enter into and execute a contract agreement in the form with such modifications as may be necessary. The contract agreement, inclusive of its enclosures, shall remain in the custody of the Office of Infrastructure and Planning, IIT Kanpur and shall be made available him as and when required. Contractor shall however be supplied, an attested copy there free of cost.
9. Canvassing in connection with tenders is prohibited and the tenders, submitted by the tenderers who resort to canvassing, are liable for rejection.
10. Tenderers shall have to sign the attached declaration (ANNEXURE A) and if the declaration is not found to represent a true statement of facts the contract is liable to be canceled, earnest money forfeited and the contractor shall have no claim on the Institute.
11. Tenderer are not allow to make additions and alterations in the tender document. Any additions and alternations, if incorporated in the tender, shall be at the tender's risk since the modified tender is liable for rejection.
12. Conditional tenders violate of the spirit and the scope or the terms & conditions of the tender, are liable to be rejected without assigning any reasons. Tenders with any form of rebate shall be rejected summarily.
13. Water and electricity required for electrical & air-conditioning works shall be supplied free of charge.
14. Stamps duty on the security money shall also be the born by contractor as per prevailing notification of U.P Govt. Income tax shall be deducted as per prevalent law.
15. Conditions for Electrical and Air-conditioning Works:-
 - a. All chase cuttings in the wall, for recessed conduits & boxes and drilling the holes shall be done with power operated machines only. No chase shall be allowed to be cut manually with the use of hammer & chisel.

- b. All cuttings in cement plaster and brick shall be made good by using cement mortar 1:3 (1 part cement, 3 part coarse sand)
 - c. The cut surfaces shall be repaired by an experienced mason only so as to match the repaired plaster with the original.
 - d. All such repaired surfaces shall be cured for 3 to 4 days to keep the surfaces wet, using water spray machine (hand/motor operated) and avoid unnecessary flooding of the area.
16. Technical literature, test certificates, and operation and maintenance manuals for window/split/tower ac units & their compressors must be provided.
17. Works Inspection and Testing of Equipment:
- a. Prior to dispatch of equipment the Institute reserves the right to inspect the same at the manufacturer's works and the contractor shall provide and secure every reasonable access and facility at the manufacturers works for inspection, for witness of all acceptance and routine tests as per relevant Indian Standards. Contractor shall give a reasonable notice for the purpose of test, and witness of all major equipment.
 - b. Pre-commissioning test: All routine tests shall be carried out on the electrical & air-conditioning equipment. Protective & measuring devices should be checked for calibration of window/split/tower ac units should be checked for air quantities and temperature. All grills/diffusers should be checked for balanced air quantities.
18. Rates: The work shall be treated as on works contract basis and the rates tendered shall be for complete item of work and all charges for items contingent to the work, such as packing, forwarding, insurance, freight and delivery at site for the materials to be supplied by the contractor, watch and ward of all materials at the site, labour related expenses as per relevant labour laws, testing of materials/ samples etc. Excluding Goods & Service tax (GST).
19. Taxes & Duties: Being an indivisible works contract, no other tax is payable other than GST. The GST shall be as applicable to IIT Kanpur as per Government rules.
20. The contractor shall have to execute the work in such place and condition where other agencies will also be engaged for other works such as site grading, filling and leveling, interiors, landscape, and electrical and mechanical engineering works, etc. No claim shall be entertained due to work being executed in the above circumstances.
21. Contractor must submit post award of work within 7 days complete schedule of work along with deployment details of resources, i.e. manpower and machinery. Schedule so submitted by the contractor, within the defined time period of the work, will be considered to be sacrosanct except for delays as might be considered by Engineer-in-Charge.

SCOPE OF CONTRACT

The two repair/ rejuvenation works under the scope of contract are as follows:

1. Replacement of butterfly valves, NRV, gear box and making arrangement for water storage at IWD AC plant.

The work involves supply and fixing of double skin sheet metal construction Vertical/horizontal type floor mounted air handling units (AHU), Variable frequency drive(VFD), ducting, duct damper, ball valves, butterfly valves, Non-Return Valves (NRV), brass air vent, high density polyethylene water storage tank with cover, SITC of open well submersible type pump and supply and fixing of MS nipple/socket etc.

2. Rejuvenation of old single skin AHU/LLD Blower with double skin 5500 cfm /Higher CFM AHU at reserve section of Library.

The work involves

- 1.SITC of 5500cfm floor mounted AHU with VFD and associated works.
2. P&F of AC duct, insulation, MS C Class pipe, B/F of SS Ball valve cpvc pipe casing , wiring and associated works.
- 3.Dismantling of old AHU, duct, pipes etc.

Note: This scope of work is indicative only. For details, please refer to the BoQ.

To be signed by the bidder and authorized signatory on behalf of IIT Kanpur

I NTEGRITY AGREEMENT

This Integrity Agreement is made at _____ on this _____ day of 2023.

BETWEEN

The Director, IIT Kanpur represented through the **Dean, Infrastructure and Planning.**

IIT KANPUR (hereinafter referred as the Principal / Owner, which expression shall unless repugnant to the meaning or context hereof include its successors and Permitted assigns) AND

..... (Name and Address of the Individual
firm Company)

through (Hereinafter referred to
as the

(Details of duly authorized signatory)

“Bidder/Contractor” and which expression shall unless repugnant to the meaning or Context hereof include its successors and permitted assigns)

Preamble

WHEREAS the Principal /Owner has floated the Tender (NIT No)
(hereafter referred to as “Tender / Bid”) and intends to award, under laid down Organization
procedure, contract for **“Repairing and replacement works of various Air Conditioning works
at different locations of IIT Kanpur .”**

Rs. 10,89,167 /- for **“Repairing and replacement works of various Air Conditioning works
at different locations of IIT Kanpur”** hereinafter referred to as the “Contract”.

AND WHEREAS the principal Owner values full compliance with all relevant laws Of the land,
rules, regulations, economic use of resources and of fairness/transparency in its relation with its
Bidder(s) and Contractor(s).

AND WHEREAS to meet the purpose aforesaid both the parties have agreed to enter into this
Integrity Agreement (hereinafter referred to as “Integrity Pact” or “Pact”). The terms and conditions
of which shall also be read as integral part and parcel of the Tender/Bid documents and Contract
between the parties. NOW, THEREFORE, in consideration of mutual covenants contained in this
Pact, the parties hereby agree as follows and this Pact witnesses as under:

Article 1 : Commitment of the Principal /Owner

- 1) The principal/Owner commits itself to take all measure necessary to prevent
corruption and to observe the following principles:
 - (a) No employee of the Principal/Owner, personally or through any of his/her family
members, will in connection with the tender, or the execution of the contract, demand,
take a promise for or accept , for self or third person, any material or immaterial
benefit which the person is not legally entitled to.
 - (b) The Principal/Owner will, during the tender process, treat all bidder(s) with equity
and reason. The Principal/Owner will, in particular, before and during the Tender
process, provide to all Bidder(s) the same information and will not provide to any
Bidder(s) confidential additional information through which the Bidder(s) could
obtain an advantage in relation to the Tender process of the Contract execution.
 - (c) The Principal/Owner shall endeavor to exclude from the tender process any person,
whose conduct in the past has been of biased nature.
- 1) If the principal/owner obtains information on the conduct of any of its employees which is a
criminal offence under the Indian Penal code (IPC)/Prevention of Corruption Act. 1988 (PC
Act) or is in violation of the principles herein mentioned or if there be a substantive suspicion
in this regard, the Principal/owner will inform the Chief Vigilance Officer and in addition
can also initiate disciplinary actions as per its internal laid down policies and procedures.

Article 2 : Commitment of the Bidder(s) /Contractor(s)

- 1) It is required that each Bidder/Contractor including their respective officers. Employees and

- agents) adhere to the highest ethical standards, and report to the Government/ Department all suspected acts of fraud or corruption or Coercion or Collusion of which it has knowledge or becomes aware, during the tendering process and throughout the negotiation or award of a contract.
- 2) The Bidder(s)/Contractor(s) commit himself to take measures necessary to prevent corruption, He commits himself to observe the following principles during his participation in the Tender process and during the Contract execution:
- a) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal/Owner's employees involved in the Tender process or execution of the Contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the Tender process or during the execution of the Contract.
 - b) The Bidder(s)/Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to cartelize in the bidding process.
 - c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act. Further the Bidder(s)/Contractor(s) will not use improperly. (for the purpose of competition or personal gain), or pass on to others, any information or documents provided by the Principal/Owner as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 - d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the names and address of agent's representatives in India, if any. Similarly, Bidder(s)/Contractor(s) of Indian Nationality shall disclose names and address of foreign agent's representatives, if any. Either the Indian agent on behalf of the foreign principal or the foreign or principal directly could bid in a tender but not both. Further in cases where an agent participates in a tender on behalf of one manufacture, he shall not be allowed to quote on behalf of another manufacture along with the first manufacture in a subsequent/parallel tender for the same item.
 - e) The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.
- 3) The Bidders(s)/Contractor(s) will not instigate third person to commit offenses outlined above or be an accessory to such offenses.
- 4) The Bidder(s)/Contractor(s) will not directly or through any other person or firm indulge in fraudulent practice means a willful misrepresentation or omission of facts or submission of fake /forged documents in order to induce public official to act in reliance thereof, with the

purpose of obtaining unjust advantage by or causing damage to justified interest of others and or to influence the procurement process to the detriment of the government interests.

- 5) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm use Coercive Practices (means the act of obtaining something, compelling an action or influencing a decision through intimidation, threat or the use of force directly or indirectly, where potential or actual injury may befall upon a person, his/her reputation or property to influence their participation in the tendering process).

Article 3: Consequences of Breach

Without prejudice to any rights that may be available to the principle/Owner under law or the Contract or its established policies and laid down procedures, the Principle/Owner shall have the following rights in case of breach of this Integrity Pact by the Bidder(s)/Contractor(s) and the Bidder Contractor accepts and undertakes to respect and uphold Principal/Owner's absolute right:

- 1) If the Bidder(s)/Contractor(s), either before award or during execution of Contract has committed a transgression through a violation of Article 2 above or in any other form, such as to put his reliability or credibility in question, the Principal/Owner after giving 14 days notice to the contractor shall have powers to disqualify the Bidder(s)/Contractor(s) from the Tender process or terminate/determine the contract, if already executed or exclude the Bidder/contractor from contract, award process. The imposition and duration of the exclusion will be determined by the severity of transgression and determined by the Principal/Owner. Such exclusion may be forever or for a limited period as decided by the Principal/Owner.
- 2) Forfeiture of EMD/Performance Guarantee/security Deposit: If the Principal/Owner has disqualified the Bidder(s) From the Tender process prior to the Award of the contract or terminated/determined the contract or has accrued the right to terminate/determine the contract according to Article 3(1), the Principal/Owner apart from exercising any legal rights that may have accrued to the Principal/Owner, may in its considered opinion forfeit the entire amount of Earnest Money Deposit, Performance Guarantee and Security Deposit of the Bidder/Contractor.
- 3) Criminal Liability: If the Principal/Owner obtains knowledge of conduct of a Bidder or Contractor, or of an employee or a representative or an associate of a Bidder or Contractor which constitute corruption within the meaning of IPC Act, or if the Principal/Owner has substantive suspicion in this regard, the Principal/Owner will inform the same to law enforcing agencies for further investigation.

Article 4 : Previous Transgression

- 1) The Bidder declares that no previous transgression occurred in the last 5 years with any other Company in any country confirming to the anti-corruption approach or with Central Government or State Government or any other Central State Public Sector Enterprises in India that could justify his exclusion from the Tender process.
- 2) If the Bidder makes incorrect statement on this subject ,he can be disqualified from the Tender

Process or action can be taken for banning of business dealing holiday listing of the Bidder/Contractor as deemed fit by the Principal/Owner.

- 3) If the Bidder Contractor can prove that he has resorted recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal/Owner may, at its own discretion revoke the exclusion prematurely.

Article 5 : Equal Treatment of all Bidders/Contractors/Subcontractors

- 1) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the principles laid down in this Agreement/Pact by any of its subcontractor's subcontractors.
- 2) The Principal/Owner will enter into pacts on identical terms as this one with all bidders and Contractors.
- 3) The Principal/Owner will disqualify Bidders, who do not submit the duly signed Pact between the Principal/Owner and the Bidder, along with the Tender or violate its provisions at any stage of the Tender process, from the Tender process.

Article 6 : Duration of the Pact

This Pact begins when both the parties have legally signed it. It expires for the Contract/Contractor 8 weeks after the completion of work under the contract or till the continuation of defect liability period, whichever is more and for all other bidders, till the contract has been awarded.

If any claim is made / lodged during the time, the same shall be binding and continue to be valid despite the lapse of this Pacts as specified above, unless it is discharged / determined by the Competent Authority, IIT Kanpur.

Article 7 : Other Provision

- 1) This Pact is subject to Indian law, place of performance and jurisdiction is the Headquarters of the division of the Principal/Owner, who floated the Tender.
- 2) Changes and supplements need to be made in writing. Side agreements have not been made.
- 3) If the contractor is a partnership or a consortium, this Pact must be signed by all the partners or by one or more partner holding power of attorney signed by all partners and consortium members. In case of a company, the Pact must be signed by a representative duly authorized by board resolution.
- 4) Should one or several provisions of this Pact turn out to be invalid; the remainder of this pact remains valid. In this case, the parties will strive to come to an agreement to their original intension.
- 5) It is agreed term and condition that any dispute or difference arising between the parties with regard to the terms of this Integrity Agreement / Pact, any action taken by the Owner/Principal in accordance with this integrity agreement/Pact or interpretation thereof shall not be subject to arbitration.

Article 8 : LEGAL AND PRIOR RIGHTS

All right and remedies of the parties hereto shall be in addition to all the other legal rights and remedies belonging to such parties under the Contract and/or law and the same shall be deemed to be cumulative and not alternative to such legal rights and remedies aforesaid. For the sake of brevity, both the Parties agree that this Integrity Pact will have precedence over the Tender/Contract documents with regard any of the provision covered under this Integrity Pact.

IN WITNESS WHEREOF the parties have signed and executed this Integrity Pact at the place and date first above mentioned in the presences of following witness:

.....
(For and behalf of Principle/Owner)

.....
(For and on behalf of Bidder/Contractor)

WITNESSES:

1.
(Signature, name and address)

2.
(Signature, name and address)

Place:

PART-C

GENERAL SPECIFICATIONS FOR VRF/ VRV/ CHILLED WATER-LINE/ HVAC WORKS

Dx- TYPE AIRCOOLED VARIABLE REFRIGERANT FLOW UNIT

Outdoor Unit

Outdoor unit shall be factory assembled, good for outdoor installation, constructed out of heavy gauge MS panels with weather proof painting. The units shall be factory wired with necessary controls duly tested prior to dispatch conforming to the following specifications.

- a. The outdoor unit shall consist of multiple scroll compressors, all with DC inverter drive of variable speed, capable to operate even when one compressor is unserviceable.*
- b. The units shall be provided with duty cycling arrangement for multiple inverter compressors.*
- d. The outdoor unit shall be modular in design to facilitate installation one after another close to each other. Preference would be given to compact units having smaller footprint.*
- e. Outdoor units should be rugged of anti-corrosion design.*
- f. The outdoor unit shall comprise of sub cooling feature to effectively use the entire coil surface through proper circuit/bridge in order to prevent flushing of refrigerant owing to large length of piping.*
- g. The condensing unit shall be provided with state-of-the-art microprocessor based control panel.*

The outdoor unit shall be provided with Aero spiral design fan exhibiting low noise level characteristics complete with aero fitting grille to facilitate spiral discharge of airflow to effect reduction in pressure losses. The fan should be capable to respond to external static pressure of 5mm.

The condensing unit shall be designed to facilitate fail safe operation when connected to multiple indoor units.

Following safety devices shall be integral part of the outdoor unit:

- High pressure switch*
- Fan drive overload protection switch*
- Fusible plug*

Overload relay including overload protection for inverter driven compressor.

Scroll Compressor

The scroll compressor shall be an industrial quality rugged, cast iron, direct hermetic compressor with scroll plates, suction & discharge service valves. The compressor shall be complete with straight suction tube, centrifugal oil pump, oil charging valve, oil level sight glass, crank case heater and check valve on the scroll discharge port. The compressor shall be complete with the provision of two-point lubrication for each motor bearing. The compressor shall be completely enclosed in a chamber with no leakage path and providing the capability for scroll plates to separate. The compressor shall be provided with industrial solid motor mounts internal motor protection and vibration isolation pads. Each compressor shall be independently wired and piped to its own circuit for efficient operation & ease of maintenance. The compressor speed shall not exceed 3000 RPM.

The compressor shall be capable of functioning with inverter control. The inverter driven compressor shall preferably be with reluctance DC inverter for higher efficiency and reliability.

Condenser

Condenser shall be air-cooled type, suitable for outdoor installation and shall be suitable for operating at 46 deg C db and 24 deg C wb temperatures. Condenser shall be in copper tube & aluminium fin construction. Condenser coil shall be of minimum 4 rows deep and the fin spacing shall not exceed 2mm. The maximum face velocity across the coil shall not exceed 215 MPM. The condenser frame shall be constructed from heavy duty galvanized steel.

The condenser fan/s shall be of propeller type with 900 RPM variable voltage electric motor complete with IP-55 protection. Motor shall be speed controlled to ensure a stable operation for varying ambient, by a factory fitted direct acting head pressure activated variable speed drive. The condenser shall be complete with provisions for refrigerant piping connections, shut off valves and any other standard accessories necessary with the equipment supplied.

Anti Corrosion Protective Treatment associated with Condensing Units, piping, Joints and U bends & refrigerant piping between outdoor and indoor units.

All interconnecting piping, joints and U bends within the condensing unit shall be painted with two coats of clear transparent polymer coating for protection against corrosion from ambient air pollution.

Two coats of protective coating shall be applied. Each coat shall have dry film thickness of 35 micron or more. The coating shall be strong, flexible and durable. It shall have good adhesive and abrasion resistance. It shall be resistant to moisture, UV, acid, alkali and other chemicals and capable of functioning between -250 C and 1500 C.

The polymer shall be obtained by the mixing of base / monomer with a hardener / polymerizer. It may brush applied or with the use of a suitable gun.

REFRIGERANT PIPING (VRF)

The copper refrigerant piping shall be carried out neatly to connect outdoor and group of indoor units and shall run along with wires/cables. The refrigerant piping shall be carried out using hard drawn copper pipes & readymade copper fittings for pipe diameter exceeding 19mm. Piping less than 19mm shall be carried out using soft seamless copper pipes. Joints shall be affected by soldering/brazing process using silver rods. Suitable sleeves shall be provided at all wall crossings as required. The refrigerant circuit shall include liquid line and gas shut-off valves besides solenoid valve at the end of condenser. The refrigerant piping shall be carefully sized with necessary headers and should consist of accessories including Y-joints.

After the refrigerant piping installation has been completed, the refrigerant piping system shall be pressure tested using nitrogen at pressure of 21Kg/ Sqcm. Pressure shall be maintained in the system for 24 hours. The system shall then be evacuated to minimum vacuum equivalent to 700mm Hg and held for another 24 hours prior to commencement of gas charging.

All refrigerant pipes shall be properly supported and anchored on the cable tray, which in turn be supported to the building structure using steel hangers, anchors, brackets and supports which shall be fixed to the building element by means of inserts or expansion shields of adequate size and number to support the load imposed thereon.

The liquid and suction refrigerant lines including all fittings, valves, strainer etc. shall be insulated with 13 mm thick closed cell elastomeric insulation material preferably in tubing form as specified in Schedule of Quantities.

To protect nitrile rubber insulation associated with exposed copper piping from degrading due to ultra violet rays & atmospheric conditions, it shall be covered with polyshield coating. Fiberglass tape shall be helically wrapped & applied with two coats of resin with hardener to give smooth finish.

The recommended wall thickness of copper pipes being used for VRF application using high pressure refrigerant, R 410 a, is as under:

Copper Pipe Outer dia (mm)	Copper tube wall thickness (mm)
	<i>Minimum requirement</i>
<i>Dia 6.4</i>	<i>0.8</i>
<i>Dia 9.5</i>	<i>0.8</i>
<i>Dia 12.7</i>	<i>0.8</i>
<i>Dia 15.9</i>	<i>1</i>
<i>Dia 19.1</i>	<i>0.8</i>
<i>Dia 22.2</i>	<i>0.8</i>
<i>Dia 25.4</i>	<i>0.88</i>
<i>Dia 28.6</i>	<i>0.99</i>
<i>Dia 31.8</i>	<i>1.10</i>
<i>Dia 34.9</i>	<i>1.21</i>
<i>Dia 38.1</i>	<i>1.32</i>
<i>Dia 41.3</i>	<i>1.43</i>

The VRF indoor unit will be ceiling suspended ductable type of nominal capacity as mentioned in the BOQ.

Machine will be operable on 380~415 volts, 3 phase, 50 Hz power supply with double earthing through proper isolator/MCB in each outdoor unit & 220±6% volt, 1 phase, 50 Hz stabilized power supply with double earthing in each VRF indoor units through proper switch.

The quantities of each item mentioned in schedule of quantities shall be on the measureable basis, any upward/downward variation shall be derived at the basis of unit rate of the corresponding item.

DUCT WORK AND OUTLETS

General

The work under this part shall consist of furnishing labour materials, equipment and appliances as specified necessary and required to install all sheet metal and other allied work to make the air conditioning supply, ventilating, and exhaust system ready for operation as per drawings.

Except as otherwise specified all duct work and related items shall be in accordance with these specifications.

Duct work shall mean all ducts, casings, dampers, access doors, joints, stiffeners and hangers.

Duct Materials

The ducts shall be fabricated from galvanized steel sheets class VIII conforming to ISS:277-1962 (revised) or aluminium sheets conforming to ISS:737-1955 (wherever aluminium ducts are specified).

All duct work, sheet metal thickness and fabrication unless otherwise directed, shall strictly meet requirements, as described in IS:655-1963 with amendment-I (1971 edition)

The thickness of the sheet shall be as follows :-

Size of Duct	Sheet Thickness		Type of Joints	Bracing if any
Upto 750 mm	0.63 mm	24 Ga	G.I. Flange	
751 mm to 1000 mm	0.80 mm	22 Ga	25x25x3 mm Angle iron frame with 8 mm dia nuts & bolts	25x25x3 mm at the rate of 1.2 M from joints
1001 mm to 1500 mm	0.80 mm	22 Ga	40x40x5 mm Angle iron frame with 8 mm dia nuts & bolts	40x40x5 mm at the rate of 1.2 M from joints
1501 mm to 2250 mm	1.00 mm	20 Ga.	50x50x5 mm Angle iron frame with 10 mm dia nuts & bolts at 125 mm centre.	40x40x3 mm at the rate of 1.2 M to be Braced Diagonally
2251 mm and above	1.25 mm	18 Ga.	50x50x6 mm Angle iron frame with 10 mm dia nuts & bolts at 125 mm centre.	40x40x3 mm at the rate of 1.6 M from joints

The gauges, joints and bracings for sheet metal duct work shall further conform to the provisions as shown on the drawings.

Ducts larger than 600 MM shall be cross broken, duct sections upto 1200 MM length may be used with bracing angles omitted.

Changes in section of duct work shall be affected by tapering the ducts with as long a taper as possible. All branches shall be taken off at not more than 45 DEG. Angle from the axis of the main duct unless otherwise approved by the Engineer-In-Charge.

All ducts shall be supported from the ceiling/slab by means of M.S. Rods of 9 MM (3/8")DIA with M.S. Angle at the bottom. The rods shall be anchored to R.C. Slab using metallic expansion fasteners.

Installations

During the construction, the contractor shall temporarily close duct openings with sheet metal covers to prevent debris entering ducts and to maintain opening straight and square, as per direction of Engineer-In-Charge.

Great care should be taken to ensure that the duct work does not extend outside and beyond height limits as noted on the drawings.

All duct work shall be of high quality approved galvanized sheet steel guaranteed not to crack or peel on bending or fabrication of ducts. All joints shall be air tight and shall be made in the direction of air flow.

The ducts shall be re-inforced with structured members where necessary, and must be secured in place so as to avoid vibration of the duct on its support.

All air turns of 45 degrees or more shall include curved metal blades or vanes arranged so as to permit the air to make the abrupt turns without an appreciable turbulence. Turning vanes shall be securely fastened to prevent noise or vibration.

The duct work shall be varied in shape and position to fit actual conditions at building site. All changes shall be subjected to the approval of the Engineer-In-Charge. The contractor shall verify all measurements at site and shall notify the Engineer-In-Charge of any difficulty in carrying out his work before fabrication.

Sponge rubber or approved equal gaskets of 6 MM maximum thickness shall be self-adhesive installed between duct flanges as well as between all connections of sheet metal ducts to walls, floor columns, heater casings and filter casings. Sheet metal connections shall be made to walls and floors by means of wooden member anchored to the building structure with anchor bolts and with the sheet screwed to them.

Flanges bracings and supports are to be black, mild steel and are to be painted with rust proof primer on all surfaces before erection. Accessories such as damper blades and access panels are to be of materials of appropriate thickness and the finish similar to the adjacent ducting, as specified.

Joints, seams, sleeves, splitters, branches, takeoffs and supports are to be as per duct details as specified, or as decided by Engineer-In-Charge.

Joints requiring bolting or riveting may be fixed by Hexagon nuts and bolts, stove bolts or buck bolts, rivets or closed center top rivets or spot welding. Self-tapping screws must not be used. All jointing material must have a finish such as cadmium plating or Galvanized as appropriate.

Fire retarding flexible joints are to be fitted to the suction and delivery of all fans. The material is to be normally double heavy canvass or as directed by Engineer-In-Charge. On all circular spigots the flexible materials are to be screwed or clip band with adjustable screws or toggle fitting. For rectangular ducts the material is to be flanged and bolted with a backing flat or bolted to mating flange with backing flat.

The flexible joints are to be not less than 75 MM and not more than 250 MM between faces.

The duct work should be carried out in a manner and at such time as not to hinder or delay the work of the other agencies especially the boxing or false ceiling contractors.

Duct passing through brick or masonry, wooden frame work shall be provided within the opening. Crossing duct shall have heavy flanges, collars on each side of wooden frame to make the duct leak proof.

Dampers

At the junction of each branch duct with main duct and split of main duct, volume dampers must be provided. Dampers shall be two gauges heavier than the gauge of the large duct and shall be rigid in construction.

The volume dampers shall be of an approved type, lever operated and completed with locking devices which will permit the dampers to be adjusted and locked in any positions and clearly indicating the damper position.

The dampers shall be of splitter, butterfly or louver type. The damper blade shall not be less than 1.25 MM (18) Gauge, reinforced with 25 MM angles 3 MM thick along any unsupported side longer than 250 MM. Angles shall not interfere with the operation of dampers, nor cause any turbulence.

Automatic and manual volume opposed blade dampers shall be completed with frames and bronze bearings as per drawings. Dampers and frames shall be constructed of 1.6 MM steel sheets and blades shall not be over 225 MM wide. The dampers for fresh air inlet shall additionally be provided with fly mesh screen, on the outside, of 0.8 MM thickness with fine mesh.

Wherever require for system balancing, a volume balancing opposed blade damper with quadrant and thumb screw lock shall be provided.

After completion of the duct work, dampers are to be adjusted and set to deliver air flow as specified on the drawings.

Fire Dampers

Automatic fire dampers shall be provided wherever shown on the drawings. The damper shall be multi blade louver type. The blades should remain in the air stream in open position and shall be constructed with minimum 1.8 MM thick galvanised sheets. The frame shall be of 1.6 MM thickness. Other materials shall include locking device, motorised actuator, control panel to trip AHU motor etc.

The fire dampers shall be capable of operating automatically on receiving signal from a fire alarm panel. All control wiring shall be provided between fire damper and electric panel.

Access panel

A hinged and gasketed access panel measuring at least 450 MM x 450 MM shall be provided on duct work before each reheat coil and at each control device that may be located inside the duct work.

Miscellaneous

All duct work joints are to be true right angle and with all sharp edges removed. Sponge rubber gaskets also to be provided behind the flange of all grilles.

Each chute from the duct, leading to a grille, shall be provided with an air deflector to divert the air into the grille through the shoot.

Diverting vanes must be provided at the bends exceeding 600 MM and at branches connected into the main duct without a neck.

Proper hangers and supports should be provided to hold the duct rigidly, to keep them straight and to avoid vibrations. Additional supports are to be provided where required for rigidity or as directed by Engineer-In-Charge.

The ducts should be routed directly with a minimum of directional change.

The duct work shall be provided with additional supports/hangers, wherever required or as directed by the Engineer-In-Charge, at no extra cost.

All angle iron flanges to be welded electrically and holes to be drilled.

All the angle iron flanges to be connected to the GSS ducts by rivets at 100 MM centres.

All the flanged joints, to have a sponge rubber packing stuck to the flanges with suitable adhesive.

The G.S.S. ducts should be lapped 6 MM across the flanges.

The ducts should be supported by approved type supports at a distance not exceeding 2.0 Metres.

Standard Grilles

The supply and return air grilles shall be fabricated from extruded aluminium sections. The supply air grilles shall have single/double louvers. The front horizontal louvers shall be of extruded section, fixed/adjustable type. The rear vertical louvers where required shall be of aluminium extruded sections and adjustable type. The return air grille shall have single horizontal extruded section fixed louvers. The grilles may or may not be with an outer frame.

The damper blades shall also be of extruded aluminium sections. The grill flange shall be fabricated out of aluminium extruded section. Grilles longer than 450 MM shall have intermediate supports for the horizontal louvers.

Diffusers

The ceiling type square diffusers shall be of aluminum extruded sections with flush or step down face, as specified with fixed pattern and neck.

All supply diffusers shall be provided with extruded aluminium dampers, with arrangement for adjustment from the bottom.

The slot diffusers shall be of aluminium extruded sections with diffusion plate and sliding damper.

Linear Diffusers/Grilles

The linear diffusers/grilles shall be fabricated from Aluminium extruded sections.

The diffusion blades shall be extruded, flush mounted type with single or double direction air flow.

The frame shall be of aluminum extruded section and shall hold the louvers tightly in fixed position.

The dampers as described under grilles shall be provided wherever specified.

Exhaust Grilles

The exhaust grilles shall be fabricated from aluminum extruded sections.

The exhaust grilles shall be horizontal fixed bar grilles with 15° blade inclination.

Sensor Terminal

Sensor mounting terminal with cap shall be provided for taking temperature, pressure or other measurement in ducts or AHUs.

The terminal shall be fabricated from gun metal stock, duly threaded with check nut, nut and washers.

Painting and Vision Barrier

All grilles, and diffusers shall be powder coated, before installation, in approved colour.

All ducts immediately behind the grilles/diffusers etc. are to be given two coats of black paint in matt finish.

The return air and dummy portion of all linear grilles shall be provided with a vision barrier made of 24 gauge galvanised sheets. The vision barrier shall be fixed to the false ceiling frame with self-tapping screws and shall be given two coats of black paint in matt finish. Care shall be taken to ensure that the return air path is not obstructed.

Testing

After completion, all duct system shall be tested for air leakage.

The entire air distribution system shall be balanced to supply the air quantity as required in various areas and the final tabulation of air quantity through each outlet shall be submitted to the Engineer-In-Charge for approval.

INSULATION

General

The Insulation of water piping, air handling units, ducting, chillers & refrigerant piping etc., shall be carried out as per specifications given below:

Materials

The materials to be used for insulation shall be as follows, unless some other material is specifically mentioned elsewhere. The detailed specifications of the materials are listed under respective sub heads.

Drain Pipe Insulation	:	Polyethylene Foam (Kinney Foam)
Duct Insulation	:	Resin Bonded glass wool
Acoustic Treatment	:	Resin Bonded glass wool
Equipment Insulation	:	Expanded Polystyrene (SE) (EP).
Refrigerant Pipe	:	Nitrile rubber insulation

Pipe Insulation

Drain Pipe Insulation

The material for insulation of drain pipes shall be sheets of Polyethelene foam having a 'K' value of 0.027 W/mK at a mean temperature of 10°C and a minimum density of 26 Kg./cubm.
The thickness of insulation shall be 2 layer of 6 mm thickness..

Duct Insulation

The materials for duct insulation shall be resin bonded fibre glass, as described earlier but conforming to I.S. 8183 of 1976. The density of insulation shall not be less than 24 kg/cubm and material shall be in the form of blankets/rolls of uniform thickness. The 'K' value at 10⁰ C. Shall not be less than 0.031 W/mK. It shall be factory faced with aluminium foil on one side reinforced with kraft paper and fused to the insulation material.

The thickness of duct insulation shall be as follows :

- a. Duct in conditioned space - 25 mm thick
- b. Duct in unconditioned space - 50 mm thick

Acoustic Treatment

The material for acoustic treatment of ducts, rooms, roofs etc. shall be resin bonded fibre glass, as described earlier, conforming to I.S. 8183 of 1976. The density of fibre glass shall be 32 kg/cub.m and the material shall be in the form of boards of uniform density. The 'k' value at 10⁰C shall not be less than 0.03 W/mK. Facing shall be provided with 0.5 mm perforated aluminium sheet held with G.I. Nuts bolts or nailed to the batten work as required.

The thickness of insulation shall be as follow unless otherwise specified elsewhere:

- a. Duct Acoustic : 25 MM
- b. Room Acoustic : 50 MM

Equipment Insulation for indoor units as specified in BOQ

CPRX Compound

The cold compound adhesive being supplied shall be CPRX Type.

Drain Piping

*The pipe shall be thoroughly cleaned with a wire brush and rendered free from all rust and grease.
Coat the pipe with one layer of red oxide primer.
Then two layer of 6mm thick insulation shall be wrapped on the pipe.
Then it shall be tied with 1 mm thick G.I. wires.*

Ducting

*Clean the surface with a wire brush and make it free from rust and oil.
Apply two coats of CPRX compound on the cleaned surface.
Wrap the duct with insulation blankets of the thickness mentioned in item 3.3.2 above and covered with 0.63 mm/19 mm wire mesh netting on the outside.
The joints shall be sealed with aluminium tape before covering with wire netting.
The Ducts in areas exposed to the weather shall be additionally covered with one layer of tar felt B.H. The tar felt shall be stuck with Hot Bitumen.*

Duct Acoustic Lining

*The duct surface shall first be cleaned from inside.
Then 25 mm square section made of 18 Ga (1.2 mm) thick G.I. sheet should be fixed on both ends of the duct piece.
The insulation slabs should be fixed between these sections of ducts using adhesive compound and **stick pins**.
The insulation shall be covered with RP tissue, sealing all joint so that no fibre is visible.
The insulation shall then be covered with 0.5 mm perforated aluminium sheets.
The sheet of insulation shall be secured to the duct by means of stick pins as mentioned above.*

ELECTRIC CABLING

1. General

The electric cable connections of motors and earthing of all equipments shall be carried out, as per specifications, given hereunder.

2. Cabling

The cabling of various equipment shall be carried using PVC Insulated and armoured cables.

The PVC armoured power cable for use on 415 volts system shall be 3 or 3.5 Core with aluminium conductors and be of 660/1100 volts grade, as per IS 1554 (Part I) 1964. The cross section of the cable shall be to suit the load and rating of the equipment. The cables shall be of aluminium conductor, PVC insulated, strip armoured with overall PVC sheathing.

The cables shall be laid as per IS-1255/1967, Indian standard code of practice.

The cables shall be laid, as per drawings in the ducts/pipes/trays etc. along a short and convenient route between switch board and the equipment, (either in trenches, on wall or on hangers, supported from the slab). Cable routing shall be checked at the site of work to avoid interference with structure, equipment etc. Where more than one cables are running close to each other, proper spacing should be provided between them.

The radius of bends of the cable should not be less than 12 times the overall dia. of cable in order to prevent undue stress and damage at the bends, the cables should be supported with wooden cleats on M.S. Supports, when laid in trenches, or wall/ceiling suspended hangers. When laid underground the cables should be covered with fine soft earth and protected with 2nd Class bricks. Suitable G.I. Pipe shall be used wherever cables are laid under the roads etc.

Wooden bushes shall be provided at the ends of pipes through which cables are connected through.

3. Surface Wiring

The surface wiring shall be cased in conduits which shall be of 1100 volts grade and conform to IS 9587-1987 (revised to date)

The conduits used shall be of high quality & all joints shall be made with sockets. The bends and elbows shall have inspection covers fixed with grease free screws. The joints shall be water tight. Approved metal saddles shall be used to secure the exposed conduits at a space of 1 meter or less. The connection of the conduits to switches etc., shall be secured by check nuts and ebonite bushes provided at the ends of conduits.

The M.S. conduits shall be heavy duty and rigid type-ISI marked/conforming to IS specifications. The wall thickness shall not be less than 2 mm. For conduits above 32 mm dia. Metallic conduits of 19 mm dia. and below shall not be used. Conduit accessories (Boxes etc.) shall conform to IS-5133-1968 and IS-2667-64 (amended-revised to date). Conduit pipes shall be jointed, wherever necessary by means of screwed couples and screwed accessories only. In Long distance straight, run of conduits inspection type couplers at suitable intervals shall be provided.

Threads on conduit pipes shall be between 13 mm to 19 mm long.

The wiring shall be carried-out as per IS 732-1989 (Amended and revised to date).

Flush inspection covers shall be provided in case of Concealed, recessed conduits. The staples for the conduits shall not be spaced more than 0.60 meters apart. Before filling up the chase with concrete the conduits should be given a coat of rust proof paint.

The wires shall be drawn only after all the conduits have been properly fixed in position. Fish wires (steel wire : 16 SWG) shall be laid in conduits for drawing of wires subsequently.

4. Control Cabling/wiring

Control cables shall be 1100 volts grade, as per IS 1554, made from copper conductor of 1.5 Sq mm PVC insulated single Core, strip armoured with an overall PVC sheathing.

The cables and conduits wiring shall be carried out as per details given under 2.2 and 2.3 above.

5. Earthing

All equipment connected with electric supply shall also be provided with double earthing continuity conductors. The size of G.I. earthing conductors shall be :-

<i>Size of phase wire sq.mm Aluminium</i>	<i>Size of G.I. conductor Tape/Wire (Swg)</i>
185	25 mm x 6 mm (strip)
150	25 mm x 6 mm (strip)
120	25 mm x 6 mm (strip)
95	4 Swg
70	4 Swg
50	6 Swg
35	6 Swg
25-6	6 Swg
4	6 Swg

Note :- Aluminium earthing conductors of equivalent Size may be used in lieu of GSS conductors mentioned above.

6. Miscellaneous

The final connections to the equipment shall be through Flexible connections in case of conduit wiring and also where the equipment is likely to be moved back and forth, such as on slide rails.

An isolator switch shall be provided at any motor which is separated from the main switch panel by a wall or partition or other barrier or is more than 15 metres away from the main panel.

Two separate and distinct earthing conductors shall be Connected from the equipment upto the main switch board panel.

The branch lines from the main panel to each equipment shall be separated and should not criss cross other lines.

The entire installation shall be tested as per Electricity rules and I.S.S. 732-1973 with amendments 1,2&3 prior to the commissioning of the plant and a suitable test report furnished by a competent and authorized person. The test report will be obtain by contractor himself at his own expenses.

All exposed switch board panels, conduits, hangers etc. shall be given 2 coats of suitable paint of approved colour, when all work has been completed.

TESTING AND COMMISSIONING

General

The contractor must perform all inspection and tests of the system as a whole and of components individually as required, under the supervision of the architect, in accordance with the provisions of the applicable ASHRAE standards or approved equal in addition to furnish necessary test certificates from manufacturers.

The system shall then be commissioned, tested and balanced to fulfil the intent and purpose for which it is designed.

In addition continuous Run Tests shall be carried out during peak weather condition.

Electrical Equipment

All electrical equipment shall be cleaned and adjusted on site before application of power.

The following tests shall be carried out:

Cables and Wires continuity tests.

Insulation resistance tests, phase to phase and phase to earth, on all circuits and equipment, using a 500 Volts meggar. The meggar reading shall be not less than one megaohm.

Earth resistance between conduit system and earth must not exceed half (1/2) CMH.

Phasing out and phase rotation tests.

Operating tests on all protective relays to prove their correct operation before energizing the main equipment.

Operating tests on all starters, circuit breakers etc.

Commissioning of the System

The system shall be commissioned by adopting the following procedure.

The installation as a whole shall be balanced and tested upon completion, and all relevant information, including the following shall be submitted to the architects.

Air volume passing through each unit, duct, grilles, apertures.

Static pressure in each air duct.

Water flow passing through each condenser, chiller, AHU etc.

Differential pressure readings across each filter, fan and coil, and through each pump.

Electrical current readings, in amperes of full and average load running and starting, together with name plate current of each electrical motor.

Continuous recording over a specified period, of ambient wet and dry bulb temperatures under varying degrees of internal heat loads and use and occupation, in each zone of each part of the building.

Daily records should be maintained of hourly readings, taken under varying degrees of internal heat load and use and occupation, of wet and dry bulb temperatures, upstream "On-Coil" of each cooling coil. Also suction temperatures and pressures for each refrigerating unit. The current and voltage drawn by each machine.

Any other readings shall be taken which may subsequently be specified by the architect.

Air Balancing

All air handling/ventilation equipment, duct work and outlets shall be adjusted and balanced to deliver the specified air quantities, at each inlet and outlet as indicated on the drawings.

If these air quantities cannot be delivered without exceeding the speed range of the pulley or the available horse power, the architect shall be notified, before proceeding with the balancing of air distribution system.

A proper record shall be maintained as per Test Pro forma given elsewhere.

Miscellaneous

The above tests and procedures are mentioned herein, for general guidance and information only, but not by way of limitation to the provisions of conditions of contract and specification.

The date of commencement of all tests listed above, shall be subject to the approval of the architect and in accordance with the requirements of this specification.

The contractor shall supply the skilled staff and all necessary instruments and carry out any test of any kind on a piece of equipment, apparatus, part of system or on a complete system, if the architect requests such a test for determining specified or guaranteed data, as given in the specification or on the drawings.

Any damage resulting from the tests shall be repaired and/or damaged material replaced, to the satisfaction of the architect without any extra cost.

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.

The contractor must inform the architect when such tests are to be made, giving sufficient notice, in order that the architect or his nominated representative may be present.

Complete records of all tests must be kept and 3 copies of these and location drawings must be furnished to the architect.

The contractor may be required to repeat the test as required, should the Ambient conditions at the time, do not give, in the opinion of the architect, sufficient and suitable indication of the effect and performance of the installation as a whole or of any part, as required.

