E -TENDER DOCUMENT

for

SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF AIR CONDITIONING WORK FOR CIC DEPARTMENT AT TAKSHASHILA BUILDING, IIT KHARAGPUR

NIT No.: IITKGP/IW/RAC/CIC/2021 DATED 02.08.2021

Tender Serial No. _______________ Issued to:

---------------------------------------------------------------

---------------------------------------------------------------

---------------------------------------------------------------
Contents

1. NOTICE INVITING TENDER .................................................. 2
   1.1. INTRODUCTION .................................................................................. 2
   1.2. PARTICULARS ................................................................................... 2
   1.3. ELIGIBILITY CRITERIA ................................................................. 3
2. INFORMATION TO BIDDERS ................................................... 5
   2.1. SCOPE OF WORK ........................................................................... 5
   2.2. GENERAL INSTRUCTIONS .......................................................... 5
   2.3. SUBMISSION OF TENDER ............................................................ 6
   2.4. EVALUATION OF BIDS AND AWARD OF WORK ....................... 6
3. UNDERTAKING BY THE BIDDER ............................................ 07
4. Annexures .................................................................................. 08-11
5. Checklist for Documents to be uploaded on ................................ 12
6. PARTICULAR CONDITIONS (Annexure-IV) .................................. 13-21

Schedule of Quantities (BOQ) .... uploaded separately in BOQ section on https://eprocure.gov.in/eprocure/op
## NOTICE INVITING TENDER

**1.1. INTRODUCTION**

INDIAN INSTITUTE OF TECHNOLOGY (IIT) Kharagpur, hereinafter called IITKGP, invites sealed tenders from the eligible contractors for “Supply, Installation, Testing and Commissioning of Air Conditioning Work for CIC Department at Takshashila Building, IIT Kharagpur” particulars of the project are as following.

### 1.2. PARTICULARS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. NIT Number</strong></td>
<td>NIT No. IITKGP/IW/RAC/CIC/2021</td>
</tr>
<tr>
<td><strong>2. Name of Work</strong></td>
<td>SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF AIR CONDITIONING WORK FOR CIC DEPARTMENT AT TAKSHASHILA BUILDING, IIT Kharagpur</td>
</tr>
<tr>
<td><strong>3. Location of Work</strong></td>
<td>AT CIC DEPARTMENT AT TAKSHASHILA BUILDING, IIT Kharagpur, West Bengal 721302.</td>
</tr>
<tr>
<td><strong>4. Estimated Cost (including GST)</strong></td>
<td>Rs. 8,25,000.00/- (Rupees Eight Lakhs Twenty five Thousand Only)</td>
</tr>
<tr>
<td><strong>5. Earnest Money Deposit</strong></td>
<td>Nil (NSIC/MSEs Registration Certificate OR Bid Security Declaration Form to be uploaded)</td>
</tr>
<tr>
<td><strong>6. Time Limit</strong></td>
<td>60 days from Date of start</td>
</tr>
<tr>
<td><strong>7. Tender Basis and Mode</strong></td>
<td>Two stage (Technical Bid &amp; Financial Bid)</td>
</tr>
<tr>
<td><strong>8. Mode of Payment to IITKGP (EMD/Tender fee)</strong></td>
<td>i) Original Demand Draft/Pay Order or copy of valid registration certificate under MSE category has to be submitted physically at the office of SE(E&amp;M) on or before the due date/extended date of submission of bid. &amp; Scanned copy of Demand Draft/Pay Order/Registration under MSE category has to be uploaded on <a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a>. ii) Demand Draft/Pay order to be drawn in favour of IIT Kharagpur payable at Kharagpur.</td>
</tr>
<tr>
<td><strong>9. Pre bid meeting</strong></td>
<td>10th August, 2021 at 11:30 AM in the Meeting Room of SE(E&amp;M) located in the Old building, IIT Kharagpur</td>
</tr>
<tr>
<td><strong>10. Closing Date &amp; Time for Receipt of bids</strong></td>
<td>23rd August 2021 up to 15:30hrs</td>
</tr>
<tr>
<td><strong>11. Date &amp; Time for Opening Technical of Bid</strong></td>
<td>24th August 2021 at 16:00hrs</td>
</tr>
<tr>
<td><strong>12. Date &amp; Time for Opening of Price Bid</strong></td>
<td>To be informed later to the successful bidder</td>
</tr>
<tr>
<td><strong>13. Engineer-in-charge and contact details.</strong></td>
<td>Mr. S. Banerjee, Engineer(RAC) Tel: 03222-282724 Email: <a href="mailto:sbanerjee@adm.iitkgp.ac.in">sbanerjee@adm.iitkgp.ac.in</a></td>
</tr>
<tr>
<td><strong>14. Address for tender issue, submission and opening</strong></td>
<td>Office of Superintendent (Electrical), 1st Floor, Old Building, IIT Kharagpur, Kharagpur WB 721302</td>
</tr>
<tr>
<td><strong>15. Website for full and updated publishing information</strong></td>
<td><a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a> <a href="http://www1.iitkgp.ac.in/topfiles/tenders.php">http://www1.iitkgp.ac.in/topfiles/tenders.php</a></td>
</tr>
<tr>
<td><strong>16. Website for tender submission &amp; processing (This is e-Tender only submission by Online)</strong></td>
<td><a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a></td>
</tr>
</tbody>
</table>
1.3. ELIGIBILITY CRITERIA

1.3.1. The bidder must be registered in appropriate class of works with Government organization like CPWD/ PWD/ MES or PSUs or those having experience in similar nature of works awarded by Government/ Semi Government Organizations/ Government Funded Autonomous Organization.

1.3.2. The bidder must have done at least 1 (ONE) similar work of value of 80% of the estimated cost or 2 (TWO) similar works for projects each of value 60% of the estimated cost or 3 (THREE) similar work for projects each of value 40% of the estimated cost with Government/ Semi-government/ PSU/ Government Funded Autonomous Organization during last 7 (seven) years preceding last date of tender submission.

Note:

(i) The estimated cost is Rs. 8,25,000.00/- (Rupees Eight Lakhs Twenty five Thousand Only)

(ii) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to the last date of receipt of applications for tender.

(iii) The bidding capacity of the contractor should be equal to or more than the estimated cost of the work put to tender. The bidding capacity shall be worked out by the following formula:

\[
\text{Bidding Capacity} = \left(\frac{A \times N \times 2}{N} \right) - B
\]

Where,

A = Maximum turnover in construction works executed in any one year during the last five years taking into account the completed as well as work in progress. The value of completed works shall be brought to current costing level by enhancing at a simple rate of 7% per annum.

N = Number of years proscribed for completion of work for which bids has been invited.

B = Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited.

(iv) Similar works shall mean: Supply, installation, testing and commissioning of VRF Air conditioning system.

1.3.3. The bidder or the specialized agency the bidder intends to associate with must be registered with appropriate government authority as a bonafide business entity and must have GST registration certificate and Permanent Account Number of income tax.

1.3.4. The validity of the registrations and licenses should be valid as on the date of tender submission.

1.3.5. The bidder shall get specific authorization letter from the OEM (Signed by officer of OEM representative in the rank of Regional Manager/ Zonal Head or business head) for quoting this particular NIT. The copy has to be submitted along with the tender in the form of hard copy and soft copy as well.

1.3.6. The Bidder has to quote with latest generation of VRF machines and shall furnish the details along with catalogue of the product in the technical bid.

1.3.7. Special condition for HVAC related Electrical and Civil Work:

The scope of HVAC shall include following civil and electrical work, these are non-billable -

- Opening / Closing / Making hole in existing Masonry wall/ Concrete / Glass structure to facilitate entry and exit of duct / pipe work and finishing it good.
- Supply & Installation of decorative pelmets if required to install the IDUs.
- Termination of drain up to ground floor with suitable size of UPVC pipe of schedule 40 grade.
IIT shall provide electrical feeder to the HVAC electrical panel located in the electrical room. The HVAC electrical panel shall be provided by the Contractor as specified.

Single phase power socket will be made available in the vicinity of the IDU’s. Plug top and further termination upto the IDU’s shall be the scope of HVAC contractor.

1. Quality of above works shall be assessed by the bidder before quote as per his scheme of execution.
2. All above work shall be executed and finished good to the satisfaction of Engineer-in-charge.

Sd/-
Superintending Engineer(E&M)

On behalf of the Director, Indian Institute of Technology Kharagpur

Copy to:
1) Dean Infrastructure(IW)
2) Asso. Dean Infrastructure(IW-Civil)
3) Asso. Dean Infrastructure(IW-E&M)
4) Chief Engineer
5) PIC, RAC
6) Head(CIC)
7) Engineer/Assistant Engineer/ Junior Engineer(RAC)
8) Notice Board
9) Tender Notice uploaded to CPPP portal & Institute Website
10) Office file
1. INFORMATION TO BIDDERS

1.1. GENERAL INSTRUCTIONS

1.1.1. The IITKGP intends to award the work of “SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF AIR CONDITIONING WORK FOR CIC DEPARTMENT AT TAKSHASHILA BUILDING, IIT KHARAGPUR”. The work consists of comprehensive repair, renovation and modification of existing electrical systems.

1.1.2. The vendor shall work out execution sequence and methodology so as to complete the project within the envisaged time and the estimated cost, duly handling the constraint mentioned above.

1.1.3. Bidding documents are to be obtained electronically through websites: https://eprocure.gov.in/eprocure/app

1.1.4. http://www1.iitkgp.ac.in/topfiles/tenders.php

1.1.5. This bid document shall be read in conjunction with GCC (General Conditions of Contract) available on http://www1.iitkgp.ac.in/topfiles/tenders.php.

1.1.6. The bidders shall visit and inspect the site and obtain all information on their own responsibility and at own cost, which may be necessary for the purpose of quoting and submitting the tender. No excuse or ignorance of site conditions and local informations shall be accepted after awarding of the contract. Access to the site will be granted by the Engineer-in-charge on all working days within working hours.

1.1.7. IITKGP shall not provide any space at site for labour huts.

1.1.8. All clarifications about the tender shall be sought by bidder on or before 10th August 2021 up to 10:30 hrs through email to the Engineer-in-charge on sbanerjee@adm.iitkgp.ac.in

1.1.9. Completion certificate issued by Competent Authority will only be considered as credential. If the Completion certificate issued by Competent Authority does not reflect the type of work, then Final bill / Schedule of Quantity of the qualifying works also to be attached along with the Completion certificate. Certificate from private individuals / organizations for whom such works have been executed shall not be accepted.

1.1.10. The bidding document (consisting of specifications, the schedule of quantities of various types of items to be executed, the set of terms and conditions of the contract and other documents / drawings, if any), Addendum/Corrigenda, Clarificationsto Pre-bid queries can be downloaded from the websites: iii)https://eprocure.gov.in/eprocure/app. Corrigenda, if any shall be published only on these websites at any time before the closing time of tender. The institute shall not be responsible for any delay / difficulties / inaccessibility of downloading facility for any reason whatsoever. The tenderers who have downloaded the tender documents from website must visit the website and ensure that such addendum(s)/corrigendum(s) (if any) is also downloaded by them. This shall be the responsibility of the prospective registered bidders to check the web site for any such corrigendum/addendum before closing time of tender and ensure that bid submitted by them are in accordance with all the corrigendum’s/ addendums.

1.1.11. All costs, charges & expenses that may be incurred in connection with the preparation of his tenders shall be borne by the bidder and the Institute accepts no liability whateverfor therefore.

1.1.12. Rates quoted by the bidders shall be inclusive of GST (Goods and Services Tax - Central, State and Interstate) and all applicable taxes. Income Tax and all other statutory deductions like labour cess etc. will be deducted from the bill as per prevailing rules.

1.1.13. Exemption to IITKGP against any tax/ duty/ fee/ surcharge/ charge/ cost, if any, found applicable or sought later from IITKGP after award shall be passed on to IITKGP by the contractor without dispute.

1.1.14. IITKGP reserves the right to reject any or all of the bids without assigning any reason.

1.1.15. Bid Validity: Bid shall remain valid for 120 days from the date of submission.

1.1.16. Firm Price: Bidder’s quoted Rates/ Prices for executing the activities under the contract shall remain firm till completion of the entire work & shall not attract any escalation under any circumstances whatsoever.

1.1.17. If any information furnished by the bidder is found as false / fabricated, then his bid will be rejected and treated as cancelled. Even if the such manipulation is detected at any stage after signing of the contract, it would lead to termination of the contract besides forfeiture of Earnest Money Deposit and liabilities towards prosecution. In such cases the bidder will be debarred from participation in future tendering process in IITKGP for next 05 (Five) years.

1.1.18. Earnest Money Deposit (EMD) of requisite amount and that in prescribed mode or proof of payment thereof shall be submitted with the Technical Bid explained in following section. MSEs registered with District Industries Centers, National Small Industries Corporation and any other body specified by Ministry of MSME or Start ups as recognized by Department of Industrial Policy and Promotion shall be exempted from payment of EMD in the bid. The self attested photocopy of their evidence should be submitted by the bidder(s) along with the formal request letter for exemption.
a. In case the NSIC/MSEs registration certificate is found invalid during evaluation, the bid of such bidder shall be rejected.

b. Bidder so exempted for submission of EMD shall have to submit an undertaking as per Annexure-II.

1.1.19. Refund / Conversion of Earnest Money Deposit: The Earnest Money received shall be refunded to the unsuccessful bidders without any interest after the opening of financial bids. The Earnest Money Deposit of successful bidder shall be retained and converted into part of Security Deposit.

1.1.20. Forfeiture of Earnest Money Deposit: Earnest Money Deposit will be forfeited in any of the following cases:
   (i) The bidder withdraws / modifies his tender during the period of Bid Validity,
   (ii) The bidder, in case of tie between lowest bids, refuses to submit revised offer,
   (iii) The bidder does not accept the correction of arithmetic errors of his tender.
   (iv) The bidder fails to deposit Performance Guarantee and information as per format given in GCC with in the stipulated time period before award of the work.

1.2. SUBMISSION OF TENDER

1.2.1. Help for Contractors, FAQ, Information about DSC and Bidders Manual Kit containing the detailed guidelines for e-Procurement system are also available on Central Public Procurement Portal. [https://eprocure.gov.in/eprocure/app]

1.2.2. It is mandatory for all the bidders to have a valid Class-II/Class-III Digital Signature Certificate (in the name of person having power of attorney to sign the Bid) from any of the licensed Certifying Agency (Bidders can see the list of licensed CAs from the link www.cca.gov.in) to participate in Procurement of IIT Kharagpur.

1.2.3. It is mandatory for the bidders to get their firm/company registered with e-procurement portal https://eprocure.gov.in/eprocure/app to have user ID & password.

1.2.4. Tender documents will be available online on website https://eprocure.gov.in/eprocure/app which can be downloaded free of cost.

1.2.5. Bidders may download and refer the “Instructions for Online Bid Submission” from [https://eprocure.gov.in/eprocure/app;jsessionid=A8B544EC72D86DF9A9D9B2DDACDAB8D.eprocgep4?page=Bidders Manual Kit & service=page].

1.2.6. The tender documents shall be submitted online in the prescribed format given on the websites and technical bids received online shall be opened as per NIT or Corrigendum thereof. No other mode of submission is acceptable. Detailed credentials as per the requirements of eligibility criteria and all tender papers except Bill of Quantities are to be submitted in “Technical Bid”.

Bill of Quantities with rates duly filled in are to be submitted in the format provided online in the name of “Financial Bid”. Hence, physical submission of the documents is limited to submission of original Earnest Money Deposit in the form of PayOrder/Demand Draft/Bank Guarantee/MSE registration certificate as per provision given in sub-clause 1.2.5 of NIT & 2.2.15 of Information to Bidders.

Representative of the bidder, who chooses to attend, may attend the online opening of the technical bids on the scheduled date and time of Bid opening. However, such representatives shall be allowed to attend the opening of the Technical Bids, only, if such person presents the letter of authority issued in his name by the bidder on his letterhead.

1.2.7. Bidders cannot submit the tender after the due date and time of e-bid submission. Time being displayed on Central Public Procurement Portal https://eprocure.gov.in/eprocure/app (“Server System Clock Time”) shall be final and binding on the bidder. e-Bids are required to be submitted by bidders, only as per the Indian Standard Time (IST) and not the time as per their location/country.

1.2.8. The bidders are advised to submit their e-bids well before the e-bid due date. IIT Kharagpur shall not be responsible for any delay in submission of e-bids for any reason including server and technical problems.

1.2.9. The Technical and Financial Bid shall be digitally signed by the Authorized Signatory of the bidder & submitted “on-line” only. The authorized signatory of the bidder must be in possession of Power of Attorney before submitting the digitally signed bid. Scanned copies of various documents can be prepared in .pdf file format.

1.2.10. Any tender received without original Earnest Money in the form specified in clause 1.2.8 of tender documents shall not be considered and shall be summarily rejected.

1.2.11. IIT Kharagpur reserves the right to cancel the tenders before submission/opening of tenders, postpone the tenders submission/opening date and to accept/reject any or all tenders without assigning any reason therefor.
1.3.1. The Bid of bidder will be opened on the specified date and time. Bids shall, first, be checked for payment of Earnest Money Deposit. Only those bids found to have duly paid/ submitted Tender Fee and Earnest Money Deposit shall be considered for evaluation.

1.3.2. Evaluation of Technical Bid: The bids received will then be assessed on the eligibility criteria mentioned at para 1.3 of Notice Inviting Tender. Bids found not meeting the eligibility criteria shall be considered non-responsive and shall be rejected summarily.

1.3.3. IITKGP retains the right to revert back to individual bidders with further clarifications/ queries on the Technical Bid. The bidder has to respond to the queries within the specified time mentioned in the covering letter.

1.3.4. On the date & time specified for opening of Financial Bid or the Revised Financial Bids as the case may be will be opened on specified date and time.

1.3.5. EVALUATION OF Financial Bids: The Financial Bid should contain the complete bid document with duly filled in Schedule of Financial Quote. Financial Bids opened as above will be checked for arithmetical errors.

1.3.6. Letter of Award (Work Order) shall be issued to the successful bidder only after receipt of the Performance Guarantee, along with Program Schedule, details of Technical Staffs to be deployed for the work and Complaint Redressal Mechanism as per following para.

2.4.8 (a) Contractor shall submit Complaint redressal arrangement with name & contact number of the contractor’s authorized representative for the purpose.

1.3.7. Agreement (Contract) consisting of complete tender document including conditions, bill of quantities, technical proposal and specialized services, drawings, if any, and acceptance thereof together with any correspondence leading thereto, shall be drawn and signed with the awardee within 10 days of the Letter of Award.

1.3.8. Date of start of work shall be reckoned from the 10th day of the issuance of the Work Order.

1.3.9. Defect Liability Period (DLP): In partial modification to clause no.16 of General Conditions of Contract (GCC), the Defect Liability Period shall be 12 months after the certificate of completion of work till the final bill has been prepared.

1.3.10. TERMS OF PAYMENT:

a. 70% towards supply of materials at site.

b. 20% towards installation.

c. 5% towards successful commissioning and handing over with all test reports and as-built drawings approved by IIT-Kharagpur.

d. 5% towards retention amount till the completion of Defects Liability Period.

1.4. COMPLAINT REDRESSAL MECHANISM

1.4.1. All maintenance complaints shall be got addressed by the contractor to the satisfaction of Engineer-in-charge within 3 days from the date of issuance of the “Job Card” from IIT Kharagpur.

1.4.2. Complaints requiring completion time more than 3 days shall be responded specifically by the contractor with the scheme, in consultation with Engineer-in-charge, and timeline for compliance, to the Engineer-in-charge within 3 days from the date of issuance of the “Job”

1.4.3. Any complaint left unattended by the contractor beyond 3 days without specific reasons on record shall attract levy of penalty of Rs 50/- per complaint per day from 4th day to 7th day and Rs 100/- per complaint per day thereafter recoverable from dues to the contractor.
2. UNDERTAKING BY THE BIDDER

UNDERTAKING

I / We have read and examined the Tender document including terms & conditions, specifications, bill of quantities, drawings and designs, general rules & directions, General Conditions of Contract, Special Conditions of Contract and all relevant other documents, publications and rules referred to in the Conditions of Contract and all other contents in the tender documents for the work.

I / We, hereby tender for execution of the work specified for the Indian Institute of Technology Kharagpur within the time specified and in accordance in all respects with the specifications, designs, drawings and instructions in writing.

We agree to keep the tender open for 120 days from the last date of its submission and not to make any modifications in its terms and conditions. A sum of Rs.________ has been deposited in cash / demand draft of a scheduled bank / Pay order as earnest money. If I / we fail to furnish the prescribed performance guarantee within the prescribed period, I / we agree that the Director, Indian Institute of Technology Kharagpur or his authorized officer shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I / we fail to commence work as specified, I / we agree that the Director, Indian Institute of Technology Kharagpur shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein.

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 hereby declare that I / We shall treat the tender documents, drawings 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 State.

Seal & Signature of Contractor

Postal Address

Dated

Witness

Address

Occupation
## TECHNICAL STAFF OF CONTRACTOR

**Name of the Work:** SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF AIR CONDITIONING WORK FOR CIC DEPARTMENT AT TAKSHASHILA BUILDING, IIT KHARAGPUR

<table>
<thead>
<tr>
<th>DISCIPLINE</th>
<th>NAME</th>
<th>QUALIFICATION</th>
<th>EXPERIENCE</th>
<th>CONTACT NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Project In-charge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineer - Structure and Civil Works</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineer – Electrical &amp; Mechanical Works</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-charge - Safety, Health &amp; Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-charge for Maintenance (DLP) period</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Seal & Signature of Contractor
UNDERTAKING FOR EMD EXEMPTION

UNDERTAKING

We hereby undertake that we shall fulfill all the terms & conditions within the specified time frame, after the acceptance of our offer, in case our offer is accepted; failing which IIT KHARAGPUR may go ahead to take necessary action such as reporting the non-compliance to appropriate Government authorities and barring us from future participation in IIT KHARAGPUR works.

Seal & Signature of Contractor

DATED:
Bid Security Declaration Form

Date:__________________________Tender No. ________________________________________          To
(Insert complete name and address of the purchaser)

I/We, The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Security Declaration. I/We accept that I/we may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am/We are in a breach of any obligation under the bid conditions, because I/We

a) Have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or

b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or reuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instruction to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/We are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown)
In the capacity of (insert legal capacity of person signing the bid Securing Declaration)
Name: (insert complete name of person signing he Bid Securing Declaration)
Duly authorized to sign the bid for an on behalf of (insert complete name of Bidder)
Dated on ................................................day of .................................................. (Insert date of signing)
Corporate seal (where applicable)
1. Checklist for Documents to be uploaded on [https://eprocure.gov.in/eprocure/app](https://eprocure.gov.in/eprocure/app)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Documents</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tender Documents</td>
<td>2.3</td>
</tr>
<tr>
<td>2.</td>
<td>EMD</td>
<td>1.2.8</td>
</tr>
<tr>
<td>3.</td>
<td>Company registered by Govt. Organisation like CPWD/PWD/MES/Autonomous bodies or Other PSUs</td>
<td>1.3.3</td>
</tr>
<tr>
<td>4.</td>
<td>GST Registration Certificate</td>
<td>1.3.3</td>
</tr>
<tr>
<td>5.</td>
<td>Permanent Account Number</td>
<td>1.3.3</td>
</tr>
<tr>
<td>6.</td>
<td>Completion Certificate during last 07 yrs.</td>
<td>1.3.2</td>
</tr>
<tr>
<td>7.</td>
<td>Updated Electrical Contractor License</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>ANNEXURES</td>
<td></td>
</tr>
</tbody>
</table>

Signature of contractor
3. PARTICULAR CONDITIONS

Indian Institute of Technology intends air conditioning of the offices at CIC DEPARTMENT AT TAKSHASHILA BUILDING

1. AIR-CONDITIONING: DESIGN CRITERIA

1.1 OUTDOOR DESIGN CONDITIONS:

Outdoor Design Conditions for Kharagpur are based on Weather data compiled and published by ISHRAE (WeDCo) for Kolkata and past experience corresponding to 2% annual cumulative frequency of occurrence and the outdoor design conditions have been considered as follows:

<table>
<thead>
<tr>
<th>Design Conditions</th>
<th>DRY BULB</th>
<th>Mean Coincident WBT</th>
<th>RH</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMER</td>
<td>110</td>
<td>43.3</td>
<td>83</td>
</tr>
<tr>
<td>MONSOON</td>
<td>94.4</td>
<td>34.66</td>
<td>82</td>
</tr>
<tr>
<td>WINTER</td>
<td>56</td>
<td>13</td>
<td>48</td>
</tr>
</tbody>
</table>

1.2 INDOOR DESIGN CONDITIONS:

Based on past experience, indoor design conditions for centrally air-conditioned spaces shall be as follows:

<table>
<thead>
<tr>
<th>SPACE</th>
<th>Temperature Deg C</th>
<th>Relative Humidity %</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom/ Studio area</td>
<td>26±1.1</td>
<td>60±10 % at full load condition</td>
<td></td>
</tr>
</tbody>
</table>

Note: Winter Heating is not envisaged.

1.3 MECHANICAL VENTILATION

Area | Air Changes Per Hour (ACH) as per NBC | Remarks |
-----|--------------------------------------|---------|
Toilets | 15 |

1.4 BUILDING CONSTRUCTION DATA

The Building construction data for calculating the building air-conditioning load is as below.

i. External Wall: $U = 1.81 \text{ Watt} / \text{ Sqm}^\circ \text{C} (0.32 \text{ Btu} / \text{ HrSqft}^\circ \text{F})$
   (230mm thick brickwall)

ii. Roof (Exposed to sun): $U = 1.316 \text{ Watt} / \text{ Sqm}^\circ \text{C} (0.23 \text{ Btu} / \text{ HrSqft}^\circ \text{F})$

iii. External Glass Specifications:
   - Glass with following details:
     - $U = 5.8 \text{ Watt} / \text{ Sqm}^\circ \text{C} (1.02 \text{ Btu} / \text{ HrSqft}^\circ \text{F})$
   - Solar heat gain Coefficient: 0.8

1.5 OCCUPANCY AND INTERNAL HEAT GAIN

<table>
<thead>
<tr>
<th>SPACE</th>
<th>Occupant</th>
<th>Equipment Load</th>
<th>Lighting Load</th>
<th>Fresh Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office area</td>
<td>75sft /person</td>
<td>125W / Person</td>
<td>Average 1 W/sft</td>
<td>Asper ASHRAE 62.1 2004 or ACPH @1.5, whichever higher</td>
</tr>
</tbody>
</table>
2. **COOLINGESTIMATE**

Estimated cooling loads are tabulated in table-2.

### TABLE -2

**PRELIMINARY COOLING ESTIMATE**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Floor</th>
<th>Description</th>
<th>Room No</th>
<th>Area (Sq Ft)</th>
<th>Occupancy</th>
<th>Heat Load (TR)</th>
<th>Type of Indoor Unit</th>
<th>IDU Cap (TR)</th>
<th>Qty</th>
<th>Total IDU (TR)</th>
<th>Total IDU (HP)</th>
<th>ODU HP</th>
<th>Avg Diversity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Room no:120</td>
<td>120</td>
<td>180</td>
<td>1</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Room no:133</td>
<td>133</td>
<td>160</td>
<td>2</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Room no:134</td>
<td>134</td>
<td>160</td>
<td>2</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Room no:132</td>
<td>132</td>
<td>180</td>
<td>1</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Room no:130</td>
<td>130</td>
<td>180</td>
<td>1</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Room no:123</td>
<td>123</td>
<td>180</td>
<td>1</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Room no:131</td>
<td>131</td>
<td>170</td>
<td>2</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Room no:121</td>
<td>121</td>
<td>180</td>
<td>1</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Room no:122</td>
<td>122</td>
<td>180</td>
<td>1</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Room no:135</td>
<td>135</td>
<td>170</td>
<td>2</td>
<td>1.35</td>
<td>Hi-Wall Split</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|               |       |             |         |              |            |                |                     |               |     |               |                |        |                 |

**Total**

|               |       |             |         |              |            |                |                     |               |     |               |                |        |                 |

16.0  
112 %
PLANT SELECTION

Air conditioning of CIC department at Takshashila building shall be done with VRF system. All the areas shall be air conditioned with energy efficient inverter scroll compressor in air cooled VRF units. The scroll compressor can operate efficiently on part load and thereby substantial energy is saved. Multiple all inverter scroll compressor in the VRF units shall be grouped together to get the benefit of overall part load operation at peak hours, seasonal & daily temperature variation.

a) The rooms at each floor are to be air-conditioned by air cooled all inverter type VRF outdoor unit and Hi-wall type indoor units as described in the table-2. The outdoor unit to be placed roof/ ground lvl. of the building as per the suit at site condition. The outdoor units shall be grouped together and shall modulate to get the benefit of overall part load operation at of peak hours, seasonal & daily temperature variation. The ODU units shall be top discharge type. The multiple indoor units shall be connected with the outdoor units through insulated hard drawn copper pipes. The copper pipes shall be UV protected in the outdoor area.

Additional scope need to be considered by AC vendor:

a. Opening / Closing / Making hole in existing Masonry wall/ Concrete / Glass structure to facilitate entry and exit of duct / pipe work and finishing it good.

b. Supply & Installation of decorative pelmets if required to install the IDUs.

c. Drain to be terminated to the nearest drain point.

d. Any type of painting related to HVAC work if required.

Notes on Electrical Scope:

- All materials to be used after prior approval of Engineer in charge.
- Suitable connectors are to be used for making connections of the neutral and earth wire in the switch boards.
- No electrical wiring is allowed to lay on the false ceiling.
- No joints are allowed in the wiring.
- Suitable Al or Cu lugs are to be used during any connection, connections without using lugs are not allowed.
- Suitable brass glandings of the cables are to be done for cable end termination.
- Giant rust screws are to be used during fixing of pipes, cables, conduits, light fittings etc on the wall.
- Valid challans and test/guarantee certificates of all the materials supplied by the contractor are to be submitted before execution of work.

All signal/control/power wiring/ Earthing (from nearest existing earthing) related to HVAC system are included in HVAC scope of works including their terminations.

TEST READINGS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TEST READINGS TO BE TAKEN AT THE TIME OF COMMISSIONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR-COOLED VRF OUTDOOR UNIT</td>
<td>Refrigerant pressures, Oil pressure</td>
</tr>
<tr>
<td></td>
<td>BHP consumed at 100%, 75% &amp; 50% Load</td>
</tr>
<tr>
<td></td>
<td>Ambient Temp</td>
</tr>
<tr>
<td>MOTOR</td>
<td>Voltage &amp; Amperage</td>
</tr>
<tr>
<td>INDOOR UNITS</td>
<td>Entering/leaving Air Temperatures, DBT/WBT Air flow rates</td>
</tr>
<tr>
<td>SUPPLY &amp; RETURN AIR GRILLES</td>
<td>Air flow rates</td>
</tr>
<tr>
<td></td>
<td>Supply air</td>
</tr>
<tr>
<td></td>
<td>DBT/WBT</td>
</tr>
<tr>
<td>SPACE TEMPERATURES</td>
<td>DBT/WBT/RH</td>
</tr>
</tbody>
</table>
1.0 Scope

Scope of this section comprises of design, supply, erection, testing and commissioning of ALL Inverter Scroll Scroll/ Rotary or Twin rotary VRF type system. The VRF product must be manufactured at ISO 9001-2008 certified factory.

2.0 OUTDOOR UNITS: INVERTER VRF SYSTEM

The Air cooled direct expansion type Full Inverter VRF outdoor unit shall be factory assembled, powder coated GI sheet metal cabinets, all hardware of anti-rust quality, conformal coating on PCB to protect from duct & humidity, hydrophilic blue fin material for better corrosion resistance, top discharge type with Brushless DC Motor only.

I. The Top Discharge type VRF ODU must have a bigger condenser coil face area with higher CFM fan resulting in improved efficiency, less deration due to higher ambient temperatures.

II. The ODU must be selected to deliver actual capacity at 42degC and it should be operational up to 50degC.

III. The VRF system must be compatible with R410A green Refrigerant only. System must be pre-charged at Factory. If required additional, based on the site, then it will be charged at additional site.

IV. Condenser Heat exchanger made of copper tubes, are inner grooved for high heat transfer. The condenser fans are fitted with high efficiency BLDC motor that regulate air flow depending on demand resulting more powersaving.

VI. The VRF system must be designed to operate across a WIDE Voltage range from 320V to 460V resulting in high uptime even in such erratic power conditions.

VII. All Inverter VRF must be designed with the new generation Refrigerant Cooled PCB, which helps maintain the drive within allowable temperature range. It enhances the reliability of the system when it is working under very high ambient conditions otherwise vendor has to confirm that the machine shall be operable up to 50degC ambient condition.

VIII. VRF (Full Inverter Type) must be designed with twin large accumulator & and an efficient oil recovery management system, hence allowing the system to be setup with long & flexible piping. The equipment must be suitable for:

   a. Max. actual piping length - 180 Rmt
   b. Max. total piping length - 1000 Rmt
   c. Max. Level difference between ODU - IDU - 90 Rmt
   d. Max. level difference between IDUs - 40 Rmt

IX. Each Indoor units must be connected (with VRF Outdoor unit) by means of individual Copper Refrigerant network or distribution joint only. The mentioned "Y" joint or refrigerant joint must be factory made & tested by OEM. The individual size of refrigerant network or "Y" joint, connecting to individual indoor units, to be calculated & supplied by OEM / Bidder only.

X. All Inverter VRF must have emergency back operation. In case of double compressor ODU, it must operate or function only if there is a failure in the main compressor.

XI. In modular VRF, where multiple units have been combined to run, as one larger unit, the system must operate even in case of failure in one of the compressors. It will help to ensure that cooling/heating remains largely unaffected even during servicing.

XII. As all the Indoor units are interconnected by the communication cable, if there is any break in any communication cable, subsequent IDUs are affected and must not function. By activating the IDU emergency operation on the Next Generation All Inverter VRF, the other IDUs must function despite of such break.
3.0 INDOOR UNITS:

General:
All indoor units (Hiwall Split, Cassette) as specified under this item shall have, in general, noise levels shall be less than 45 db. For critical application noise levels below these limits may, however, be specified during design stage.

I. Each unit shall have electronic control refrigerant flow rate corresponding to load variation of the room.

II. Theaddress of the indoor unit shall be set automatically in case of individual and group control.

III. In case of centralized control system, it shall be possible to set the address of individual indoor unit through a liquid crystal remote controller.

IV. The Ductable indoor unit fan shall be high static, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on motor shaft having support from housing.

V. The Evaporator cooling coil shall be made out of seamless copper tubes and have continuous aluminium fins. The fins shall be hydraulically/mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested at 21 kg/sq.mtr air pressure under water.

VI. Indoor unit shall have cleanable type filter to an integrally moulded / moulded plastic frame. The filter shall be slide in and neatly insertable type. It shall be possible to clean the filters either with compressed air or water.

VII. Each unit shall have computerized PID control for maintaining designed room temperature. Each unit shall be provided with microprocessor thermostat for cooling.

VIII. Each ductable unit shall have with corded remote controller and each high wall & cassette type indoor unit shall be with cordless remote controller as standard features. The remote controller shall memorize the latest malfunction code for easy maintenance. The controller shall have self-diagnostic features for quick maintenance and service. The controller shall be able to change fanspeed and angle of swing flap (for high wall unit & Cassette) individually as per requirement.

Place of Installation: Kharagpur

<table>
<thead>
<tr>
<th>Constructional details</th>
<th>As per bid drawings and documents.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>The power supply variation limits for 230V and 415V shall be as following. All electrical equipment shall perform satisfactorily under these conditions. Voltage variation +/-10% Frequency variation +/-5% Control wiring – 220V, 1Ph, 2 wire, 50Hz</td>
</tr>
<tr>
<td>Others</td>
<td>Dust filters action level 20 Microns. The noise level within the air conditioned space shall be restricted to 45 db NC Level for Hiwall &amp; Cassette unit &amp; 50 db for Ductable indoors. Not more than that.</td>
</tr>
</tbody>
</table>

4.0 Installation

4.1 The outdoor unit shall be installed as decided by the Indian Institute of Technology- Kharagpur. The room unit shall be either ceiling or wall/floor mounted as shown on drawings/as per the requirement of the client.

4.2 Refrigerant lines shall be inconspicuously and generally shown in the drawings and as directed onsite. The suction and liquid lines shall be bonded together and insulated with elastomeric tubing. The joints of insulation need to be sealed by joint tape of same material. UV protection for outdoor piping is required. All power wiring shall be drawn from the nearest socket outlet and shall include the control wiring, power wiring, on-off switch with speed controller.
4.3 All pipe sizing shall be done taking into account the length and rise.

4.4 A12mm insulated drain pipes shall be provided as shown on the drawing and as directed on site.

5.0 Testing

5.1 The unit shall be tested for establishing the capacity and power consumption. Tests shall be carried out in accordance with IS 5141 – 1969 (revised upto date) computed results shall tally with specified capacity and power consumption figures furnished with the tender offer.

5.2 On completion of piping the system and the piping shall be tested using Nitrogen gas by raising the pressure to 1.5 times the working pressure and holding the test pressure for 3 hours.

5.3 Tests shall be carried out on:
   a) The compressor and drive motors side
   b) Condenser side for heat rejection
   c) Cooling coil for cooling capacity
   d) Evaporator air volume

5.4 A test certificate from prototype factory tests will be acceptable.

6.0 Mode of Measurement

6.1 Each unit shall be measured as one item of work which shall consist of:

   i) Outdoor unit
   j) Indoor unit
   k) Refrigerant and drain piping (with insulation)
   l) Electrical power control wiring, room thermostat and control panel
   m) Refrigerant charge & oil
   n) Erection
   o) Commissioning and testing

7.0 REFRIGERENT PIPING

7.1 Scope.

The scope of this section covers supply, installation of refrigerant piping & drain piping with insulation as specified here & as shown in the drawings.

7.2 Refrigerant copper Piping

   - 16/18 gauge copper tubing shall be used to make connection to equipment’s wherever required.
   - Flare fittings e.g. flare nuts; tees, elbows, reducers etc. shall be of brass.
   - The pipes and fittings shall be connected by means of welded joints. The connection to gauges, control set etc. (if any) shall be with soft copper tubing and flare fittings.
   - Refrigerant piping routing shall be decided by Engineer – in – Charge.
   - The refrigerant piping installation shall be as per drawing.

7.3 Drain Piping

   - All condensation drainage shall be pitched in the direction of flow to ensure adequate drainage with an adequate trap seal to prevent leakage / infiltration.
   - Provide pitch of 20 mm per meter for a smooth drainage of condensate.
   - Condensate drain piping fixing shall be as per drawing.
   - The routing of drain piping shall be decided by Architect/Engineer – in – Charge.
   - The material for the drain pipe is CPVC.
   - Drain piping supporting shall be as per drawing.
7.4 **Suction Line Insulation**

The Suction Line shall be insulated with 19/25 mm thk. Nitrile Rubber Insulation covered with aluminium foil (As per Specified with K Value of 0.027-0.029 K Cal/Hr. MDeg C at 0-16 Deg C)

7.5 **Drain Piping Insulation**

The drain pipes shall be insulated with 6mm thick Nitrile Rubber Insulation.

7.6 **Mode of Measurement**

- Refrigerant pipes with insulation shall be in linear measure along the center line of the pipe including accessories, supports etc and paid for per RMT.
- Condensate drain pipes with insulation shall be in linear measure along the center line of the pipe including accessories, supports etc and paid for per RMT.

8. **ELECTRICALS**

8.1 **Scope.**

The scope of this section covers supply, installation & Testing of cables connecting Indoor Unit & Outdoor Unit as per specification.

8.2 **Electrical.**

- The supply should be complete with appropriate earthing as per IERules.
- Depending on the number and capacity of units to be installed, each unit should have separate control through a main incoming switch with adequate capacity of approved makes.
- Each ODU should have separate SFU adjacent to the unit/within the unit and visible from the unit.
- Electrical cabling should be done with armored copper cable of approved makes only.
- Fuse switches should be HRC cartridge type with visible indication.
- The cabling shall be done as per drawing.

9. **Bidder need to submit the following data along with the technical bid:**

**VRF Indoor Unit Technical Data sheet**

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Details of Technical Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make</td>
</tr>
<tr>
<td>2</td>
<td>Model</td>
</tr>
<tr>
<td>3</td>
<td>Type of VRF Indoor</td>
</tr>
<tr>
<td>4</td>
<td>Nominal Cooling Capacity (TR)</td>
</tr>
<tr>
<td>5</td>
<td>Input Power (KW)</td>
</tr>
<tr>
<td>6</td>
<td>Net weight (kg)</td>
</tr>
<tr>
<td>7</td>
<td>Sound pressure level (db)</td>
</tr>
<tr>
<td>8</td>
<td>Air Flow (CFM) in high / med / Low</td>
</tr>
<tr>
<td>9</td>
<td>External Static Pressure (Pa)</td>
</tr>
</tbody>
</table>
### VRF Outdoor Unit Technical Data Sheet:

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Details of Technical Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make</td>
</tr>
<tr>
<td>2</td>
<td>Model</td>
</tr>
<tr>
<td>3</td>
<td>Combination of Base Model (if Any)</td>
</tr>
<tr>
<td>4</td>
<td>Actual Cooling Capacity at 42Deg C (HP)</td>
</tr>
<tr>
<td>5</td>
<td>Total Power Consumption at 42 DegC (KW)</td>
</tr>
<tr>
<td>6</td>
<td>Power Supply</td>
</tr>
<tr>
<td>7</td>
<td>Overall Dimension (w x d x h in mm)</td>
</tr>
<tr>
<td>8</td>
<td>net weight (kg)</td>
</tr>
<tr>
<td>9</td>
<td>Type of Refrigerant</td>
</tr>
<tr>
<td>10</td>
<td>Pre charged refrigerant Qty (kg)</td>
</tr>
<tr>
<td>11</td>
<td>Number of Accumulator</td>
</tr>
<tr>
<td>12</td>
<td>Type of Expansion Valve</td>
</tr>
<tr>
<td>13</td>
<td>Type of Compressor</td>
</tr>
<tr>
<td>14</td>
<td>Make &amp; model number of individual compressor</td>
</tr>
<tr>
<td>15</td>
<td>Compressor quantity</td>
</tr>
<tr>
<td>16</td>
<td>Total Qty of Inverter Compressor- for individual model</td>
</tr>
<tr>
<td>17</td>
<td>Input Power of Inverter Compressor motor (kw)</td>
</tr>
<tr>
<td>18</td>
<td>Input Power of Fixed Compressor motor (kw)</td>
</tr>
<tr>
<td>19</td>
<td>Type of Condenser coil</td>
</tr>
<tr>
<td>20</td>
<td>Type of Condenser Fan</td>
</tr>
<tr>
<td>21</td>
<td>Type of Condenser Fan- Motor</td>
</tr>
<tr>
<td>22</td>
<td>Total Number of Fans for specified capacity ODU</td>
</tr>
<tr>
<td>23</td>
<td>Power input of individual Cond Fan - Motor (kw)</td>
</tr>
</tbody>
</table>
**LIST OF APPROVED VENDORS**

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Item</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Inverter type VRF Outdoor Units &amp; Indoor Units</td>
<td>O-general / Hitachi/Mitshubishi (Heavy)/ Daikin/ Toshiba/ Mitshubishi (Electric)</td>
</tr>
<tr>
<td>2.</td>
<td>Control Cables</td>
<td>Finolex/ Polycab/ Havells /RR Kable</td>
</tr>
<tr>
<td>3.</td>
<td>Power Cables</td>
<td>Finolex/ Polycab/ Havells / RR Kable</td>
</tr>
<tr>
<td>4.</td>
<td>CU Pipe</td>
<td>Rajco/ Nippon/ Mandev</td>
</tr>
<tr>
<td>5.</td>
<td>Thermal insulation</td>
<td>Armaflex/ K-flex/ Armacell</td>
</tr>
<tr>
<td>6.</td>
<td>Conduit</td>
<td>Precesion/AKG/POLYCAB</td>
</tr>
<tr>
<td>7.</td>
<td>Cable tray</td>
<td>Legrand/OBO/MK-Honeywell/Profab/Asian</td>
</tr>
<tr>
<td>8.</td>
<td>Electrical Starter Panel / DB</td>
<td>L&amp;T/ Schneider/ABB/Siemens/ EAP/ Power and Control/System Dynamic/ TTS Systematics</td>
</tr>
<tr>
<td>9.</td>
<td>U-PVC Pipe</td>
<td>Supreme/ Oriplast/ Utkarsh</td>
</tr>
</tbody>
</table>

**Note:** For items not covered in the above list or in case of non-availability of preferred make of any item listed above, the make/ brand to be used in the work, should have prior approval from the Engineer-In-Charge.