



INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR  
KHARAGPUR, WEST BENGAL 721302

E -TENDER DOCUMENT

*for*

***Supply, Installation, Testing & Commissioning of Air conditioning work for Rubber  
Technology Research Lab,RTC of IIT Kharagpur***

***(2<sup>nd</sup> Call)***

***Notice Invitation Tender Serial No. NIT No. IITKGP/RAC/VRF/RTC/2026 DATED 05.05.2026***

*Tender Serial No. \_\_\_\_\_ Issued to:*

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## Contents

<b>1.</b>	<b>NOTICE INVITING TENDER</b>	<b>2</b>
1.1.	INTRODUCTION .....	2
1.2.	PARTICULARS.....	2
1.3.	ELIGIBILITY CRITERIA.....	3
<b>2.</b>	<b>INFORMATION TO BIDDERS</b>	<b>5</b>
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
<b>3.</b>	<b>UNDERTAKING BY THE BIDDER</b>	<b>07</b>
4.	Checklist for Documents to be uploaded on .....	15
6.	Scope of Work .....	16-20
7.	General Conditions .....	21
9.	Special Level Agreement (Annex. VI) .....	23
10.	Price bid related information (Annex. VII) .....	24
11.	<i>Schedule of Quantities (BOQ).....uploaded separately in BOQ section on <a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a></i>	



## 1. NOTICE INVITING TENDER

### 1.1 INTRODUCTION

Indian Institute of Technology (IIT) Kharagpur, hereinafter called IITKGP, invites online tenders from the eligible contractors for Supply, Installation, Testing & Commissioning of Air conditioning work for Rubber Technology Research Lab,RTC of IIT Kharagpur

### 1.1. PARTICULARS

1.NIT Number	IITKGP/RAC/VRF/RTC/2026
2.Name of Work	Supply, Installation, Testing & Commissioning of Air conditioning work for Rubber Technology Research Lab,RTC of IIT Kharagpur.
3.Location of Work	Rubber Technology Resarch Lab.
4.Estimated Cost(including GST)	Rs. <b>41,93,476.00/-</b> (Rupees Forty One Lakhs Ninety Three Thousand Four Hundred Seventy Six Only)
5.Earnest Money Deposit	Rs. <b>83,870/-</b> (Rupees Eighty Three Thousand Eight hundred Seventy only)
6.Time Limit	100 days from Date of start and 4years of CAMC after DLP.
7.Tender Basis and Mode	Two stage (Technical Bid & Financial Bid)
8.Mode of Payment to IITKGP(EMD/Tender fee)	<p>i) Original Demand Draft/Pay Order has to be submitted physically at the office of RAC Unit on or before the due date/extended date of opening of bid &amp; Scanned copy of Demand Draft/Pay Order has to be uploaded on <a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a></p> <p>ii) Demand Draft/Pay order to be drawn in favour of IIT KHARAGPUR payable at Kharagpur.</p> <p>iii) EMD shall be valid for 60 days from date of opening.</p>
10. Pre bid meeting	<b>13<sup>TH</sup> May,2026, 11:00hrs, in the Meeting Room of RAC Unit located in the Old building , IIT Kharagpur</b>
9.Closing Date & Time for Receipt of bids	<b>28<sup>th</sup> May,2026 up to 12:00hrs</b>
10.Date & Time for Opening Technical of Bid	<b>29<sup>th</sup> May,2026 up to 12:00hrs</b>
11. Date & Time for Opening of Price Bid	<b>To be informed later to the successful bidder</b>
12. Engineer-in-charge and contact details.	Mr. S. Banerjee, Executive Engineer(RAC) Tel: 03222-282724 Email: <a href="mailto:sbanerjee@adm.iitkgp.ac.in">sbanerjee@adm.iitkgp.ac.in</a>
13. Address for tender issue, submission and opening	Office of RAC Unit,1 <sup>st</sup> Floor, Old Building, IIT Kharagpur, Kharagpur WB 721302
14.Website for full and updated <i>publishing</i> information	<a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a> <a href="https://www.iitkgp.ac.in/tenders">https://www.iitkgp.ac.in/tenders</a>
<b><u>15. Website for tender submission &amp; processing (This is e-Tender only submission by Online)</u></b>	<b><u><a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a></u></b>

## 1.2. ELIGIBILITY CRITERIA

- 1.2.1. 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.
- 1.2.2. The bidder must have done at least 1 (ONE) similar work of value of 80% of the estimated cost for HVAC works **or** 2 (TWO) similar works for projects each of value 60% of the estimated cost for HVAC works **or** 3 (THREE) similar work for projects each of value 40% of the estimated cost for HVAC Works with Government/Semi-government/ PSU/ Government Funded Autonomous Organization during last **7 (seven) years** preceding last date of the month of tender submission.
- 1.2.3. The Bidder should have registered Sales & Service office in West Bengal with adequate manpower. List of tools and tackles and resume of the workmen may be provided in the technical BID. Firm should have full-fledged service set up in West Bengal along with trained team of technical staff (Detailed Organization Chart Needs to be submitted) & Should have own warehouse in West Bengal, to ensure constant & immediate supply of spare parts at all times. Organization chart of the service set up should be furnished duly signed by authorized signatory.

### Note:

The estimated cost is **41,93,476.00/-** (Rupees Forty One Lakhs Ninety Three Thousand Four Hundred Seventy Six Only)

(i) 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.

(ii) **Similar works** shall mean **SITC of VRF AC system**.

- 1.2.4. 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.
- 1.2.5. The validity of the registrations and licenses should be valid as on the date of tender submission.
- 1.2.6. Average annual turnover of the bidder as per ITCC (Income Tax Clearance Certificate) or profit & loss statement shall not be less than 30% of the estimated cost, not having incurred loss in more than two years, during last 5 years ending 31 Mar 2025.
- 1.2.7. **The bidder other than OEM 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.**

1.2.8. The scope of HAVC 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.
- 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. All above work shall be executed and finished good to the satisfactory of Engineer in charge.

Sd/-

Superintending Engineer (E&M)

On behalf of the **Director, Indian Institute of Technology Kharagpur**

### Copy to:

- 1) Dean , EEC
- 2) Asso. Dean ,EEC
- 3) HOD(RTC)
- 4) Sec. to Deputy Director
- 5) Sec. to Dean Admin.
- 6) Executive Engineer(RAC)
- 7) Sr Asst. Engineer/Assistant Engineer/ Junior Engineer (RAC)

- 8) Notice Board
- 9) Tender Notice uploaded to CPPP portal & Institute Website
- 10) Office file

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR



भारतीय प्रौद्योगिकी संस्थान खड़गपुर

## 2. INFORMATION TO BIDDERS

### 2.1 SCOPE OF WORK

The IITKGP intends for **Supply, Installation, Testing & Commissioning of Air conditioning work for Rubber Technology Research Lab,RTC of IIT Kharagpur**

- 2.1.1 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.

### 2.2 GENERAL INSTRUCTIONS

- 2.2.1 Bidding documents are to be obtained electronically through websites: <https://eprocure.gov.in/eprocure/app>
- 2.2.2 <https://www.iitkgp.ac.in/tenders>; *ii)*<https://eprocure.gov.in/eprocure/app>
- 2.2.3 This bid document shall be read in conjunction with GCC (General Conditions of Contract) available on <https://www.iitkgp.ac.in/tenders>
- 2.2.4 The bidder shall visit and inspect the site and obtain all information on his own responsibility and at own cost, which may be necessary for the purpose of quoting and submitting the tender. No excuse or ignorance as to site conditions and local information 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.
- 2.2.5 IITKGP shall not provide any space at site for labour hutments.
- 2.2.6 All clarifications about the tender shall be sought by bidder on or before pre-bid meeting. The bidders may make suggestions which shall be considered during the Pre Bid Meeting. Intending bidder(s) may also send their queries or suggestion, if any, through e-mail to the Engineer-in-charge on or before **13<sup>th</sup> May,2026, 10:30hrs**. No queries shall be entertained after notification of replies to noteworthy queries received till the date of pre-bid meeting.
- 2.2.7 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 certificates. Certificate from private individuals / organizations for whom such works have been executed shall not be accepted.
- 2.2.8 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, Clarifications to Pre-bid queries can be downloaded from the websites: i)<https://eprocure.gov.in/eprocure/app>
- 2.2.9 <https://www.iitkgp.ac.in/tenders> ; *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.*
- 2.2.10 All costs, charges & expenses that may be incurred in connection with the preparation of his tender shall be borne by him and the Institute accepts no liability whatsoever therefore.
- 2.2.11 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 labourcess etc. will be deducted from the bill as per prevailing rules.
- 2.2.12 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.
- 2.2.13 IITKGP reserves the right to reject any or all of the bids without assigning any reason.
- 2.2.14 **Bid Validity:** Bid shall remain valid for 120 days from the date of submission.
- 2.2.15 **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.**
- 2.2.16 If any information furnished by the bidder is found as false / fabricated, then his bid will be rejected and treated as cancelled. Even if 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.
- 2.2.17 **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.



2.2.18 **Refund / Conversion of Earnest Money Deposit:** The Earnest Money received shall be refunded to the unsuccessful bidders without any interest upon executing the Contract Agreement by successful bidder. The Earnest Money Deposit of successful bidder shall be retained and converted into part of Security Deposit.

2.2.19 **Forfeiture of Earnest Money Deposit:** Earnest Money Deposit will be forfeited in any of the following cases:

2.2.19.1 The bidder withdraws / modifies his tender during the period of Bid Validity.

2.2.19.2 The bidder, in case of tie between lowest bids, refuse to submit revised offer.

2.2.19.3 The bidder does not accept the correction of arithmetical errors of his tender.

2.2.19.4 The bidder fails to deposit Performance Guarantee and information as per format given in GCC within the stipulated time period before award of the work.

## 2.3 SUBMISSION OF TENDER

2.3.1 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>]

2.3.2 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 CA's from the link [www.cca.gov.in](http://www.cca.gov.in)) to participate in e-Procurement of IIT KHARAGPUR.

2.3.3 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.

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

2.3.5 Bidders may download and refer the "Instructions for Online Bid Submission" from (<https://eprocure.gov.in/eprocure/app;jsessionid=2A56E178EED5C7D8536175EFBB573C9F.eprocgep2?page=HelpForContractors&service=page>). ).

2.3.6 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 requirement of eligibility criteria and all tender papers except Bill of Quantities are to be submitted in "Technical Bid"

2.3.7 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 MSE registration certificate as per provision given in sub-clause 1.2.7 of NIT & 2.2.15 of Information to Bidders.

2.3.8 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.

2.3.9 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.

2.3.10 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.

2.3.11 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.

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

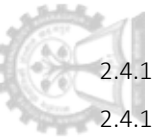
2.3.13 IIT KHARAGPUR reserves the right to cancel the tenders before submission/opening of tenders, postpone the tender submission/opening date and to accept/reject any or all tenders without assigning any reason thereof. IIT KHARAGPUR's assessment of suitability as per eligibility criteria shall be final and binding.

2.3.14 Tenderers may note that they are liable to be disqualified at any time during tendering process in case any of the information furnished by them is not found to be true. EMD of such tenderers shall be forfeited. The decision of IIT KHARAGPUR in this regard shall be final and binding.



## 2.4 EVALUATION OF BIDS AND AWARD OF WORK

- 2.4.1 The Bid of bidder will be opened electronically on the specified date and time of opening at the Office of RAC Unit, 1st Floor, Old Building, IIT Kharagpur, Kharagpur WB 721302 in the presence of willing bidders or their authorized representatives.
- 2.4.2 Date, time and place of opening of Financial Bid will be informed after evaluation of Technical Bid to the Technically Qualified Bidders.
- 2.4.3 Bids shall, first, be checked for payment of **Earnest Money Deposit**. Only those bids found to have duly paid/ submitted Earnest Money Deposit shall be considered for evaluation.
- 2.4.4 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**
- 2.4.5 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.
- 2.4.6 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.
- 2.4.7 **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.
- 2.4.8 The successful bidder shall be issued Letter of Acceptance (LOA) of the bid, and be required to furnish a Performance Guarantee as per General Conditions of Contract, Program Schedule with specific Milestones to be achieved as to complete the work within the stipulated time limit and details of his Technical Staff to be deployed as per ANNEXURE-I
- 2.4.9 **Letter of Award (Work Order)** shall be issued to the successful bidder only after receipt of the Performance Guarantee, along with Program Schedule and the details of Technical Staff to be deployed for the work.
- 2.4.10 **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 after issue of Work Order.
- 2.4.11 **Date of start** of work shall be reckoned from 10<sup>th</sup> day from the date of issue of "Letter of Acceptance".
- 2.4.12 **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 final or otherwise of its completion of work or till the final bill has been prepared.
- 2.4.13 **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.



### 3. 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 120days 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 as earnest money. If I / we, fail to furnish the prescribed performance guarantee within prescribed period, I / we agree that the said 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**

DISCIPLINE	NAME	QUALIFICATION	EXPERIENCE	CONTACT NUMBER
Overall Project In-charge				
Engineer - Structure and Civil Works				
Engineer – Electrical & Mechanical Works				
In-charge - Safety, Health & Environment				

Seal &amp; Signature of Contractor



**UNDERTAKING FOR GCC COMPLIANCE****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 &amp; 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)



**ANNEXURE - IV****DETAILS OF THE FIRM**

1.	Name of Firm	
2.	Registered / Postal Address	
3.	Working Office Address	
4.	Working Email id	
5.	Mobile No.	
6.	Telephone No.	
7.	Particulars of Registration with various government bodies/organization.	
8.	Were you ever debarred/ blacklisted by any department during the past seven years?	
9.	Name of Directors /Partners with Address	
10.	Permanent Account Number (PAN) No	
11.	GST Registration No.	



## ANNEXURE-V

Format for Net Worth Certificate

It is to certify that as per the audited balance sheet and profit & loss account during the financial year ....., the net worth of ... (individual/farm/company) having registered address at ..... as on 31.3.2025 is Rs.....after considering all liabilities. It is further certified that the net worth of the company has not eroded by more than 30% in the last three years ending on 31.3.2025.

Signature of Chartered Accountant

.....

Name of Chartered Accountant

.....

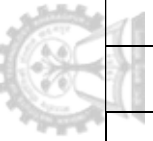


Membership No. of ICAI

Date & Seal

4. Checklist for Documents to be uploaded on <https://eprocure.gov.in/eprocure/app>

Sl. No.	Documents	Reference
1.	Tender Documents	
2.	EMD	1.2.8
3.	Document support of Bonafide Business Entity	1.3.3
4.	GST Registration Certificate	1.3.3
5.	Permanent Account Number	1.3.3
6.	Average annual turnover of the bidder as per ITCC or profit and loss statement for last 5 year	1.3.6
7.	Experience Certificate	1.3.2
8.	OEM authorization certificate	1.2.7
9.	ANNEXUREs	
10.	SOQ	



#### 4. SCOPE OF WORK

The Rubber Technology Reserch Lab of Rubber Technology Department, Indian Institute of Technology Kharagpur intends for air-conditioning.

The areas and the air-conditioning system considered are as under.

##### 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:

Design Conditions	DRY BULB		Mean Coincident WBT		RH
	Deg F	Deg C	Deg F	Deg C	%
SUMMER	110	43.3	83	28	33
MONSOON	94.4	34.66	82	28	60
WINTER	56	13	48	9	55

###### 1.2 INDOOR DESIGN CONDITIONS

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

SPACE	Temperature Deg C	Relative Humidity %	Remarks
Entire area	26±1.1	60±10 % at full load condition	

**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 :  $U = 1.81 \text{ Watt / Sqm}^{\circ}\text{C}(0.32 \text{ Btu / HrSqft}^{\circ}\text{F})$   
(230mm thick brick wall)
- ii. Roof (Exposed to sun) :  $U = 1.316 \text{ Watt / Sqm}^{\circ}\text{C}(0.23 \text{ Btu / HrSqft}^{\circ}\text{F})$
- iii. External Glass Specifications : Glass with following details:  
 $U = 5.8 \text{ Watt / Sqm}^{\circ}\text{C}(1.02 \text{ Btu / HrSqft}^{\circ}\text{F})$   
Solar heat gain Coefficient: 0.8

###### 1.5 OCCUPANCY AND INTERNAL HEAT GAIN

SPACE	Occupant	Equipment Load	Lighting Load	Fresh Air
Entire area	75sft /person	125W/ Person	Average 1W/sft	Asper ASHRAE 62.1 2004 or ACPH @1.5 , whichever higher

## 2. COOLING ESTIMATE

Estimated cooling loads are tabulated in table-2.

**TABLE -2**

### **PRELIMINARY COOLING ESTIMATE**

Sr.No	Floor	Description	Area (Sqft)	Heat Load (TR)	Type of Indoor Unit	Total IDU (TR)	ODU HP	ODU Location
1	Ground Floor	Different room and labs	3755	28	Hi wall	28	63 HP (Nominal capacity) air cooled inverter type VRF outdoor unit	Roof Top
2	1 <sup>st</sup> floor	Different room and labs	3740	28	Hi wall	28		
3	2 <sup>nd</sup> floor	Different room and labs	600	7	Hi wall	7		
Total				63		63		

## 3. PLANT SELECTION

Air conditioning of the above mentioned areas shall be done with **63HP** energy efficient Inverter type scroll compressor in air cooled VRF units. The scroll compressor can operate efficiently on part load and there by substantial energy is saved. Multiple/single digital scroll compressor in the VRF units shall be grouped together to get the benefit of overall part load operation at of peak hours, seasonal & daily temperature variation.

The area is to be air-conditioned by air cooled VRF outdoor unit and the suitable no of indoor units as mentioned in table-2. The outdoor units will be grouped together to get the benefit of overall part load operation at of peak hours, seasonal & daily temperature variation. Putting them together in single point facility will provide availability of the part load operation in breakdown / drop in demand. Indoor units may be Hi-wall/ cassette type as per the site condition. The outdoor unit shall be placed ground/ roof of the building as per the suit at site condition.

### **Additional scope need to be considered by AC vendor:**

- 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.
- Drain to be terminated to the nearest drain point.
- Any type of painting related to HVAC work if required.

TEST READINGS

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



### Technical specification of VRF unit

#### 1.0 Scope

Scope of this section comprises of design, supply, erection, testing and commissioning of ALL Inverter 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 SYSEM

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 bigger condenser coil face area with higher CFM fan resulting in improved efficiency, less deration due to higher ambient temperatures.
- II. The ODU to be selected to deliver capacity at 35 degC and it should be operational upto 50degC.
- III. The Outdoor unit must consist of Inverter Scroll/twin rotary inverter Compressor only. Tender BOQ specified VRF ODU must be having All Inverter Scroll/twin rotary compressors. There should not be any fixed compressor or Partial inverter, if found Bidder will be rejected at any stage of Project.
- IV. The VRF system must 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 additional at site.
- V. 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 power saving.
- 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 upto 50degC ambient condition.
- VIII. VRF (Full Inverter Type) must be designed with twin large accumulator & and an efficient oil recovery management system, hence allow the system to be set up 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 Y distribution joints only. The mentioned "Y" joint or refnet joints must factory make & tested by OEM. The individual size, of refnets or "Y" joints , connecting to individual indoor units, to be calculated & supplied by OEM / Bidder only.
  - X. All Inverter VRF should have emergency back operation. In-case of double compressor ODU, it must operate or function even if there is a failure or maintenance downtime of one 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 or maintenance downtime or shutdown of one VRF ODU. 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 (Hi-wall 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 respond to load variation of the room.
- II. The address 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 seam less copper tubes and have continuous aluminium fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes 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 each and quick maintenance and service. The controller shall be able to change fan speed and angle of swing flap (for high wall unit & Cassette) individually as per requirement.

**Place of Installation : Kharagpur**

Constructional details	As per bid drawings and documents.
Power Supply	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
Others	Dust filters action level 20 Microns. The noise level within the air conditioned space shall be restricted to 45 dB NC Level for Hiwall& Cassette unit & 50db for Ductable indoors. Not more than that.

### 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 client.

4.2 Refrigerant lines shall be inconspicuously and generally as shown in the drawings and as directed on site. 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 A 12mm insulated drain pipe 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 motor 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. 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 connections 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 connections to gauges, controls 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 with foil facing.

#### 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 IE Rules.
- 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 **armoured copper cable** of approved makes only.
- Fuse switches should be HRC cartridge type with visible indication.
- The cabling shall be done as per drawings or instruction from Engineer – in –charge.
- The cabling supporting 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

Sl No	Details of Technical Requirement	
1	Make	
2	Model	
3	Type of VRF Indoor	
4	Nominal Cooling Capacity (TR)	
5	Input Power (KW)	

6	Net weight (kg)	
7	Sound pressure level (db)	
8	Air Flow (CFM) in high / med / Low	
9	External Static Pressure (Pa)	

**VRF Outdoor Unit Technical Data Sheet:**

Sl. No	Details of Technical Requirement	
1	Make	
2	Model	
3	Combination of Base Model (if Any)	
4	Actual Cooling Capacity at 42Deg C (HP)	
5	Total Power Consumption at 42 DegC (KW)	
6	Power Supply	
7	Overall Dimension (w x d x h in mm)	
8	net weight (kg)	
9	Type of Refrigerant	
10	Pre charged refrigerant Qty (kg)	
11	Number of Accumulator	
12	Type of Expansion Valve	
13	Type of Compressor	
14	Make & model number of individual compressor	
15	Compressor quantity	
16	Total Qty of Inverter Compressor- for individual model	
17	Input Power of Inverter Compressor motor (kw)	
18	Input Power of Fixed Compressor motor (kw)	
19	Type of Condenser coil	
20	Type of Condenser Fan	



21	Type of Condenser Fan- Motor	
22	Total Number of Fans for specified capacity ODU	
23	Power input of individual Cond Fan - Motor (kw)	



Complaints during contract execution time shall be resolved by the vendor to the satisfaction of Engineer-in-charge within twenty four hours from the time of intimation.

**Any machine minor breakdown more than a 24 hour @ 200/- hour.**

**Any machine breakdown more than a 48 hour @ 400/- hour.**

Any of the machines under breakdown should be repaired and put back in service within 24 hours (where compressor repair is not involved) & 48 (Forty Eight) hours (where compressor repair is involved) from the time of reporting defect.

Thus after 5 days IIT Kharagpur shall have the right to get the complaint rectified through any other agency at a risk and cost of the concerned agency.

After any termination or expiry of the contract, the contractor needs to handover the existing ac systems in good order & condition as per tender protocol within 7 (Seven)days if fails to do so the defective machines will be rectified through any other agency at a risk and cost of the concerned agency.

Signature of the bidder and seal

(Name & Designation of the authorized signatory)



Sl No	Item	Manufacturer
1.	Inverter type VRF Outdoor Units & Indoor Units	O-general / Mitshubishi (Heavy)/ Daikin/ Toshiba/ Mitshubishi (Electric)/ Voltas/ Bluestar/ LG/Carrier/HITACHI
2.	Control Cables	Finolex/ Polycab/ Havells /KEI.
3.	Power Cables	Finolex/ Polycab/ Havells /KEI.
4.	CU Pipe	Rajco/ Nippon/ Mandev
5.	Thermal insulation	Armaflex/ K-flex/ Armacell
6.	Conduit	Precesion/AKG/POLYCAB
7.	Cable tray	Legrand/OBO/MK-Honeywell/Profab / Asian / ISI marked makes

**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.



## PRICE-BID

Price offer for "Supply, Installation, Testing & Commissioning of Air conditioning work for Rubber Technology Research Lab,RTC of IIT Kharagpur." as per aforesaid Tender Document including appendix – A AND ANNEXURE –I, II, III & V.

Sl.No	Description of Work / Item(s)	No.of Qty	Unit s	Rate (Rs)	Amount (Rs)
1.00	Supply, Installation, Testing & Commissioning of Air Cooled type outdoor units of VRF system having hermetically sealed inverter scroll compressor, condenser coil fabricated from Seamless Copper tube & Plate type Al. Fins of Multi Row, Axial Flow, top discharge throw condenser fan, Condenser fan - motor unit, all system controls-safety. The system should have flexibility to handle total 280 Rmt of ref. piping. ODU shall be placed on structure with heavy duty anti vibrational pad to protect the system from any kind of unwanted vibration. The system shall have minimum COP of 3.7 at ARI condition as per CPWD guidelines. Each Outdoor units with High Pressure switch, Fan driver overload protector, Over current relay, Inverter Overload Protector & Fusible Plug. The unit shall be suitable for 415 ± 10 % volts, 50 Hz, 3 phase AC supply, and IP protection will be suitable for outdoor installation. The VRF System shall have green ref. gas only- R410A/ R407.The Indian Seasonal Energy Efficiency Ratio (ISEER) of the unit shall be as per Energy Conservation and Sustainable Building Code (ECSBC) 2024 asbelow and complete as per CPWD specification, connections, inter connections etc. as required. (For capacity <40 kWr ISEER 6.4, Capacity >40 and <70 ISEER 6.5, Capacity > 70 ISEER 6.6 for ECSBC+ Building)	63	HP		
2.00	Indoor Units Supply, Installation, Testing & Commissioning of Indoor units address setting and capacity as mentioned below. Multi speed motor, coil section with DX coil, outer cabinet, drain pan mechanism insulation, pipe connections, clamp metal, washer fixing plate, sealing pads, screws, clamps, washer for hanging bracket & insulation for fitting, fresh air intake connector for cassettes etc. of various capacities as per specifications. Power cabling (3mtr from unit) with conduit from power socket & plug top to indoor is inclusive of price.				
2.01	Hi-Wall Type Indoor Unit - Capacity - 0.8TR	2	Nos.		
2.02	Hi-Wall Type Indoor Unit - Capacity - 1.0TR	2	Nos.		
2.03	Hi-Wall Type Indoor Unit - Capacity - 1.3TR	2	Nos.		
2.04	Hi-Wall Type Indoor Unit - Capacity - 1.5TR	13	Nos.		
3.02	Hi-Wall Type Indoor Unit - Capacity - 1.7TR	9	Nos.		
2.05	Hi-Wall Type Indoor Unit - Capacity - 2.0TR	3	Nos.		
2.06	Hi-Wall Type Indoor Unit - Capacity - 2.5TR	6	Nos.		
3.00	VRF Y JOINTS FOR BRANCH DISTRIBUTION REFRIGERENT PIPE JOINTS WITH PRECAST INSULATION				
3.01	Supply, installation, testing & commissioning of Y shape Branch Distribution Joints for VRF system. ( The quantity shown here is indicative - in case the quantity requirement is differ based on the system selection for the specific product the revised quantity is required to quoted here)	33	Nos.		
4.00	REMOTE CONTROLLER				
4.01	Supply, installation, testing & commissioning of Cordless remotes for VRF indoor units	37	Nos.		
5.00	SITC of VRF Refrigerant Piping: Supply, installation, testing & commissioning of Seamless heavy gauge Copper piping of following size duly insulated with 13 mm/ 19mm thk. Nitrile Rubber Insulation covered with aluminium foil ( As per Specified with				





	K Value of 0.027-0.029 K Cal/Hr.M Deg C at 0-16 Deg C) . Refrigeration piping will have to be taken in the piping rack / Support individually connecting to all indoor units for the respective floors. Even necessary supports, fittings, valves & ref. joints where ever required will be included. The exposed refrigerent insulated piping shall be covered with UV Resistance canvass coating.				
5.01	34.93 mm O.D.(with 19 mm insulation )	90	Rmtr		
5.02	31.8 mm O.D.(with 19 mm insulation )	60	Rmtr		
5.03	28.6 mm O.D.(with 19 mm insulation )	45	Rmtr		
5.04	25.4 mm O.D..(with 19 mm insulation )	30	Rmtr		
5.05	22.2 mm O.D..(with 19 mm insulation )	30	Rmtr		
5.06	19.05 mm O.D..(with 19 mm insulation )	30	Rmtr		
5.07	15.88 mm O.D..(with 19 mm insulation )	30	Rmtr		
5.08	12.7 mm O.D..(with 19 mm insulation )	48	Rmtr		
5.09	22.2 mm O.D..(with 13 mm insulation )	30	Rmtr		
5.10	19.1 mm O.D..(with 13 mm insulation )	30	Rmtr		
5.11	15.9 mm O.D..(with 13 mm insulation )	90	Rmtr		
5.12	12.7 mm O.D.(with 13mm insulation )	48	Rmtr		
5.13	9.52 mm O.D.(with 13mm insulation )	48	Rmtr		
5.15	6.35 mm O.D.(with 13mm insulation )	36	Rmtr		
6.00	Supply, Installation and Testing of rigid PVC Drain Piping complete with fittings, supports as per specifications and duly insulated with 6 mm thick closed cell nitrile rubber insulation.				
6.01	32 mm dia	30	Rmtr		
6.02	25 mm dia	30	Rmtr		
7.00	SITC of GI perforated Cable Tray for the refrigerant pipe hanging & Covering				
7.01	300 x 50 x 2 mm	60	Rmtr		
7.02	150 x 50 x 1.6 mm	45	Rmtr		
8.00	Supply & fixing of control cum transmission wiring of Copper conductor Shielded cable along with PVC conduit / casing for looping between indoor & outdoor VRF system.				

8.01	2 C X 1.5 Sq. mm (Communication cable)	900	Rmtr		
8.02	3 C X 1.5 Sq. mm - PVC insulated & PVC sheathed cable for IDU power connection	100	Rmtr		
8.03	Supply, installation, testing & commissioning of require size copper conductor steel armoured power cable with termination to individual Outdoor units.(From Power Panel to VRF ODU)	45	Rmtr		
10.00	Civil foundation of VRF ODU	1	Lot		
11.00	Making wall opening for passage in the wall/glass for ref & drain pipes and cables and making good of the same for all the indoor/ outdoor units.	1	Lot		
12.00	Decorative Pelmet of required size for fixing of IDUs on wall with 16 mm thick anti termite laminated board.	37	Nos		
13.00	Supply, installation, testing and commissioning of Higher Efficient models of NON-INVERTER TYPE SPLIT AC, Three STAR RATING OF BEE (Bureau of Energy Efficiency) AIR CONDITIONERS of 1.5 TR capacity confirming to latest Indian Standards and suitable for operation on 230 Volts + 10 %, single Phase, 50 Hz AC supply with rotary compressor, Refrigerant and capable to perform cooling, dehumidifying, Air Circulating, auto swing with remote control with Cool/Fan/Dry/Auto mode with suitable thermostat. The unit should have LED Display. (Preferred make: Mitsubishi Electric/ Mitsubishi heavy/ O general/ Bluestar/ Voltas/ Daikin/ Hitachi/ Carrier/ LG)	12	Nos		
14.00	Comprehensive AMC of the VRF system for four years after DLP.				
14.01	Comprehensive AMC 1st Year after DLP	63	HP		
14.02	Comprehensive AMC 2nd Year after DLP	63	HP		
14.03	Comprehensive AMC 3rd Year after DLP	63	HP		
14.04	Comprehensive AMC 4th Year after DLP	63	HP		
	<b>Total price including GST@18%</b>				

