

**DELHI TECHNOLOGICAL UNIVERSITY**  
Shahbad Daulatpur, Bawana Road, Delhi-110042

**Notice Inviting e-Tender**

The Executive Engineer Delhi Technological University, Shahbad Daulatpur, Bawana Road, New Delhi-110042 **invites** on behalf of DTU online item rate tender in three bid system (Eligibility criteria, Technical bid & Financial bid) from appropriate class of CPWD/MES/BSNL/Railway registered contractor with specialization in the field of VRV/VRF Air Conditioning System having service center office in Delhi/NCR for the following work:

NIT No.

**Name of Work:** Providing VRF /VRV System in existing building of Delhi Technological University. East Delhi Campus. Vivek Vihar, Phase -2, Jhilmil Colony, Delhi.

**Estimated Cost:** Rs. **1,93,24,985/-** **Earnest Money:** - Rs. **3,86,500/-** Period of **Completion:** - **03 Months**, Last time & date of submission of bid: 15:00PM on Tender forms and other details can be obtain from the website <https://govtprocurement.delhi.gov.in>

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Note: To be Published

**Executive Engineer**

Bawana Road, DTU

# **e-NOTICE INVITING TENDER**

**Name of Work:-**Providing VRF /VRV System in existing building of Delhi Technological University. East Delhi Campus. Vivek Vihar, Phase -2, Jhilmil Colony, Delhi.

- |    |                       |   |                              |
|----|-----------------------|---|------------------------------|
| 1. | Estimated cost        | : | <b>Rs. 1,93,24,985/-</b>     |
| 2. | Earnest Money         | : | <b>Rs. 3,86,500/-</b>        |
| 3. | Security Deposit      | : | 2.5% of Gross Value the Bill |
| 4. | Performance Guarantee | : | 5% of Accepted Value Work    |
| 5. | Time Allowed          | : | 03 Months                    |

NIT approved amounting to **Rs. 1,93,24,985/-**(**One Crore Ninety Three Lakhs Twenty Four Thousand Nine Hundred Eighty Five Only**)

**Executive Engineer**  
Bawana Road, DTU

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## **INSTRUCTION TO CONTRACTOR**

The contractor submitting the tender should read the schedule of quantities, additional conditions, additional specifications, particular specifications and other terms and conditions given in the NIT and drawing. The tenderer should also read the General Conditions of Contract for CPWD Works Manual 2014 with upto date correction slips, which is available as Government of India Publications, however provisions included in the tender document shall prevail over the provisions contained in the standard form. The set of drawings and NIT shall be available with the **Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi**. The contractor should also visit the site of work and acquaint himself with the site conditions before tendering. The following conditions, which already form part of the tender conditions, are specially brought to his notice for compliance while filling the tender. They are requested to comply following instructions.

Tenders with any condition including that of conditional rebates shall be rejected forthwith.

The successful tenderer shall be required to submit a performance guarantee of 5% (Five percent) of the agreement amount within 15 days of issue of letter of acceptance. This period can be further extended by Engineer-in-Charge upto a maximum period of 7 days on the written request of the contractor.

Work Contract Tax, GSTIN etc. as applicable shall be borne by the contractor himself. The contractor shall quote his rated considering all such taxes.



**ENGINEERING CELL**  
**DELHI TECHNOLOGICAL UNIVERSITY**  
**Shahbad Daulatpur, Bawana Road, Delhi – 110042**

**INFORMATION AND INSTRUCTIONS FOR CONTRACTORS FOR e-TENDERING FORMING PART OF NIT**

The **Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi** on behalf of the DTU, invites online item rate tender in three-bid system through e-tendering from **appropriate class** of CPWD/MES/BSNL/Railway registered contractor with specialization in the field of VRV/VRF Air Conditioning System for the following work.

<b>NIT. No.</b>	<b>Name of work</b>	<b>Estimated Cost</b>	<b>Earnest money</b>	<b>Time Allowed</b>	<b>Start date &amp; time of submission of tender</b>	<b>Time and date of opening</b>	<b>Date of opening of Price Bid</b>
1.	Providing VRF /VRV System in existing building of Delhi Technological University. East Delhi Campus. Vivek Vihar, Phase - 2, Jhilmil Colony, Delhi.	<b>RS. 1,93,24,985/-</b>	<b>RS. 3,86,500/-</b>	03 Months	11.00 AM On dt. 24/02/18	3.30 PM On dt. 23/03/2018	After A/A. 23/03/2018

3. Scanned copies of all required documents viz. Demand draft /Fixed deposit receipt of a schedule bank for EMD in favour of **Registrar, DTU, New Delhi**. Should be uploaded by the contractors for Above mention work. **Original DD/PO/FDR for EMD (Bid security) as well as signed copies of uploaded documents shall be deposited in the tender box placed in Admin. Block, Engineering Cell, DTU Delhi-42** for the same before 1500 hrs. on the last day fixed for uploading of bids failing which their bids shall not be evaluated opened. Price bid shall be uploaded on the website before the last date/time for receipt of the tender. The price bid of only those tenders will be opened whose application are found in order and approved by the competent authority.

4. This tender information may also be seen at website <https://govtprocurement.delhi.gov.in>.

5. The department reserves the right to reject or accept any or all application without assigning any reasons.

**Executive Engineer**

1. The intending bidder must read the terms and conditions of CPWD-6 carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.
2. Information and Instructions for bidders posted on website shall form part of bid document.
3. The intending bidder must have valid class-III digital signature to submit the bid.
4. The bid document consisting of plans, specifications, the Schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen from website [www.tenderwizard.com/CPWD](http://www.tenderwizard.com/CPWD), [www.eprocure.gov.in](http://www.eprocure.gov.in) or [www.cpwd.gov.in](http://www.cpwd.gov.in) free of cost.
5. Those bidders not registered on the website mentioned above, are required to get registered beforehand. If needed they can be imparted training on online bidding process as per details available on the website.
6. On opening date, the bidders can login and see the bid opening process. After opening of bids he will receive the competitor bid sheets.
7. Bidder can upload documents in the form of PDF format only.
8. Bidder must ensure to quote rate of each item. The work shall be held on .....at 11:00AM in the office Executive Engineer, Delhi Technological University to clarify various provisions and techno-commercial of these bidding documents. All submissions shall be thoroughly considered and if any change(s) is/are found necessary, the same will be made in the tender documents and displayed on the e-tendering website. The decision of the competent authority shall be final and binding.

The enlistment of the bidders should be valid on the last date of submission of tenders, if applicable.

In case the last date of submission of tender is extended, the enlistment of bidder should be valid on the original date of submission of tenders, if applicable.

Earnest Money in the form of Treasury Challan or Demand Draft or Pay order or Banker's Cheque or Deposit at Call Receipt (drawn in favour of **Registrar, DTU, NEW DELHI** or Bank Guarantee of any Scheduled Bank shall be scanned and uploaded to the e-tendering website within the period of tender submission and original should be deposited in office of tender box placed in Admin. Block, Engineering Cell, DTU Delhi-42.

Interested contractor who wish to participate in the tender has also to make following payments in the form of Demand Draft/Pay order or Banker's Cheque of any Scheduled Bank and to be scanned and uploaded to the e-tendering website within the period of tender submission:

Copy of eligibility documents, registration of GST and latest return of GST etc. as required shall be scanned and uploaded on the e-tendering website within the period of tender submission. All the bid documents such as eligibility documents, Certificate of Registration for GST, and acknowledgement of up to date filed return etc. should be scanned and uploaded in complete form.

All the incomplete bids shall be summarily rejected and no clarification shall be sought thereafter. Online P.Q. bid documents submitted by intending bidders shall be opened only of those bidders, who have deposited earnest money and other documents scanned and uploaded are found in order. The online technical bid & simultaneously price bid of only those bidders shall be opened who fulfill the work eligibility criteria & technical bid.

**List of Documents to be scanned and uploaded within the period of bid submission:**

1. Copy of Demand Draft / BG/ Deposit at Call Receipt/Bank Guarantee of any Scheduled Bank against EMD.
2. Eligibility Documents as per NIT.
3. Certificates of work experience as per NIT.
4. Certificate for service centre/office in Delhi/NCR.
5. Certificate of Financial Turnover from CA.
6. Certificate of any Profit/loss from CA.
7. Bank Solvency Certificate. Valid up to 6 month from date of opening of Technical Bid
8. Certificate of Registration for GST.
9. Latest copy of GST return, duly acknowledgement.
10. The Technical Compliance data sheet of all Annexure A to F from page no 36 to 43 of this tender document shall be filled and signed by each. Participating Agency and scanned and uploaded to website for e-valuation of technical cum commercial bid.

**Item rate tenders are invited on behalf of DTU Work:** Providing VRF /VRV System in existing building of Delhi Technological University. East Delhi Campus. Vivek Vihar, Phase -2, Jhilmil Colony, Delhi., **from** Specialized agencies in the field of VRV/VRF Air Conditioning System having service centre/office in Delhi/NCR and fulfilling the following eligibility criteria:-

Experience of having successfully completed works during last seven years ending last day of the month previous to the months in which tender is invited.

One similar completed work costing not less than 80% of estimated cost with some Central/State Government Department/Central Autonomous Body/ Public Sector Undertaking

OR

Two similar completed works, each of value not less than 60% of estimated cost.

OR

Three similar completed works, each of value not less than 40% of estimated cost.

**“Similar work” shall mean work of ‘SITC of VRV / VRF Air Conditioning System’.**

**Note:- Completion/Experience certificate shall be signed not below the rank of Executive Engineer.**

- a) The value of executed works shall be brought to the 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 tenders.
- b) Should have had average annual financial turnover of **Rs. 60** lakhs during the last three consecutive financial years ending 10<sup>th</sup> Feb, 2018. (CA Certified).
- c) Should not have incurred any loss in more than two years during the last five years ending 10<sup>th</sup> Feb, 2018. (CA Certified).
- d) Should have a solvency of Rs. 26.57 lakhs. Valid up to 6 month from the date of opening technical bid.
- e) The specialized agency should have service center/office in Delhi/NCR.

The enlistment of the contractors should be valid on the last date of submission of tenders (if applicable).

In case the last date of submission of tender is extended, the enlistment of contractor should be valid on the original date of submission of tenders.

**1.1 The work is estimated to cost Rs. 1,93,24,985/-**-This estimate.

1.1.1 The authority is competent to approve NIT for the combined cost and belonging to the major discipline will consolidate NITs for calling the tenders.



For composite tender, besides indicating the combined estimated cost put to tender, should clearly indicates the estimated cost of each component separately. The eligibility of renderer will correspond to the combined estimated cost of different components put to tender.

1.2 Intending tender is eligible to submit the bid provided he has definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below:- **-N.A.-**

#### Criteria of eligibility for submission of tender documents

1. Agreement shall be drawn with the successful tender on prescribed Form No. CPWD 7/8 (or other Standard Form as mentioned) which is available as a Govt. of India Publication. Tender shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.

2. The time allowed for carrying out the work will be **03 Months** from the date of start as defined in schedule 'F' or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the tender documents.

3. The site for the work is available. ---Yes----

OR

The site for the work shall be made available in parts as specified below:--**N.A.-**

4 The tender document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents except Standard General Conditions of Contract Form can be seen from website <https://govtprocurement.delhi.gov.in> and dtu.ac.in

5. After submission of the bid the contractor can re-submit revised bid any number of times but before last time and date of submission of tender as notified.

6. While submitting the revised bid, contractor can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of tender as notified.

7. When tenders are invited in three stage system and if it is desired to submit revised financial bid then it shall be mandatory to submit revised financial bid. If not submitted then the tender submitted earlier shall become invalid.

8. This receipt shall also be uploaded to the e-tendering website by the intending bidder upto the specified bid submission date and time.

The original EMD receiving Executive Engineer shall release the EMD after verification from the e-tendering portal website ([www.tenderwizard.com](http://www.tenderwizard.com)>tender free view>advance search>awarded tenders) that the particular contractor is not L-1 tenderer and work is awarded. A part of earnest money is acceptable in the form of bank guarantee also. Online bid documents submitted by intending bidders shall be opened only of those bidders, whose

original EMD deposited with DTU and other documents scanned and uploaded are found in order. The bid submitted shall be opened at **03:00 PM**

9. The contractor whose tender is accepted will be required to furnish performance guarantee of 5% (Five Percent) of the tendered amount within the period specified in Schedule F. This guarantee shall be in the form of cash (in case guarantee amount is less than Rs. 10000/-) or Deposit at Call receipt of any scheduled bank/Banker's cheque of any scheduled bank/Demand Draft of any scheduled bank/Pay order of any Scheduled Bank of any scheduled bank (in case guarantee amount is less than Rs. 1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form. The earnest money deposited alongwith bid shall be returned after receiving the aforesaid performance guarantee. 2.5% of performance guarantee shall be retained as security deposit.

**The contractor whose bid is accepted will also be required to furnish either copy of applicable licenses/registrations or proof of applying for obtaining labour licenses, registration with EPFO, ESIC and BOCW Welfare Board and Programme chart (Time and Progress) within the period specified in schedule F.**

10. Tenders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders, the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. A tender shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The tender shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tender implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

11. The competent authority on behalf of the DTU does not bind itself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the tenders received without the assignment of any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tender shall be summarily rejected.

12. Canvassing whether directly or indirectly, in connection with tender is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.

13. The competent authority on behalf of DTU reserves to himself the right of accepting the whole or any part of the tender and the tender shall be bound to perform the same at the rate quoted.

14. The contractor shall not be permitted to tender for works in the CPWD Circle (Division in case of contractors of Horticulture/Nursery category) responsible for award and execution of contracts, in which his near relative is posted a Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior

Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazette officer in the Central Public Works Department or in the Ministry of Urban Development. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department.

15. No Engineer of gazette rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the previous permission of the Government of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractor's service.

16. The tender for the works shall remain open for acceptance for a period of **Ninety (90) days** from the date of opening of tenders/ **Ninety days** from the date of opening of financial bid in case tenders are invited on 2/2 bid system (**strike out as the case may be**) if any tender withdraws his bid before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the tender shall not be allowed to participate in the retendering process of the work.

17. This notice inviting Tender shall form a part of the contract document. The successful tender/contractor, on acceptance of his tender by the Accepting Authority shall within 15 days from the stipulated date of start of the work, sign the contract consisting of:-

a) The Notice Inviting Tender, all the documents including additional conditions, specifications and drawings, if any, forming part of the tender as uploaded at the time of invitation of tender and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto.

b) Standard C.P.W.D. Form 7/8 or other Standard C.P.W.D. Form as mentioned

#### **18. For Composite Tenders**

18.1.1 The Executive Engineer in charge of the major component will call tenders for the composite work. The cost of tender document and Earnest Money will be fixed with respect to the combined estimated cost put to tender for the composite tender.

18.1.2 The tender document will include following three components: Part A:- CPWD-6, CPWD 7/8 including schedule A to F for the major component of the work, Standard General Conditions of Contract for CPWD 2010 or latest edition as applicable with all amendments/modifications. Part B:- General / specific conditions, specifications and schedule of quantities applicable to major component of the work. Part C:- Schedule A to F for minor component of the work. (EE in charge of major component shall also be competent authority under clause 2 and clause 5 as mentioned in schedule A to F for major components) General/specific conditions, specifications and schedule of quantities applicable to minor component(s) of the work.

18.1.3 The tender must associate with himself, agencies of the appropriate class eligible to tender for each of the minor component individually.

18.1.4 The eligible tender shall quote rates for all items of major component as well as for all items of minor components of work.

18.1.5 After acceptance of the tender by competent authority, the EE in charge of major component of the work shall issue letter of award on behalf of the D. After the work is awarded, the main contractor will have to enter into one agreement with EE in charge of major component and has also to sign two or more copies of agreement depending upon number of EE's/DDH in charge of minor components. One such signed set of agreement shall be handed over to EE/DDH in charge of minor component. EE of major component will operate part A and part B of the agreement. EE/DDH in charge of minor component(s) shall operate Part C along with Part A of the agreement.

18.1.6 Entire work under the scope of composite tender including major and all minor components shall be executed under one agreement.

18.1.7 Security Deposit will be worked out separately for each component corresponding to the estimated cost of the respective component of works. The Earnest Money will become part of the security deposit of the major components of work.

18.1.8 The main contractor has to associate agency(s) for minor component(s) conforming to eligibility criteria as defined in the tender document and has to submit detail of such agency(s) to Engineer-in-charge of minor component(s) within prescribed time. Name of the agency(s) to be associated shall be approved by Engineer-in-charge of minor component(s).

18.1.9 In case the main contractor intends to change any of the above agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge of minor component. The new agency/agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

18.1.10 The main contractor has to enter into agreement with contractor(s) associated by him for execution of minor component(s). Copy of such agreement shall be submitted to EE/DDH in charge of each minor component as well as to EE in charge of major component. In case of change of associate contractor, the main contractor has to enter into agreement with the new contractor associated by him.

18.1.11 Running payment for the major component shall be made by EE of major discipline to the main contractor. Running payment for minor components shall be made by the Engineer-in-charge of the discipline of minor component directly to the main contractor.

18.1.12 Final bill of whole work shall be finalized and paid by the EE of major component. Engineer(s) in charge of minor component(s) will prepare and pass the final bill for their component of work and pass on the same to the EE of major component for including in the final bill for composite contract.

19. In case any discrepancy is noticed between the documents as uploaded at the time of submission of the bid online and hard copies as submitted physically in the office of Executive Engineer, then the bid submitted shall become invalid and the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the tender shall not be allowed to participate in the retendering process of the work.

# **PART-I**

# **TECHNICAL BID**

**GOVERNMENT OF DELHI  
DELHI TECHNOLOGICAL UNIVERSITY**

STATE : DELHI BRANCH : E&M  
DIVISION : PRJOJECT OFFICE

*Item Rate Tender & Contract for Works*

(A) **Name work of:-**Providing VRF /VRV System in existing building of Delhi Technological University. East Delhi Campus. Vivek Vihar, Phase -2, Jhilmil Colony, Delhi.

(i) To be submitted Online by 3:00 PM hours on .....(Date)Executive Engineer, Bawana Road, DTU Campus, Delhi – 110042

(ii) To be opened, online, in presence of tenderers who may be present at **3:30 PM** hours on.....in the office of **Executive Engineer Bawana Road, DTU Campus, Delhi – 110042**

Issued to: \_\_\_\_\_(contractor)

Signature of officer issuing the documents \_\_\_\_\_  
Designation **Executive Engineer Bawana Road, DTU Campus, Delhi – 110042**

Date of Issue:

**TENDER**

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

I/We hereby tender for the execution of the work specified for the DTU within the time specified in Schedule 'F', Viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule –I of General

Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for by, and in respects in accordance with, such conditions so far as applicable.

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

A sum of **Rs. 3,86,500/-** has been deposited in cash / receipt treasury challan/deposit at call receipt of schedule bank/demand draft of a schedule bank as earnest money. If I/We,

fail to furnish the prescribed performance guarantee within prescribed period. Further, if I/we fail to commence work specified I/We agree that DTU or his successors in office shall without prejudice to any other right or remedy 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 and to carry out such deviation as may be ordered, upto maximum of the percentage mentioned in Schedule 'F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2, 12.3 and 12.5 of the tender form.

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 are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

I/We agree that should I/We fail to commence the work specified in the above memorandum, an amount equal to the amount of the earnest money and performance guarantee mentioned in the form of invitation of tender and performance guarantee shall be absolutely forfeited to the DTU and the same may at the option of the competent authority on behalf of the DTU be recovered without prejudice to any other right or remedy available in law out of the deposit in so far as the same may extend in terms of the said bond and in the event of deficiency out of any other money due to me/us under this contract or otherwise.

Dated:-

Signature of contractor  
Postal Address

Witness:-

Address:-

Occupation:-

### **ACCEPTANCE**

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the DTU for a sum of Rs. \_\_\_\_\_(Rupees\_\_\_\_\_).

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

- i)
- ii)
- iii)

**For & on behalf of DTU**

Signature \_\_\_\_\_

Dated\_\_\_\_\_

Designation \_\_\_\_\_

## SCHEDULES

### SCHEDULE 'A'

Schedule of quantities (Enclosed) As per schedule attached

### SCHEDULE 'B'

Schedule of materials to be issued to the contractor.

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

### SCHEDULE 'C'

Tools and plants to be hired to the contractor

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

### SCHEDULE 'D'

Extra schedule for specific requirements/document for the work, if any.

**-Additional Conditions**

**Attached**



## **SCHEDULE 'E'**

Schedule of component of Cement, Steel, other Materials, Labour etc. for price escalation.

–

N.A.-

## **CLAUSE 10 CC**

**-- N.A. --**

## **SCHEDULE 'F'**

Reference to General Conditions of contract

Name of work :-Providing VRF /VRV System in existing building of Delhi Technological University. East Delhi Campus. Vivek Vihar, Phase -2, Jhilmil Colony, Delhi.

Estimated cost of work :-**Rs. 1,93,24,985**

Earnest money :-**Rs. 3,86,500/-**

Performance Guarantee :- 5% of accepted Value Work

Security Deposit :- 2.5% of gross Value Work

### **General Rules & Directions:**

Officer inviting tender **Executive Engineer,  
Delhi Technological University,  
Bawana Road, Delhi-110042**

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 &12.3. **See below**

### **Definitions: -**

2 Engineer-in-charge **Executive Engineer,  
Delhi Technological University,  
Bawana Road, Delhi-110042**

2Accepting Authority **Vice chancellor, DTU**  
2(x) Percentage on cost of materials and labour to cover all overheads and profits 15%

2Standard schedule of Rates **-- Market Rate/DSR-2016 –**

2(xii) Department **Delhi Technological University.**

2(xiii) Standard CPWD contract Form CPWD Form 8 as modified & corrected upto date

**Clause 1**

- i) Time allowed for submission of performance guarantee from the date of issue of letter of acceptance, in days- 07 Days
- ii) Maximum allowable extension beyond the period provided in (i) above in days - 04 Days

**Clause 2**

Authority for fixing **Vice Chancellor**

Compensation under clause 2 DTU

Clause 2A

Whether Clause 2A shall be Applicable **Not applicable**

**Clause 5**

Number of days from the date of issue of letter of acceptance for reckoning date of start **07 days/ actual date of start of work, whichever is earlier.**

Mile stone(s) as per table given below:-

**Table of Mile Stone(s)**

<b>Sl. No.</b>	<b>Description of Milestone (Physical)</b>	<b>Time allowed in days (from date of start)</b>	<b>Amount to be with-held in case of non achievement of milestone</b>
1			
2			
3			
4		As per Appendix A	
5			

Time allowed for execution of work **03 (Three Months)**

**Clause 6, 6A**

**Clause applicable – (6 or 6A) 6A**

Clause 7

Gross work to be done together with net payment/ adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment.

10 Lakh

**Clause 7A** - Labour licenses and registration of contractor with EPFO ESIC and BOCW Welfare Board for the particular work.(Applicable)

**Clause 10A.**

List of testing equipment to be provided by the contractor at site lab

.....N.A.....  
.....

Clause 10B (ii).

Whether clause 10B (ii) shall be applicable

..... No.....

Clause 10C –Component of Labour expressed as percent of value of work.

Clause 10CA. – N.A.

Materials Covered under this clause  
India

Nearest Material for which All

Wholesale price Index is to be followed.

1. ....
2. ....
3. ....

.....  
..... N.A. ....  
.....

**Clause 10CC**

Clause 10 CC to be applicable in contracts with stipulated Period of completion exceeding the period shown in next column ..... Months

-- N.A. --

**Clause 11**

Specifications to be followed for execution of work **As per CPWD Specification electrical part-I 2013 & External Part-II 1994 & HVAC 2017 amended up to date**

**Clause 12**

Deviation limit beyond which clauses 12.2 & 12.3 shall apply for maint. work. ....  
.....30%.....

**Clause 16**

competent Authority for deciding reduced rates

**Vice Chancellor  
Bawana Road, DTU**

**Clause 18**

List of mandatory machines, tools and plants to be deployed by the contractor at site.

1. As per site requirement and as per direction of Engineer-in-Charge.

**Clause 19 :-**

The contractor shall obtain a valid license under the contract labour (R&A) Act, 1970 ; and the contract labour (Regulation & Abolition) Central Rules, 1971 before the Commencement of the work & continue to have a valid license until the completion of the work provisions of the inter-state Migrant Workman (Regulation of Employment and Condition of Service) Act, 1979.

**Clause 19 L:-**

The E.S.I. and E.P.F. Contribution on the part of employer in respect of this contract shall be paid by the contractor. These contributions on the part of employer paid by the contractor shall be reimbursed by the Engineer-in-Charge to the contractor on actual basis. The applicable & eligible amount of E.P.F. and E.S.I. shall be reimbursed preferably within 07 days but not later than 30 days of submission of documentary proof of payment provided the same are in order.

**Clause 25:** Constitution of Dispute Redressal Committee (DRC) as decided by VC, DTU

**Clause 36:**

<b>So No.</b>	<b>Minimum Qualification of Technical Representative</b>	<b>Discipline</b>	<b>Designation (Principal Technical Representative)</b>	<b>Minimum Experience</b>	<b>Numbers</b>	<b>Rate at Which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36 (i).</b>
1	Graduate Engineer	Electrical/ Mechanical	Principal Technical Representative	2 Years	1 No.	Rs. 15,000 P.M. (Fifteen Thousand)

**RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION**

<b>S.No</b>	<b>Description of Item</b>	<b>Rates in figures and words at which recovery shall be made from the Contractor</b>
NIL		

## **COMMERCIAL AND ADDITIONAL CONDITIONS**

### **1.0 General**

- 1.1 The work is of extremely urgent and important nature and is required to be completed on priority within the target date, in co-ordination with other agencies.
- 1.2 The firm is required to deliver all the major component of Inverter Based DC Twin rotary Scroll based VRF AC system as per milestone given in tender.
- 1.3 This Specification covers manufacturing, testing as may be necessary before dispatch, delivery at site, all preparatory work, assembly and installation, commissioning putting into operation of Inverter Based DC Twin rotary / Scroll based VRF AC system.
- 1.4 The indoor units, outdoor units and major components to be installed shall be got approved by the Engineer-in-charge or his representative before installation.
- 1.5 The contractor should have executed work on at least one heritage building of Grade-I category or 2 heritage buildings of Grade-II category.

### **2.0 Location**

2.1 The Inverter Based VRF based AC system will be installed at **Delhi Technological University. East Delhi Campus. Vivek Vihar, Phase -2, Jhilmil Colony, Delhi-110095.**

2.2 The work shall be executed as per CPWD General Specifications for HVAC works (Other than VRF units) amended upto date & as per relevant IS and as per directions of Engineer-in-charge.

These additional specifications are to be read in conjunction with above and in case of variations, specifications given in this Additional conditions shall apply. However, nothing extra shall be paid on account of these additional specifications & conditions as the same are to be read alongwith schedule of quantities for work.

2.3 The tenderer should in his own interest visit the site and familiarizes himself with the site conditions before tendering

2.4 No T&P shall be issued by the department and nothing extra shall be paid on account of this.

### **3.0 Commercial Conditions**

#### **3.1 Type of Contract**

The work to be awarded by this tender shall be treated as indivisible works contract.

3.1.1 The tenderers are advised not to deviate from the technical specifications items, commercial terms and conditions of NIT like terms of payment, guarantee, arbitration clause, escalation etc.

3.1.2 The department reserves the right to reject any of all the price bids and call for fresh prices/tenders as the case may be without assigning any reason.

### **4.0 WORK TO BE ARRANGED BY THE DEPARTMENT**

Unless and otherwise specified in the tender documents, the following works shall be arranged by the department

4.1 Whatever space available at site for accommodating all the equipments and components involved in the work, but watch & ward will be done by the firm till final handover to the department

4.2 Power supply, Water supply and drain points at existing point at one point only free of charges.

## **5 .0 WORKS TO BE DONE BY THE CONTRACTOR**

5.1 Unless and otherwise mentioned in the tender documents, the following works shall be done the contractor and therefore, their cost shall be deemed to be included in their tendered cost. Foundations for equipments i/c foundation bolts, channel, base frame, scaffolding for fixing of pipes and vibration isolation spring/ pads.

5.2 Excavation and refilling of trenches in soil wherever the pipes are to be laid directly in ground including necessary base treatment and supports.

5.3 Sealing of all floor slab/wall openings provided by the department or contractor for pipes and cables from fire safety points of view after laying of the same.

5.4 Painting of all exposed metal surfaces of equipments and components with appropriate colour etc. as required to the satisfaction of Engineer-in-charge.

5.5 Making good all damages caused to the structure during installation and restoring the same to their original finish.

5.6 Masonary ducts within and outside the building for laying of pipes, cable & ducts as per relevant item

## **6.0 SECURITY DEPOSIT SECURITY**

6.1 Deposit shall be deducted from each running bill and the final bill to the extent of 2.5% of the gross amount payable in each running bill, subject to maximum limit of 2.5% of the tendered value of work.

## **7 .0 PRICE**

7.1 The prices to be quoted by the intending tender shall include the supply and installation at the site of all equipment ancillary material and other items. Whatever required for carrying out the job to fulfill the intent and purpose as laid down in the specifications or in the drawings. The tenderer's price shall be deemed to include all nuts, bolts, shims, clamps, supports etc. as required for proper fixing and or grouting of equipment, ancillary items etc. whether specifically mentioned or not. The contractor shall also include in this price all taxes, duties or other levels, (viz GST, customs duty. octroi etc.) which are legally livable. Failure to include allivable taxes and duties will not entitle the contractor to any extra claims from the department.

The contractor's rates shall remain firm and fixed during the currency of the contract.

## **8.0 REJECTION OF DEFECTIVE PLANT**

8.1 If on test any portion of the plant equipment or components are found to be defective or not fulfilling the intent or the meaning of the specification. The same shall be replaced or repaired of the entire satisfaction of the Engineer-in-charge.

8.2 In case the contractor fails to remove the defects, within a specified period considered reasonable by the Engineer-in-charge. The department reserves the right to take necessary remedial measures through other agencies and all expenses thus incurred would be recovered from the contractor.

## **9.0 COMPLETENESS OF THE TENDER, SUBMISSION OF PROGRAMME, APPROVED DRAWINGS AND COMMENCEMENT OF WORK.**

9.1 Completeness of the tender

All sundry equipments, fittings, assemblies, accessories, hardware items, foundation bolts, supports, termination lugs for electrical connection, cable glands, junction boxes and all other items which are useful and necessary for proper assembly and efficient working of the various equipments and components of the work shall be deemed to have been included

in the tender irrespective of the fact whether such items are specifically mentioned in the tender or not.

9.2 Submission of programme within 3 days from the date of award, the successful tenderer shall submit his programme for submission of drawings, supply of equipment, installation, testing, commissioning and handing over of the installation.

9.3 Submission of Drawings

The contractor shall submit the shop drawing for approval before start of work as per Appendix-A

9.4 Commencement of work

The contractor shall immediately commence work as soon as the drawings submitted by him are approved.

## **10.0 CO-ORDINATION WITH OTHER AGENCIES**

The contractor shall co-ordinate with other agencies involved in the work so that the work of other agencies is not hampered due to delay in his work.

## **11.0 QUALITY OF MATERIALS AND WORKMANSHIP**

11.1 The components of the installation shall be of such design so as to satisfactorily function under all conditions of operation in Delhi

11.1 The entire work of manufacture/ fabrication, assembly and installation' shall conform to sound Engineering practice. The entire installation shall be such as to cause minimum transmission of noise and vibration to the building structure.

## **12.0 CARE OF BUILDINGS**

Care shall be taken by the contractor during execution of the work to avoid damage to the building. He shall be responsible for repairing all such damages and restoring the same at his cost. He shall also remove all unwanted and waste materials arising out of the installation from the site of work from time to time.

## **13.0 INSPECTION AND TESTING**

13.1 All major equipments i.e. outdoor & indoor units of Inverter based VRF system shall be offered for initial inspection at manufacturers works. The contractor will intimate the date of testing of equipments at the manufacturers, works before dispatch. The successful tenderer shall give sufficient advance notice of minimum two weeks regarding the dates proposed for such tests to the department's representative to facilitate his presence during testing. The Engineer-in-charge at his discretion may witness such testing. The cost of the Engineer's visit to the factory will be borne by the Department. Equipments will be inspected at the manufacturer/Authorized Dealers premises, before dispatch to the site by the contractor if so desired by the Engineer-in-charge.

13.2 Copies of all documents of routine and type test certificates of the equipment, carried out at the manufacturers premises & bill of landings if material/equipment is imported, shall be furnished to the Engineer-in-charge and consignee.

13.3 After completion of the work in all respect the contractor shall offer the installation for testing and operation.

## **14.0 PAYMENT TERMS**

The following percentage of contract rates shall be payable against the stages of work shown herein



Stage of work -	%age of rates
14.1 On Pro-rata supply of item received at site in good condition.	70%
14.2 On completion of pro rata installation	10%
14.3 On commissioning and completion of successful trial run	10%
14.4 On completion of first major seasonal test/ monsoon test	10%

### **15.0 COMPLETION DRAWINGS**

Three sets of the following laminated drawings shall be submitted by the contractor while handing over the installation to the Department-

15.1 AC system drawings giving complete details of all the equipments, including their foundation.

15.2 Line diagram and layout of all electrical control panels giving switchgear ratings and their disposition cable feeder sizes and their layout.

15.3 Control wiring drawings with all control components and sequence of operations to explain the operation of control circuits.

15.4 Plumbing layout drawings giving sizes and lengths of all the pipes and the sizes and location of all the types of valves, and including isometric drawings for the entire piping including the pipe connection to the various equipments and insulation details wherever required.

### **16.0 AFTER SUPPLY SERVICES.**

The Firm shall ensure adequate and prompt after supply service in the form of maintenance, spares and personnel are available at site of work during the one year guarantee period to minimize the breakdown period. The firm shall also ensure that in the event of any breakdown of AC system, that area is made operational within 24 hrs. otherwise a penalty as deemed reasonable by Engineer-in-charge shall be recovered from the firm.

### **17.0 STORAGE AND CUSTODY OF MATERIALS:**

Whatever space available at site for storage of sundry materials and erection equipments will be made available otherwise the agency has to make his own arrangement. No separate storage accommodation shall be provided by the department. Watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the final taking over of the installation by the department.

### **18.0 COMPLETION OF PERIOD.**

The completion period of 3(Three) months indicated in the tender documents is for the entire work of planning, designing, supplying, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge.

### **19.0 PERFORMANCE GUARANTEE**

19.1 The tender shall guarantee among other things, the following:

- a) Quality, strength and performance of the materials used.
- b) Safe mechanical and electrical stress tm all parts under all specified conditions of operation.
- c) Satisfactory operation during the maintenance period.

19.2 The successful tenderer shall submit an irrevocable performance guarantee of 5% of the tendered amount in addition to other deposits mentioned elsewhere in the contract for his proper performance of the contract agreement within 07 days of issue of letter of intent. This guarantee shall be in the form of government securities or fixed deposit receipts or

guarantee bonds of any scheduled bank or the State bank of India in the specified format. The performance guarantee shall be initially valid upto the stipulated date of completion plus 90 days beyond. The bank guarantee kept valid till the recording of completion certificate for the work by the competent authority.

#### **20.0 POWER SUPPLY**

Electric service connection of 415 V, 3 phase, 4 wire, 50 Hz, AC supply shall be provided by the department for installation purpose free of charge.

#### **21.0 WATER SUPPLY**

Water supply shall be made available by the department at one point free of charge.

#### **22.0 INSURANCE AND STORAGE**

All consignments are to be duly insured upto the destination from warehouse to works at the cost of the supplier. The insurance covers shall be valid till the equipment is handed over duly installed, tested and commissioned.

#### **23.0 PAINTING**

This shall include cost of painting of entire exposed iron work complete in the installation. All equipments works shall be painted at the works before dispatch to the site.

#### **24.0 GUARANTEE**

24.1 The contractor shall guarantee that all the material, machinery and components supplied fabricated designed and installed by him shall be free from defects due to faulty design material and/ or workmanship, that the plant shall perform satisfactorily and the efficiency of the system and all the components shall not be less than the values laid down in the specifications and the capacities shall be atleast equal to those specified.

24.2 The period of the guarantee shall be 12(twelve) months from the date of commissioning & handing over of complete system whichever Later. During which period if any or all components found to be defective shall be replaced or repaired free of charge and any short comings found in the system as specified shall be removed at no extra cost. The contractor shall provide the necessary personnel and tools for fulfilling the above guarantee.

24.3 If the defects are not removed within a reasonable time the department may arrange to do so at the contractor's risk and cost, without prejudice to any other rights.

#### **25.0 DOCUMENT TO BE FURNISHED ON COMPLETION OF INSTALLATION**

Three sets of the following shall be furnished to the department by the contractor on completion of

- a) Completion drawings
- b) 3 sets of manufacturer's technical catalogues of all equipment's and accessories.
- c) Operation and maintenance manual of all major equipments detailing all adjustment, operation and maintenance procedure.
- d) A proper training and regular checking from the VRF/VRV manufacturers representative should be there in order to ensure smooth commissioning and functioning of the system.

#### **26.0 PROJECT SCHEDULE FOR TIMELY COMPLETION**

The contractor shall provide complete project schedule in terms of dispatch of material to supply of material at site. Man management schedule and also the schedule for the progressive completion of the project. This Project Planning sheet has to be submitted within 15 days from the date of issue of purchase order. (As per Appendix -A)

## **27.0 COMPENSATION FOR DELAY OF WORK**

Any delay of the work with respect to the approved schedule of project planning sheet shall be penalized. The project completion date shall be provided by DTU once the project is awarded. In case of any delay which is not in the scope of contractor an approval letter has to be sanctioned by DTU. Details Milestones to be achieved & amounts to be withheld for not meeting milestones: Total completion of the project:- 3 months.

Appendix-A

<b>Sr.No.</b>	<b>Description of Milestone</b>	<b>Time Allowed in Days</b>	<b>Amount to be withheld in case of achievement of milestone</b>
	Scheduling of the entire project should be submitted including the material flow chart, cash flow chart, Work progress bar chart, should be submitted along after award of LOI on an immediate basis.		
1	Preparation design and fabrication of drawing.	8th Day	0.5% of the tendered value
2	Submission of final workshop drawings	10th day	0.5 % of the tendered
3	Initiation of Supply refrigerant piping and 1 % of the tendered drain piping and cabling.	15th day	1 % of the Tendered value
4	Initiation of Installation of refrigerant piping, drain piping and cabling, ducting.	30th day	1 % of the Tendered Value
5	Initiation of Supply of VRF & VRV Equipments at site	45th day	1.5 % of the tendered Value
6	Initiation of Installation of VRF and equipment	60th day	1.5 % of the tendered Value
7	Initiation of Pre Commissioning of Entire system	70th day	1.5 % of the tendered Value
8	Final commissioning	90th day	2.5 % of the tendered Value

1. Time allowed for the final supply and execution of the entire project will be 3 months.
2. Milestones are indicative and should be achieved within the timeframe shown above.

**28. GENERAL**

DTU will not be responsible for any accident to the staff by any reasons whatsoever. The contractor will ensure that the staff employed by him on site is duly insured for liability in case of any accident, strikes, riots, civil commotion, etc. DTU will not be liable for any damage caused due to any reasons.

## **TECHNICAL SPECIFICATION**

1. The scope of this tender comprises the design, supply erection, testing and commissioning of inverter technology based / Scroll Type VRF type system of air conditioning conforming to these specification/ Explanatory Note and in accordance with the requirements of Drawing and Schedule of Quantities. The prices quoted shall include all the equipment ancillary material as specified and all such items whatsoever and which may be required to fulfill the intent and purpose as laid down in the specification and the approved drawings. The contractor shall calculate equipment capacity based upon design parameters specified for the system design & verify all the quantities and sizes of refrigerant pipe, fitting, cables, control cable, pipes, insulation, indoor units, and outdoor units etc. before installation to avoid any shortfall or surplus. The tenderer shall also include all necessary civil work and MS framework for installation of outdoor and indoor units in VRF based air condition system. The cost quoted by tenderer shall also include the refrigerant gas R-410A & its charging for proper & specified functioning of air conditioning system. The scope of work of the contractor also includes –

- a) Cutting of walls and floors/ceiling.
- b) Making holes.
- c) Sleeves.
- d) Foundations

Civil work & MS frame work for indoor and outdoor units related to VRF equipments, all cuttings should be properly finished as existing surrounding. The installation of outdoor unit on the terrace of the building should be checked up structurally & their mounting should be structurally safe for the outdoor unit to ensure in such a way that after installation operation of equipment is safe & satisfactory & no damage to the building structure takes place.

2. The scope in the tender schedule also includes detailed designing of complete air-conditioning system based on inverter technology base Scroll VRF air conditioner with air cooled outdoor units system capable of cooling and heating (reverse cycle) as per individual or season requirement suitable for operation on 415 V, 3 Phase, 50 Hz AC electric supply. The outdoor units shall have both cooling & heat pump mode, consisting of one/ multiple outdoor unit with single circuit of refrigerant piping and multiple indoor units of various types. Each indoor unit should have capability to cool or heat as per seasonal weather changes. This shall also include complete capacity calculation for indoor and outdoor units complete with CAD drawing, designing & layout of following.

- I. Outdoor units.
- II. Indoor units.
- III. Refrigerant piping
- IV. Condensate water piping & disposal.

V. Power & Control Cables between Outdoor units & Indoor units.

While designing the system care should be taken to select outdoor units of suitable capacity based on design data provided below & to economize on available floor area for installation of outdoor units as well as optimum utilization of outdoor units. The indoor units should be designed based upon the heat load calculations for individual rooms/ areas to be air-conditioned and over capacities should be avoided. The design should also specifically take care of disposal of condensate drain water so that there is no leakage of condensate water

inside the room as well in the route of condensate water pipe line. The layout of refrigerant piping is to be designed in such a way so that it should not disturb the aesthetic of the building/ room, inadvertent damage in the route of pipe should not occur in future & optimum length of pipe line for efficient air conditioning. After completion of the work four sets of 'as erected/ commissioned drawing' of activities listed above shall be submitted.

#### Design Data

The work of air- conditioning outdoor and indoor units as specified in schedule of work is required to be carried out at DTU East. It is an old building especially not designed to suit central air-conditioning. There may be certain parameter like inadequate heat insulation of the building, air leakage from doors, windows or other outlets such as staircases, corridor, ventilators, shaft & including no under deck insulation of top floor of the building. Therefore the specified design parameters are only tentative in nature however, all efforts shall be made to achieve the following specified design parameters and if at any design stage need for higher capacity outdoor HP is required, necessary approval shall be accorded based on design analysis and discussions on the subject. In case of any deviation from the parameters specified below, the technical issues involved shall be brought to the notice of Engineer- in-charge for seeking necessary approvals to achieve these parameters. Engineer-incharge, however, reserves the right to permit any deviations from the parameters as specified.

#### **Outside conditions-**

Summer	: 43.3°c DB; 23.9°c WB
Monsoon	: 35.0° CDB' 28.3°c WB
Winter	: 7.2°c DB' 5.0°c WB

#### Inside conditions (Desired)-

Summer	: 23.8°C± 1°C
Monsoon	: RH not exceeding 65%
Winter	: 21°C ±,loC

Note: 1 HP unit = 0.8 TR (Approximately)

3. The tenderer shall quote only makes for which he has satisfactorily executed the job and shall also furnish certificate to the effect that the such equipment has performed satisfactorily under Indian weather conditions at least for a period of one year from its commissioning. The performance certificate from the end user shall also be enclosed with the tender documents. The firm should comply with the parameters as specified in the terms & conditions.

4. The project of air-conditioning DTU East is required to be executed in time 1 bound and professional manner. The equipments involved in air-conditioning are complex in nature comprising of instrumentation and control. The job, therefore calls for highest order of technical expertise and also requirement of experience of air-conditioning installation with proven performance. The tenderer, shall, therefore obtain, before quoting/ the consent of OEM and furnish the same along with the bid document. This consent shall also covers aspects of desired assistance in the field of design, development, testing, execution, completion & maintenance/ maintenance spares of the air-conditioning system.

5. Notwithstanding the technical details as specified in the tender, the manufacturers may offer/ indicate systems and necessary design & features applicable for the offered products at the tendering stage.

6. Only one make and model should be freeze by the bidder. Final make and model No. (Indoor units and outdoor units) is to be confirmed from all the bidder as per technical sheet.

## 7. OUTDOOR UNIT

i. The outdoor unit shall be factory assembled, weatherproof casing (Material of construction of casing shall be vendor's standard design), constructed from heavy gauge GI sheets steel panels and coated with baked enamel finish. The outdoor unit shall be completely factory wired, tested with all necessary controls & filled with first charge of refrigerant before delivering at site.

ii. The inverter technology based Scroll type VRF equipment should be capable so that refrigerant piping between indoor units and outdoor unit shall be extendable up to 165m of equivalent length with maximum height difference between outdoor & indoor unit of 10m & level difference between two indoor units shall be maximum up to 5m. All the outdoor units comprising of multiple modules should have at least one inverter type compressor in each module.

iii. Selected modules should have COP 3.3 to 3.5 at 100% load (Cooling mod) at AHRI conditions and each module should have at least one inverter compressor/unit.

iv. The COP for the same may be furnished as per attached annexure A enclosed proforma & necessary price loading shall be made to decide the lowest tender & technical data as per annexure B.

v. All the details pertaining to power consumption as per ARI standards should be duly filled and furnished as per the sheet enclosed.

vi. The above COP values as indicated are required to be furnished in Original by the tenderer directly from the original equipment Manufacturer (OEM) with OEM' seal and signature on all documents.

vii. The outdoor unit shall be factory tested and filled with first charge of refrigerant R-410A before delivering at site.

viii. It should also be provided with duty cycling for D.C inverter Twin Rotary/ Scroll compressors (100% Invertors) capable of changing the 'rotating speed of compressor by inverter controller to follow variation in cooling & heating loads & switching starting sequence for better stability and prolonging equipment life or similar features if available in D.C Twin Rotary / Scroll will also be accepted.

ix. The unit shall be provided with its own microprocessor control panel with provision for integration with the building management system for Air-conditioning system.

x. The machine must have a sub cool feature to use coil surface more effectively through proper circuit bridge so that it prevents the flushing of refrigerant from long piping due to this effect thereby achieving energy savings.

xi. The outdoor unit should 'be fitted with low noise level and should not be more than 67 db (A) at normal cooling operation when measured at 1.5m distance from ground level.

xii. The outdoor unit should be fitted with low noise aero spiral design fan with aero fitting grill for spiral discharge airflow to reduce pressure loss and should be fixed with DC/AC fan motor for better efficiency.

xiii. In case of trouble occurs in an indoor unit(s), the continuous operation of system should be possible.

- xiv. The outdoor unit shall be designed in such a way that cleaning of drain Pan should be easy & inspection/ replacement of compressor should be easy.
- xv. The condensing unit shall be designed to operate safely when connected to multiple fan coil units.
- xvi. Mounting with duly finish free of cost on 50x50x6mm thick angle iron.
- xvii. Evaporative temperature control function of outdoor units is As per BOQ.

### **7.1 Compressor**

- i. The compressor is 100% inverter based D.C Twin Rotary/ Scroll System shall be highly efficient. The system should response efficiently in accordance to the variation in cooling or heating load requirement.
- ii. All outdoor units shall have multiple steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed.
- iii. Oil heaters shall be provided in the compressor casing or as per manufacturer standard equipments.

### **7.2 Oil Recovery system**

Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths.

The system must be provided with oil balancing circuit to avoid poor lubrication.

### **7.3 Refrigerant Circuit**

The refrigerant circuit shall include liquid and gas shut-off valves and a solenoid valves at condenser end. The equipment must have inbuilt refrigerant stabilization control for proper refrigerant distribution.

All necessary safety devices shall be provided to ensure the safe operation of the system.

### **7.4 Heat Exchanger**

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminium fins to form a cross fin coil. The aluminium fins shall be covered by anti-corrosion resin film.

The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

### **7.5 Safety Devices**

All necessary safety devices shall be provided to ensure safe operation of the system. Whatever safety devices are required shall be part of outdoor unit:- high pressure switch, fuse, fan drive overload protector, fusible plug, crankcase heater, over load relay, overload protection for nverter based technology & digital based technology.

7.6 The outdoor roof mounted units shall be provided in such a fashion that these do not affect the overall aesthetics and ambience of the building. If required these units shall be suitably amouflaged to give good aesthetic look. These provisions, however, shall be discussed, if required, at a later date and the prices for the same shall be worked out separately as extra tern.

7.7 Noise levels for outdoor units shall not be more than 67 db(measured at a point 1 meter in front of the unit at a height of 1.5 meters).



## 8.0 INDOOR UNITS

All indoor units as specified shall have, in general, noise levels less than 46 db. For critical applications noise levels below these limits may, however, be specified during design stage & shall be selected based on tonnage however CFM should be as per standard manufacturers practice in co-relation with tonnage.

### High Wall Indoor Type Unit

The unit shall be high wall mounted type. The unit shall be equipped with pre-filters, fan section, auto clean technology and DX-coil section. The plastic body shall be light in weight and shall be able to suspend / hang on walls. The fan shall be aerodynamically designed diffuser turbo fan type. Unit shall have an external attractive panel for supply and return air. (Technical data may be furnished as per annexure A)

## 9.0 Refnet Joints / Header Joints

Supply & installation of the Y-Joint/ Ref-net separation refrigeration pipe joints and headers in the appropriate orientation to enable correct distribution of refrigerant. The Distribution Joints should be factory insulated with pre-formed sections of Expanded Polystyrene/Equivalent.

## 10. Refrigerant Piping

i. Refrigerant piping for the air-conditioning system shall be upto 19.1 mm dia of soft seamless copper tubes & for above 19.1 mm dia the pipe material shall be of hard seamless copper tubes with pipe material being hard drawn copper pipe. Forged copper fittings shall be used for the refrigerant piping.

The refrigerant piping arrangements shall be in accordance with good engineering practices as applicable to the air-conditioning industry, and shall include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits except Y joint/separation tubes.

ii. Before jointing any copper pipe or fittings, its internals shall be thoroughly cleaned by passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently it shall be thoroughly blown out using nitrogen gas.

iii. After completion of installation of the refrigerant piping, the refrigerant piping system shall be pressure tested using nitrogen gas at a suitable pressure as specified by OEM (Original Equipment Manufacturer). Pressure shall be maintained in the system for 48 hours. The system shall then be evacuated to vacuum of not less than 700 mm Hg and held for 24 hours.

iv. The supplier of air-conditioning system shall choose sizes as designed and erect proper interconnections of the complete refrigerant circuit. The thickness of copper piping shall not be less than 20 SWG for pipes upto 19.1 mm, 18 SWG for pipes between 19.1 mm to 31.9 mm and above 31.9 mm shall be 16 SWG for larger dia as specified by OEM.

v. The suction line pipe size and the liquid line pipe sizes shall be selected according to the manufacturer's specified diameter. All refrigerant pipes shall be properly supported and anchored to the building/structure using steel hangers, fasteners, brackets and supports which shall be fixed to the building/structure by means of inserts or expansion shields or anchor fasteners of adequate size and number to support the load imposed thereon.

vi. The refrigerant piping should be laid in such a way that it should not distort the interior of the room, wherever the refrigerant pipe has to be laid across the room, it should be laid in a concealed manner by making appropriate boxing arrangement matching with the interior of the room. All associated minor Civil Engineering works (like chasing on wall, ceiling & replastering & repainting etc.) related with the above items are included in the scope of work. The above scope does not include false ceiling wherever required.

vii. To protect Nitrile rubber insulation of outdoor installed copper piping from degradation due to ultra violet rays and atmospheric condition, it shall be covered with polyshield coating of at least two coats of resin and hardener (poly bond make or equivalent). Fibre glass tape shall be helically wound with adequate overlap & coated with two coats of resin with hardener to give smooth & plain finish.

viii. Entire liquid and suction refrigerant pipe lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm/ 13mm thick electrometric nitrile rubber as specified in BOQ.

#### **11.0 Drain Piping duly insulated**

The drain pipe connection of each fan coil unit to the main header should be 25 mm dia/32 mm dia as required. The header pipe should be of 40 mm dia/32 mm dia as required. The drain-pipe should be heavy PPR pipe ISI marked and conforming to relevant IS complete with fitting as required whereas the connection of the fan coil unit to the PPR pipe should be with flexible braided pipe. The drain piping should be insulated with 6 mm thick tubular nitrile rubber insulation.

For proper drainage of condensate U trap shall be provided in the drain piping wherever required.

All pipe supports shall be prefabricated and pre-painted slotted angle supports, properly installed with clamps. The condensate drain pipe arrangement for disposal of condensate water be made in such a way that there should not be any leakages of condensate water inside rooms as well in the route of drain water pipe line & water should be discharged at the location jointly decided with

Engineer -in-Charge of work. All associated Civil Engineering works as per requirement at site in above connection like making chase in the wall & restoring it original shape by re-plastering & repainting, etc. are included in the scope of work. The arrangement of drain-pipe shall be made in such a way that it should not affect the aesthetic of the building as well as is maintenance friendly & easily accessible.

12. Various sizes pvc insulated copper conductor wiring cables pvc insulated multi stranded sheathed copper conductor wiring cable for working voltage upto & including 1100 Volts, ISI marked conforming to IS 694/1990 (Latest Version). Wiring of installation shall be in conformity with IS 732/1989 (Latest Version), IS 4648/1968 (Latest Version).

### **LIST OF PREFERRED MAKE**

- |                                   |                                                               |
|-----------------------------------|---------------------------------------------------------------|
| 1) VRV / VRF System               | - Daikin/Mitsubishi Electric/Toshiba/LG                       |
| 2) Three phase motors             | - NGEF/ Siemens/ Kirloskar                                    |
| 3) Control Panel                  | - Advance/Ambit/CWS/Adlec/Tri Colite/AE Power Solution/Hensel |
| 4) Power Wire                     | - ICC/CCI/ Skytone/Havells/ Bonton/Batra Hanley.              |
| 5) Control Wire                   | - Skytone/Havells/Bonton/Polycab/Phinolix                     |
| 6) Vibration Isolation Spring     | - Resistoflex/Salicon Nano                                    |
| 7) Dash Fasteners                 | - Canon / Fisher /HILTI                                       |
| 8) Welding Rods                   | - Advani / L&T                                                |
| 9) Cable Tray                     | - Murphy/Supersteel/AKG/Vinous/Steel way                      |
| 10) M.C.C.B./ MCB                 | - Schneider / MG /Siemens /ABB (Imported Only)                |
| 11) MS Coated Cable Tray          | - System Steel / Slotco/ Pilco / Ricco                        |
| 12) Refrigerant Piping            | - Rajco/Mandev/Camipro/Jindal/ Mexflow                        |
| 13) Refrigerant Piping Insulation | - K-Flex /A Flex/ Armacell/Paramount                          |
| 14) Condensate Drain Pipe         | - Polypack/Supreme/Prince/Finolex                             |
| 15) PPR Pipe.                     | - Vector, Hindustan Plastic, Fusion Aqua Plast                |

Executive Engineer  
Bawana Road, DTU

**Annexure -A****TECHNICAL DATA FOR VRF INDOOR UNIT**

			<b>1</b>	<b>2</b>	<b>3</b>
<b>1</b>	Make				
<b>2</b>	Model		Hi wall 1.0 TR	Hi wall 1.5TR	Hi wall 2.0 TR
<b>3</b>	Country of origin				
<b>4</b>	Nominal Cooling capacity	Btu/h			
<b>5</b>	Type of refrigerant				
<b>6</b>	Air flow	GMH			
<b>7</b>	Auto clean technology (Yes/No)				
<b>8</b>	No. of steps for control of fan speed of IDU	Steps			
<b>9</b>	Fan Speed				
<b>10</b>	Type of Fan				
<b>11</b>	Mode Of Selection				
<b>12</b>	Controller Operation				
<b>13</b>	Motor Output	W			
<b>14</b>	External Static Pressure	Pa			
<b>15</b>	Flow Control				
<b>16</b>	Electric supply	V			
<b>17</b>	No .of Phases	Ph			
<b>18</b>	Frequency	Hz			
<b>19</b>	Power consumption	W			
<b>20</b>	Type of Filter				
<b>21</b>	No. Of Filter	No			
<b>22</b>	Noise Level	DB(a)			
<b>23</b>	External Dimensions of Unit				
<b>a</b>	Length	mm			
<b>b</b>	Width	mm			
<b>c</b>	Height	mm			
<b>24</b>	Unit Net Weight Kg	Kg			
<b>25</b>	Pipe Connection				
<b>a</b>	Suction	mm			
<b>b</b>	Liquid	mm			
<b>c</b>	Drain	mm			
<b>26</b>	Casing				
<b>27</b>	No. Of Motor				

## ANNEXURE-B

### 3.0 TECHNICAL DATA SHEETS:

Scope: Scope of this section comprises of furnishing all the technical data of various equipments.

Failure to furnish the data as schedule below will lead to rejection of the quote submitted by the vendor.

#### TECHNICAL DATA FOR VRF OUTDOOR UNIT

S.No.	Description												
1	Make												
2	Model												
3	Country of origin												
4	Type of VRF Technology												
5	Nominal capacity	HP											
6	No.of Modules	Nos											
7	Type of refrigerant used												
8	No.of compressors per unit	Nos											
9	No.of steps for control of fan speed of ODU	Steps											
10	Running Current	Amp											
11	Max. Voltage	V											
12	Max.allowable length of refrigerant piping	m											
13	Type & make of ref.joints used												
14	Max.speed of compressor rps	rps											
15	Capacity modular range	%											
16	Type of lubrication system												
17	Details of oil recovery unit (Oil retrieval cycle)												
18	Stages of oil separation												
19	Compressor Motor type												
20	Compressor motor output	KW											
21	Electric supply	V											
22	No. of Phases	Ph											
23	Frequency	Hz											
24	Weather protection (outdoor unit)	Kg											
25	Outdoor unit weight												
26	Noise level at 1 m	dB											
27	Overall dimension of Outdoor unit	mm											
28	Features of ODU												
A	Compressors												
B	DG Set capacity												
C	Backup operation ( In case of 1 Compressor failure)												
D	Run time compressors												

E	Life of Compressor										
F	Foot print of Outdoor unit										
G	Minimum operating frequency of compressor										
H	Accumulator										
29	Co-Efficient of Performance-COP										
	100%										
	75%										
	50%										

**ANNEXURE - C**

<b>ANNEXURE - C</b>			
<b>NIT No.</b>			
<b>Name of Agency</b>			
<b>Schedule of Addresses of Manufacturers Premises / Places of Inspection</b>			
<b>S. No.</b>	<b>EQUIPMENT</b>	<b>ADDRESS</b>	<b>REMARKS</b>
VRV / VRF outdoor/ Indoor units			

**ANNEXURE - D**

**NIT No.**

**List of Technical Literature & Catalogue and any other information**

**The tenderer should furnish the list of technical literature & catalogues of the Equipments offered.**

<b>Name of Agency</b>		
<b>Sl.No.</b>	<b>Data / Information</b>	<b>Remarks</b>
1		
2		
3		



**ANNEXURE -E**

**NIT No.**

**SCHEDULE OF ADDITIONAL SITE REQUIREMENTS TO BE FULFILLED BY  
DTU AS ENVISAGED BY THE CONTRACTOR.**

**Name of Contractor  
:-**

<b>S.No.</b>	<b>Description of Work</b>	<b>Remarks</b>
1		
2		
3		
4		
5		
Place :		
Date :		

**ANNEXURE-F**

**NIT No.**

**SCHEDULE OF DEPARTURE FROM SPECIFICATIONS**

<b>Name of Agency</b>		
<b>S. No.</b>	<b>Ref. to Clause of the specification</b>	<b>Description of Deviation</b>
		<b>Reason for Departure</b>
<b>Part - I</b>		

**DEPARTURE FROM GENERAL SPECIFICATION**

1)		
2)		
3)		
4)		
5)		
6)		
7)		

## Part – II

### DEPARTURE FROM DETAILED REQUIREMENTS SPECIFIED BY DEPARTMENT

1)	
2)	
3)	
4)	
5)	
6)	
7)	

Certified that except for the departures mentioned above the tender is in accordance with CPWD General Specification for Electrical works (Part-I) Internal – 2013, CPWD General Specification for HVAC Works 2004 and in accordance with detailed requirements specified in the tender specifications / Schedule of Quantities.

## **Additional Terms & Conditions for comprehensive maintenance**

1. A separate supplementary agreement shall be made with the successful tenderer for sub head V of schedule of work i.e. Comprehensive maintenance for 5 years after guarantee period of one year. The payment for comprehensive maintenance shall be made quarterly after the end of each quarter
2. The work shall be carried out as per CPWD specifications of internal and external electrical works & HVAC Work as amended up to date and as per instructions of Engineer in-charge.
3. **The scope of work shall be following:**
  - 3.1 The contractor shall execute the work i.e. "Comprehensive Maintenance and Operation of digital scroll, Variable Refrigerant Flow (VRF) type of HVAC Air conditioning system of 240 HP.
  - 3.2 The scope of maintenance include running of complete air-conditioning system including all items related with comprehensive maintenance of the HVAC system with specified maintenance schedule. Repair & replacement of defective components, providing of spares and all other associated accessories which are not covered otherwise and attention of all types of defects, necessary for smooth operation of the HVAC system to the satisfaction of Engineer-in-Charge. The Contractor should also carry out any other schedule jointly decided by Engineer-in-charge and the Contractor for any equipment of the HVAC system to ensure smooth and trouble free operation
4. Comprehensive & routine maintenance:-

Preventive & Breakdown maintenance including Daily, Weekly, Monthly, Quarterly and Yearly maintenance of the VRF HVAC system. Comprehensive maintenance also includes repair of defective system with provision of spares as required. No extra payment will be made for supply/repair/replacement of spares.

Maintenance of complete HVAC system so that performance of the plant is satisfactory.
- 5.1 Indoor Units (IDUs) of various type/size complete with display, electronic/PCB cards, cordless / corded remote control, internal control/power wiring, regular cleaning of filters, fan motor & any other associated work for proper & specified functioning of indoor units.
- 5.2 Outdoor Units (ODUs) of various capacities with associated compressor, supply/ filling of compressor oil, etc., Inverters, Digital Scroll system, electronic/PCB cards, MCB /MCCB, IGBT, control /power wiring, oil recovery system, heat exchanger, condenser motor fan, internal refrigeration circuit & any other associated work for proper & specified functioning of outdoor units.
- 5.3 Refrigerant piping along with all joints etc. including detection/repairing of leakage, pressure testing, vacuum purging, gas recharging/ topping including supply of refrigerant.
- 5.4 The repair work shall be carried out in a professional manner. This shall also include restoration of insulation after repair. Any other associated work for proper & specified functioning of air conditioning system. The scope also includes supply & charging of refrigerant due to any unforeseen circumstances.
- 5.5 Condensate drain water pipe cleaning, detection/repairing of pipes for any leakages, insulation etc. Any other associated work for proper functioning of drain water disposal system.

5.6 All control & power wiring between indoor & outdoor units. Any other associated work for proper & specified functioning of air conditioning system.

5.7 Maintenance & upkeep of sub-AC panels on the roof including switchgear, cabling from sub-AC panel up to outdoor units, consumables etc (excluding incoming cables to sub-AC panels)

5.8 Any other item/activities associated with proper functioning of comprehensive maintenance complete air conditioning system deemed to have been included in the scope of work.

5.9 In order to attend breakdowns of the AC system, the engineering works (eg. False ceiling, any kind of structural/masonry work, opening and closing) required if any, shall be in the scope of work.

**5.10** While replacement of MCB at ODU; all incoming and outgoing connections shall be in the scope of work.

### **Deployment of maintenance staff:**

The contractor will depute technically qualified, competent and experienced staff in adequate number, for the comprehensive maintenance. It may however be noted that normally scheduled maintenance should be carried out on Saturday & Sunday or any Gazetted Holidays for which the contractor will give at least 24 hours advice to the Engineer-in-Charge.

6.1 The work is to be carried out as per CPWD Specification /International Norms /Standards and in such a manner that all premises always look Neat & Clean.

6.2 The Man-power deployed by the contractor shall be in Uniform as agreed upon with DTU and carry proper and valid I-Card with them while carrying out Breakdown/Maintenance work at the sites.

6.3 The attendance of Contractors staff will be monitored through Office In-Charge DTU.

### **7 Attending to complaints:**

7.1 List of minimum spares to be available at site for smooth operation shall be prepared by the Contractor and Engineer-in-charge within 07 days of start of work and accordingly all spares shall be available within 15 days of start of Contract

7.2 All defects and deficiencies should be rectified promptly after lodging of complaint. The complaint can be lodged through telephonic message or through complaint register kept at site in designated place.

7.2.1 Response Time (Max) - 30 Minutes to reach the site of complaint.

7.2.2 Rectification Time (Max.) - 03 Hrs. If Max. 03 IDU and ODUs (except leakage, compressor, condenser failure) are involved.

7.2.3 Rectification Time (Max.) - 12 Hrs. If 04 to 10 IDU and ODUs, 10 each, (except leakage, compressor, condenser failure) are involved.

7.2.4 Leakages in refrigerant circuit, compressor, condenser and IDU/ODUs beyond 10 - 48 hrs.

7.2.5 The quantum of work involved should be decoded within 30 minutes of the complaint received and recorded jointly with the representative of the Contractor and Engineer-in-charge.

7.3 Above healthy spares, refrigerant & necessary programmable PCB cards shall be maintained in sufficient quantity to reduce down time of the system. The spares shall be of OEM/same make. Where the Make of item is not identified/ defined, it shall be of reputed make

with the approval of Engineer in-charge.

7.4 In case the above spares (quantities) are not maintained at site, by the Contractor, the stores would be purchased by DTU and the cost of purchase shall be deducted by from the bills for payment to the Contractors.

## **8 Maintenance schedules**

8.1 In addition to attending to complaints, the contractor will be required to carry out prescribed daily, monthly, quarterly, half yearly, yearly maintenance schedules. The maintenance schedules and the work to be done in each schedule & report format shall be jointly decided by the Engineer-in-Charge & the Contractor.

8.2A proper record of maintenance scheduled should be kept; the Contractor & Engineer-in-Charge shall jointly record the details of maintenance schedule in the register meant for it. The register shall be updated and ready for check at any time.

**Executive Engineer**  
Bawana Road, DTU

# PART-II

## FINANCIAL BID

## SCHEDULE OF WORK

**Name of Work:** Providing VRF VRV System in existing building of Delhi Technological University East Delhi Campus Vivek Vihar Phase 2 Jhilmil Colony Delhi

S No	Description	Unit	Qty.	Rate (Rs)	Amount (Rs)
1	<b>EQUIPMENT (VRF)</b>				
1.1	<b>VARIABLE REFRIGERANT FLOW SYSTEM (With Heat Pump)</b>				
	Supply, installation, testing and commissioning of aircooled variable refrigerant flow modular type airconditioning system with R410a refrigerant suitable for 415±10%, 50 cycles. The unit shall consist of indoor and outdoor units with individual controller as per detail given in specifications and having following items : (These items are to be given in Indian rupees with custom duties, inland frt, clearance etc on Site basis)				
	Modular type outdoor units equipped with highly efficient inverter type scroll/Rotary compressors with special precoated heat exchanger, low noise condenser fan housed in compact housing duly powder coated and Outdoor unit having COP at 100% load to be minimum 3.3 to 3.5. of following capacities:				
	Cost of R 410 A Gas should be inclusive				
	The outdoor unit should include all loading, unloading, transportation, power cabling/wiring from near the indoor and outdoor units respectively.				
	<b>The Vendor should consider the deration on ODU selection as per New Delhi Ambient conditions.</b>				
	Outdoor Units-Heat Pump , Fully Gas Charged				
1.1.1	VRV Zone-1, 24 HP	Nos.	1		
1.1.2	VRV Zone-2, 48 HP	Nos.	1		
1.1.3	VRV Zone-3, 52 HP	Nos.	1		



1.1.4	VRV Zone-4, 24 HP	Nos.	1		
1.1.5	VRV Zone-5, 36 HP	Nos.	1		
1.1.6	VRV Zone-6,7, 28 HP	Nos.	2		
1.2	<b>Ceiling Mounted Ductable Type indoor unit - VRV</b>				
	Supply, installation, testing and commissioning of ceiling mounted mid static ductable type indoor unit with cordless/corded remote controller. Fully Factory assembled, wired and tested Indoor Units as per specifications and as required to make the system complete.				
1.2.1	335-494 CFM / 1.0-1.05 TR	No.	5		
1.2.2	525-565 CFM / 1.25-1.33 TR	No.	4		
1.2.3	565-635 CFM / 1.6-1.65 TR	No.	4		
1.2.4	670-740 CFM / 1.7-2.1 TR	No.	2		
1.2.5	875-883 CFM / 2.5-2.65 TR	No.	10		
1.2.6	1100 -1150 CFM / 3.0-3.30 TR	No.	2		
1.2.7	1250-1624 CFM /4.55- 4.75 TR	No.	3		
1.2.8	2200-2295 CFM / 6.35-6.5 TR	No.	11		
1.3	<b>Ceiling Suspended Type indoor unit - VRV</b>				
	Supply, installation, testing and commissioning of ceiling suspended type indoor unit with cordless/corded remote controller. Fully Factory assembled, wired and tested Indoor Units as per specifications ans as required to make the system complete.				
1.3.1	610-620 CFM / 2.0 to 2.02 TR	No.	32		
1.4	<b>Touch screen controller for indoor units controller - VRV</b>				
1.4.1	Supply, installation, testing and commissioning of LED Display Type Centralized Controller (Which can control 74 nos. indoor units in terms of ON/Off Status, temp. Status, Fan Speed, ODU On/Off Status etc.) with all accessories and controls.	Nos.	1		

1.5	Supply, installation, testing and commissioning of Interconnecting refrigerant pipe work with ( 19mm thick) closed cell elastomeric nitrile rubber tubular insulation between each set of indoor & outdoor units as per specifications, all piping inside the room shall be properly supported with hangers and all external piping with UV coating shall run in <b>cable tray</b> .				
1.5.1	41.3 mm OD	RM	40		
1.5.2	38.1 mm OD	RM	130		
1.5.3	34.9 mm OD	RM	280		
1.5.4	31.75 mm OD	RM	80		
1.5.5	28.6 mm OD	RM	80		
1.5.6	22.2 mm OD	RM	136		
1.5.7	19.1 mm OD	RM	190		
1.5.8	15.9 mm OD	RM	350		
1.5.9	12.7 mm OD	RM	120		
1.5.10	9.5 mm OD	RM	206		
1.5.11	6.4 mm OD	RM	100		
1.6	Supply, installation, testing and commissioning of imported refrigerant Y-joints/ headers.	Nos.	67		
1.7	Supply, installation, testing, termination and commissioning of control cum transmission wiring (should be shielded cable in PVC Pipe) of 2C x 1.5 Sqmm Cu between indoor unit and outdoor unit and indoor units and its remote controller.	Rmt	1200		
1.8	Providing and fixing and in position the following PVC pipes for condensate drain duly insulated with kinny foam & vapour barrier duly secured with adhesive tape as per specification ,cut to required length and installed with all joints , including the necessary fittings. (For all the indoor units upto the main header in the shaft door vertical risers)				

1.8.1	25 mm dia	RM	225		
1.8.2	32 mm dia	RM	50		
1.8.3	40 mm dia	RM	20		
<b>1.9</b>	<b>CANVASS CONNECTION</b>				
1.9.1	Supply, Installation, Testing and commissioning of double layer canvas connection with 1/2 hr. fire rating as per specification.	Nos.	120		
<b>1.10</b>	<b>Floor Mounted Horizontal Air Handling Units (FM AHU)</b>				
	Supply, Installation Testing and Commissioning of floor mounted AHU's. The AHU's shall be double skin type made of 0.80 mm thick GI sheet with 23+/-2mm (Indoor application) or 43+/-2 mm (Terrace/Outdoor application) Thick PUF insulation. The Drain Pan for AHU's shall be of SS. They shall be suitable for indoor/outdoor installation. The AHU's selected shall be supplied with Forward / Backward direct driven/belt driven Blower Fans suitable to deliver the undergiven CFM and Static. The AHU's shall be DX-Type (complete with mixing chamber if required (Optional) and electrical push butt nos. Cooling Coil) on starting panel for operating the AHU.				
a.	10000 CFM, 31.5 TR, 6- Row Deep DX cooling coil (1 Nos. Coils), 55 mm Static Pressure, with Pre filter , thermal break profile and with three phase <b>motor suitable for VFD drive a</b>	No.	1		
<b>1.11</b>	<b>REMOTE CONTROLLERS</b>				
a	Supply, installation, tesing and commissioning of Imported Remote controllers (Corded) for operation of ductable indoor units/AHU.	NOS.	1		
<b>1.12</b>	<b>Accessories</b>				
a	SITC of Expansion and control Kit Required for the above AHU to make the system complete	Nos	2		
<b>1.13</b>	<b>AIR CURTAIN</b>				

	Supply, installation testing and commissioning of AIR CURTAIN of following size with Door switch or sensor as per approved make .(At ground entrance)				
a	2100 mm long (High flow type)	No.	2		
	<b>TOTAL CARRIED TO SUMMARY (VRV Equipment)</b>				
<b>2</b>	<b>Air Distribution</b>				
	<b>Site Fabricated Duct</b>				
2.1	Supply, Fabrication, Installation and testing of sheet metal ducts in accordance with the approved shop drawings and specifications, and shall also confirm to the BIS specifications. The duct shall be fabricated at site for to suit pieces.				
a	0.63mm (24 gauge) GSS	SqM	700		
b	0.8 mm (22 gauge) GSS	SqM	600		
c	1.0mm (20 gauge) GSS	Sqm	100		
2.2	Supplying, installing, testing and balancing of aluminium supply/return air grilles of various sizes. Each grill shall be with fixed horizontal front bar at Zero/15 Deg deflection through the collar and register.				
a	Aluminium supply air grilles with damper.	Sqm.	12.0		
b	Aluminium Exhaust./return air grilles without damper.	Sqm.	12		
c	Aluminium supply air square diffuser with damper	Sqm.	2		
d	Aluminium return/exhaust air square diffuser without damper.	Sqm.	2		
e	Linear air grilles diffuser(150 MM wide)	RM	10		
f	GI Volume control dampers for ducts	Sqm.	2		
<b>2.3</b>	<b>MOTORIZED FIRE AND SMOKE DAMPERS</b>				

	Supply, Installation, Testing and commissioning of motorized combination fire and smoke damper (spring return type) of approved make of atleast 120 minute fire rating and as per the specifications as detailed earlier in the relevant sections. The fire damper shall be complete with electronic temperature sensor and electrically operated actuator .The fire dampers shall be located in the supply/return air ducts/AHU outlets, at all fire rated crossovers (shafts/walls etc.) The control panel will be such located that the reset can be easily done These combination smoke and fire dampers shall be interlocked with the building management system for fire detection / HVAC and shall trip/close in the event of fire / smoke in the respective zone .				
a	Bare Fire Dampers without sleeve for AHU supply outlet	Sqm.	2		
b	Control panel actuator , including Electrical, spring type actuator, remote indication of the fire damper position.	No	4		
c	Interconnecting wiring for the fire alarm system with the AHU and the smoke dampers.	Lot	1		
d	Sealing the openings around the sleeve of the fire dampers with approved fire sealant, as per the recommendations of the manufacturer and specifications.	Lot	1		
2.4	<b><u>Fresh Air/Exhaust Air Louvers</u></b>				
	Supply, Installation, Testing and Commissioning of extruded aluminium louvres with frame bird screen , mounting arrangement etc. as per specifications and drawings.				
	Fresh Air/Exhaust Louvers	Sqm.	2.0		
	<b>TOTAL CARRIED TO SUMMARY (Air Distribution)</b>				
<b>3</b>	<b>MECHANICAL INSULATION</b>				
3.1	<b>DUCT LINE ACOUSTIC TREATMENT</b>				

	Supply and Application of Acoustic Insulation Inside the Duct with Engineered Nitrile Rubber open cell foam with Density 140 - 180 Kg/m <sup>3</sup> passing Class 1 Fire Performance test as per BS 476 Part 7, Air Erosion test for 10,000 fpm air velocity as per ASTM C 1071-05 and with built-in EPA approved antimicrobial protection; to be applied using manufacturer's recommended Rubber based Adhesive in a blend of solvents.				
a	12 mm thick acoustic in surround for Duct	SqM	250		
b	25 mm thick (For AHU Room)	SqM	80		
<b>3.2</b>	Supply & Installation of Thermal Insulation with pre laminated 7 mil Glass cloth covering over Closed Cell Class O Nitrile Rubber Elastomeric Insulation & built-in EPA approved antimicrobial protection of Density 40 - 55 Kg/m <sup>3</sup> , Thermal Conductivity of 0.033 W/mk at 0 DegCelcius Mean Temp. and $\mu \geq 10000$ (without any additional vapour barrier), to be applied on Ducts using manufacturer's recommended Rubber based Adhesive in a blend of solvents.				
a	9 MM Thick	SqM	1200		
<b>3.3</b>	<b>Exposed Roof Insulation</b>				
a	13 mm thick Under deck insulation as per the specifications detailed above in the section	SqM	800.0		

<b>4.0</b>	<b>CIVIL WORKS</b>				
4.1	Necessary civil works of making opening and finishing them as required by Project Manager				
4.2	Cutouts for refrigerant pipes i.e cutout of required size (Cutting holes up to 30x30 cm in walls including making good the same: With common burnt clay F.P.S. (non modular) bricks	Each	30		
4.3	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. In cement mortar	Cum	10		
4.4	CEMENT PLASTER (IN FINE SAND) 1:4 (1 cement : 4 fine sand)	Sqm	100		