

**GOVERNMENT OF INDIA
CENTRAL PUBLIC WORKS DEPARTMENT**

NOTICE INVITING TENDER

NIT NO: - 09/CE/MUMBAI-II/2023-24

Name of work:- **Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.**

Sl. No.	Details of Sub-Head	Amount (in Rupees)
1.	Estimated Cost –Replacement of existing central air conditioning plant with latest VRV/VRF system(A)	Rs. 6,98,11,284/-
2.	Estimated Cost - comprehensive maintenance (B)	Rs. 3,84,26,098/-
3.	Composite Estimated cost (A+B)	Rs. 10,82,37,382/-
4.	Earnest Money	Rs. 20,82,374/-
5.	Performance Guarantee	5% of tendered value
6.	Security Deposit	2.5% of tendered value
7.	Time Allowed	i) 08(Eight) Months for original work ii) 05 (Five) years for comprehensive maintenance after completion & expiry of one year DLP of original work.

This NIT is approved for Rs. 10,82,37,382/- (Rs. Ten Crore Eighty Two Lakhs Thirty Seven Thousand Three Hundred & Eighty Two Only). It contains pages 01 to 148 only.

Assistant Engineer (E),
CE, Mumbai-II, CPWD,
Mumbai.

Executive Engineer,
CE, Mumbai-II, CPWD,
Mumbai.

Chief Engineer,
CE, Mumbai-II, CPWD,
Mumbai

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Technical Cum Eligibility bid

(PART-A, PART-B & PART-C)

CENTRAL PUBLIC WORKS DEPARTMENT

NIT No.:-09/CE/MUMBAI-II/2023-24

PART - A

Press notice
CENTRAL PUBLIC WORKS DEPARTMENT
(166 YEARS OF Engineering Excellence)
NOTICE INVITING e-TENDERS

The Executive Engineer(E), Mumbai-III, CPWD, Mumbai-37(Tel./Mobile No., e-mail address eeemced3cpwd@gmail.com) on behalf of the President of India invites on line percentage rate bids from the Specialized firms reputed in VRV / VRF system in two bids system for the following work:

NIT No:- 09/CE/MUMBAI-II/2023-24

Name of work:- **Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.**

Estimated Cost	Rs. 10,82,37,382/-	E&M: 10,82,37,382/-
Earnest money	Rs. 20,82,374/-	
Time of completion	08(Eight) Months for original work and 05 (Five) years for comprehensive maintenance after completion & expiry of one year DLP of original work	

Last time & date of submission of Bid at **3.30 P.M. on 03/04/2024.**

The tender forms and other details can be obtained from the website www.tenderwizard.com/CPWD or www.cpwd.gov.in. The Press Notice is also available on www.eprocure.gov.in

*** To be filled by the Executive Engineer.**

INFORMATION & INSTRUCTIONS FOR BIDDERS FOR
e-TENDERING FORMING PART OF BID DOCUMENT & TO BE POSTED ON
WEBSITE

The Executive Engineer(E), Mumbai-III, CPWD, Mumbai-37(Tel./Mobile No., e-mail address eeemced3cpwd@gmail.com) on behalf of the President of India invites on line percentage rate bids from the Specialized firms reputed in VRV / VRF system in two bids system for the following work:

NIT No	09/CE/MUMBAI-II/2023-24
Name of Work & location	Replacement of existing chiller plant with latest VRV/ VRF unit along with comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.
Estimated cost put to bid	Rs. 10,82,37,382/-
Earnest Money	Rs. 20,82,374/-
Period of Completion of work(in months)	08 (Eight) Months for original work and 5 years for Comprehensive maintenance work
Date and Time of submission of queries by email to the Executive Engineer (E), Mumbai-III, CPWD, Antop Hill, Mumbai-400037 <i>(e-mail address eeemced3cpwd@gmail.com).</i>	Before Pre Bid conference latest by 17.30 hrs. on 23/03//2024.
Date and Time of Pre Bid conference	At Chief Engineer Mumbai-II, 4th Floor, New CGO Bldg., Mumbai-400 020 at 3.30 P.M. on 27/03/2024.
Last date of online submission of bid, Earnest Money Deposit Declaration and other documents as specified in the bid document	Upto 3.00 P.M. on 03/04/2024
Date and Time of opening of Price bid	Will be intimated separately
Last date & time of physical submission of original/certified copy (as the case may be) of all the scanned and uploaded documents as specified in bid document in the office of tender opening authority by the Lowest Tenderer Only.	To be submitted during office hours within a week from the date of opening of Price Bid. In case the last day happens to be closed holiday, these documents shall be submitted on the next working day.

*** To be filled by the Executive Engineer.**

- Contractors who fulfill the eligibility requirements mentioned in CPWD-6 shall be eligible to apply. Joint ventures/Consortium/ Special Purpose Vehicles are not

accepted.

2. 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.
3. This information and instructions for bidders posted on website shall form part of bid document.
4. The bid document consisting of Plans, Specifications, Schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen and downloaded from website www.tenderwizard.com/CPWD or www.cpwd.gov.in free of cost.

Intending Bidders are advised to keep visiting the above mentioned web-site from time to time for any updates in respect of the tender documents, if any. Failure to do so shall not absolve the applicant of his liabilities to submit the applications complete in all respect including updates thereof, if any. An incomplete application may be liable for rejection.

5. *But the bid can only be submitted after uploading the mandatory scanned documents i.e. Earnest Money Deposit Declaration and other documents as specified within the period of bid submission.*
6. Those contractors not registered on the website mentioned above, are required to get registered beforehand. If needed they can be imparted training on online bidding process as per details available on the website.
7. The intending bidder must have valid **class-III** digital signature to submit the bid.
8. On opening date, the contractor can login and see the bid opening process. After opening of bids he will receive the competitor bid sheets.
9. Contractor can upload documents in the form of JPG format and PDF format.
10. For specialized component(s) as defined in the bid document, the bidder has to meet the eligibility criteria himself.
11. Contractor must ensure to quote rate of each item. The column meant for quoting rate in figures appears in pink colour and the moment rate is entered, it turns sky blue. In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as "0". Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (ZERO). However, If a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section / sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.
12. The technical bid shall be opened first on due date and time as mentioned above. The time and date of opening of price bid of contractors qualifying the technical bid shall be communicated to them at later stage.
13. Pre Bid conference shall be held on **Chief Engineer Mumbai-II, 4th Floor, New CGO Bldg., Mumbai-400 020 at 3.30 P.M. on 27/03/2024** to clear the doubt of intending bidders, if any. Bidders should send all their queries by email to the Executive Engineer (E), Mumbai-III, CPWD, Antop Hill, Mumbai-400037 before Pre bid meeting latest by **5.30 P.M. on 23/03/2024** (e-mail address ceemced3cpwd@gmail.com).

Based on pre-bid meeting, modifications/ addendum/ corrigendum if any will be issued and the same shall form a part of tender document.

If further pre-bid conferences are required for complete and effective interactions, the date and time of same will be communicated at the end of 1st pre-bid meeting or later. All modifications/addendums/corrigendum issued regarding this bidding process, shall be uploaded on website only.

*** To be filled in by the Executive Engineer**

14. When bids are invited in three stage system and if it is desired to submit revised Price bid then it shall be mandatory to submit revised Price bid. If not submitted then the bid submitted earlier shall become invalid.
15. The department reserves the right to reject any prospective application without assigning any reason and to restrict the list of qualified contractors to any number deemed suitable by it, if too many bids are received satisfying the laid down criterion.
16. Performance report of works in Form D-1 is not to be submitted by the bidder. All the eligible similar works executed and submitted by the bidders shall be got inspected by a committee which may consist of client or any other authority as decided by NIT approving authority. The marks for the quality shall be given based on this inspection.
17. List of Documents to be scanned and uploaded within the period of bid submission:
 - i. *Receipt of Deposition of original EMD (As Per Proforma-A attached)*
 - ii. Certificate of Financial Turnover & Profit/Loss from CA (Form-A).
 - iii. Bankers Certificate (Form-B) or Net worth Certificate (Form B-1).
 - iv. Certificates of Work Experience (Form-C&D).
 - v. Letter of Transmittal (Proforma-2)
 - vi. Structure and organization (Form E)
 - vii. Affidavit for Non-black listing on Rs. 100/- Non-Judicial Stamp Paper attested by Notary. (Proforma-3).
 - viii. Manufacturer Undertaking/ Authorization Certificate as per proforma for VRV/VRF (Proforma-4)
 - ix. Affidavit as per provisions of clause 1.2.3 of CPWD-6 (Proforma-5)
 - x. GST Registration Certificate, if already obtained by the bidder.
If the bidder has not obtained GST registration as applicable, then he shall scan and upload an undertaking in attached proforma along with other bid documents. (Proforma-6)
 - xi. Calculation of bidding capacity as prescribed in eligibility criteria with supporting documents. (Proforma-7)
 - xii. Undertaking regarding make in India products.
18. All forms, Proforma as etc. shall be on the letter head of the respective authority (i.e.

Bidder/ Bank/ CA/ Employer/ Manufacturer/ company etc.) signed by a duly authorized person with his full name and the full name of his firm.

CPWD-6

**NOTICE INVITING TENDER
GOVERNMENT OF INDIA
CENTRAL PUBLIC WORKS DEPARTMENT
CPWD-6 FOR E-TENDERING**

The Executive Engineer(E), Mumbai-III, CPWD, Mumbai-37(Tel./Mobile No., e-mail address eeemced3cpwd@gmail.com) on behalf of the President of India invites on line percentage rate bids from the Specialized firms reputed in VRV / VRF system in two bids system for the following work:

Name of Work: Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.

1.1 **The work is estimated to cost Rs. 10,82,37,382/-.**This estimate, however, is given merely as a rough guide.

1.1.1 The authority competent to approve NIT for the combined cost and belonging to the major discipline will consolidate NITs for calling the bids. He will also nominate Division which will deal with all matters relating to the invitation of bids.

For composite bid, besides indicating the combined estimated cost put to bid, should clearly indicate the estimated cost of each component separately. The eligibility of bidders will correspond to the combined estimated cost of different components put to bid. With respect to work experience certificates, separate eligibility criteria have been prescribed for operation and Comprehensive maintenance component. Therefore eligibility criteria for original work will be on the basis of composite estimated cost less operation and maintenance component.

1.2 Intending bidders 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 satisfied the Criteria of eligibility specified below:-

Criteria of eligibility for submission of bid documents

1.2.1 Contractors who fulfill the following requirements shall be eligible to apply. *Joint ventures/Consortium/ Special Purpose Vehicles are not accepted.*

a) Should have satisfactorily completed the works as mentioned below during the last seven years ending last day of month previous to the one in which tenders are invited.

i) Three similar works each costing not less than Rs.4,32,94,953/-& SITC of VRV/VRF system of minimum 360 Hp Each.

Or

Two similar works each costing not less than Rs. 6,49,42,429/- & SITC of VRV/VRF system of minimum 540 Hp each.

Or

One similar work costing not less than Rs. 8,65,89,906/-&

SITC of VRV/VRF system of minimum 720 Hp each.

For this purpose, 'Cost of work' shall mean gross value of the completed work including the cost of materials supplied by the Government/Client, but excluding those supplied free of cost. This should be certified by an officer not below the rank of Executive Engineer / Project Manager or equivalent.

ii) **Similar work shall mean works of “Supply, Installation, Testing and commissioning of VRF/VRV units system” (as given in criteria).**

iii) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to previous day of last date of submission of bids.

iv) If private works are shown in support of eligibility, certified copy of any Govt. document {tax deducted at source (TDS) certificate or any other certificate of Govt.} to prove the execution and of that amount shall be submitted along with the experience certificate. The amount mentioned in that certificate shall tally with the actual amount of work done.

b) The bidder should have had Average Annual Financial Turnover of **Rs. 324.71 lakhs on original works** during the last three consecutive financial years (**ending 31st March 2023**) balance sheets duly audited by Chartered Accountant. Year in which no turnover is shown would also be considered for working out the average. Scanned copy of certificate from CA with UDIN to be uploaded. Further details if required may be asked from the contractor after opening of technical cum eligibility bid. There is no need to upload entire voluminous balance sheet. The value of annual turnover figure shall be brought to current rate by enhancing the actual turnover figure at simple rate of 7% per annum.

c) Should not have incurred any loss (profit after tax should be positive) in more than two years during available last five consecutive balance sheets (ending 31st March 2023), (stand along financial statement) duly certified and audited by the Chartered Accountant. Scanned copy of certificate from CA with UDIN to be uploaded. Further details if required may asked from the contractor after opening of eligibility /technical bids. There is no need to upload entire voluminous balance sheet.

d) The bidders should have a bankers certificate from a Commercial Bank for amount equal to **Rs. 432.95 lakhs** on the format prescribed in Form B. Scanned copy of original Commercial Bank certificate to be uploaded.

OR

The bidder should submit Net worth certificate of minimum **Rs. 108.24 lakhs** issued by the certified Chartered Accountant with UDIN on the format prescribed in Form B-1. Scanned copy of original certificate to be uploaded.

e) The bidder should have sufficient number of Technical and Administrative employees for the proper execution of the contract. The bidder shall have to submit a list of these employees stating clearly how these would be involved in this work within 15 days of award of work.

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

$$\text{Bidding Capacity} = \{[AxNx1.5]-B\}$$

Where,

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

N = Number of years prescribed for completion of work for which bids has been invited. When the value of N is less than 0.5 year then for calculation purpose minimum value of N shall be taken as 0.5. (For this work N will be number of years of original work i.e 7/12 years).

B = Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited less amount of works which are stuck up due to local body clearance, environmental clearance, court decisions etc. shall not be considered for calculation of B.

- 1.2.2 To become eligible for issue of bid, the bidders shall have to furnish an affidavit as under:

I/We undertake and confirm that eligible similar works(s) has/have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for bidding in CPWD in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of ~~Earnest money deposit~~/Performance Guarantee. (Scanned copy to be uploaded at the time of submission of bid).

- 1.2.3 It will be mandatory for the contractors to upload the affidavit as per the provisions of clause 1.2.2.

- 1.2.4 In addition to above, the bidder has to furnish/upload all other documents mentioned in information and instruction for bidders and bid document.

2. Agreement shall be drawn with the successful tenderer on prescribed Form No. **CPWD 7** (or other Standard Form as mentioned) which is available as a Govt. of India Publication and also available on website www.cpwd.gov.in. Bidders shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.

3. The time allowed for carrying out the work will be **08 (Eight) Months** for original work and 5 years for comprehensive maintenance after completion of 1 year of DLP 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 bid documents.

4. (i) The site for the work is available. As the work is to be carried out in existing working office complex, the agency has to take utmost care for execution of work and the work needs to be carried out in different stages. Tentative schedule for activities has been prepared. The schedule of activities given below is provisional. It is liable to change and must be considered only as advance information to assist bidders.

(ii) Tentative layout drawings are available, but these are only indicative/ suggestive just to give idea regarding works. However final layout drawings and all working drawings (architectural, structural etc.) & details required for the work shall be prepared by the contractor as per the requirement in accordance with OEM standards. Nothing extra shall be paid for this.
5. 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 except Standard General Conditions of Contract Form can be seen on the website www.tenderwizard.com/CPWD or www.cpwd.gov.in free of cost.
6. 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 bid as notified.
7. 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 components) but before last time and date of submission of bid as notified.
8. Earnest Money in the form of Insurance Surety Bonds, Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee including e- Bank Guarantee (for balance amount as prescribed) from any of the Commercial Banks (drawn in favour of **Executive Engineer (E), MCED-III, CPWD, Mumbai**) shall be scanned and uploaded on the e-Tendering website within the period of bid submission. The original EMD should be deposited either in the office of Executive Engineer inviting bids or division office of any Executive Engineer, CPWD within the period of bid submission. The EMD receiving Executive Engineer (including NIT issuing EE/AE) shall issue a receipt of deposition of earnest money deposit to the bidder in a prescribed format (enclosed) uploaded by tender inviting EE in the NIT. A part of earnest money is acceptable in the form of bank guarantee also. In such case, minimum 50% of earnest money or Rs. 20 lakh, whichever is less, shall have to be deposited in shape prescribed above, and balance may be deposited in shape of Bank Guarantee including e- Bank Guarantee of any Commercial bank having validity for a period of 90 days for single bid works and 180 days for two bid system or more from the last date of receipt of bids which is to be scanned and uploaded by the intending bidders. The earnest money given by all the tenderers except the lowest tenderer shall be refunded immediately after the expiry of stipulated bid validity period or immediately after acceptance of the successful bidder, whichever is earlier. However, in case of two/ three bid system,

earnest money deposit of bidders unsuccessful during technical bid evaluation etc. should be returned within 30 days of declaration of result of technical bid evaluation. Copy of certificate of work experience and other documents as specified in the notice inviting e- tender shall be scanned and uploaded on the e-Tendering website within the period of bid submission. However, certified copy of all the scanned and uploaded documents as specified in e- tender notice shall have to be submitted by the lowest bidder within a week physically in the office of tender opening authority. Online bid documents submitted by intending bidders shall be opened only of those bidders, whose original EMD deposited with any division of CPWD and other documents scanned and uploaded are found in order.

The bid submitted shall be opened at **03:30 PM on 03/04/2024.**

*To be filled by the Executive Engineer

9. The bid submitted shall become invalid and e-Tender processing fee if applicable shall not be refunded if:
 - (i) The bidder is found in eligible
 - (ii) The bidder does not upload scanned copies of all the documents as stipulated in the bid document.
 - (iii) If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest bidder in the office of bid opening authority.
 - (iv) If a tenderer quotes Nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section/subhead in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tender.
 - (v) Scanned copies of documents are illegible.

10. The contractor whose bid is accepted will be required to furnish performance guarantee at specified percentage of the tendered amount as mentioned in schedule E and within the period specified in Schedule F. This guarantee shall be in the form of Insurance Surety Bonds, Account Payee Demand Draft, Fixed Deposit Receipt or Bank Guarantee from any of the Commercial Banks in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule 'F', including the extended period if any, the Earnest Money deposited by the contractor shall be forfeited automatically without any notice to the contractor. The earnest money deposited along with bid shall be returned after receiving the aforesaid performance guarantee. 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 including Provident Fund Code No. If applicable and also ensure the compliance of aforesaid provisions by the subcontractors, if any engaged by the contractor for the said work within the period specified in Schedule F.

- 10.1 The contractor will be required to scan and upload all the documents mentioned in Information & Instructions for Bidders For e-Tendering forming Part of Bid Document.

11. The description of the work is as follows:

Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.

Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), 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 bid. A bidders 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 bidders 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 bid by a bidders 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.

11.1 Intending Bidders are advised to get familiarized with the local body rules, Fire fighting, MCGM, tree cutting authorities, environment clearances, orders passed by any court on the environment issues, any other issue related to obtaining commencement certificate & occupancy certificate and satisfy themselves before submitting their bids as to the status, nature of the rules and regulations and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. Bidder shall be deemed to have full knowledge of such rules and regulations whether he has read it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. In case of reduction of scope of work or no work is possible to carry out on account of such issues, no cost shall be payable to them. Submission of a bid by the bidder implies that he has read this notice and all other documents and has made himself aware of the Local Body Byelaws and other factors having a bearing on the execution of the work.

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

13. Canvassing whether directly or indirectly, in connection with bidders is strictly prohibited and the bids submitted by the contractors who resort to canvassing will be liable for rejection.

14. The competent authority on behalf of President of India reserves to himself the right of accepting the whole or any part of the bid and the bidders shall be bound to perform the same at the rate quoted.
15. The contractor shall not be permitted to bid 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 as 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.
16. No Engineer of Gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the prior permission of the Government of India in writing. This contract is liable to be 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 bid or engagement in the contractor's service.
17. The bids for the work shall remain open for acceptance for a period of 75 (seventy five) days from the date of opening of technical bids in case bids are invited in 2 or 3 bid system. Further
 - (i) If any tenderer withdraws his tender or makes any modification in the terms & conditions of the tender which is not acceptable to the department within 7 days after last date of submission of bids, then the Government shall without prejudice to any other right or remedy, be at liberty to forfeit 50% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.
 - (ii) If any tenderer withdraws his tender or makes any modification in the terms & conditions of the tender which is not acceptable to the department after expiry of 7 days after last date of submission of bids, then the Government shall without prejudice to any other right or remedy, be at liberty to forfeit 100% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.
 - (iii) In case of forfeiture of earnest money as prescribed in para (i) and (ii) above, the bidders shall not be allowed to participate in the rebidding process of the same work.
- a. This notice inviting bid shall form a part of the contract document. The successful bidder /contractor, on acceptance of his bid 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 bid, all the documents including additional conditions, specifications and drawings, if any, forming part of the bid as uploaded at the time of invitation of bid 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 or other Standard C.P.W.D. Form as applicable.
 - a. Once the Original work(E&M) is completed and completion certificate is recorded, a supplementary agreement after completion of DLP of 1 year for execution of comprehensive maintenance part of contract for specified years period shall be drawn on the form attached in the bid document.
 - b. The contract includes two components i.e. i) Original work and ii) comprehensive maintenance.
18. Once the Original work (E&M) is completed and completion certificate is recorded, a supplementary agreement for execution of operation and comprehensive maintenance part of contract for specified years period shall be drawn on the form attached in the bid document.

SECTION – I

BRIEF PARTICULARS OF THE WORK

The particulars given in this section are provisional. They are liable to change and must be considered only as advance information to assist the bidder.

1. Salient details of the work for which bids are invited are asunder:

Sl. No.	Name of Work	Estimated Cost	Period of completion
As specified in CPWD-6/ Information and Instructions for Bidders for e-tendering Forming Part of Bid Document/ Press notice			

2. The work is situated at NABARD head office, BKC Bandra east.
3. General features and major components of the work are asunder.

Brief Details for proposed work:

The Proposed work consists of replacement of existing chiller unit of capacity 1200 TR with energy efficient VRF/VRV units. The work shall be carried out in phased manner in 5 nos. of wings spread from A to E. The scope of work consists of replacement of existing water cooled AHUs into DX AHU along with refrigerant piping, Installation of Outdoor VRF/VRV units, replacement of panel, APFC panel, electrical distribution work of Outdoor and indoor AHUs etc. Dismantling of existing 1200 TR plant including AHUs, chiller units, cooling towers, Pumps, panels, pipe lines etc. is also in the scope of work i/c dismantling and buyback of the same. After completion of original works & expiry of DLP of 1 year, CMC of 5 year of entire system is in the scope of work of contractor.

Electrical & Mechanical Works:

1. SITC of 1200 HP VRF/VRV units
2. SITC of 40 Nos various capacity DX AHUs.
3. SITC of copper refrigerant piping.
4. SITC of AHU kit & communication kit
5. Minor duct modifications & Fire damper installation.
6. Dismantling and Buyback of existing chiller unit of 1200 TR capacity.
7. SITC of main electrical panel and APFC panel.
8. Electrical work associated with AHUs & outdoor units.
9. Comprehensive Maintenance of equipments for 5 years after DLP of 1 year.

Work shall be executed according to General Conditions of Contract for Central PWD works available separately at printer's outlets. The bidder may obtain the address of the outlets from the respective Executive Engineer. The same is also available online at www.cpwd.gov.in.

SECTION – II

INFORMATION & INSTRUCTION FOR BIDDERS

1.0 General :

- 1.1 Letter of transmittal and forms for deciding eligibility are given in Section –III.
- 1.2 All information called for in the enclosed forms should be furnished against the relevant columns in the forms. If for any reason, information is furnished on a separate sheet, this fact should be mentioned against the relevant column. Even if no information is to be provided in a column, a “nil” or “no such case” entry should be made in that column. If any particulars / query is not applicable in case of the bidder, it should be stated as “not applicable”. The bidders are cautioned that not giving complete information called for in the application forms or not giving it in clear terms or making any change in the prescribed forms or deliberately suppressing the information may result in the bid being summarily disqualified. Bids made by telegram or telex and those received late will not be entertained.
- 1.3 References, information and certificates from the respective clients, certifying suitability, technical knowledge or capability of the bidder should be signed by an officer not below the rank of Executive Engineer or equivalent.
- 1.4 The bidder may furnish any additional information, which he thinks is necessary to establish his capabilities to successfully complete the envisaged work. He is, however, advised not to furnish superfluous information. No information shall be entertained after submission of eligibility criteria document unless it is called for by the Employer.
- 1.5 The bid should preferably be type written. The bidder should sign each page of the application. Overwriting should be avoided. Correction, if any, should be made by neatly crossing out, initialing, dating and rewriting. Pages of the eligibility criteria document are numbered. Additional sheets, if any added by the contractor, should also be numbered by him. They should be submitted as a package with signed letter of transmittal.

2.0 Definitions:

- 2.1 In this document the following words and expressions have the meaning hereby assigned to them.
- 2.2 Employer: Means the President of India, acting through the Executive Engineer concerned.
- 2.4 Bidder: Means the individual, proprietary firm, firm in partnership, limited company private or public or corporation. Joint ventures/Consortium/SPVs are not accepted as bidders.
- 2.5 “Year” means “Financial Year” unless stated otherwise.

3.0 Method of Application:

- 3.1 If the bidder is an individual, the application shall be signed by him above his full type-written name and current address.
- 3.2 If the bidder is a proprietary firm, the application shall be signed by the proprietor above his full typewritten name and the full name of his firm with its current address.
- 3.3 If the bidder is a firm in partnership, the application shall be signed by all the partners of the firm above their full type written names and current addresses, or, alternatively, by a partner holding power of attorney for the firm. In the latter case, a certified copy of the power of attorney should accompany the application. In both cases a certified copy of the partnership deed and current address of all the partners of the firm should accompany the application.
- 3.4 If the bidder is a limited company or a corporation, the application shall be signed by a duly authorized person holding power of attorney for signing the application accompanied by a copy of the power of attorney. The bidder should also furnish a copy of the Memorandum of Articles of Association duly attested by a Public Notary.

4.0 Final decision making authority:

The employer reserves the right to accept or reject any bid and to annul the process and reject all bids at any time, without assigning any reason or incurring any liability to the bidders.

5.0 Particulars provisional:

The particulars of the work given in Section-I are provisional. They are liable to change and must be considered only as advance information to assist the bidder.

6.0 Site visit:

The bidder is advised to visit the site of work, at his own cost, and examine it and its surroundings to himself collect all information that he considers necessary for proper assessment of the prospective assignment.

7.0 Initial Criteria for eligibility:

As specified in CPWD-6/ Information and Instructions for Bidders for e-tendering Forming Part of Bid Document/ Press notice

8.0 Evaluation Criteria:

- 8.1 The details submitted by the bidders will be evaluated in the following manner:
- 8.1.1 The initial criteria prescribed in Para 7.0 above in respect of experience of eligible similar works completed, loss, solvency/ net worth and financial turn over etc. will first be scrutinized and the bidder's eligibility for the work will be determined.
- 8.1.2 The bidders qualifying the initial criteria as set out in para 7.0 above will be evaluated for following criteria by scoring method on the basis of details furnished by them. (a) Financial strength (Form 'A' & 'B') Maximum 20 marks (b) Experience in eligible similar nature of work Maximum 20 marks during last seven years (Form 'C') (c) Performance on works (Form 'C') - Time over run Maximum 20 marks (d)

Performance on works (Form 'D'-1) - Quality Maximum 40 marks Total 100 mark
To become eligible for short listing the bidder must secure at least fifty percent marks in each (Section a, b, c & d) and sixty percent marks in aggregate.

The department, however, reserves the right to restrict the list of such qualified contractors to any number deemed suitable by it.

Note: The average value of performance of work for time over run and quality shall be taken on the basis of performance report and eligible similar works.

Evaluation of performance:

Evaluation of the performance of contractors for eligibility shall be done by NIT approving authority or a Committee constituted by him.

All the eligible similar works executed and submitted by the bidders ~~and ongoing works as well for the works with estimated cost put to tender more than 30 crores (Thirty crores)~~ shall be got inspected by a committee which may consist of client or any other authority as decided by NIT approving authority. The marks for the quality shall be given based on this inspection.

The agency shall coordinate such inspections and provide all necessary documents, information as desired by the visiting officer(s).

Scoring method of evaluation :- The scoring for evaluation mentioned in these columns shall be done as given in Proforma - I . This should be made part of the tender documents

PROFORMA - 1 CRITERIA FOR EVALUATION OF THE PERFORMANCE OF CONTRACTORS FOR PRE-ELIGIBILITY

Attribute			Evaluation				
(a)	Financial strength	(20 marks)					
	(i) Average annual turnover 16 marks	16 marks	(i) 60% marks for minimum eligibility criteria				
	(ii) Banker's Certificate	4 marks	(ii) 100% marks for twice the minimum eligibility criteria or more In between (i) & (ii) - on pro-rata basis				
(b)	Experience in similar class of works	(20 marks)	(i) 60% marks for minimum eligibility criteria (ii) 100% marks for twice the minimum eligibility criteria or more In between (i) & (ii) - on pro-rata basis				
(c)	Performance on works (time over run)	(20 marks)					
	Parameter	Calculation For points	Score Maximum Marks				
	If TOR=		1.00	2.00	3.00	>3.5	20
	(i) Without compensation	levy of	20	15	10	10	

	(ii) With levy of compensation	20	5	0	-5	
	(iii) Levy of compensation not decided	20	10	0	0	
	TOR = AT/ST, where AT= Actual Time; ST= Stipulated Time in the Agreement plus (+) justified period of Extension of Time Note: Marks for value in between the stages indicated above is to be determined by straight line variation basis.					
(d)	Performance of works (Quality) as per Assessment in Form D-1. (40 marks)					
	Completed works (max. 40 marks)	(Total marks assessed)				

9.0 Financial Information:

As specified in CPWD 6/ Information and Instructions for Bidders for e-tendering Forming Part of Bid Document/ press notice Form B-1.

10.0 Experience of similar works:

10.1 As specified in CPWD 6/ Information and Instructions for Bidders for e-tendering Forming Part of Bid Document/ press notice. Form -C

11.0 Organization Information:

Bidder is required to submit the information in respect of his organization in Form-E.

12.0 Letter of transmittal:

The bidder should submit the letter of Transmittal attached with document.

13.0 Opening of Price bid:

After evaluation of applications, a list of short listed agencies will be prepared. Thereafter, the Price bids of only the qualified and technically acceptable bidders shall be opened at the notified time, date and place in the presence of qualified bidders or their representatives.

The time and date of opening of Price bid shall be intimated to the bidders through website.

Award Criteria:

14.1 The employer reserves the right, without being liable for any damages or obligation to inform the bidder, to:

- (a) amend the scope of work and value of contract.
- (b) Reject any or all the applications without assigning any reason.

14.2 Any effort on the part of the bidder or his agent to exercise influence or to pressurize the employer would result in rejection of his bid. Canvassing of any kind is prohibited.

SECTION - III

INFORMATION REGARDING ELIGIBILITY

Receipt of Deposition of original EMD

(Receipt No..... /Date.....)

Name of Work:- “Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.”

- 1. NIT No. 09/CE/MUMBAI-II/2023-24
- 2. Estimated Cost: Rs. 10,82,37,382/-
- 3. Amount of Earnest Money Deposit: Rs. 20,82,374/-
- 4. Last date of submission of bid: 03/04/2024 upto 3.00 P.M.

(* To be filled by NIT approving authority / EE at the time of issue of NIT and uploaded along with NIT)

- 1. Name of Contractor:-.....**
- 2. Form of EMD:-.....**
- 3. Amount of Earnest Money:-.....**
- 4. Date of Submission of EMD:-.....**

(**To be filled by EMD receiving EE)

**Signature, Name and Designation
of EMD Receiving officer (EE/AE(P)/AE/AAO) along with office stamp**

LETTER OF TRANSMITTAL

From:-

To,

Executive Engineer (E)

Mumbai-III, CPWD,

Mumbai-37.

Subject: Submission of bids for the work of

“Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.”

Sir,

Having examined the details given in the bid document for the above work, I/we hereby submit the relevant information.

1. I/we hereby certify that all the statement made and information supplied in the enclosed forms, Performa set and accompanying statement are true and correct.
2. I/we have furnished all information and details necessary for eligibility and have no further pertinent information to supply.
3. I/we submit the requisite certified Solvency certificate or Net worth certificate and authorize the respective *Executive Engineer*, to approach the Bank issuing the certificate to confirm the correctness thereof. I/we also authorize the respective *Executive Engineer* to approach individuals, employers, firms and corporation to verify our competence and general reputation.
4. I/we submit the following certificates in support of our suitability, technical knowledge and capability for having successfully completed the following eligible similar works:

Sl. No.	Name of work	Amount	Certificate from
1.			
2.			
3.			

Certificate : It is certified that the information given in the enclosed eligibility bid are correct. It is also certified that I / We shall be liable to be debarred, disqualified / cancellation of enlistment in case any information furnished by me / us is found to be incorrect.

Enclosures:

Seal of bidder

Date of submission:

Signature(s) of Bidder(s).

FORM-A

FINANCIAL INFORMATION

- I. Financial Analysis – Details to be furnished duly supported by figures in balance sheet/ profit & loss account for the last five financial years duly certified by the Chartered Accountant, as submitted by the applicant to the Income Tax Department (Copies to be attached).

Note: At the time of submission of bid, scanned copy of certificate from CA to be uploaded. Further details if required may be asked from the contractor after opening of eligibility /technical bids.

Fig in lakhs Rs.

Financial Year	Particulars	
	Gross Annual Turnover on Construction Works	Profit/loss (standalone financial statement).
2018-2019		
2019-2020		
2020-2021		
2021-2022		
2022-2023		

- II. Financial arrangements for carrying out the proposed work.

Signature of Chartered Accountant with Seal

Signature of Bidder(s)

FORM - B

BANKERS' CERTIFICATE FROM A COMMERCIAL BANK

This is to certify that to the best of our knowledge and information that M/s./Sh..... having marginally noted address, as a Customer of our bank are/is respectable and can be treated as good for any engagement upto a limit of Rs..... (Rupees.....)

This certificate is issued without any guarantee or responsibility on the bank or any of the officers.

(Signature) For the Bank

NOTE

1. Bankers Certificates should be on letter head of the Bank, addressed to tendering authority.
2. In case of Partnership firm, certificate should include names of all partners as recorded with the Bank.

FORM - B1

**FORM FOR CERTIFICATE OF NETWORTH FROM CHARTERED
ACCOUNTANT**

It is to certify that as per the audited balance sheet and profit & loss account during the financial year....., the Net Worth of M/s

(Name & Registered Address of Individual/ Firm/ Company), as on(the relevant date) is Rs..... after considering all liabilities. It is further certified that the Net Worth of the company has not eroded by more than 30% in the last three years ending on (the relevant date).

Unique documents identification number (UDIN)

(Signature of Chartered Accountant)

Name of Chartered Accountant: -

Membership No. of ICAI: -

Date and Seal: -

NOTE:

1. Net Worth certificate should be on letter head of the Chartered Accountant, addressed to tendering authority (Executive Engineer(E), Mumbai-III, CPWD, 1st floor, B wing, Kendriya Sadan, Sector-7, Antop Hill, Mumbai-400037).
2. In case of partnership firm, certificate should include names of all partners as recorded with the Chartered Accountant.
3. The certificate should not be more than 6 months old.

FORM – C

**DETAILS OF ELIGIBLE SIMILAR NATURE OF WORKS COMPLETED
DURING THE LAST SEVEN YEARS ENDING PREVIOUS DAY OF LAST DAY
OF SUBMISSION OF TENDER**

Sl. No	Name of work/project and Location	Owner or sponsoring Organization	Cost of work in Crores of rupees	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Litigation / arbitration cases pending / in progress with details*	Name and address (Postal & email)/ telephone no of officer to whom reference may be made	Whether the work was done on back to back basis Yes/No
1	2	3	4	5	6	7	8	9	10

*Indicate gross amount claimed and amount awarded by the Arbitrator.

**SIGNATURE OF BIDDER(s)
(With Stamp)**

FORM-D

PERFORMANCE REPORT OF WORKS REFERRED TO IN FORMS‘C’

1. Name of Work / Project and Location:
 - a) Whether the work executed with Internal & External electrical installations
:-(Yes/No)
 - b) Whether the work executed with HVAC system-
:- (Yes/No)
 - m) Whether works mentioned in “Name of work/Project”
above is included in scope of main work :- (Yes/No)
2. Agreement No.
3. Estimated Cost:
4. Tendered Cost:
5. Date of start:
6. Date of completion:
 - i) Stipulated date of completion:
 - ii) Actual date of completion:
7. Amount of compensation levied for delayed completion, if any
 - a) Whether case of levy of compensation for delay has been decided or not
:- Yes/No
 - b) If decided, amount of compensation levied for delayed completion, if any
8. Amount of reduced rate items, if any
9. Performance Report:

(i)	Quality of Work	:	Outstanding/Very Good/Good/Poor
(ii)	Financial Soundness	:	Outstanding/Very Good/Good/Poor
(iii)	Technical Proficiency	:	Outstanding/Very Good/Good/Poor
(iv)	Resourcefulness	:	Outstanding/Very Good/Good/Poor
(v)	General behaviour	:	Outstanding/Very Good/Good/Poor

Dated:

Executive Engineer or Equivalent with stamp

Note: The performance report should be certified by an officer not below the rank of EXECUTIVE ENGINEER or equivalent.

**ASSESSMENT OF QUALITY FOR COMPLETED WORKS REFERRED IN
FORM-C**

Name of Work :-

Date of Inspection :-

Date of submission of report :-

A. General Observation & Operational Aspects		Max marks	Marks obtained
1.	VRV/VRF outdoor unit works.	45	
2.	AHUs/indoor unit works	30	
3.	Copper piping, jointing, ducting works	15	
4.	Electrical and allied works	10	

Note :-

1. All the above parameters (Sr. No. 1 to 4) may be considered for assessing the overall quality of work executed by the contractor.
2. In case, any attribute is not applicable, the same may not be included in assessment and mentioned are not applicable (N/A)
3. In individual parameter marks obtained should be 60% and in aggregate marks obtained should be 70%. Percentage will be taken for marked parts only & shall be worked out of 100 marks accordingly.

STRUCTURE AND ORGANISATION

1. Name and address of the bidder
2. Telephone no./Telex no./Fax no.
3. Legal status of the bidder (Scan & Upload copies of original document defining the legal status)
 - (a) An individual
 - (b) A proprietary Firm
 - (c) A firm in Partnership
 - (d) A limited company or Corporation
4. Particulars of registration with various Government Bodies (Scan & Upload Attested Photocopy)

	Organization/Place of Registration	Registration No.
1		
2		

5. Names and titles of Directors and Officers with designation to be concerned with this work
6. Designation of individuals authorized to act for the organization.
7. Has the bidder, or any constituent partner in case of partnership firm, Limited Company/Joint Venture, ever been convicted by the court of law? If so, give details.
8. In which field of Engineering Construction, the bidder has specialization and interest?
9. Any other information considered necessary but not included above.

Signature of Bidder(s) with stamp

PROFORMA OF AFFIDAVIT FOR NON - BLACK LISTING

I/we undertake and confirm that our firm/partnership firm has not been blacklisted by any state/Central Departments/PSUs/Autonomous bodies during the last 7 (seven) years of its operations. Further that, if such information comes to the notice of the department then I/we shall be debarred for bidding in CPWD in future forever. Also, if such an information comes to the notice of department on any day before date of start of work, the Engineer-in-charge shall be free to cancel the agreement and to take further necessary action as prescribed in the document.

(Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid)

NOTE: Affidavit to be furnished on a 'Non-Judicial' stamp paper worth Rs.100/-

Signature of Notary with seal

Signature of Bidder(s) or an authorized Officer of the firm with stamp

MANUFACTURER UNDERTAKING/AUTHORIZATION CERTIFICATE

To,
The Executive Engineer (E),
Mumbai-III, CPWD,
Mumbai-37.

Name of work: **Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.**

NIT No. 09 /CE/Mumbai-II/2023-24

Dear Sir,

We,(Name of OEM) having registered office atwho are established and OEM of(Name of equipment) which are being offered for the above project having production facilities at.....(Place) do hereby authorize M/s. (Name of bidder) to submit a bid and subsequently negotiate and sign the Contract with you against above NIT including the above equipment, goods produced by us and hardware, software if any, provided by us. We hereby unconditionally support the bidder technically throughout the execution of contract, attend manufacturing defect and subsequent Comprehensive Maintenance Contract period of five years and we shall provide all the genuine spares required for healthy functioning of the equipment and other equipment supplied by us for a period of at least seven years including the software updates and upgrades if any, as per terms & conditions of the above NIT. We duly authorize the said Bidder to act on our behalf in fulfilling the obligations under the NIT.

We also under take that in case of default in execution of this tender by the.....(Name of Bidder), the..... (Name of OEM) will take all necessary steps to provide service support for our equipment as per tender terms.

For and on behalf of the OEM

Signed:_____

Date:_____ In the capacity of _____ (and this should be signed by a person having the power of attorney to legally bind the manufacturer).

Date:.....

Place:.....

(Designation).....

(Company Seal).....

Note 1. The letter of Authorization Certificate should be on the letterhead of the OEM (Original Equipment Manufacturer) and should be signed by a person competent and having Power of Attorney to legally bind the Manufacturer.

Counter Signature by.

Major contractor with stamp

Proforma- 5

**PROFORMA OF AFFIDAVIT FOR EXECUTION OF SIMILAR WORKS
[As per clause 1.2.3 of CPWD-6]**

I/We undertake and confirm that eligible similar works(s) has/have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for bidding in CPWD in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Performance Guarantee. (Scanned copy to be uploaded at the time of submission of bid)

NOTE: Affidavit to be furnished on a 'Non-Judicial' stamp paper worth Rs.100/-

Signature of Bidder(s) or an authorized
Officer of the firm with stamp

Signature of Notary with seal

UNDERTAKING FOR GST REGISTRATION

“If work is awarded to me, I/we shall obtain GST registration Certificate as applicable within one month from the date of receipt of award letter or before release of any payment by CPWD, whichever is earlier, failing which I/we shall be responsible for any delay in payments which will be due towards me/us on account of the work executed and/or for any action taken by CPWD or GST department in this regard.”

Signature of Bidder(s) with stamp

Note : The undertaking should on the letterhead of the bidder.

Proforma for Calculation of bidding capacity

The bidding capacity of the contractor should be equal to or more than the estimated cost of the work put to tender.

The bidding capacity shall be worked out by the following formula:

$$\text{Bidding Capacity} = \{[AxNx1.5]-B\}$$

Where,

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

N= Number of years prescribed for completion of work for which bids has been invited. When the value of N is less than 0.5 year then for calculation purpose minimum value of N shall be taken as 0.5.

B= Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited less amount of works which are stuck up due to local body clearance, environmental clearance, court decisions etc. shall not be considered for calculation of B.

A=

N=

B=

$$\text{Bidding capacity} = \{[AxNx1.5]-B\}$$

=

Note: Bidder to upload all supporting documents for above.

FORM OF SUPPLEMENTARY AGREEMENT

This Agreement made this day the between hereinafter called the First Party which expression shall include his heirs, executors and administrators/their successors and assigns and the President of India, hereinafter called the Second Party, which expression shall include his successors and assigns, shown as under :

- (1) That this Agreement shall be called as Supplementary Agreement to the Agreement No.relating to the Name of work entered into by the parties to this Agreement.
- (2) That WHEREAS the First Party has substantially completed the execution of the work described in and covered by the Agreement No.....except the items mentioned in the Schedule annexed to this Agreement and whereas the items of the work mentioned in the Schedule annexed to this agreement ~~cannot now be executed on account of non completion of the sanitary work, electric installation and some other work~~ pertains to and comprehensive maintenance for 5 years; and whereas both the parties are desirous that the items mentioned in the Schedule annexed to this Agreement should be executed by the First Party ~~after the completion of the sanitary work, electric installation and some other work~~ separately, it is hereby further agreed as under :
 - (a) That First Party shall and will execute the work covered by the items mentioned in the Schedule annexed to this Agreement at the rates and as per the terms and conditions of the original Agreement No.whatsoever called upon to do so by the Engineer-in-Charge, within ~~a period of one year from the date hereof~~ specified period.
 - (b) That the First Party shall have absolutely no claim of whatsoever nature against the Second Party for doing the work mentioned in the Schedule annexed to this Agreement as required under clause (a) above, except that which he would be entitled to under the original Agreement No.
 - (c) That the First Party shall have to execute all the items which the Engineer-in-charge consider necessary.
 - (d) That the First Party shall start with the work of the remaining items mentioned in the Schedule annexed to this Agreement within..... days from.....on the receipt of a letter to the effect from the Engineer-in-Charge or from any date fixed in the said letter and shall complete the said work within the time fixed by the Engineer-in-Charge or as extended by him from time to time.
 - (e) That on the due execution and completion of this Agreement by the parties, the bill of the First Party in relation to the work already done by him under the Original Agreement No. shall be provisionally finalized by the Second Party and payment on account, if any amount due, shall be made to the First Party provided that the Second Party shall have a right to retain such amount as

is considered reasonable by him as a security for the execution of the work mentioned in the Schedule annexed to this Agreement and the Second Party shall have right to deal with the said amount of security as he thinks proper under the terms and conditions of the Original Agreement. Further, on the due execution and original completion of this Agreement, the First Party shall be entitled to claim back his security deposit relating to the work in question, subject to the right of the Second Party to retain such amount as he thinks reasonable as mentioned above soon after the maintenance period of one year mentioned in clause of the Original Agreement, is over.

- (f) That the final bill relating to the entire work under the two agreements shall be prepared after the completion of the entire work covered by Agreement No..... and this Agreement, except as modified by this Agreement, the said Agreement No.....shall remain in full force and effect.

IN WITNESS WHEREOF THE ABOVE MENTIONED PARTIES HAVE PUT THEIR SIGNATURE ONTHIS DAY THE _____

Proforma – C

On non-judicial stamp paper on minimum Rs.100/-

(Guarantee offered by Bank to CPWD in connection with the execution of contracts)

Form of Bank Guarantee for Earnest Money Deposit/ Performance Guarantee/ Security Deposit/ Mobilization Advance

1. Whereas the Executive Engineer (name of division)....., CPWD on behalf of the President of India (hereinafter called "The Government") has invited bids under(NIT number) dated.....For.....
(name of work) The Government has further agreed to accept irrevocable Bank Guarantee for Rs..... (Rupees.....only) valid upto.....(date)*as **Earnest Money Deposit** from.....(name and address of contractor)(hereinafter called "the contractor") for compliance of his obligations in accordance with the terms and conditions of the said NIT.

OR**

Whereas the Executive Engineer.....(name of division).....CPWD on behalf of the President of India (hereinafter called "The Government") has entered into an agreement bearing number.....with(name and address of the contractor).....(hereinafter called "the Contractor") for execution of work(name of work).....

The Government has further agreed to accept an irrevocable Bank Guarantee for Rs.....(Rupees..... Only) valid upto (date)as **Performance Guarantee / Security Deposit / Mobilization Advance** from the said Contractor for compliance of his obligations in accordance with the terms and conditions of the agreement.

2. We,.....(indicate the name of the bank)(hereinafter referred to as "the Bank"), hereby undertake to pay to the Government a amount not exceeding Rs. (Rupees.....only) on demand by the Government within 10 days of the demand.

3. We,..... (indicate the name of the Bank), do here by undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.....(Rupees.....only).

4. We,(indicate the name of the Bank), further undertake to pay the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceeding pending before any Court or Tribunal, our liability under this Bank Guarantee being absolute and unequivocal. The payment so made by us under this bank guarantee shall be a valid discharge of our liability for payment there under and the Contractor shall have no claim against us for making such payment.

5. We, (indicate the name of the Bank), further agree that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligation here under to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor or for any forbearance, act of omission on the part of the Government or any indulgence by the

Government to the said Contractor or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. We,(indicate the name of the Bank), further agree that the Government at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor at the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee the Government may have in relation to the Contractor's liabilities.
7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.
8. We, (indicate the name of the Bank), undertake not to revoke this guarantee except with the consent of the Government in writing.
9. This Bank Guarantee shall be valid up tounless extended on demand by the Government. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs.(Rupees only)and unless a claim in writing is lodged with us within the date of expiry or extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Date

Witnesses:

- | | |
|---------------------------------------|--|
| 1. Signature.....
Name and address | Authorized signatory
Name

Designation
Staff code no.
Bank seal |
|---------------------------------------|--|

2. Signature.....

Name and address

***Date to be worked out on the basis of validity period of 90 days where only financial bids are invited and 180 days for two/three bid system from the date of submission of tender.**

**In paragraph 1, strike out the portion not applicable. Bank Guarantee will be made either for earnest money *or* for performance guarantee/ security deposit/ mobilization advance, as the case may be.

**GOVERNMENT OF INDIA
CENTRAL PUBLIC WORKS DEPARTMENT**

State: Maharashtra
Branch: E&M

Division: EE(E),Mumbai-III
ZONE: CE, Mumbai-II

PERCENTAGE RATE TENDER & CONTRACT FOR WORKS

**Tender for the work of: Replacement of existing chiller plant with latest VRV/
VRF unit alongwith comprehensive Maintenance of
VRV/VRF Units for 5 years at NABARD, BKC,
Bandra East, Mumbai.**

To be uploaded by **3.00 P.M. on 03/04/2024** at www.tenderwizard.com/cpwd.

- (i) To be opened in presence of tenderers who may be present at **3.30 P.M. on 03/04/2024** in the office of Executive Engineer (E), Mumbai III, CPWD, Antop Hill, Mumbai-37.

*** To be filled by the Executive Engineer**

TENDER

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

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

I/We agree to keep the tender open for thirty (30) days from the due date of opening in case of single bid system / seventy five (75) days from the date of opening of Technical BID incase tenders are invited on 2/3 bid system for specialized work and not to make any modification in its terms and conditions.

~~A sum of Rs...../ is hereby forwarded in cash / receipt treasury Challan / deposit at all receipt of a scheduled bank / fixed deposit receipt of a scheduled bank / fixed deposit receipt of scheduled bank / demand draft of a scheduled bank / bank guarantee issued by a scheduled bank as earnest money.~~

~~A copy of earnest money in receipt treasury challan/deposit at call receipt of a scheduled bank/fixed deposit receipt of scheduled bank/demand draft of a scheduled bank/bank guarantee issued by a scheduled bank is scanned and uploaded (strike out as the case may be). If I/We, fail to furnish the prescribed performance guarantee within prescribed period, I/We agree that the said President of India or his successors, in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I/We fail to commence work as specified, I/We agree that President of India or the successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said the performance guarantee absolutely. The said Performance Guarantee shall be a guarantee to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form.~~

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

The proforma of EMD Declaration duly filled in and signed by the authorized signatory is uploaded to the e-tendering website within the period of bid submission.

If I/We, fail to furnish the prescribed performance guarantee within prescribed period, I/We agree that the said President of India or his successors, in office shall without prejudice to any other right or remedy, be at liberty to suspend me/us for one year from the date of issue of suspension order.

Further, if I/We fail to commence work as specified, I/We agree that President of India or the successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said the performance guarantee absolutely. The said Performance Guarantee shall be a guarantee to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form.

Further, I/We agree that in case of forfeiture of Performance Guarantee as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work and also be suspended for one year from the date of issue of suspension order.

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

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

Dated.....	X	Signature of contractor.....	X
Witness.....	X	Postal Address.....	X
Address.....	X	Telephone No.....	X
Occupation.....	X	Fax	X
Telephone No.....	X	E-mail	X

X To be filled by contractor.

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 President of India for a sum of Rs.....* /-.
(Rupees.....*.....
.....)

The letters referred to below shall form part of this contract agreement.

- a).....*
- b).....*
- c).....*

For & on behalf of the President of India
Signature.....
Designation.....

Dated:
(* To be filled by Executive Engineer

PROFORMA OF SCHEDULES

SCHEDULE 'A'

Schedule of quantities	:	Enclosed
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SCHEDULE 'D'

Extra schedule for specific requirement/ document for the work, if any	:	Enclosed
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SCHEDULE 'E'

Reference to General Conditions of contract	:	General Conditions of Contract 2023 Maintenance works modified & corrected upto previous day of last day of submission of tender
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**Name of Work: Replacement of existing chiller plant with latest VRV/ VRF unit
alongwith comprehensive Maintenance of VRV/VRF Units for 5
years at NABARD, BKC, Bandra East, Mumbai.**

Estimated cost of work	:	Rs.10,82,37,382/-
E & M Components (SITC of VRV / VRF Units)	:	Rs.6,98,11,284/-
Civil components	:	--
Comprehensive maintenance	:	Rs. 3,84,26,098/-
Earnest money	:	Rs. 20,82,374/-
Performance Guarantee	:	5% of tendered value
Security Deposit	:	2.5% of tendered value

SCHEDULE “F”
(GENERAL RULES & DIRECTIONS)

Definitions:

2(vi)	Engineer-in-Charge	1) Executive Engineer(E), Mumbai-III, CPWD, Mumbai-400 037
2(vii)	Director General/ CPWD Directorate	CPWD Directorate includes Director General/Special Director General/ Additional Director General/CPM/CA/ Chief Engineer/CE-ED/PM/SE/SE-PD/Director (Horticulture)
	Successor	Any authority as notified by the CPWD Directorate before, during and after execution of work/ agreement.
2(viii)	Accepting Authority	Chief Engineer or any other Authority as decided by CPWD Directorate
2(x)	Percentage rate on cost of materials and labour to cover all overheads and profits.	15%
2(x)	Standard Schedule of Rates	DSR (E&M)2022& DSR for VRV/VRF-2019 modified & corrected upto last date of receipt of tender / market rate.
2(xi)	Department	Central Public Works Department (CPWD)
9(ii)	Standard CPWD Contract forms GCC 2020, CPWDForm7 /8 as modified & corrected upto	GCC Maintenance work 2023 , CPWD Form 7 as modified & corrected up to previous day of the last date of submission of the tender.

Clause 1

(i)	Time allowed for submission of Performance Guarantee, Programme Chart (Time and Progress) and applicable labour licenses, registration with EPFO, ESIC	7 (Seven) days
(ii)	Maximum allowable extension with late fee @0.1% per day of Performance Guarantee amount beyond the period provided in (i) above	3 (Three) days

Clause 2

Authority for fixing compensation under clause 2	:	Chief Engineer or any other Authority as decided by CPWD Directorate
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Clause 5

Number of days from the date of issue of letter of acceptance for reckoning date of start	:	10 (Ten) days (OR) Date of handing over of site which is later.
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Milestone(s) as per table given below:

Sl. No.	Description of Milestone (Physical)	Time allowed in months (from date of start)	Amount to be with-held in case of non-achievement of each of the mile stone (% of tendered amount of Civil/Electrical component)
1	i) Submission of method statement, layout drawings, all equipment details, technical submission along with drawings for E&M services for approval HVAC system etc. ii) After Technical approval of equipments and order, delivery schedule with tentative date of delivery shall be submitted. iii) Dismantling of existing system as required.	1.5 month	0.5%
2	Supply of material of VRF/VRV system for Phase -A (capacity – 600 HP) including AHUs, piping etc. as required.	3.5 months	1 %
3	Installation, Testing and commissioning of VRV / VRF system as per the feasibility at site in phase-A	4.5 Months	1%
4	Supply of material of VRF/VRV system for Phase -B (remaining capacity) including AHUs, piping, electric panel etc. as required.	5 months	1 %
5	Installation, Testing and commissioning of VRV / VRF system as per the feasibility at site in phase-B including electric panel	7 months	1 %
6	Handing over of complete plant	8 months	0.5 %

Time allowed for execution of work	:	08 (Eight) Months
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Authority to decide:		
(i)	Authority to convey the decision of shifting of mile stone and extension of time	: Executive Engineer of major component or any other Authority as decided by CPWD Directorate
(ii)	Authority to decide Rescheduling of mile stone and Extension of time	: Chief Engineer or any other Authority as decided by CPWD Directorate
(iii)	Shifting of date of start in case of delay in handing over of site	: Chief Engineer or any other Authority as decided by CPWD Directorate

PROFORMA OF SCHEDULES Clause 5 schedule of handing over of site.

Part	Portion of site	Description	Time period for handing over reckoned from date of issue of letter of intent/acceptance
Part A	Portion without any hindrance	Full site for the work is available in phased manner.	
Part B	Portions with encumbrances		
Part C	Portions dependent on work of other agencies		

Clause 6

Computerized Measure Book (CMB) / Electronic Measurement Book (EMB) Mode of Measurement:	EMB through CPWD ERP Portal
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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.	: Rs.50 Lakhs for original work and for CMC in minimum 3 months period.
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Clause 7A

Whether Clause 7A shall be applicable	: Yes No running account bill shall be paid for the work till the applicable labour licenses, registration with GST, EPFO. ESIC, whatever applicable are submitted by the contractor to the Engineer-in-charge.
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Clause 10 A

List of testing equipment to be provided by the contractor at site lab	:	As per decision of Engineer-in-charge
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Clause 10B(ii)

Whether clause 10B (ii) shall be re applicable	:	No
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Clause 10C

Not Applicable

Clause 10CC

Not Applicable

Clause – 11

Specifications to be followed for execution of work	:	CPWD Specifications for: i. CPWD General Specifications for Electrical Works Part I Internal-2023 ii. CPWD General Specifications for Electrical Works Part II External-2023 iii. CPWD General Specifications for HVAC works. All modified & corrected by way of issue of modifications by CPWD upto last date of receipt of tender

Clause16

Competent Authority for deciding reduced rates.	:	Chief Engineer or any other Authority as decided by CPWD Directorate
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Clause 18

List of mandatory machinery, tools & plants to be deployed by the contractor at site	:	As per requirement of work at site as per decision of Engineer-in-charge.
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Clause 19C, 19D, 19G &19K

Authority to decide penalty for each default	:	1) Executive Engineer(E), Mumbai-III, CPWD, Mumbai-400 037
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Clause 25

Conciliator	Special Director General (Mumbai), CPWD, Mumbai or his successor
Arbitrator Appointing Authority	Chief Engineer (Mumbai-II), CPWD. Mumbai or his successor
Place of Arbitration	Mumbai or as decided by Learned Arbitrator and the parties

Clause 32

Requirement of technical representative(s)& recovery rate

Sl. No.	Qualification	Number	Minimum Experience in years	Designation	Rate of which recovery shall be made from the contractor in the event of not fulfilling
1	Graduate Engineer	1	5 (and having experience of one similar nature of work)	Project Manager	Rs.40,000/- Per month
2	Graduate Engineer or Diploma Engineer	1	2 or 5 years respectively	Project Planning/ quality/billing Engineer	Rs.30,000/- Per month per person

1. Assistant Engineers retired from Government services that are holding Diploma will be treated at par with Graduate Engineers.

Diploma holder with minimum 10 year relevant experience with a reputed construction co. can be treated at par with Graduate Engineers for the purpose of such deployment subject to the condition that such diploma holders should not exceed 50% of requirement of degree engineers.

2. The above given strength shall be required to be deployed as and when necessity arises at site or so directed by Engineer-in-charge.
3. The Tenderer shall submit a certificate of employment of the technical representative (s) (in the form of copy of Form -16 or CPF deduction issued to the Engineers employed by him) along with every account bill/final bill and shall produce evidence of regular physical availability of such engineers on the above project at any times if so required by the Engineer-in-charge.
4. The Recovery on account of non-deployment of technical staff shall be made by the Engineer in Charge of the respective Discipline / Component.

PART - B

ELECTRICAL & MECHANICAL
PORTION

PART-I : ELECTRICAL & MECHANICAL SERVICES

GENERAL TERMS AND CONDITIONS

1. The work shall be generally carried out in accordance with tender specifications and the following specifications /rules with up to date amendments.
 - i. CPWD General Specifications for Electrical work Part-I (Internal)-2023
 - ii. CPWD General Specifications for Electrical work Part-II (External)-2023
 - iii. CPWD General Specifications for Electrical work Part-IV (Substation)-2013
 - iv. CPWD General Specifications for HVAC Works-2017 all above modified & corrected upto last date of receipt of tender
 - v. Commercial and Additional conditions for this work.
 - vi. The Indian Electricity Act, 2003, as amended upto date.
 - vii. Indian Electricity Rules 1956 amended upto date.
 - viii. Local Fire Regulations, National electrical code 2011 amended up to date and Relevant sections of relevant IS codes of latest edition and CPWD special publications available on CPWD website. (Note: The higher specifications/ stringent conditions of CPWD specifications or NBC-2018 shall be followed). Relevant BIS standards as modified up to date.
2. Interpreting Specifications:

In the case of discrepancy between the Schedule of Quantities, the Specifications and / or the Drawings, the following order of preference shall be observed: -

 - i. Description of Schedule of Quantities.
 - ii. Particular Technical Specification and Special Condition, if any.
 - iii. Commercial and Additional conditions or this work.
 - iv. Drawings.
 - v. CPWD Specifications
 - vi. Indian Standard Specifications of B.I.S. OR other International code in case IS code is not available.

However, nothing extra shall be paid on account of these, as the same are to be read along with schedule of quantities for the work.
3. If there are varying or conflicting provisions made in any one document forming part of the contract, the Accepting Authority shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the contractor.

Any error in description, quantity or rate in Schedule of Quantities or any omission there from shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the works comprised therein according to drawings and specifications or from any of his obligations under the contract.

4. Commercial and Additional condition so that particular work are to be read in conjunction with above and in case of variations, specifications given in these additional conditions shall apply. However, nothing extra shall be paid on account of these additional specifications and conditions, as the same are to be read along with schedule of quantities for the work.
5. Agency has to prior to their own design parameters before approval of TDS, CPWD does not have any Auto CAD liasing agency shall submit detailed heat load calculation, design of refrigerant circuit, VRV / VRF placement, piping design, AHU capacity and their electrical distribution design before TDS approval. Dismantling of existing system will be done in phased manner as the building is functional.
6. **The VRV/VRF system shall be separate for each wing in NABARD Building.**
7. **For executing electrical component of work (Item No. 22 to 30 of BOQ) the successful bidder either should have electrical contractors license himself or he will have to associate an agency having valid electrical contractors license issued by competent authority and valid in the state of Maharashtra. He has to submit consent letter from electrical associate agency and MOU signed with agency on the prescribed performas. Details of such agency(s) alongwith consent letter from the electrical agency (both in prescribed performa) will have to be submitted to the Executive Engineer within 30 days from the date of issue of award letter or within 15 days before scheduled start of such component of work, whichever is earlier.**
8. After approval of Associate electrical agency(s) by Engineer-in-charge, the main contractor has to enter into MoU with agency(s) associated by him. Copy of such MoU shall be submitted to EE in charge. In case of change of associate contractor, the main agency(s) has to enter into MoU/agreement with the new contractor associated by him. The MoU (as per prescribed proforma) shall be in shape of affidavit on stamp paper duly attested by Notary in original within 5 (Five) days after issue of approval letter (for Associate electrical Agency). The MoU shall be signed by both the parties i.e. Main Contractor as 1st party and Associated electrical Agency as 2nd party, independently for electrical work.

COMMERCIAL AND ADDITIONAL CONDITIONS

1. This specification covers manufacture, testing as may be necessary before dispatch, delivery at site, all preparatory work, assembly and installation, commissioning putting in to operation of equipment of all E & M components of the tender.
2. The Tenderer may, before submission of the tender, must study various CPWD specifications; get themselves acquainted with site and site conditions. The department shall not bear responsibility for the lack of knowledge and also the consequences thereof to the Contractor. The information and data shown in the drawings and mentioned in the tender document have been furnished in good faith and for general information and guidance only. The Engineer-in-Charge in no case shall be held responsible for the accuracy thereof and / or interpretations or conclusions drawn there from by the Contractor and all consequences shall be borne by the Contractor and no claim, whatsoever, shall be entertained from the Contractor, if the data or information furnished in tender document is different from data / drawing for actual construction issued after the award of work or incorrect otherwise. It is presumed that the Contractor has satisfied himself for all possible contingencies, situations, bottlenecks and acts of coordination, which may be required between different agencies.
3. Before commencing the work, the Contractor shall, without in any way limiting his obligations and liabilities, insure at his own cost and expense against any damage or loss or injury, which may be caused to any person or property. Nothing extra shall be payable on this account.
4. There is space constrain for providing new E&M equipment. New equipment is to be provided in the Ground floor area by dismantling some of the existing equipments. The dismantling of old equipments is to be meticulously planned and new equipment is to be procured in time before dismantling. The dismantling of existing equipments will be in stages and some equipment is to be dismantled after installing new equipment and making necessary connections. The entire process is to be planned in such a way that no interruption shall be caused to existing NABARD. The work will be carried out with least disturbance during shifting and dismantling of equipments & shut down taken in consultation with the client department as the work is to be executed in a operational Data centre.
5. **INSPECTION OF SITE**
The Contractors should in his own interest visit the site, inspect and examine the site and its surroundings, get familiarize with the site conditions before tendering and satisfy themselves with the nature of site, the means of access to the site, the constraints of space for stacking material / machinery, labour etc., constraints put by local regulations, if any, weather conditions at site, general ground / subsoil conditions etc. or any other circumstances which may affect or influence their tenders. The site is available for work. The contractor shall, immediately on issue of letter of acceptance of tender, make arrangements for starting the work.

6. COMMERCIAL CONDITIONS

Type of Contract: The work to be awarded by this tender shall be treated as indivisible works contract. Income tax, GST, labour cess & other statutory deductions etc. shall be made at source as per the prevalent laws. The deductions of Security Deposit, Income Tax, Labour Cess etc. shall be done as applicable on the gross payment and net payment shall be paid accordingly.

7. RATES

The rates quoted by the tenderer, shall for complete items of works, firm and inclusive of all taxes (including GST, labour cess etc.,) duties and levies, all charges for items contingent to the work such as for packing, forwarding, insurance, freight and delivery, installation, testing, commissioning etc. at site including temporary construction of storage, equipments required for temporary power connections, risks, over head charges, general liabilities/obligations and clearance from CEA, local power supply company, local bodies, Fire authorities. However, the statutory fees for the inspections/approvals/NOC from CEA, local power supply company MSEDCL, Fire authorities shall be reimbursed by the department.

The clause 12.4 of the general condition of contract GCC maintenance work 2023 stipulates as under which is brought into the knowledge of the contractor:

The cost of any operation necessarily in contemplation of tenderer while quoting tender or necessary or incidental to proper execution of an item of work included in the Schedule of Quantities or in the Schedule of Rates mentioned in Schedule F, whether or not specifically indicated in the description of the item and the relevant specifications, shall be deemed to be included in the rates quoted by the tenderer or the rate given in the said Schedule of Rates, as the case may be. Nothing extra shall be admissible for such operations.

8. FACILITIES FOR THE DEPARTMENT:

The Contractor shall provide, construct and maintain at all times during execution and till the completion of work, a temporary site office with adequate furniture, electric light fittings, A.C., fans, electric/ power points, switches etc at his own cost for exclusive use of Engineer-in-Charge and his authorized representatives. The rates quoted by the Contractor shall be inclusive of providing and maintaining such facilities and nothing extra shall be payable on this account.

The contractor shall also provide an office boy to assist in day to day work at complete disposal of Engineer in charge or his authorized representative.

9. ~~In case of Specialized E&M original Works and other original E&M works, wherever required, that the lowest tenderer should submit an undertaking from the OEM for the specialized work particular minor component~~

~~a. — Authorization certificate.~~

- ~~b. The OEM is unconditionally support the lowest tenderer technically through out the execution of contract as well as for Maintenance/Comprehensive Maintenance Contract for the useful life of the system, and~~
- ~~c. OEM is provide all the spares required for healthy functioning of the equipment for atleast even years from the date of supply of equipment.~~

10. Unless otherwise provided in the Schedule of Quantities, the rates quoted by the Contractor shall be inclusive of carrying out the works at and / or upto all heights, lifts, leads and depths. The contractor shall make all arrangements for the same. Nothing extra shall be payable on this account.
- The tenderer shall take into account the element of wastage(s) those are likely to be there in all elements of the work and quote his price, taking that into account. The tenderer shall study all the items from the point of view of wastage(s), which are likely to take place as the work is to be executed in a working office. Nothing extra shall be payable on this account.
11. Insurance and Storage:
All consignments are to be duly insured up to the destination from warehouse to warehouse at the cost of the supplier. The insurance covers shall be valid till the equipments is handed over duly installed, tested and commissioned.
12. The contractor shall ensure quality construction in a planned and time bound manner. Any sub-standard material or work beyond set out tolerance limits shall be summarily rejected by the Engineer-in-charge.

The work is to be carried out in workman like manner and generally in accordance with the plans. However, the contractor will be bound to carry out the work with minor deviation over the plan supplied if desired by the Engineer-in-Charge of the work.

All ancillary and incidental facilities required for execution of work like labour camp, stores fabrication yard, site offices for Contractor/CPWD staff, watch and ward, temporary ramp, temporary structure for plants and machineries, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates/clearances, completion certificates from local bodies etc., protection works, barricading, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts. All incidental charges of any kind including cartage, storage, wastage and safe custody of material etc. shall be the sole responsibility of the Contractor & shall be borne by him and no claim whatsoever shall be entertained on this account.

The contractor shall give due notices to Municipality/Corporation, Police and/or other authorities that may be required under the laws/rules under force and obtain all requisite permissions/licenses for temporary obstructions/enclosures and pay all charges which may be levied on account of his execution of the work under the agreement. Nothing extra shall be payable on this account.

13. The Contractor shall prepare the programme chart for the execution of the work showing clearly all activities from the start of work to the completion, with details of requirements of materials, man power, equipments and machinery deployment, required for the completion of the work within the stipulated period and submit the same to the Engineer-in-Charge, as prescribed, after award of work. The Contractor shall also submit monthly programme and progress reports and update/re-schedule the same every month. These shall be submitted by the contractor in soft copy also besides forwarding hard copy of the same.

14. The contractor shall coordinate with local bodies/licensing authorities/supply company etc for getting approvals/clearances and shall submit necessary documents required for the same. No extra payment shall be made for the same. However statutory charges for such approvals/clearances shall be reimbursed by the department.

15. COMPLETENESS OF TENDER

All sundry equipment, fittings, unit assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections, and all other items which are useful and necessary for efficient assembly and installation of equipment 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 documents or not.

16. STORAGE AND CUSTODY OF MATERIALS

The contractor shall make his own arrangements for storage of materials. The contractor shall be responsible for the safe custody of the electrical installation in the building, including fitting, fixtures and equipments till the installations handed over to the client/department. No storage accommodation shall be provided by the department. He should make his own arrangement for proper watch and ward, safe custody of the site/property/material provided by him and materials issued by the department against pilferage and breakage during the period of execution and thereafter till the work is completed and physically handed over to the client/department at his risk and cost. No claim will be entertained on this account.

17. CARE OF THE BUILDING:

Care shall be taken by the contractor while handling and installing the various equipments and components of the work to avoid damage to the building/existing equipments. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of the installation from the site of work.

The contractor or his representative, labour should not remove / disturb/ dislocate the existing equipments and its parts from its positions until and unless it is authorized by the Engineer-in-charge. Care shall be taken not to damage the Civil / Electrical installation by improper handling etc. The contractor shall be responsible for any damage on account of negligence of the contractor's staff, the same will have to be made good at contractor's own cost. He shall also remove at his cost all unwanted and waste materials arising out of the maintenance from the site of work. Nothing extra shall be paid on this account.

18. APPROVAL OF MATERIALS, SHOP FLOOR DRAWINGS AND COMMENCEMENT OF WORK

The design layout plans / drawings / other documents pertaining to E & M services shall have to be submitted for approval and got checked within the time period as specified in the table of mile stone. Within 15 days of award of work the contractor shall visit the site and submit following documents for approval.

1. List of makes & Model numbers of all items and/or equipments and accessories offered for all packages.
2. Catalogues of the equipments to be supplied, detailed technical literature, specifications, pamphlets and performance data for appraisal and evaluation.
3. Shop floor drawings of each package separately for approval. It is the responsibility of the tenderer to get the makes, models and shop floor drawings approved by the department.
4. All general arrangement drawings.
5. Any other drawing/information not specifically mentioned above but deemed to be necessary for the job by the contractor.

All materials equivalent to the one specified should be got approved by the Engineer-in-charge before using the said materials in the work.

The Engineer-in-charge shall scrutinize the proposal and approve the makes and models which are acceptable as per the schedule, specifications, conditions of the agreement and inform the agency for procurement.

After approval of the equipment/materials by the department the agency shall procure the equipment/materials from the OEM/authorized distributor/dealer as the case may be.

Adequate care that only tested and genuine materials of proper quality are used in work shall be ensured by firm. The firm shall also ensure that:

- i) Material will be ordered & delivered at site only with the prior approval of the department to ensure timely delivery.
- ii) The firm will be required to procure material directly from the manufacturer/authorized dealers to ensure genuineness & quality and as per the approved makes only. Proof in this regard shall be submitted by the contractor if required by the department.

Year of manufacturing of all equipments/fittings/cables shall be current.

The successful tenderer should also furnish well in advance three copies of detailed instructions and manuals of manufactures for all items and/or equipments regarding installation, adjustments operation and maintenance including preventive maintenance and troubleshooting together with all the relevant data sheets, spare parts catalogue and workshop procedure for repairs, assembly and adjustment etc all in triplicate.

19. SUPERVISION OF WORK:

The proposed work is a prestigious project and quality of work is of paramount importance. The Contractor shall depute Site Engineers & well experienced skilled workers as required and deploy modern T&P and other equipment to execute the work. He shall submit organization chart along with details of Engineers and supervisory staff. It shall be ensured that all decision making powers shall be available to the representatives of the Contractor at site itself to avoid any likely delays on this account. The Contractor shall also furnish list of persons for specialized works to be executed for various items of work. The Contractor shall identify and deploy key persons having qualifications and experience in the similar and other major works, as per the field of their expertise. If during the course of execution of work, the Engineer-in-Charge is of the opinion that the deployed staff is not sufficient or not well experienced; the Contractor shall deploy more staff or better-experienced staff at site to complete the work with quality and in stipulated time limit.

The contractor will ensure that all the skilled persons deployed for executing the electrical work posses wireman license issued by approved authorities, otherwise he will not be permitted to execute the work.

Consequences arising due to the default of the contractor to comply with this condition would be contractor's responsibility only.

20. The contractor or his authorized representative shall sign the site order book and comply with the remarks entered therein by the representative of the Department.

21. PROTECTIVE / SAFETY MEASURES: Necessary protective and safety equipments shall be provided to the Site Engineer, workers & Supervisory staff by the Contractor at all time in his own cost and used at site.

The contractor has to make his own arrangement for the safety of his workman. Department shall not be responsible in case of any accident taking place during the work.

The contractor shall take all safety precautions to avoid accidents by exhibiting necessary caution boards day and night, speed limit boards, red flags, red light and by providing necessary barriers and all other measures required from time to time. The contractor shall be responsible for all damages and accidents due to negligence on his part.

No hindrances shall be caused to traffic during the execution of the work. In case of any accident of labours/ contractual staff's the entire responsibility will rest on the part of the contractor and any compensation under such circumstances if becomes payable the same shall be entirely born by the contractor and department shall have not role on this account.

22. DISPLAY PERMISSIONS: The Contractor shall display all permissions, licenses, registration certificates, bar charts, other statements etc. under various labour laws and other regulations applicable to the works, at his site office.

23. Indemnity:

The successful tenderer shall at all times indemnify the department, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the department shall not be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer due to the above.

24. Compliance with Regulations and Indian standards.

All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

Factories Act.

Indian Electricity Rules.

I.S. & B.S. Standards as applicable.

Workmen's Compensation Act.

Statutory norms prescribed by local bodies like CEA, Power Supply Company, fire authorities etc.

Safety Codes & Statutory Regulations

Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the design, manufacture and installation of the equipment with all accessories in accordance with currently applicable statutory regulations and safety codes.

In respect of all labour employed directly or indirectly on the work for the performance of the contractor's part of work, the contractor at this own expense, will arrange for the safety provisions as per the statutory provisions, B.I.S recommendations, factory act, workman's compensation act, CPWD code and

instructions issued from time to time. Failure to provide such safety requirements would make the tenderer liable for penalty for Rs. 500/- for each violation. In addition the Engineer-in-charge, shall be at liberty to make arrangements and provide facilities as aforesaid and recover the cost from the contractor.

The contractor shall provide necessary barriers, warning signals and other safety measures while executing the work etc. or wherever necessary so as to avoid accident. He shall also indemnify CPWD against claims for compensation arising out of negligence in this respect. Contractor shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause. The department shall not be responsible for any accident occurred or damage incurred or claims arising there from during the execution of work. The contractor shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the contractor due to the above provisions thereof.

25. After completion of the installation, the same shall be offered for inspection by the representatives of the Central Electricity Authority if required, local powers supply company and local fire authority. The contractor will extend all help including test facilities to the representatives of CEA/local power supply company/Local fire authority. The observations of CEA/local power supply company/Local fire authority will be attended to by the contractor. The installation will be commissioned only after getting clearance from CEA/local power supply company/Local fire authority. Contractor should get inspection done & obtain approval from Central electrical Authority, local power Supply Company and local fire authority.

The Department is free to get the Equipment & machinery inspected from any of the external inspection agency and contractor shall co-operate with external agency in getting the inspection done. All defects/observation made by the inspecting agency shall be complied by contractor without any extra cost.

26. The contractor shall render all help and assistance in documenting the total sequence of this project by way of photography, etc. nothing extra shall be payable to the contractor on this account. Cost of photographs, etc. shall be borne by the contractor.

27. **TOOLS AND PLANTS:**

No tools and plants, tackles including any special T&P either for unloading or for shifting the equipments for erection purposes etc. shall be supplied by the Department and the Contractor shall have to make his own arrangements for all these facilities at his own cost. Contractor should provide modern T&P and other equipments to execute the work. No claim of hindrance (or any other claim) shall be entertained on this account. Scaffoldings & any other T & P required for execution, testing and commissioning of work shall be arranged by the contractor and is included in the cost of work tendered by the contractor.

28. Extent of work:
The work shall comprise of entire labour including supervision and all materials necessary to make a complete installation and such tests and adjustments and commissioning as may be required by the department. The term complete installation shall not only mean major items of the plant and equipments covered by specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in details in the tender document in connection with this contract as this is a turnkey job.
- a. The cable, sand and all other items shall be brought to site only after taking correct measurements as per actual requirement of work. Excess quantities shall not be accepted and paid. i.e., Quantity of item brought to site and used in work as per actual requirement shall only be measured and paid irrespective of quantities of BOQ / work schedule. The item brought at site and paid, if not used in the project have to be taken back by the contractor and deductions in the payment shall be adjusted in subsequent bills. The decision of the Engineer-in-charge in this regard shall be final & binding on the contractor.
 - b. In addition to supply, installation, testing and commissioning, of all E&M equipment, following works shall be deemed to be included within the scope of work to be executed by the tendered. Nothing extra shall be paid on this account.
 - i) Minor building works necessary for installation of equipments, foundation, making of opening in walls or in floor and restoring to their original conditions, finish and necessary grouting etc. as required.
 - ii) All necessary supports for cable and MS Channel for erection.
 - iii) Testing of PTs/CTs for metering & protection purpose & relay calibration & setting.
 - iv) The contractor shall remove all the debris due to the works from the site as soon as the work is completed.
 - c. Getting inspection done & obtaining approval from Central Electrical Authority, local power Supply Company and local fire authority for energizing the installation as briefed above.
 - d. All E&M equipment/materials shall be tested from the 3rd party laboratories as per the guidelines of Quality Assurance Policy [HYPERLINK: https://cpwd.gov.in/Publication/Quality_Assurance_poiley.pdf](https://cpwd.gov.in/Publication/Quality_Assurance_poiley.pdf)
The laboratories shall be preferably be Government Labs/Government autonomous bodies or as approved by the competent authority. Payment of all charges and cost of testing etc. shall be as per the relevant clauses of the contract.
29. The Contractor shall maintain all the work in good condition till the completion of entire work. The Contractor shall be responsible for and shall make good, all damages and repairs, rendered necessary due to fire, rain, traffic, floods or any other causes. The Engineer-in-Charge shall not be responsible for any claims for

injuries to person/workmen or for structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the Contractor or of any other of his representatives, in his employment during the execution of the work. The compensation, if any, shall be paid directly to the Department / authority / persons concerned, by the Contractor at his own cost.

Any Damage done to the building during the execution of electrical work shall be responsibility of the contractor and shall be made good immediately at his own cost to the entire satisfaction of the Engineer-in-Charge. The decision of the Engineer-in-charge shall be final and binding.

30. For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, not with-standing the fact that the Contractor may have to pay extra amounts for any reason, to the labourers and other staff engaged directly or indirectly on the work according to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them.
31. **Electric Power Supply and Water Supply:** It is the responsibility of the contractor to arrange power supply of 415 Volt, 3 phase, 4 Wire, 50 Hz, AC supply and water supply for installation and testing purposes during the contract period. Nothing extra shall be paid on this account.
32. No foreign exchange shall be made available by the department for importing (purchase) of equipments, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor on account of variation in the foreign exchange rate and/or any Custom duties / charges or any other levies.
33. **SUBMISSION OF AS BUILT DRAWINGS:** The contractor shall submit the completion certificate and completion plan as per Clause 1.26 of General Specifications for Electrical Works Part-I, Internal 2023. The Contractor shall submit 5 sets of "AS BUILT" drawings, for all services (laminated hard copies + soft copy) on completion of the work, but before finalization of bill failing which recovery @2.5% tender amount subject to maximum of Rs. 50,000/- shall be made from final bill.
34. **DEFECT LIABILITY PERIOD**
The defect liability / free maintenance period shall be 12 months from the date of completion of work. The contractor has to carry out maintenance as per manufacturer's standards for a period of 12 months from the date completion. Nothing extra shall be paid on this account.

35. **Guarantee:**

All equipments shall be guaranteed for a period of 12 months from the date of completion against unsatisfactory performance and/or break down due to defective design, workmanship of material. The equipments or components, or any part thereof, so found defective during guarantee period shall be forthwith repaired or replaced free of cost, to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of the Engineer-in-Charge in this regard shall be final. The firm will be required to attend to the breakdowns calls as and when required and also ensure timely periodically checks for installations as per CPWD Specifications and standard trade practice.

The tenderer shall warranty among other things, the following:

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

36. **Payment terms for all E&M Packages:** The following percentage of contract rates shall be payable against the stages of work shown herein:

Stage	Items	On initial Inspection of materials and delivery at Site in good condition on pro-rata basis	On completion of pro-rata installation	On completion of Testing and commissioning	On handing over
Package	Percentage of Rate on pro rate basis				
HVAC system	Refrigerant piping, NRVs, VRF/VRV outdoor, Indoor units, Master remote controller, Split AC units, & AHUs	70	15	10	5

Stage payment to the contractor for various minor components of work shall be regulated as per CPWD Specifications. For works for which the % payment is not specially mentioned in the specification, the rate of stage payment shall be decided by Engineer-in-Charge.

No payment should be made for ODU capacity beyond HP mentioned in schedule of quantities.

37. All the hidden work shall be carried out in the presence of engineer-in-charge or his authorized representative.

38. **Payment to labour:**

Contractor shall pay payment to labourers (workers) through account payer cheque/ECS.

Contractor shall submit Proof of payment made to labourers engaged for this work in two copies.

Payment details shall include name of worker, bank account details, photocopy, amount due, amount paid and cheque number or ECS statement.

Contractor shall make payment to workers at the rates not less than the rates payable as per minimum labour rates published by labour department Central Govt/Govt. of Maharashtra (whichever are higher).

Contractor has to obtain labour license from the labour commissioner office as per prevailing Government rules and has to upload following labour details online on CPWD web site in WBPIMS using his pan numbers as log-in ID within 7days.

Address & contact details of the contractor.

- a. Number of labour employed for the work.
- b. Copy of labour license.
- c. Registration details with EPFO ESIC, BOCW Welfare Board.
- d. ESI smart Card for labour.
- e. Details and mode of payment made to the labour alongwith details of ESI and EPF contribution paid on the part of employed.

39. **NO WAIVING OF LEGAL RIGHTS AND POWERS**

The Engineer-in-Charge shall not be precluded or stopped from taking any measurements, and framing of estimates or detaining any certificates made either before or after the completion and acceptance of the work and payment, from showing the true amount and character of the works performed and materials furnished by the Contractor and from showing that any such measurements, estimates or certificates untrue or incorrectly made and that Engineer-in-charge shall not be precluded or stopped from recovering from the Contractor such damages as it may be sustained by reasons of his failure to comply with the terms and conditions of the contract.

40. **QUALITY ASSURANCE:**

To assure quality assurance / procedure for E & M services mentioned in O.M. No. 51(4)/CE(Elect.)/CSQ/2018/252(H), dtd.30.01.2018 issued by the Directorate, CPWD, New Delhi shall be applicable.

The Contractor shall make available, on request from the Department, for record, copies of challans, cash memos, receipts and other certificates, if any, vouchers towards the quantity and quality of various materials procured and the same shall be kept in record. These shall also provide information on the name of the manufacturer, manufacturer's product identification, manufacturer instructions,

warning, date of manufacturing and test certificates from manufacturers for the product for each consignment delivered at site, shelf life, if any, for the department to ensure that the material have been procured from the approved source and of the approved quality, as directed by the Engineer-in-Charge. Day to day account of receipt of such material shall be maintained at site of work and shall be regulated by the department. Nothing extra shall be payable on this account.

41. **Inspection before Dispatch:** All routine tests shall be conducted before dispatch of equipments. No equipment shall be dispatched out from the manufactures premises before such tests are conducted and test result recorded. These test certificates shall be given along the supply of equipments. The Engineer-In-charge shall, if he so desires inspect and witness the pre-delivery tests. For this purpose, the agency shall give 15 days advance notice. Agency shall arrange for inspection of the department. Department shall bear expenses of its officials for inspection as far as travelling, boarding and / lodging is concerned. However, the inspection shall be done at the discretion of the department without any cost implication but ROUTINE TEST & TYPE TEST Certificates shall have to be submitted for equipments. Prior to dispatch, all equipments shall be adequately protected & insured for the whole period of transit, storage and erection against corrosion and incidental damages etc. from the effect of vermin, sunlight, rain, heat and humid climate.

If the department desires to send any samples of materials for testing in a accredited laboratory, the Contractor at his own expense shall supply all materials, labour for preparing and testing samples as required by the Engineer-in-Charge. The testing shall be carried out in the presence of the representative of the Engineer- in- Charge. Payment of all charges and cost of testing etc. shall be as per the relevant clauses of the contract.

For items/equipment requiring initial in section at manufacturer's works, the contractor will intimate the date of testing of equipments at the manufacturer's works before dispatch. The department also reserves the right to inspect the fabrication job at factory and the successful tenderer has to make the arrangement for the same. The successful tenderer shall give sufficient advance notice regarding the dates proposed for such tests/inspection to the department's representative(s) to facilitate his presence during testing/fabrication. The Engineer-in-charge at his discretion may witness such testing/fabrication. The cost of the Engineer's visit to the factory will be borne by the Department. Also equipment may be inspected at the Manufacture's premises, before dispatch to the site by the contractor.

42. **Quality of material and workmanship:**

All parts of the equipment shall be of such design, size and material so as to function satisfactorily under all rated conditions of operation. All components of the equipments shall have adequate factor of safety. The work of fabrication and

assembly shall conform to sound engineering practice and on the basis of “Fail Safe Design”. The mechanical parts subject to wear and tear shall be easily replaceable type. The construction of the equipments shall be such as to facilitate easy operation, inspection, maintenance and repairs. All connections and contacts shall be designed to minimize risk of accidental short circuits caused by animals, birds and vermin etc. All identical items and their component parts should be completely, interchangeable including spare parts.

The contractor shall be responsible for removal of all defects in the work during the guarantee/warranty period. However, if any failure is noticed during this period which is attributable to poor quality of material and bad workmanship, the contractor will be required to rectify the same on his own cost, failure of which the department will be at liberty to get the defects rectified at the risk & cost of the contractor. The contractor will also be required to carry out his own inspection/testing during the guarantee/warranty period and attend to any defect taking place during this period.

Inspection and testing at site:

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

- i) The installation shall be subject to necessary inspection during every stage of erection, by the Engineer-in-charge or his authorized representative. The contractor shall provide all facilities and assistance for the purpose.
- ii) The completed installation shall be inspected and tested by the Engineer-in charge in the manner as will be laid down by him, in consultation the agency.
- iii) All instruments and facilities necessary for the tests shall be provided by the agency.

The contractor will have to arrange for insulation and other tests as per rules in the presence of the representative of Engineer-in-Charge as and when required by him and submit the test report in triplicate before the work can considered as complete.

43. **Quality Control and Testing of materials:**

All the material to be used on works shall bear ISI certification mark unless otherwise the make is specified in the item or special conditions appended with this tender document. In case ISI mark material or the materials mentioned in the tender documents are not available, the decision in this regard shall be as per opinion of Engineer-in-charge, which shall be final and binding. The materials to be used shall conform to CPWD specifications applicable in this tender or IS Code. In such cases Engineer-in-charge shall satisfy himself about the quality or such material and give his approval in writing. Only articles classified as first quality by the manufacturers shall be used unless otherwise specified. All material not having ISI mark shall be tested as per relevant ISI specification. The Engineer in charge may relax the condition regarding testing if the quantity of the materials

required for the work is small. In all cases of use of ISI marked materials proper proof of procurement of materials from authentic manufacturers shall be provided by the contractor to the entire satisfaction of Engineer-in-charge. All materials equivalent to the one specified should be got approved by the Engineer-in-charge before using the said materials in the work.

44. Painting:

This shall include cost of painting of entire exposed iron work complete in the installation. All major equipments of works LT panels, bus duct, cable trays, HVAC equipment shall be factory final finish painted at the works before dispatch to the site. The agency shall be required to do only touching to the damages caused to the painting during transportation, handling & installation at site, if there is no major damage to the painting. However hangers, supports etc. of bus trunking & cable tray, stands etc. shall be painted with required shade including painting with two coats of anticorrosive primer paint at site.

45. Completeness of work:

The installations shall be completed in all respects and put in to operation even where certain details have not been mentioned / left out in the specifications. Any discrepancy may be brought out in pre-bid meeting.

- ii) All E&M services such as Internal Electrical installations, Panels, etc shall be declared as completed after completion of trial run of 15 days or completion of whole work whichever is later. DLP / Warranty period of all works / machine / equipment shall commence from date of completion of complete work (project).

46. Completion Period

The completion period indicated in the tender documents is for the entire work of planning, designing, approval of drawings etc., arrangement of materials & equipments, delivery at site including transportation, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge.

47. Acceptable makes of various Equipments:

The acceptable makes of various equipments/ components/ accessories have been indicated in “Preferred Makes” appended with the tender documents. The tenderer shall work out the cost of the offer on this basis. Alternate makes are not acceptable.

1. To ensure genuineness of materials the contractor will procure materials from authorized dealers only.
2. Material shall be procured only after assessing exact quantity at site in Consultation with Engineer-in-charge.

48. Data Manual and Drawings to be furnished by the Tenderer : After award of work

The successful tenderer would be required to submit the following drawings after award of work for approval as per milestones of tender.

General arrangement drawing, including detailed shop drawings of all E&M components, conduit size and route layout, Tray/floor trunking layout, bus way trunking, Panel Drawing, Light Fitting Distribution Drawing, Fire alarm, Fire fighting Layout, cable routes, VRF VRV AC piping, outdoor units locations and other drawings of all E&M components shall be prepared in AUTOCAD or equivalent software and submitted by the agency well in advance to get the approval from the EE (E) and care shall be taken not to avoid any delay in the other individual E&M components.

- a. Details of foundations for the equipments and the weights of assembled equipments.
- b. Any other drawings necessary for the job.
- c. Reflected Ceiling Plan (RCP) for all floors by incorporating all equipments likely to come in ceiling/false ceiling shall be submitted or approval before starting actual work by considering all E&M components.
- d. The successful tenderer should furnish well in advance of start of work, three copies of detailed instructions and manufacturer's manuals of all equipments regarding installation, operation and maintenance, preventive maintenance & trouble shooting with all the relevant data sheets, spare parts catalogue, etc.

49. Inspection and Testing

- a. The Engineer-in-charge or his representative 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. Engineer-in-charge at his discretion may waive off inspection at factory/at the manufacturer's works before dispatch.
- b. Copies of all documents of routine and type test certificates of the equipment, carried out at the Manufacture's premises shall be furnished to the Engineer-in-charge. The decision of the Engineer-in-charge in this regard shall be final & binding on the contractor.

50. Insurance and storage

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

51. Verification of correctness of Equipment at destination

The contractor shall have to produce all the relevant records to certify that the genuine equipments from the manufacturers has been supplied and erected to the satisfaction of the Engineer-in-charge.

52. Training

The scope of works includes the on job technical training for all services of two to four persons of client/Department at site as decided by Engineer-in-charge. Nothing extra shall be payable on this account.

53. Annual comprehensive maintenance

Supplementary agreement for annual comprehensive Maintenance contract for the stipulated period after completion of work shall be executed by the agency.

It includes annual comprehensive maintenance i.e. scheduled, preventive, break down maintenance, repair, replacement of worn out/damaged parts of entire system free of cost including free of cost labour, all taxes and all other incidental charges. The fault /complaint call shall be attended within a minimum down time during the comprehensive maintenance period failing which department reserves the right to execute the same at the risk and cost of the contractor and to recover the same from the contractor for the same.

The annual comprehensive maintenance shall include at least one visit every month for all items or as specified. The annual comprehensive maintenance shall be executed through qualified service personnel of OEM or Authorised service centre of OEM or certified channel partner etc. The deputed service personnel shall sign in the log book with the list of complaints noticed and spares replaced/ nature of works undertaken during each visit and sign the record.

The annual comprehensive maintenance shall be executed as per the conditions mentioned under relevant part of this document

54. Maintenance

Sufficient trained and experienced staff shall be made available to meet any exigency of work during the guarantee period of one year from the date of Completion of work.

SH – I Technical Specifications for Original work

1. L.T. Panel

System:

- a) Nominal voltage: 3 Phase, 433V, 50 Hz
- b) Neutral: Solidly earthed at substation.

LT compartment shall be suitable to house following equipment,

- Bus bar connection from transformer to LT 4P, 2000A , EDO ACB with LSIG protection
- Bus bars should be suitable for termination of 11 Number of 3.5CX240/300Sq.mm A2XFY aluminium cables

The design should comply for the following standards all amended upto date.

IEC-439-1,1992	Low voltage Switch gear and Control gear assemblies Part-I, type tested and partially type tested assemblies
IEC-947-1,1998	Low voltage Switch gear and Control gear Part-I general rules
IEC-1180-1,1992	High voltage test techniques for low voltage equipment Part-I definition test and Procedure equipment.
IEC-529,1989	Degree of protection provided by enclosures (IP code)

Equipment Specification

2000A Air circuit Breaker (ACB)

These shall be fixed type with electrically operated (EDO type) mechanism. The short circuit mechanism and breaking capacity as shall be supported by test certificate. The test certificates should be from CPRI / any Govt. approved recognized test house /laboratory.

The circuit breaker shall be fitted with CT operated thermal overload and short circuit releases devices for suitable current rating.

Overload releases should be settable from 50% to 100% of the rated current In.

Ambient temperature compensated type and there should not be de-rating of ACB current carrying capacity at 50C. The testing of ACB for the temperature rise shall be carried out by the manufacturer as per the prevailing, IS / IEC or any other international standards.

ACB shall be provided with very sensitive overload and short circuit release. Short circuit release should have settable value as required with an adjustable times having setting range of 40 – 460 m seconds, to have a proper co-ordination with short circuit release of outgoing MCCBs.

3 phase, 4 wire, neutral earthed having link arrangement.

Rated current thermal current – as required

Service voltage – 415volts

No. of break/ pole – one

Frequency – 50 c/s

Rated insulation voltage – 1000volts

- 1) Rated short circuit breaking capacity
- 2) Rated services S/C breaking capacity I_{cs} (rms) – 75kA Rated ultimate S/C breaking capacity I_{cu} (rms) – 75kA
- 3) Break Time - less than 40ms
- 4) S/C making capacity I_{cm} (peak) - 105kA
- 5) Rated short time withstands current - I_{cw} 75kA for 1 sec.
- 6) Suitable for outdoor installation.
- 7) It shall conform to IS 13947 / pt.2 / 1993 with latest amendment, if any.
- 8) Performance category - Utilization category – B.
- 9) The status of open and close shall be clearly visible.
- 10) The trip indication separated for overload and individual phase wise trip indication for short circuit to be provided.
- 11) The ACB shall have the provision to lock the operating mechanism in off position
- 12) The operating mechanism should be form front and the compartment should have the degree of rotation IP – 54.
- 13) Separator shall be provided between all phases inside. ACB enclosed to prevent travel of arc during short circuit.
- 14) The CT's mounted for thermal overload release shall have secondary winding inaccessible including tripping mechanism of O/L and magnetic releases to avoid tampering CT's should also have provision of separators.
- 15) Two nos. earthing bolts for propose of earthing of ACB may also be provided & suitable for G.I stay wire of size 7 / 10 SWG.
- 16) The bus bar size shall be confirming to relevant IS and the neutral bus bar shall be of same wire of size as phase bus bar and should be suitable for connecting neutral.
- 17) The ACB shall be tested in accordance with the provision of IS: 13947 – Part I or relevant IEC Connection between transformer LT terminal to ACB shall be through TPN tinned copper bus bars with current density more than or equal to 1.0-1.6A/Sq.mm.

Interconnections between the main bus bars and individual units shall be made using vertical / horizontal aluminium bus bars of adequate rating.

HT & LT metering:

Shall be as per mentioned in schedule of quantities

Earthing:

Earthing arrangement shall be provided for earthing each cable, PVC/brass cable gland, neutral busbar, chassis and framework of the cubicle with separate earthing terminals at two ends. The main earthing terminals shall be suitably marked. The earthing terminals shall be of adequate size, protected against corrosion, and readily accessible. These shall be identified by means of sign marked in a legible manner on or adjacent to terminals.

Neutral bus bar strip shall be connected to Earthing terminal with help of GI strip of suitable capacity & nut-bolt arrangement.

Tests at Site

In addition to tests at manufacturer's premises, all relevant pre-commissioning checks and tests conforming to IS code of practice No. 10028 shall be done before energization. The following tests are to be particularly done before cable jointing or connecting up the busbar trunking.

- (a) Insulation test between HV to earth and HV to MV with 5000 volts Megger.
- (b) Insulation test between MV to earth with 500 volts Megger.
- (c) All test results are to be recorded and reports should be submitted to the department.

2. M.V.PANELS SPECIFICATIONS

Scope

This Section covers the detailed requirements of medium voltage switch panel for 433V, 3 phase, 50 Hz, 4 wire system. The Scope of these specifications covers the design, material selection, manufacture, testing at manufacturer's works, insurance, packing, transportation, loading/unloading, supply at site, installation, testing and commissioning of the low voltage panels/ boards covered in the schedule of quantities, for indoor / outdoor installation. These shall be assembled/ fabricated from a factory/fabricator of repute and CPRI approved. All switchgears shall be fully rated at an ambient of 40°C.

Type of Panel

The medium voltage switch board panel shall comprise of any one of the following types of switchgears or combination thereof as specified.

- (a) Air Circuit breakers draw out or fixed type.

- (b) Switch Disconnect or Fuse Units fixed type, MCCBs of suitable Ics ratings. MCCBs shall invariably be Current Limiting type. Features like Double Break, Positive Isolation functions shall be preferred.

The Panel shall be indoor type having incoming sectionalisation and outgoing switch gears as specified. The design shall be cubical type. The degree of enclosure protection shall be IP42 as per IS 13947 (Part-I) or as specified.

M.V.PANEL

This section covers Supply/erection/testing and commissioning of the panels suitable for 415 Volt, 3 phase, 50Hz 4 wire system.

General Construction

The cubicle panel/switch board shall be floor mounted (on base frame) free standing, totally enclosed and extensible type. The switch board shall be dust & vermin proof and shall be suitable for the climate conditions as specified. The design shall include all provisions for safety of operation and maintenance personnel. The general construction shall conform to IS8623:1993 for factory assembled switch board.

Cubical Type Panels

Cubical type panels shall be fabricated out of sheet steel not less than 2.0 mm thick. Wherever necessary, such sheet steel members shall be stiffened by angle iron frame work. General construction shall employ the principle of compartmentalization and segregation for each circuit. Unless otherwise approved, incomer and bus section panels or sections shall be separate and independent and shall not be mixed with sections required for feeders. Each section of the rear accessible type panel shall have hinged access doors at the rear. Over all height of the panel shall not exceed 2.4 meters. Operating levers, handle etc. of highest unit shall not be higher than 1.7 meters. Multi-tier mounting of feeder is permissible. The general arrangement for multi-tier construction shall be such that the horizontal tiers formed present a pleasing and aesthetic look. The general arrangement shall be approved before fabrication.

Cable compartments of adequate size shall be provided in the Panels/Distribution Boards for easy termination of cables. Cable entries for various feeders shall be either from top or bottom through cable alleys located in between two circuit sections, either in the rear or in the front of the panel. All outgoing and incoming feeder terminals shall be brought out to terminal blocks in the cable compartment. All cable terminations shall be through gland plates. There shall be separate gland plate for each cable entry so that there will not be dislocation of already wired circuits when

new feeders are added. Cable entry plates shall therefore be sectionalized. The construction shall include necessary cable supports for clamping the cable in the cable alley or rear cable chamber.

Cubicle panels with more than 1000 Amps bus shall be made of tested structural modular sections.

Bus Bar and Connections

The bus bars shall be of Copper of high conductivity electrolytic quality and of adequate section. Current density for copper shall not exceed 160 amps/sq. cm. The bus bar system may comprise of a system of main horizontal bus bars and ancillary vertical bus bars run in bus bar alleys on either side of which the circuit could be arranged with front access cable entries. In the case of rear access, horizontal bus system shall run suitably either at the top or bottom. All connections to individual circuits from the bus bar shall preferably be solid connections; however flexible connections shall also be permitted as per recommendations of the Panel Manufacturer. All bus bars and connections shall be suitably sleeved/ insulated in approved manner.

Incomer/Termination

In comer termination shall be suitable for receiving bus trunking /under ground cables. Cable terminations shall in variably be through terminal blocks (Polyamide or superior) or brought out solid terminal.

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the terminal blocks. No direct connection of incoming or outgoing cables to internal components of the Panels/Distribution board is permitted.

Instruments

All volt meters and ammeters shall be flush mounted of size minimum 96 mm conforming to class 1.5 of IS 1248 for accuracy. All volt meters shall be protected with MCB.

Indicating Lamps

On all the incomers of M.V panels, ON/OFF indicating LED lamps shall be provided and shall be suitable for operation on AC supply. Phase indicating LED amps shall be associated with necessary ON/OFF toggle switch.

Small Wiring

All small wiring for Controls, Indication etc. shall be with suitable FRLS/HFFR (halogen free fire retardant) copper conductor cables. Wiring shall be suitably protected within switch board. Runs of wires shall be neatly bunched, suitably supported and clamped. Means shall be provided for

easy identifications of the wires. Where wires are drawn through steel conduits, the works shall conform to CPWD General Specifications for

Electrical Works (Part I- Internal), 2013 and IS 732 as the case may be. Identification ferrules shall be used at both ends of the wires. All control wiring meant for external connections are to be brought out of terminal board.

Earthing : 2 nos. 20x3mm copper strip for LT panel upto 400Amp capacity or 2 nos. 20x5mm copper strip for LT panel for higher capacity shall be fixed all around the panel connected to 2 nos. earth bus copper strips connected to incoming earth conductors.

Name plates & Labels: Suitable white engraving on black name plate and indications labels of metallic plates- anodized aluminium for all switchboards and circuits shall be provided. These shall indicate the feeder number and feeder designation. A common label shall also be provided for the panel

Single line circuit diagram showing the arrangements of circuit inside the Panels/DBs shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet.

Sheet Steel Treatment and Painting:

Sheet steel used in the fabrication of switchboards shall undergo a rigorous cleaning and surface treatment, seven tank process comprising of alkaline degreasing, descaling in dilute sulphuric acid and a recognized phosphating process after which a coat of primer paint compactively with the final paint shall be applied over the treated surface. Final paint coat of oven baked powder coating of minimum 50-micron thickness, of sheet approved by Engineer-in-charge shall then be provided.

Interlocks

Suitable mechanical interlock castle key type shall be provided, if specified. For automatic operation, only electrical interlocks shall be provided. Interlocking scheme shall be designed for automatic operation.

Selectivity Study

The successful bidder shall submit a total discrimination study report alongwith panel drawings for approval to Engineer-in-charge as per the SLD & manufacturers approved Selectivity and cascading tables. Total Selectivity should be achieved between ACB-ACB, ACB-MCCB, MCCB-MCCB, MCCB-MCB/MPCB in complete SLD. Bidder needs to consider ratings as per OEM's published Selectivity tables for achieving the same. Ratings in SLD are for general selection only. However final decision in this shall be made by Engineer-in-charge.

OPERATIONAL REQUIREMENTS

The indoor type MV panel shall conform to the following: -

- (a) The panel shall comprise of incomers, outgoing feeders and bus coupler as specified. The incomer shall be either a double break/contact repulsion MCCB or an Air Circuit Breaker. The bus coupler shall be either a circuit breaker or a double break / contact repulsion MCCB or switch dis-connector fuse unit as specified. The outgoing feeders shall be circuit breakers/MCCBs as specified.
- (b) Bus bars for phase and neutral shall have a rating as specified in the format of Appendix II of General Specifications for Electrical Works-Substation Part-IV 2013.
- (c) The entire switch panel shall be cubical type generally conforming to IS 8623:1993 for factory assembled switch board.
- (d) The incomer panel shall be suitable for receiving bus trunking or MV cable of size specified either from top or from bottom.
- (e) All incoming Air Circuit Breaker/ MCCB shall have suitable adjustable tripping current and the time delay settings.
- (f) The entire panel shall have a common earth bar of size as specified with two terminals for earth connections.

RATING AND REQUIREMENTS

Air Circuit Breaker

All Air Circuit Breakers shall be 3/4 pole with minimum 50/65 KA breaking capacity (35MVA at 433V) conforming to IS 13947 (Part-II). Rated current shall be as per capacities specified. The equipment shall be complete with the following: -

- (a) Necessary circuit breaker carriage with 3 position (isolate, test, service) draw-out mechanism.
- (b) Necessary isolating plugs and sockets.
- (c) Necessary mechanism inter lock and automatic safe shutters gear with arrangement for pad locking.
- (d) Necessary independent manual spring mechanism with mechanical On/Off indication as well as electrical On/Off indication.
- (e) Necessary bus bars with bolted type neutral links.
- (f) ACB shall be provided with microprocessor based releases having built in over load, short circuit & earth fault protection. Microprocessor release shall be EMI (Electro Magnetic Induction)/ EMC (Electro Magnetic Compatible) certified.

- (g) Necessary set of auxiliary switches.
- (h) Necessary set of CTs with ratios as specified.
- (i) Necessary identification, metering requirements as specified i/c. ON/OFF indication lamps, selector switches, fuses, ammeter, voltmeter etc.
- (j) In case of 4 pole breaker neutral shall be fully rated with adjustable settings from 50% to 100% of I_n .
- (k) ACB terminals shall be suitable/suitably brought for direct aluminium termination as per IS 13947 Part-II.
- (l) Communication Function:

The ACB shall be communication capable and all the below mentioned parameters shall be accessible through Mod bus TCP/IP protocol, so as it shall be possible to monitor and control via EMS, BMS, Computer or any other HID:

- Circuit-breaker status.
- Trip unit settings.
- The tripping history data viewed on PC/laptop.
- The measurements processed by the control unit.
- It shall be possible to control the circuit breaker remotely.
- Communications functions shall be independent of the control unit.

Note: Wherever fixed type circuit breakers are required, it shall be clearly specified.

MCCB

All MCCBs shall be current limiting type with features of load line reversibility and suitable for Horizontal/ Vertical mounting without any rating. Beyond 300 Amps capacity MCCBs shall have positive isolation and preferably double break / contact repulsion & double insulation features.

The MCCBs shall invariably be used with terminal spreaders.

All the MCCB's Shall be suitable for fault breaking capacity as mentioned in the schedule of quantities but in any case, should not be less than 25 kA. Operating mechanism should be double break, Quick make / Quick break & trip free type. All the MCCB's shall be provided with variable Over Current, fixed Short Circuit releases. The variable Earth fault release is optional. The same shall be provided if called for in the schedule of quantity. The MCCB's having rating 250 Amps and the above the releases shall be Microprocessor based only and the MCCBS of lower ratings the

releases shall be Thermo magnetic type. All MCCBs up to 630A should be covered in 2 frame sizes. All the MCCBs shall have $I_{cs}=100\%$ of I_{cu} . All the MCCBS shall conform to isolation function as per IEC947-2 Section 7.1.2. All four pole MCCBS above 160 Amps shall have capability of setting Neutral to N or N/2 as mentioned in the BOQ. All accessories of MCCBS shall be snap fitted type. All MCCBS should have flexibility of Line Load reversibility. The Manufacturer of the MCCBs should provide energy curves and Total discrimination charts with cascading table for the approval of the Consultant/Bank prior to ordering the MCCBs. All the MCCBS should comply to IEC 60947-2 and IS/IEC 60947-2. All the MCCBS should have three clear positions ON/OFF and TRIP. MCCBs shall comply with environmental directives National / International.

The MCCB shall be provided with direct or extended Rotary handle with door interlock facility for all the rating of the MCCBS. All the MCCBS should be suitable for total discrimination. The MCCBs having rating more than 160 Amps shall have communication option which should able to display the status of each breaker and its setting, Control the circuit breakers and display the faults. All MCCB's shall be true double make & double break with current limiting type, enabling full use of current limitation. Operating mechanism shall be of the quick make quick break type, with the speed of operation independent of the operator, and mechanically trip free from the operating handle to revert the contacts from being held closed against short-circuit and overload conditions. The operating mechanism shall be constructed to operate all poles in a multi-pole breaker simultaneously during opening, closing and tripped conditions.

Protection Function

Electronic trip units shall comply with appendix F of IEC60947-2 standard (measurement of Rms current values, electromagnetic compatibility, etc.).

All electronic components shall withstand temperatures up to 125°C.

Earth fault protection if required should be an integral part of the release & should be adjustable

The control unit shall have thermal memory to store temp rise data in case of repetitive overloads or earth fault for protecting the cables & loads.

The accessories like shunt trip, closing trip coils should be continuously rated to avoid the burning due to sustained command. Fault differentiation should be available.

The MCCBs should be with Class-2 front facia in order to avoid any live part exposure in case the front cover is opened for the accessory mounting.

All the Moulded Case Circuit Breakers should able to monitor load and adjustable Magnetic Threshold above 200 Amps. All the MCCBs should have Trip Unit Inter changeability at site.

The MCCB shall be 3 pole / 4 pole as the need be. In case of 4 pole MCCB, the 4th pole shall be 100% rated.

The MCCB shall be available in fixed / draw-out version as the need be.

It shall be possible to fit accessories on the MCCB such as auxiliary contact, trip indication contact, rotary handle, under volt coil or shunt trip coil, etc. In case of rotary handle, the same shall have built-in door interlock, defeat & padlocking facility. The rotary handle shall be same as that for SDF or MCCB for better aesthetics.

The MCCB shall be manually operated or motor operated as the need be. It shall be possible to convert the MCCB from manually operated to motorized MCCB and vice-versa.

All the MCCB shall be suitable for 690V ac system voltage.

The MCCB shall be suitable for impulse withstand of 8 kV.

The MCCB shall have short circuit breaking capacity Icu of 16 or 25 or 36 or 50 kA rms. The MCCB breaking capacity shall have Icu = 100% of Ics for the entire range.

The MCCB shall have no de rating up to 50°C service temperatures. In case the MCCB needs de rating, manufacturer shall declare the de rated current carrying capacity at 50°C service temperature.

The MCCB shall be current limiting and shall have line-load inter changeability without any loss of capacity.

The MCCBs above 100A, shall have adjustable and properly calibrated overload and short circuit settings.

Trip Unit

The MCCBs up to 160A shall be with thermo-magnetic trip unit. 160A & above, the trip unit shall be microprocessor based. Static trip unit shall not be acceptable.

The trip unit shall be capable to accept any change in the setting on-line, without need to switch off the MCCB.

The trip unit shall have overload and short circuit protection. It shall be possible to change the trip unit from thermo-magnetic to microprocessor based and vice-versa.

Test at Manufacturers Work

All routine tests shall be carried out at ACB/ MCCB manufacturers works and test certificates produced to the department.

Contactors

The contactors shall conform to the latest IS specification IS/IEC – 60947 (4). The contactors shall be suitable for 690 V AC with impulse withstand capacity of 8 kV. The contactors shall have no de rating up to 55°C service temperature. In case the contactors need de rating, manufacturer shall declare the de rated current carrying capacity at 55°C service temperature. The contactors shall be suitable for various duties viz AC1, AC2, AC3 & AC4.

For applications such as capacitor switching or crane duty etc, special definite purpose contactors shall be used. Contactors above 45A shall have arc chamber interlock to prevent ON operation if arc chamber is not in place. Vendor to specify 10 seconds rating for the contactors offered. Contactors above 16 A, shall have replaceable contacts. The spare kits shall be available. The contactor – overload relay combination shall be type tested for type-2 co-ordination at 50 kA.

Overload Relays

The overload relays shall conform to the latest IS specification IS – 13947 (4). The overload relays shall be suitable for 690 V ac. The overload relays shall have no de rating up to 55°C service temperature. In case the overload relays need de rating, manufacturer shall declare the de rated current carrying capacity at 55°C service temperature. The overload relay shall be bi-metallic type with built-in single-phase preventer and 1NO+1NC aux contacts.

The overload relay shall have trip test and auto / manual reset facility.

For critical motors, wherever specified, microprocessor-based overload relay shall be used. Static relays shall not be allowed. For motors above 75 kW, a microprocessor-based motor protection relay shall be used. Static relays shall not be allowed. The relays shall offer at least following protections

3 ph. balanced overload	-	Locked rotor
Phase imbalance	-	Earth fault
Single phasing	-	Thermistor
Trip cause indication by LED &-		Trip class setting

Relays

Circuit breakers shall be provided with integrally mounted Microprocessor based Releases. The Releases shall have a set of 3 phase characteristics which shall be adjustable over wide range to provided discrimination between a multiplicity of devices.

Microprocessor based relays shall be used for all applications including auto changeover. These relays shall be draw out type with built-in test facilities. All the Microprocessor Relays shall conform to IEC 60255-5. LED indication shall be provided in these relays capable of being reset without opening the relay case

Installation

The installation work shall cover assembly of various sections of the panels lining up, grouting the units etc. In the case of multiple panel switch boards after connecting up the bus bars etc., all joints shall be insulated with necessary insulation tape or approved insulation compound. A

common earth bar as per section 7 of the specifications (Part-IV 2013) shall be run inside at the back of switch panel connecting all the sections for connection to frame earth system. All protection and other small wirings for indication etc. shall be completed before calibration and commissioning checks are commenced. All relays, meters etc. shall be mounted and connected with appropriate wiring.

Drawings/ Data for Panels/ Boards

Before fabrication of the panels/ boards, Contractor shall submit 4 sets of detailed general arrangement drawings, single line diagrams and schematic diagrams for all circuits/ modules for approval. G.A. drawings shall show foundation/ fixing details also.

G.A. drawings shall indicate the list of components with manufacturer's reference scheme/wiring diagram and detailed bill of materials.

Minor changes suggested by the Engineer-in-charge during approvals shall be without any price variation.

Testing and Commissioning

The panels shall be inspected by Engineer-in-charge or his representative at fabricators works prior to dispatch to site to witness the followings.

- a) Physical variation and dimensional check
- b) Verification of bill of material
- c) Functional check
- d) HV test
- e) IR test

Commissioning checks and tests shall include all wiring checks and checking up of connections. Relay adjustment/setting shall be done before commissioning in addition to routine Megger tests. Checks and tests shall include the following:-

- (a) Operation checks and lubrication of all moving parts.
- (b) Interlock function checks.
- (c) Continuity checks of wiring, fuses etc. as required.
- (d) Insulation test : When measured with 500V Megger the insulation resistance shall not be less than 100 mega ohms.
- (e) Trip tests and protection gear test.
Copies of type test carried out at the switch board fabricators shop shall be furnished along with the delivery

3. CABLE TRAYS

- 1.0 Perforated Cable Trays of ladder type and associated accessories tees, bends, elbows and reducers shall be fabricated from 2.0 /1.6 mm G.I. Prefabricated Cable trays of perforated type and associated accessories tees, elbows and reducers shall be same as cable tray thickness G.I Sheets. Cable trays shall be made of corrosion resistant material or if made of material shall be adequately protected against the corrosion.

- 2.0 Cable trays accessories shall be painted with One Shop coat of Red oxide zinc chromate primer and two side coats of Aluminium alkyd paint.
- 3.0 Cable trays shall not have sharp edges, burrs or projections that may damage the insulation jackets of the wiring.
- 4.0 Cable trays shall not have side rails or equivalent structural member's cable trays shall include fittings or other suitable means for change in direction and elevation of runs.

Cable Tray Mounting

Unless otherwise specifically noted on the relevant layout drawing, all cable tray mounting works to be carried out the following :

- a) Cable tray mounting arrangement type to be as marked on layout drawing.
- b) Assembly of tray mounting structures shall be supplied fabricated, erected & painted by the electrical Successful Bidder.
- c) Tray mounting structures shall be welded to plate inserts or to structural beams duly approved by the Engineer-in-charge.
- d) Wherever embedded plates & structural beams are not available for welding the tray mounting, contractor to supply the MS plate & fix them to floor slab by four anchor fasteners of minimum 16 mm dia. having minimum holding power of 5000 Kg, at no extra cost.
- e) Maximum loading on a horizontal support arm to be 120 Kg/meter of cable run.
- f) Width of the horizontal arms of the tray supporting structures to be same as the tray widths specified in tray layout drawings, plus length required, for welding to the vertical supports.
- g) The length of vertical supporting members for horizontal tray runs will be to suit the number of tray tiers shown in tray layout drawings.
- h) Spacing between horizontal support arms of vertical tray runs to be 300 mm.
- i) Cable trays will be welded to their mounting supports.
- j) Minimum clearance between the top most tray tier and structural member to be 300 mm.
- k) Cable in vertical race ways to be clamped by saddle type clamps to the horizontal slotted angles. Clamps to be fabricated from 3 mm. thick aluminium strip at site by the electrical Successful Bidder to suit cable groups.
- i) The structural steel (standard quality) shall be according to latest revision of IS : 2062 & IS 808 Rev III of 1989. Welding shall be as per latest revision of IS : 816 Rev I of 1969. All structural steel to be painted with one shop coat of red oxide and oil primer followed by a finishing coat of aluminium alkyd paint where any cuts or holes are made on finished steelwork these shall be sealed against oxidation

by red oxide followed by the same finishing paint. Steel sheet covers wherever indicated to be similarly painted.

Earthing:

To enable earthing every 15 m, bimetal terminals or tin-plated aluminium connectors must be used. These must be recommended and tested by the manufacturer.

4. CABLE WORKS

Scope:

This section covers supply, laying and jointing as required and testing and energizing all cable work.

Specification Of Cable

- a) 1.1KV grade XLPE insulated PVC sheathed armoured Aluminium/Copper cables shall be 3½/4 core of sizes as specified. The cable shall conform to IS 7098 / (Part-I) 1988 with the Latest Amendments.
- b) All control wires shall be 650 V grade copper conductor Halogen free fire retardant or FRLS PVC insulated, conforming to IS 694. The minimum size of the control wires shall be 1.5 sq. mm.

Installation

Cable shall be laid in ground, trenches, cable trays and on walls as specified. Installation shall include all supports and clamps as required. The complete work shall be in accordance to CPWD General Specifications for Electrical Works - Part II (External) 2023 amended upto date. As far as possible cables shall not be fixed on walls directly but laid on cable trays.

Cable Identification Tags:

Wherever more than one cable is laid/run side by side, marker tags, inscribed with cable identification details shall be permanently attached to all the cables in the manholes/open ducts etc. These shall also be attached to various cables laid direct in ground at suitable intervals as decided before trenches are filled up.

TESTING

Testing of the complete cable installation shall be as per clause 2.8.2 and 2.8.3 of CPWD General Specifications for Electrical Works-Part II (External) 2023 amended upto date.

All cables before laying shall be tested with a 500 Volts megger for 1.1 KV grade. The cable cores shall be tested for continuity, absence of cross

phasing, insulation resistance to earth/sheath/armour and insulation resistance between conductors.

All cables shall be subjected to above mentioned tests during laying, before covering the cables by protective covers and back filling and before the jointing operations.

Power Distribution System Losses

The power cabling shall be adequately sized as to maintain the distribution losses not to exceed 1% of the total power usage. Record of design calculation for the losses shall be maintained.

The cables be designed as per the voltage drop regulations at peak load, and the losses be calculated on the basis of the assessed load during the day, week and year and should not be limited to the peak load.

Cable schedule shall be proposed and get approved by the Engineer-in-charge, before laying. This schedule will indicate point to point laying, no of runs, voltage drop, No of termination, size of cable any gland selected etc.

Route Marker

Route marker shall be provided along straight runs of the cables at locations decided and generally at intervals not exceeding 100m. Markers shall also be provided to identify change in the direction of the cable route and also for location of every underground joint. These are included in scope of cable work and nothing extra shall be paid on account of this.

Route markers shall be made from 100mmx100mmx5mm GI/Aluminium plate, welded or bolted on to 35mmx35mmx6 mm angle iron 60 cm long. Such plate's marker shall be mounted parallel to and 0.5 m or so away from the edge of the trench.

The word 'cable' and other details such as voltage grading size etc. shall be inscribed on the marker.

SAFETY REQUIREMENTS

SCOPE

This section covers the requirements of items to be provided in the sub-station for compliance with statutory regulations, safety and operational needs.

REQUIREMENTS

Safety provisions shall be generally in conformity with appendices (A) and (C) of CPWD General Specifications of Electrical Works (Part I-Internal), 2023. In particular following items shall be provided:

(a) Insulation Mats

Insulation mats conforming to IS 15652:2006 shall be provided in front of main switch boards as well as other control equipments as specified.

(b) First Aid Charts and First Aid Box

Charts (one in English, one in Hindi, one in Regional language), displaying methods of giving artificial respiration to a recipient of electrical shock shall be prominently provided at appropriate place. Standard first aid boxes containing materials as prescribed by St. John Ambulance brigade or Indian Red Cross should be provided in each sub-station.

(c) Danger Plate

Danger Plates shall be provided on HV and MV equipments. MV danger notice plate shall be 200 mm x 150 mm made of mild steel at least 2 mm thick vitreous name led white on both sides and with the description signal red colour on front side as required. Notice plates of other suitable materials such as stainless steel, brass or such other permanent nature material shall also be accepted with the description engraved in signal red colour.

(d) Fire Extinguishers

Portable CO₂ extinguishers conforming to IS 2878: 1976/ chemical conforming to IS 2171:1976 extinguishers, HCFC Blend A (P-IV) shall be installed in the sub-station at suitable places. Other extinguishers recommended for electric fires may also be used.

(e) Fire Buckets

Fire buckets conforming to IS 2546: 1974 shall be installed with the suitable stand for storage of water and sand.

(f) Tool Box

A Standard tool box containing necessary tools required for operation and maintenance shall be provided in the sub-station.

(g) Caution Board

Necessary number of caution boards such as “Man on Line” ‘Don’t Switch on’ etc. shall be available in the sub-station.

(h) Key Board

A keyboard of required size shall be provided at a proper place containing castle keys, and all other keys of sub-station and allied areas.

Cable Termination

The termination and connection of cables shall be done strictly in accordance with manufacturer’s instruction, drawings and/or as directed by the Engineer In charge or his representative.

The work shall include all clamping, fitting, fixing, cable jointing, crimping, shorting and grounding etc. as required for heat/cold shrinking technology for the complete job.

All equipment required for all such operations shall be of Successful Bidder’s procurement under this specification. Furnishing of all consumable materials, such as soldering material, electrical tape, sealing material as well as cable jointing kits shall be included in the rates.

The equipment will be generally provided with blank bottom plates for cable/Metal

conduit entry and cable end box for power cables.

The Successful Bidder shall perform all drilling, cutting on the blank plate and any minor modification work required to complete the job. If the cable end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the Successful Bidder at the discretion of Engineer-in-charge.

The Successful Bidder shall put ferrules on all cable cores in all junction boxes and at all terminations. The ferrules shall carry terminal numbers with cross reference as per drawings. All ferrules shall be coloured, plastic and interlocked type. Spare cores shall be similarly ferruled, crimped with lug and taped on the ends.

The Successful Bidder shall also maintain and submit when requested, a record of cable insulation value when drawn from store, after laying, before and after termination/jointing.

Cable shall generally be installed in perforated type site fabricated/pre-fabricated trays except for some short run in rigid/flexible conduit for protection or crossings. Cables laid on trays and risers shall be neatly dressed and clamped at suitable intervals for horizontal and vertical cable runs.

All power cables shall be clamped individually and control cables shall be clamped in groups of three or four cables. Prior to lying of cables inside both indoor and outdoor trenches, the Successful Bidder shall properly clean inside those trenches.

Also the cable runs both before and after the fire seals shall be suitably sprayed with anti-fire propagation liquid at least for 1M length. After completion of installation and prior to connection, all power cables shall be subjected to a high potential test.

Earthing

Earthing work shall be carried out in accordance with chapter 8 of General Specifications for Electrical Works Part-I Internal 2023 & as per IS 3043 – 1987 amended upto date.

Earth pits are required to avoid the hazard of electric shock by keeping the exposed conductive surfaces of a device at earth potential. It is recommended that separate earth pits be constructed for separate type of devices i.e. electrical, cooling, IT, UPS, security etc.

All the non-current carrying grid parts of the electrical installation and mechanical equipment shall be earthed properly. The cables armor and sheath, electric panel boards, lighting fixtures, ceiling and exhaust fan and all other parts made of metal shall be bonded together and connected by means of specified earthing system

An earth continuity conductor shall be installed with all the feeders and circuits and shall be connected from the earth bar of the panel boards to the Metal conduit system, earth stud of the switch box, lighting fixture, and earth pin of the socket

outlets and to any metallic wall plates used. All the enclosures of motors shall be also connected to the earthing system

Earthing Copper strips from earthing station to equi-potential bar

Earthing Copper strips / wires from equi-potential bar to power panels, DBs, mechanical system etc.

Bonding of noncurrent carrying parts, and metallic parts of the electrical installations as per Indian standard. IS: 3043 - 1966 Code of practice for Earthing.

The resistance from any part of the lightning protection system to earth shall not exceed 1 ohm before any bonding has been affected to metal in or on a structure or to services below ground. If the value obtained exceeds the specified one then shall be reduced by adding to the number of earth electrode.

5. VRF/VRV SYSTEM

SCOPE OF WORK

The Scope of Work covers the supply, installation, testing, commissioning and warranty VRV/VRF system and services provided for the same.

The work shall be generally carried out in accordance with schedule of quantities and the following specifications and conditions.

- (a) CPWD General Specifications for Heating, Ventilation & Air-Conditioning (HVAC) – 2017
- (b) CPWD General Specifications for Electrical work Part I Internal – 2023
- (c) CPWD General Specifications for Electrical work Part II External – 2023
- (d) Commercial and technical conditions for this work.
- (e) The Indian Electricity Act 2003
- (f) Indian Electricity Rules 1956, all amended up to date.

TECHNICAL SPECIFICATIONS - VRV / VRF System

1. General Description

- a) The system selected is a modular system, with number of indoors connected to centrally located outdoor units. The outdoor units for all the system shall be air cooled type.
- b) All the VRF air conditioners shall be fully factory assembled, wired, internally piped & tested. The outdoor unit shall be pre-charged with first charge of refrigerant. Additional charge shall be added as per refrigerant piping at site. All the units shall be suitable for operation with 415 V +/- 10%, 50 Hz +3%, 3 Phase supply for outdoor units & 220 V +/- 10%, 50 Hz +/- 3%, 1 Phase supply for indoor units.
- c) The equipment for variable refrigerant volume/flow (VRV/VRF) system shall be air-cooled consisting of Outdoor units and multiple Indoor units for cooling the space in summer.

- d) The system shall consist of suitable Outdoor units, Indoor units as required, interconnecting refrigerant piping, drain piping with insulations, central controller unit, control cabling, and accessories as required.
- e) It shall be possible to connect multiple Indoor units on a single refrigerant circuit. The Indoor units on any circuit may be of different type and should allow individual control. ODU power consumption & delivered TR @39 degree C Ambient and 24 degree C room temp – Zero derating upto 39 degree C at 100% load.

All the compressors of outdoor units shall be suitable for variable loading. The VRF system shall provide stable, trouble free & safe operation, with flexibility of operating desired indoor units. The outdoor units must be capable of delivering exact capacity proportional to the number of indoor units switched on & the heat load in the air conditioned area. The proportional operation shall be achieved by varying the refrigerant flow by the outdoor units. The operation of the VRF system shall be through independent wired/ wireless remote controllers, as specified.

The scope of work also includes Pressure Testing of the entire system and holding the same for minimum 24 Hours. Flushing the system, Refrigerant Gas (R 410) Charging / Topping up in the system and final commissioning of the system all complete as required. Providing and Fixing of Fire Sealant to close the cut-outs of all Cables, refrigerant pipes and tray all complete as required and to the satisfaction of Engineer-in-charge.

The system shall be designed to meet the following Internal Design Conditions for summer and monsoon 24 ± 1 Deg°C DBT & $55 \pm 5\%$ RH for Office and staff areas..

Monsoon outside condition 35Deg°C DBT.

Filtration: 20 Micron flat Pre filters.

After the refrigeration system has been charged and has been in continuous operation for one week, the contractor shall replace the initial type "HH" filter drier with the final filter dryer.

2. Outdoor Unit

- i. The outdoor unit should comprise of Inverter controlled Scroll /Twin rotary Compressor hermetically sealed.
- ii. Each module of outdoor unit must have at least 50% of Variable/Invertors compressor which can work on Part load Suitable to operate at heat load proportional to indoor requirement.
- iii. The ODU must deliver COP of minimum **4.7 at 50% load.**
- iv. The outdoor units must be suitable for actual refrigerant piping length between outdoor unit& the farthest indoor units. Allowable level difference between outdoor unit & indoor units shall be as per manufacturer recommendations.
- v. Allowable level difference between various indoor units connected to one out door unit shall be up to 10mtrs.
- vi. The outdoor units shall be suitable to operate within an ambient temperature range of 5 Deg C to 42 Deg C in cooling mode.
- vii. The entire operation of outdoor units shall be through independent remotes of indoor units. No separate Start/ Stop function shall be required.
- viii. Starter for the Outdoor Unit compressor shall be —Direct on Line type. Inverter compressor of the unit shall starts first & at the minimum frequency, to reduce the inrush current during starting.

- ix. Complete refrigerant circuit, oil balancing/ equalizing circuit shall be factory assembled & tested
- x. The Outdoor unit shall be a factory assembled unit housed in a sturdy weather proof casing,
- xi. Constructed from rust-proofed mild steel panels complete with powder coated finish.
- xii. Each module of Outdoor units shall consist of scroll /Twin rotary compressor(s), air-cooled condenser as Heat Exchanger, high efficiency propeller fans with low noise motor, internal Refrigerant piping, safety controls, Air Inlet grilles, fan protection grille etc. all enclosed in weather proof housing.
- xiii. The Outdoor unit shall have multiple scroll/Twin rotary compressors and shall be able to operate even in case of break down of one of the compressors. (The smallest capacity unit may have only one compressor). Outdoor units shall be complete with following safety devices:
 - i) High pressure switch
 - ii) Fan drive overload protector
 - iii) Over current relay
 - iv) Overload Protector
 - v) Fusible Plug
- xiv) The Outdoor unit shall be suitable for mix and match connection of various types and capacities of Indoor units as per demand.
- xv) The noise level shall not be more than 62 dB(A) under normal operation, measured horizontally, 1 m away and 1.5m above ground.
- xvi) The Outdoor unit shall be modular in design and shall allow for side by side installation of multiple Outdoor units, to match the requirement.
- xvii) All the units shall be provided with built-in microprocessor control panel, for automatic operation and capacity control.
- xviii) The units shall be suitable for Refrigerant R-410A.
- xix) Suitable single phase preventer for protection from single phasing, phase reversal, phase unbalance condition with inbuilt timer suitable for operation on 415 Volts supply, i/c enclosure & connections etc are to be provided.

Compressor: The compressor in inverter-based scroll /twin rotary system shall be highly efficient. The system should response efficiently in accordance to the variation in cooling or heating load requirement. 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. Oil heaters shall be provided in the compressor casing or as per manufacturer standards.

Condensing Unit: Condensing units of the system shall be provided incorporating following details:

The Condenser coil shall be Air-cooled type with copper tubes and aluminium fins. The condenser coils shall be of adequate size and shall have an integral sub cooler circuit for

sub cooling of the liquid. Condenser coil shall have a refrigerant side working pressure of 400 psig with anti-corrosive treatment. Condenser shall have multiple piping and cabling connection option. Pump down facility should be provided in the refrigerant system by providing good quality hand / shut off valves to avoid loss of refrigerant gas during maintenance. The condenser fans shall be propeller type, with aluminium blades, low speed, and low vibration levels and quite in operation with IP 55 Protection.

Oil Recovery System Unit : System 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.

Refrigerant Circuit: The refrigerant shall be R410a. The refrigerant circuit shall include liquid and gas shutoff valves and a solenoid valves at condenser end. The equipment must have in-built refrigerant stabilization control for proper refrigeration distribution. All necessary safety devices shall be provided to ensure the safe operation of the system.

Heat Exchanger: The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminium fins to form a cross fin coil. Heat exchanger coil shall have a refrigerant side working pressure of 400 psig. 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 safe guard.

Safety Devices: All necessary safety devices shall be provided to ensure safe operation of the system. Following safety devices shall be part of outdoor unit: - high pressure switch, fuse, fan drive overload protector, fusible plug, crankcase heater, over load relay, overload protection for inverter.

Anti-Corrosion Treatment:

- i. The portions of machines like side panel, outer panel, bottom frame, which are exposed to corrosive atmosphere, should be alloyed hot-dip zinc coated steel plate, coated with corrosion protection powder polyester resin coating on both inner and outer surfaces in thickness of 64 microns or more or other equivalent industry standards.
- ii. Finned coil protection net should have coating of resin /any other coating containing ultraviolet ray absorbent. Fan and its fan protective net should be with weather resistant polypropylene resin/ any other materials to ensure corrosion prevention.
- iii. The copper pipe-aluminium fan shall be with special acrylic resin coated or any as per any other industry standards and internal supports, frame, control box shall also be hot-dip zinc coated steel plate and with rust preventive powder coating of 64 microns or more on inner and outer surface.
- iv. All screws, bolts used in outdoor unit shall be with SUS410, Zinc-Nickel alloy plating, zinc chrome acid film treatment and rust inhibitor coating.

Field installed Accessories:

The outdoor shall be factory assembled weather proof casing constructed from heavy gauge MS panels and coated with baked enamel finish.

3. Indoor Units (IDU)

- i. The units include pre-filter, fan section and DX coil section. The housing of units shall be light weight powder coated galvanized steel. Units shall have external casing of ABS Plastic for supply & return air.
- ii. The system shall permit connection of a variety of non duct able or duct able Indoor units on to single refrigerant piping circuits, as per description given later.
- iii. The capacity of the IDU shall vary as per the requirement of the given area.
- iv. The Cassette type of IDU is to be connected as per SOQ given.

3.1 Common features of Indoor Units

- i. The cooling / heating evaporator coils of the various types of Indoor Units shall be of direct expansion type.
- ii. The coils shall be fabricated from copper tubes of min. 8 mm dia. with extended aluminium fins and designed for low velocity.
- iii. The fins shall be bonded to the tube using hydraulic expansion of tubes ensuring tight bonding between tube and fins for efficient heat transfer.
- iv. The coils shall be complete with well designed tube circuiting and liquid distributor.
- v. All types of units shall have a built in electronic expansion valve and suitable control units.
- vi. The control units shall control temperature, fan speed and features specific to each unit such as night mode, set back, etc.
- vii. Suitable drain pan and drain arrangement shall be part of all IDUs.
- viii. The control units shall permit control from a corded or a wireless remote controller.
- ix. The unit casing shall be Galvanized Steel Plate or Aluminium

Wired / CORDLESS Remote Controller :

Wired/Cordless remote controller shall be supplied. The controller must have display screen, which displays complete operating status. The digital display must allow setting of temperature at 1 Deg C interval. Remote shall be able to individually program by timer the respective times for operation start and stop within a maximum of 72 hours. Remote must be equipped with thermostat sensor in the remote controller that will make possible more comfortable room temperature control The remote shall be able to monitor room temperature & preset temperature by microcomputer & can select cool/ heat operation mode automatically. The remote must constantly monitor malfunctions in the system & must be equipped with a “self-diagnosis function” that let know by a message immediately when a malfunction occurs. In case of corded remote it shall be possible to wire the remote up to 500 metre.

CENTRALIZED TYPE REMOTE CONTROLLER:

The controller should be LCD remote controller to act as an advanced air-conditioning management system to give complete control of VRV / VRF air-conditioning Equipment, it should have ease of use for the user and must have a user-friendly panel and LCD display. It shall be able to control up to 64 zones or 64 groups (each group consists of Max. 16 units) or 128 nos. of indoor units with the following functions.

- i. Starting/stopping of Air-conditioners as a zone or group or individual unit.
- ii. Temperature settling for each indoor unit or zone.
- iii. Switching between temperature controls modes, switching of fan speed and direction of airflow, enabling/disabling of individual remote controller operation.
- iv. Monitoring of operation status such as operation mode & temperature setting of individual indoor units, maintenance information and troubleshooting information.
- v. OPTIONAL-Display of air conditioner operation history.
- vi. OPERATIONAL-Daily management automation through yearly schedule function with possibility of various schedules. The controller shall have wide screen user friendly LCD display and can be wired by a non-polar 2 wire transmission cable to a distance of 1 kilometre away from indoor unit.

4. Refrigerant Piping

- i. All refrigerant pipes and fittings shall be type 'L' hard drawn copper tubes and wrought copper fitting suitable for connection with silver solder. The copper thickness of wall shall be 20G/ 22G(0.7 to 1 mm)
- ii. All joints in copper piping shall be swaged joints using low temperature brazing and/ or silver solder.
- iii. Before jointing any copper pipe or fittings, its interior 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 construction of the joints. Subsequently, it shall be thoroughly blown out using nitrogen.
- iv. Refrigerant lines shall be sized to limit pressure drop between evaporator and condensing unit to less than 0.2 kg per Sq.cm.
- v. After the refrigerant piping installation has been completed the refrigerant piping system shall be Pressure tested using, Freon mixed with nitrogen at a pressure of 20 Kg per Sq.cm. (High side) and 10Kg per Sq. cm (Low side). Pressure shall be maintained on the system for 24 hours.
- vi. The system shall then be evacuated to a minimum vacuum of 70 cm. of mercury and held for 24 hours, during which time; change in vacuum shall not exceed 12 cm of mercury. The pressure testing shall be done in the presence of Engineer-in-charge or his authorised representative
- vii. After successful pressure testing, Full Charging of Refrigerant Gas (R 410), Topping up in the system, if required and final commissioning of the system all complete as required.
- viii. All refrigerant piping for the VRV/VRF system shall be carried out using hard drawn seamless copper pipe using either soft, half hard or hard pipes as per chart below:

ix. The piping thickness shall be as follows:

OD(Inch)	OD(mm)	Min. Wall Thickness (mm)	Soft	Half Hard or Hard
1/4"	6.35	0.80	√	√
3/8"	9.52	0.80	√	√
1/2"	12.70	0.80	√	√
5/8"	15.88	1.00	√	√
3/4"	19.05	1.00	X	√
7/8"	22.20	1.00	X	√
1.1/8"	28.58	1.00	X	√

Copper tubes used for refrigerant piping

Seamless Copper Tube for Air conditioning and Refrigeration conforming to ASTM B280, IS 10773 : 1995 & IS 5493 : 1981

STRAIGHT LENGTHS

Standard Size, inch.	Outside Dia. inch. (mm)	Wall Thickness inch. (mm)	Weight, lb/ft (kg/m)	Nom. Weight, kgs 5.8 metres	* Safe Working internal pressures PSI (KPa) 150°F
3/8	0.375 (9.52)	0.030 (0.76)	0.126	1.09	810 (5585)
1/2	0.500 (12.7)	0.035 (0.89)	(0.187)	1.71	675 (4654)
5/8	0.625 (15.9)	0.040 (1.02)	0.198	2.46	625 (4310)
3/4	0.750 (19.1)	0.042 (1.07)	(0.295)	3.13	545 (3758)
7/8	0.875 (22.2)	0.045 (1.14)	0.285	3.92	495 (3415)
1 1/8	1.125 (28.6)	0.050 (1.27)	(0.424)	5.65	440 (3035)
1 3/8	1.375 (34.9)	0.055 (1.40)	0.362	7.65	385 (2655)
1 5/8	1.625 (41.3)	0.060 (1.52)	(0.539)	9.85	355 (2450)
2 1/8	2.125 (54.0)	0.070 (1.78)	0.455	15.13	315 (2170)
2 5/8	2.625 (66.7)	0.080 (2.03)	(0.677)	21.42	295 (2035)

3 1/8	3.125 (79.4)	0.090 (2.29)	0.655	28.73	275 (1895)
3 5/8	3.625 (92.1)	0.100 (2.54)	(0.975)	37.08	270 (1860)

- x) The branching of refrigerant piping from the main line shall be carried out using manufacturer approved either specially designed, Tee connectors or 'Y' joints. These joint should ensure that each branch receives the required refrigerant flow.
- xi) All pipe sizing shall be on the basis of sizing data of the concerned manufacturer and should ensure adequate oil return back up to the compressor.

5. Pipe Insulation

1) Refrigerant Pipe Insulation

- a) The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm thick Nitrile close cell rubber, so that condensation does not occur.
- b) The joints shall be properly sealed with synthetic glue to ensure proper bonding of the ends.

2) Condensate Drain piping & its insulation

- a) All pipes to be used for condensate drain shall be UPVC pipe conforming to IS&all joints should be Gluing or solvent cementing as per manufacturer recommendation. The pipe shall be laid in proper slope for efficient draining of the condensate water.
- b) Drain pipe carrying condensate water shall be insulated with 9 mm nitrile rubber insulation having K valve 0.037 W/mk at a mean temperature of 20⁰ C at min. density of 55 kg./m³.The joint shall be properly sealed with synthetic glue to ensure proper bonding of the ends.
- c) All pipe supports shall be of pre-fabricated and pre-painted slotted angle supports properly installed with clamps.

6. HANGERS AND ANCHORS:

A. All piping shall be rigidly supported from the building structure by means of adjustable hangers. (WELDING TO BUILDING STRUCTURE WILL NOT BE PERMITTED.) Unistrut type trapeze hangers shall be used where pipes run side by side. Hanger spacing shall be as follows:

Horizontal: Copper Piping Maximum Spacing 3/8" dia and under 4'-0", 1/2" dia, through 3/4" 6'-0", 1" through 1-1/2" 8'-0", 2" and larger 10'-0"

Vertical: Copper piping shall be supported at 10 feet intervals maximum.

B. Round rods supporting the pipe hangers shall be of the following dimensions:

2" pipe and under 3/8" rod 2-1/2" to 3" pipe 1/2" rod

C. Soft copper tubing where permitted shall be fastened to the building structure with Unistrut type clamps and Unicushion inserts. Clamps shall not be spaced greater than 4'-0" apart.

7. BRAZED JOINTS:

A. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb. Joints shall be cool before reassembling valve.

B. Tubing shall be cut square, reamed, and burrs removed.

C. Both inside of fittings and outside of tubing shall be well cleaned with an abrasive cloth or stainless-steel wire brush before brazing. Steel wool is NOT permitted.

D. During brazing an inert gas (such as dry nitrogen, argon) shall be continuously passed through the system at a flow rate sufficient to maintain an oxygen-free environment to prevent the formation of copper oxide scale.

E. Care shall be taken to prevent annealing of fittings and tubing when making connections.

F. Copper to copper joints shall be brazed with a copper-phosphorous brazing alloy containing a minimum of 15% silver and conforming to AWS A5.8, BCuP5.

G. Copper to brass joints shall be brazed with a silver brazing alloy containing a minimum of 50% silver and conforms to AWS 5.8, BAg-7.

H. Copper to stainless steel joints shall be brazed with a silver brazing alloy containing a minimum of 50% silver and conforms to AWS 5.8, BAg-7.

I. All brazed joints shall be cleaned to remove residual flux.

8. FACTORY BUILT AIR HANDLING UNIT (AHU)

The air handling unit shall be of double skin construction, draw through type in sectionalised construction consisting of blower section, coil section, humidification section (where specified), filter section and insulated drain pan. Unless otherwise specified, the unit shall be horizontal type. The canvass connection for AHUs is also included in the rate of AHU.

Vertical type units are generally used whenever there is a space constraint

Rating

i) The capacity of the cooling/heating coil, the air quantity from the blower fan and static pressure of blower fan shall be as laid down in the tender documents. Where these parameters as calculated by the tenderer exceed the specified values, the coils and the blower fan shall satisfy these calculated values.

- ii) The coil shall be designed for a face velocity of air not exceeding 155 m/min.
- iii) The requisite static pressure demanded by the air circuit shall be developed by the fan at the selected operating speed. The static pressure value shall not in any case be less than 40 mm water gauge in normal cases, not less than 65 mm water gauge where microbe filters are also used and not less than 100 mm water gauge where absolute filters are also used. The fan motor HP shall be suitable to satisfy these requirements and the drive losses.
- iv) The air outlet velocity from the blower fan shall not exceed 610 m/min.
- v) Noise level at a distance of 2M from AHU shall not exceed 75 dBA.

Material and Construction Housing/ Casing

- i) The housing/ casing of the air handling unit shall be of double skin construction. The housing shall be so made that it can be delivered at site in total/ semi knocked down conditions depending upon the requirements. The main framework shall be of extruded aluminium hollow structural sections. The entire framework shall be assembled using mechanical joints to make a sturdy and strong framework for various sections. For fresh air from TFA Unit. Application framework shall be made of thermal break hollow extruded aluminium profile.
- ii) Double skin panels shall be 25mm thick, made of 0.8mm pre- plasticized and pre-painted with PVC guard, GSS sheet on outside and 0.8mm galvanized sheet inside with Polyurethane foam insulation of density not less than 38 kg/cu. m injected in between by injection moulding machine. These panels shall be bolted from inside/ screwed from outside on to the framework with soft rubber gasket in between to make the joints airtight. The gaskets shall be inserted within groove in extruded aluminium profile of the framework. For units installed outdoor, the thickness of double skin panels shall be minimum 40 mm.
- iii) Frame work for each section shall also be bolted together with soft rubber gasket in between to make the joints air tight. Suitable doors with nylon handles, aluminium die-cast powder coated hinges & latches shall be provided for access to various panels for maintenance. However, AHU in the form of complete single unit shall also be acceptable with access door(s) for maintenance to various sections. The entire housing shall be mounted on galvanised steel channel frame work made out of G.I. sheet of thickness not less than 2mm. For higher capacity AHUs hot dip galvanized steel channel framework made of minimum 3 mm thick G.S. sheet shall be used.

Drain Pan

Drain pan shall be made out of minimum 1.25 mm stainless steel sheet externally insulated with 10mm thick closed cell Polyethylene foam insulation or **nitrile rubber or PUF** with necessary dual slope to facilitate fast removal of condensate. Necessary supports will be provided to slide the coil in the drain pan.

Cooling / Heating coil

- i) The coil shall be made from seamless solid drawn copper tubes. The minimum thickness of tube shall be 0.5 mm for cooling / heating / heating-cum-cooling coils.
- ii) The depth of the coil shall be such as to suit the requirements, viz. re-circulated air applications, or 100 % fresh air applications and the bypass factor required shall be specified in the tender specifications. The coil shall be 4 or 6 rows deep for normal re-circulated air application and 8 rows deep for all outdoor air application, unless otherwise specified in the tender specifications. In case of 8 rows deep coils, it shall be made of 2x4 rows deep coils with a spacing of 200mm between the two coils, access door and independent drain pan.
- iii) U bends shall be of copper, jointed to the tubes by brazing, soft soldering shall not be used.
- iv) Each section of the coil shall be fitted with flow and return headers to feed all the passes of the coil properly. The headers shall be of copper and shall be complete with refrigerant in/out connections, vent plug on top and drain at the bottom. The coil shall be designed to provide suitable velocity in the tubes.
- v) The fins shall be of aluminium. The minimum thickness of the fins shall be as per OEM.
- vi) The coil shall be suitable for use with the refrigerant specified or with water as the case may be. Refrigerating coils shall be designed for the maximum working pressure under the operating conditions.

Supply Air Fan and Drive

- i) The supply air fan shall be AMCA certified centrifugal type with forward/backward curved blades double inlet double width type. For static pressure upto 65mm forward curved blades shall be used and for higher sizes backward curved blades shall be used.
- ii) The fan housing of Galvanised sheet steel and the impellers shall be fabricated from heavy gauge steel sheet as per approved manufacturer's standard. The side plates shall be die formed for efficient, smooth airflow and minimum losses. Fan impeller shall be mounted on solid shaft supported to housing using heavy duty ball bearings. Fan housing and motor shall be mounted on a common extruded aluminium base mounted inside the fan section on anti- vibration spring mounts or cushy- foot mount. The fan outlet shall be connected to casing with the help of fire retardant fabric.
- iii) The fan impeller assembly shall be statically and dynamically balanced.
- iv) The fan shall be fitted with V belt drive arrangement consisting of not less than two evenly matched belts. Belts shall be of oil resistant type. Adequate adjustments shall be provided to facilitate belt installation and subsequent belt tensioning by movement of the motor on the slide rails. A readily removable door guard shall be provided.
- v) The fan motor shall be totally enclosed fan cooled squirrel cage induction motor with IP-54 protection & selected for quiet running. The motor shall be suitable for operation on $415 \pm 10\%V$, 3 phase, 50A.C. supply. The fan

motor shall be premium efficiency IE3 class , as per IS 12615. The motor shall be suitably designed for use with variable frequency drive.

Air Filters

The air used in an air-conditioning system must be filtered to maintain a clean atmosphere in the conditioned space. The concentration of contaminants in the air and the degree of cleanliness required in the conditioned space will determine the type of filter or filters that must be used.

Type of filters

1) Pre-filters :

Cleanable metallic viscous type filter made out of aluminium wire mesh or of dry cleanable synthetic type minimum 50mm thick, shall be provided on the suction side of AHU as standard equipment with the unit. These filters shall have the efficiency of 90% down to 10 micron particle size. When these filters become loaded or full of dirt, it is removed from service and replaced by another filter. The dirty filter can then be washed in a cleaning solution in a tank, dried and then given a bath of viscous oil. Face velocity across these filters shall not exceed 155 MPM.

Dry fabric (fine) filters

These filters shall have efficiency of 99% down to 5 micron particle size as per EU 7 standard. These filters are provided only where special cleanliness standard is required such as for library, lab, wards, OTs etc. These are provided on the discharge side of AHU after fan section and are always backed by pre-filters provided on the suction side of AHU. Face velocity across these filters shall not exceed 155 MPM. These filter shall be separately measured and paid for.

General Construction of filters

- i) Each AHU shall be provided with a factory assembled filter section containing pre-filters made of cleanable metal viscous filters made of corrugated aluminium wire mesh, or dry cleanable synthetic filters. These shall be minimum 50 mm thick with a frame work of aluminium.
- ii) The filter area shall be made up of panels of size convenient for handling. The filter panels shall be held snugly within suitable aluminium framework made out of minimum 1.6 mm aluminium sheet with sponge neoprene gaskets by sliding the panels between the sliding channels so as to avoid air leakage.
- iii) In order to indicate the condition of these filters while in operation, a manometer shall be provided to indicate the pressure drop across the fine filters and absolute filters.
- iv) Special filters, if any specified in the tender specifications shall be provided in addition to the above filters. In that event, the latter shall function as pre-filters.

Installation

The air handling unit shall be so installed as to transmit minimum amount of vibration to the building structure. Adequate vibration isolation shall be provided by use of rubber/ neoprene pads and/or vibration isolation spring mountings.

PAINTING

All equipment shall be supplied as per manufacturer's standard finish painting.

Factory Testing:

Air Handling Units:

- i) Salient features such as model, size, physical dimensions, and other details of various sections, fan motor details, fan dia, static pressure etc. Shall be verified against the contract requirements.
- ii) Manufacturer's internal test certificates for the motor and air handling unit shall be furnished and scrutinized as per contract requirements.
- iii) Test certificate for static and dynamic balancing of the fan/blower should be furnished. Fan balancing may be witnessed by Engineer-in-Charge or his authorised representative.
- iv) Salient features like, type, material, no. and gauge of fins and tubes and no. of rows of cooling coil shall be furnished and verified with reference to contract requirements during stage inspection.
- v) Hydraulic pressure to the extent of 10 Kgf/sq.cm or pneumatic pressure of 21 kgf/sq.cm shall be applied to cooling coil and this pressure should be maintained for 1 hour and no drop should be observed indicating any leaks.

9. DUCTING

MATERIAL

- vi) All ducts shall be fabricated either from Galvanised Sheet Steel (GSS) conforming to IS: 277 or aluminium sheets conforming to IS:737. The steel sheets shall be hot dip galvanized with MAT finish with coating of minimum 120 grams per square meter (GSM) of Zinc, GI sheets shall be lead free, eco-friendly and Ro HS compliant.
- vii) The thickness of sheets for fabrication of rectangular ductwork shall be as under. The thickness required corresponding to the longest side of the rectangular section shall be applicable for all the four sides of the duct work.

Longest side (mm)	Minimum sheet thickness	
	For GSS	For Aluminium
750mm and below	0.63	0.80

751mmto1500mm	0.80	1.00
1501mmto2250 mm	1.00	1.50
2251mm&above	1.25	1.80

- iv) All sheet metal connections, partitions and plenums required for flow of air through the filters, fans etc. shall be atleast 1.25 mm thick

Galvanised steel sheets, in case of G.I. sheet ducting or 1.8 mm thick aluminium sheet, in case of aluminium sheet ducting and shall be stiffened with 25 mm x 25 mm x 3 mm angle iron braces.

Aluminium ducting shall normally be used for clean room applications, hospitals works and wherever high cleanliness standards are functional requirements.

Associated Items

- v) Supply/return air outlets, F.A. grilles and accessories shall be constructed from extruded aluminium sections.
- vi) Flanges for matching duct sections, stiffening angles (braces) and supporting angles shall be of rolled steel sections, and shall be of the following sizes.

Application	Duct Width	Angle size
Flanges	Upto 1000 mm	35 mm x 35 mm x 3 mm
-do-	1001 mmto2250 mm	40 mm x 40 mm x 3 mm
-do-	More than 2250 mm	50 mm x 50 mm x 3 mm
Bracings	Upto 1000 mm	25 mm x 25 mm x 3 mm
-do-	More than 1000 mm	40 mm x 40 mm x 3 mm
Support angles	Upto 1000 mm	40 mm x 40 mm x 3 mm
-do-	1001 mm to 2250 mm	40 mm x 40 mm x 3 mm
-do-	More than 2250 mm	Size and type of RS section shall be decided in individual cases

- i) Hanger rods shall be of mild steel and of at least 10 mm dia for ducts up to 2250 mm size, and 12 mm dia for larger sizes.
- ii) All nuts, bolts and washers shall be zinc plated steel. All rivets shall be galvanised or shall be made of magnesium- aluminium alloy. Self tapping screws shall not be used.

Ducts

- iii) Ducts shall be fabricated at site or factory fabricated and shall be generally as per IS: 655 "Specifications for metal air ducts", unless otherwise deviated in these General Specifications.
- iv) The interior surfaces of the ducting shall be smooth.
- v) All the ducts upto 600 mm longest side shall be cross broken between flanges by a single continuous breaking. Ducts of size 600 mm and above shall be cross broken by single continuous breaking between flanges and bracings. Alternatively, beading at 300 mm centres for ducts upto 600 mm longest side, and 300 mm centres for ducts above 600 mm size shall be provided for stiffening.
- vi) As far as possible, long radius elbows and gradual changes in shape shall be used to maintain uniform velocity accompanied by decreased turbulence, lower resistance and minimum noise. The ratio of the size of the duct to the radius of the elbow shall be normally not less than 1:1.5.
- vii) Flanged joints shall be used at intervals not exceeding 2500 mm. Flanges shall be welded at corners first and then riveted to the duct.
- viii) Stiffening angles shall be fixed to the sides of the ducts by riveting at 1.25 meters from joints for ducts of size 600 mm to 1500 mm, and 0.6mm from joints for ducts of size larger than 1500 mm. Bracings for ducts larger than 1500 mm can alternatively be by diagonal angles.
- ix) Plenums for filters shall be complete with suitable access door of size 450 mm x 450 mm.
- x) All factory fabricated duct shall be supplied in L sections, the length of any piece shall not be more than 1800 mm for duct with longest side of cross section as 600 mm and above and 3000 mm for rest.

Air Outlet and Inlets (Supply and Return)

- xi) All air outlets and intakes shall be made of extruded aluminium sections & shall present a neat appearance and shall be rigid with mechanical joints.
- xii) Square and rectangular wall outlets shall have a flanged frame with the out side edges returned curved 5 to 7 mm and fitted with a suitable flexible gasket between the concealed face of the flanges and the finished wall face. The core of supply air register shall have adjustable front louvers parallel to the longer side to give upto 22.5 degrees vertical deflection and adjustable back louvers parallel to the shorter side to achieve a horizontal spread air pattern to at least 45 degrees. Return air grilles shall have only front louvers. The outer frame work of the grilles shall be made of not less than 1.6 mm thick aluminium sheet. The louvers shall be of aero foil design of extruded aluminium section with minimum thickness of 0.8 mm at front and shall be made of 0.8 mm thick aluminium sheet. Louvers may be spaced 18 mm apart.
- xiii) Square and rectangular ceiling outlets/intakes shall have a flange flush with the ceiling into which it is fitted or shall be of anti smudge type. The outlets shall comprise an outer shell with duct collar and removable diffusing assembly. These shall be suitable for discharge in one or more directions as required. The outer shell shall not be less than 1.6mm thick

extruded section aluminium sheet. The diffuser assembly shall not be less than 0.80 mm thick extruded aluminium section.

- xiv) Circular ceiling outlets/intakes shall have either flush or anti smudge outer cone as specified in the tender specifications. Flush outer cones shall have the lower edge of the cone not more than 5 mm below the underside of the finished ceiling into which it is fitted. Anti smudge cones shall have the outer cone profile designed to reduce dirt deposition the ceiling adjacent to the air outlet. The metal sheet used for construction of these shall be minimum 1.6 mm thick extruded aluminium sheet.
- xv) Linear diffusers shall have a flanged frame with the outside edges returned 3.5 mm and shall have one to four slots as required. The air quantity through each slot shall be adjustable. The metal sheet used for the construction of these shall be minimum 1.6 mm thick extruded aluminium sheet.
- xvi) Grilles and diffusers constructed of extruded aluminium sections shall have grille bars set straight, or deflected as required. These shall be assembled by mechanical interlocking of components to prevent distortion. These grilles and diffusers shall have are arrest of adjustable blades, perpendicular to the face blades for deflection purposes.
- xvii) All supply air outlets shall be fitted with a volume control device, made of extruded aluminium gate section. The blades of the device shall be mill finish/ block shade pivoted on nylon brushes to avoid rusting & rattling noise, which shall be located immediately behind the outlet and shall be fully adjustable from with in the occupied space without removing any access panel. The volume control device for circular outlets shall be opposed blade radial /shutter type dampers, or two or more butterfly dampers in conjunction with equalizing grid. Opposed blade dampers shall be used for square and rectangular ceiling/wall outlets and intakes.
- xviii) All the products supplied by contractor should supplement in performance by selection curves of product ratings from the manufacturer.
- xix) Laminar supply air diffusers shall be made of 2mm thick powder coated aluminium sheet duly insulated with 5mm thick closed cell polyethylene foam insulation having factory laminated aluminium foil and joints covered with self adhesive aluminium tape and having holes 2/3 mm dia including frame work.

Fresh Air In takes

- i) Fresh air in take grills shall be made of extruded aluminium sections.
- ii) A flanged frame using RS sections shall be provided on front face to conceal the gap between the louvers and the adjoining wall face. Corners of frame shall be welded. The frame shall be made structurally rigid.
- iii) Louvers made from extruded aluminium section shall be in modular panel form for ease of handling. These shall be free from waves and buckles. Vertical blades shall be truly vertical and horizontal blades shall be truly horizontal. But joints in blades shall not be accepted.
- iv) Additional intermediate equally spaced supports and stiffeners shall be provided to prevent sagging/ vibrating of the louvers, at not more than 750 mm centres where the louver's length is longer than 750 mm.

- v) A bird wire screen made of 12 mm mesh in 1.6 mm steel wire held in angle or channel frame shall be fixed to the rear face of the louver frame by screens.

FIREDAMPERS

- i) Fire dampers shall be provided in all the supply air ducts and return air ducts (where provided), return air passage in the air-handling unit room and at all floor crossings. Access door will be provided in the duct before each set of fire dampers.
- ii) Fire dampers shall be multi blade louvers type. The blade should remain in the air stream in open position & shall allow maximum free area to reduce pressure drop & noise in the air passage. The blades and frame shall be constructed with minimum 1.6mm thick galvanised sheet & shall be factory fitted in a sleeve made out of 1.6 mm galvanised sheet of minimum 400mm long. It shall be complete with locking device, motorised actuator & control panel.
- iii) Fire dampers shall be motorised smoke & fire dampers type. It shall be supplied with spring loaded UL stamped fusible link to close fire damper in the event of rise in duct temperature. Fire damper shall also close on receipt of fire alarm signal to cut off air supply instantaneously. An electric limit switch shall also be operated by the closing of fire damper, which in turn shall switch off power supply to AHU blower motor as well as strip heaters.
- iv) Fire dampers shall be CBRI tested & certified for 90 minutes rating against collapse & flame penetration as per UL 555-1995.(Under writers laboratories)
- v) Fire dampers shall be compatible with the fire detection system of building & shall be capable of operating automatically through an electric motor on receiving signal from fire alarm panel.
- vi) Necessary wiring from fire alarm panel up to AHU electric panel shall be provided by the department & further from AHU electric panel to fire damper shall be provided by air conditioning contractor.

6. After award of work: The successful tenderer would be required to submit the following for the PACs and VRF/VRV system:

- a) Heat load calculation of the areas /rooms proposed with air conditioning for approval by the Engineer-in-Charge. Subsequently, after approval of the heat load calculations, submission of GAD drawing of entire VRF air conditioning system shall be submitted to the department for approval.
- b) Details of foundations/stands for the equipments and the weights of assembled equipments.
- c) Refrigerant pipe design details with calculations.
- d) Access panel requirements and flashing details.
- e) Cable layout, control wiring, schematic drawing etc.
- f) Any other drawings and details necessary for the job as called for and in general required for approval before commencement of installation.

7. Guarantee

- i) The contractor shall guarantee the complete system to maintain the specified conditions under all conditions of ambience and internal loads subject to the condition that designed outside conditions & designed internal loads are not exceeded. Also the inlet/ outlet temperatures shall be guaranteed.
- ii) Any leakage of refrigerant and/or oil due to defective design, manufacture, workmanship or installation during the guarantee period shall be made good by the contractor free of charge.

LIST OF PREFERRED MAKES (Electrical)

Sr.No.	Description	Makes
1	Air Circuit Breaker	Siemens /ABB / Schneider Electric/Legrand
2	MCCB	Siemens/ABB /Schneider Electric/Legrand
3	SFU with HRC fuses, 415V	Siemens / Schneider Electric / ABB/Legrand
4	Protection Relays	ABB/Siemens/ Schneider Electric/Legrand
5	Contactors, Timer, starters	Siemens / Schneider Electric / ABB/Legrand
6	Bi Metal Relays	Siemens/ABB/Schneider /Legrand
7	Dry type Capacitors, 440V, 50Hz	Siemens/Epcos/ABB/Schneider
8	APFC Relay	Siemens/Epcos/Neptune /ABB /Schneider /Trinity/Beluk
9	MCB DBs/MCBs/RCCB/ RCBO/ELCB/Industrial Sockets	ABB/Siemens/Schneider Electric /Legrand
10	Electric Panel/ Enclosure (CPRI approved fabricator)	Adlec/ Tricolite/ Advance Panels & Switchgear Pvt. Ltd Haridwar / Marine/ RES/Pristine/Electricals /ABAK Electrofab
11	Current Transformer	AE/Kappa/Alstom / L&T
12	Potential Transformer	AE/Kappa/Alstom/BHEL
13	Digital Meters/ Digital Energy Meters/ Multifunction Meters/Load Managers	Conzerv/ Elmeasure/ Socomec/ Secure/Neptune /AE/Trinity /Siemens/Schneider/ABB
14	Voltmeter, Ammeter	Schneider/Secure/Socomec/ ABB/AE /Conzerv
15	Power Quality Meters	Schneider/Eaton Power/PSL
16	PLCs	ABB/Omron/Siemens/Allen Bradley
17	Relays(Microprocessor/ Electromechanical/ Numerical)	Siemens/ABB /Schneider/ Alstom
18	Motorized/manual COS & ATS	ABB/Siemens/Schneider /Socomec
19	Connectors	Connect well /Siemens/ABB
20	Indication Lamps	Siemens / GE Power / ABB / Schneider /Teknic/ L&T
21	Selector Switches	AE / Kaycee/Siemens/Salzer/ L&T

22	Local Push Button Stations	BCH/Teknic/Siemens/ Schneider / Vaishno/L&T
23	HRC Fuses & Fuse Settings/ Links with Bakelite moulded base	Siemens / ABB/Schneider/ L&T
29	Batteries Charger	Volstat/Statcon/Uptron/ Mahamai/Powertron
30	LV Power/Control Cables 1.1 KV grade Aluminium/copper conductor	Polycab/Havells/Finolex
31	Terminals/ Terminal Block	Phoenix Contacts/Wago & Controls / Weidmuller/ Elmex/ Connect well/ Essen
32	GI/MS Pipe (ISI marked)	TATA/ Jindal/ Zenith /Prakash Surya
33	Cable Glands	Dowells/ Comet/Braco/Jainsons
34	Cable lugs/Thimbles/ Terminal Ends (heavy duty)	Dowell/Jainson/ Braco
35	Perforated/Ladder Cable Tray	MK/OBO Betterman/AKG/ Indiana/ Slotco/Pilco/Storack/Venus
36	Paints	Asian/Berger/Nerolac
37	Anchor Fastener	Fisher / Hilti / OBO
38	Pressure Gauges	H-Guru/Ware/Taylor / Metzger/ Bestobell/ Star Scientific / Fiebig/ Danfoss
39	Variable frequency drives	Siemens/Danfoss/ABB/schneider
40	Refrigerant Copperpipe	Rajco Metals/ Mandev/Mexflow / Nippon/ Hindustan Copper /Mettube
41	NitrileRubber insulation	Paramount ARMAFLEX/ Vidoflex/ Eurobatex/ Therma flex/A- Flex/K-Flex
42	Class O rubber insulation for duct thermal insulation	A-Flex/K-flex/ Armacall/APL
43	Crossed linked Polyethylene insulation	Torcellene/Thermobreak
44	Volume Control Damper, Fresh/ Exhaust air louver	Titus / Trox/ System Air /Caryaire/ Conair/ Mapro / Airmaster/ Dynacraft/

		Cosmos
45	Indoor Units, Y joints and fittings, Central and Remote controller, Cassette VRF type four directional air flow DX split indoor air conditioning units etc.	Daikin / Toshiba / Mitsubishi / O-General / Carrier / LG
46	Vibration Isolators / Rubbed pad / Duct support Arrangement	Dunlop / Resistoflex / Cori / Easyflex / Emerald
47	GI sheet	Jindal / Tata / Nippon / SAIL
48	Filters	Thermodyne / Anfilco / Trucool / Purolator / Spectrum
49	Variable frequency drives	Siemens / Danfoss / ABB / Schneider
50	VRF / VRV units	Daikin / Toshiba / Mitsubishi / O-General / Carrier / LG
51	Floor and ceiling grills	Unitile / AET Flexispace / Balaji
52	UPVC Drain Pipes & accessories	Supreme / Astral / Ashirwad / Prince / Finolex
53	Sealing Compound	Hilti / 3M / M-Seal
54	Explosion proof exhaust fan (Centrifugal / Axial / Vane Axial) / In-line fans	Kruger / Greenheck / System Air / Nicotra / Wolter / Ostberg / Pineair with motor from their approved OEM
55	Air handling units	Zeco / Edgetech / Citizen

The make and models to be used in work shall be got approved from Engineer-in-charge. Similarly the items which are not mentioned in above list shall be got approved from the Engineer-in-charge before use at site and decision of Engineer-in-charge in this regard shall be final and binding.

SH – II GENERAL TERMS & CONDITION FOR COMPREHENSIVE MAINTENANCE

(A) General Conditions :

1. After successful completion of the Original Work of project, as per scope of document, a supplementary agreement shall be drawn with the main Contractor for comprehensive Maintenance of the services, installation and various equipments etc. in accordance with scope and terms & conditions of this part.
2. This section covers the comprehensive maintenance of all the various services, installations and equipments in the original work for a period of five years after the completion of work. However, No payment shall be made for Comprehensive maintenance during 1st year i.e. the period of defect liability of one year.
3. The work is for 24x7x365 days of operation and adequate man power shall be positioned at site by the contractor. As the maintenance has to be carried out with least down time of the installations, the Engineer-in-charge shall have the right to get the installation operated at the risk and cost of the successful tenderer by the other agencies/ departmentally, if in his opinion, the same has not been carried out by the contractor. It may not be possible to issue written orders for carrying out the maintenance at the risk and cost. The same may be intimated in person/ telephonically. The decision of the Engineer-in-charge whether any situation warranted such an action and to be considered as emergency is final and binding on the contractor. Comprehensive maintenance includes routine, preventive and break down maintenance of the complete system.
4. The work includes routine and preventive maintenance and checks as per good and accepted maintenance practices as per the recommendations of the OEMs of the respective equipment or as specified in the schedule and replacement of defective / worn out parts, for which department shall not provide parts / spares. In addition call back service shall be provided by the contractor and the repair work commenced within 4 hours of such a call and completed as expeditiously as possible. The call back shall be for 24 x 7 x 365 days.
5. The contractor shall generate & provide daily, monthly, quarterly, Half yearly, yearly reports of the service and all calls received, resolved, pending (due to what reason) in an Excel sheet and/or Hard copies to Engineer-in-charge.
6. The contractor will deploy adequate staff to attend the break down, also appropriate mechanism will be devised to register the complaints.

7. All the services are to be maintained comprehensively by entering back to back agreements with the respective OEMs or OEM authorized service centre or Certified channel partners. Copy of the renewed back to back agreements on yearly basis shall be submitted to the Engineer-in-charge before their expiry.
8. This shall also include a minimum specified preventive maintenance visits per year by OEM/authorized service providers /firms having experience who are thoroughly familiar with the type of equipment and system provided for this project as per preventive and comprehensive maintenance schedule. The preventive/breakdown maintenance report for each visit duly signed by the OEM/ service provider shall be submitted
9. The contractor shall carry out the checks/Tests as per the additional condition and specifications. The result of such should be recorded in a Logbook/test register in the Performa as decided by the Engineer-in-charge duly signed and kept for verification at any time.
10. The work shall be carried out as per CPWD General specifications for Electrical works, Part-I (Internal)-2023, Part-II (External)- 2023, Sub-Station Part IV - 2013, Part-VI (Fire Alarm & Detection System)-2018, & DG Sets part- VII, HVAC Works – 2017and maintenance manual, should also comply with relevant provisions of the Indian Electricity Rules /Acts as applicable, amended up to date, and as per directions of Engineer-in-Charge.
11. Rates quoted shall be firm and inclusive of all taxes, levies, duties including GST, EPF and ESIC and other taxes. Any increase in these rates during the currency of contract shall be borne by the contractor. The contractor shall quote the rates accordingly. Labour Welfare Cess, Income Tax and any other statutory deductions at the prevailing rates shall be deducted at source from the contractor's bills and remitted to the State/Central Government.
12. Successful contractor shall maintain (a) complaint register (b) log books and (c) preventive maintenance register of various installations under taken by him. Contractor shall obtain counter signature of officer designated by Engineer-in-charge on the records maintained. The required stationary / forms / registers etc shall be arranged by contractor for all services.
13. The agency should have a complete set of T&P items at site required for day to day maintenance of the installation and nothing shall be given by department. Special T&P, if any, required should also be available with the agency. Nothing extra shall be paid on account of this.
14. The successful contractor shall provide standard tools- supplier, screw drivers (Small & big), line testers, torch, spanner sets, hammer including drill machine with bit in sufficient quantities at site.
15. The contractor shall provide full details of the escalation matrix with official address, best reachable phone numbers (both fixed & mobile numbers) and working Email Ids. The contractor shall submit list of workers to be deployed on the job with name, address residence proof (Aadhar card) and attested photograph a long with document regarding technical, academic qualification & experience of the operator duly attested before start of the work. The verification

of qualifications and experience shall be done by concerned EE (E) or AE(E). If the working staff is changed /substituted by the contractor or due to the instruction by the engineer-in-charge of the work the contractor shall submit the above documents in respect of the new staff deputed. The whole process, shall be carried out to the entire satisfaction of the Engineer-in-Charge or his representative.

16. The contractor or his representative should be available on his mobile phone 24 hours of the day to register the complaint. The events recorded on BMS or other suitable method adopted shall be used for calculating the uptime / downtime etc.
17. The contractor shall maintain a cell / Mobile phone in Electrical sub- station and the SIM shall be returned to the department on closure of the contract.
18. Agency has to observe all the labour rules and regulations in-force. Contractor shall payment to workers at the rates not less than the rates payable as per as per prevailing minimum wages act and minimum labour rates published by Labour Department Central Govt. / Govt. of Maharashtra from the time to time. (which ever are higher).
19. The staff deputed by the contractor shall be liability of contractor, no claim for regularization of the labour deployed for subject work in any form, their wages, bonus, overtime etc. shall be entertained by department. It shall be the sole be responsibility of the contractor. The contractor shall indemnify the department against any claim arising out of it.
20. In case of any accident during maintenance work / operation leading to injuries / damages to human being / equipments, loss of life the contractor shall be fully responsible for settling all claims, compensation, penalty and indemnify the department against any claim arising out of such accident. CPWD will not be liable for any claim, compensation, penalty etc. on this account or on account of non observance of any other requirement of law relevant to this work.
21. Department shall in no way be involved in any dispute of whatever kind, between the contractor and the staff engaged by him. The department will not be responsible in any way. The log books cannot be taken by the contractor or his workforce for any purpose whatsoever.
22. In case of fire, the contractor at once shall locate the site of fire and information shall have to be sent by him to the nearest fire station, security, JE(E), AE(E) and EE(E), in addition to taking action for extinguishing the same.
23. The contractor staff shall maintain work diary at the site and immediately upon attending a complaint, have to be go signed from the client dept. /Engineer-in-charge in to of having attended the complaints.
24. The inventory of the buildings shall be handed over to the contractor by the deptt. Which shall be signed by the contractor. The contractor invariably shall hand over the installation in working condition. For any loss of property/defects or shortage, the valuated recovery shall be made from the contractor.
25. The contractor shall be responsible for the safe custody of all the equipments at all times. The contractor shall be responsible for all thefts, pilferage, damages

etc. and such materials/ work shall be made good free of cost. If it is not done, suitable recovery shall be made from the bills of the contractor

26. The contractor and / or his representative, labour shall not remove / disturb / dislocate the existing equipments and its parts from its positions. The Entire installations should be intact at any time of inspections and as handed over to him at the time of initial taking over of its operation. Care shall also be taken not to damage the installation by improper handling etc while operation of the equipments.
27. No advance payment shall be made. However, quarterly payment or at such higher interval as desired by the contractor subject to satisfactory maintenance of all the installations as per agreement and submission of EPF and ESI remitted vouchers in respect of staff deployed by the contractor for the work. Necessary statutory recoveries such as income tax, GST, labour welfare cess etc. will be recovered from the bills.
28. The RA / final bill shall be released only after submission of labour payment details/documents after making payment to labourers /staff employed at site and fortnight labour report is to be submitted if required.
29. The EPF & ESIC contribution validly paid by the contractor shall be reimbursed on submission of documentary proof of payment made towards EPF and ESIC.
30. In case of faults beyond the capacity of the staff provided as above, contractor shall immediately provide extra specialized work force so as to attend to the fault in minimum reasonable time or as instructed by the Engineer-in-charge during the validity of contract.
31. The required additional staff shall be deputed by contractor for breakdown and comprehensive maintenance purpose. In case of any breakdown, contractor shall try to replace the faulty part/rectify the defect at the earliest even for standby units, In any case normal services /comfort level should not be disturbed. In case the contractor fails to provide satisfactory service, appropriate recovery for each service shall be made from monthly bill, after giving notice by E Mail/Fax.
32. Wherever contractor has to engage specialized firm/OEM/authorized service providers, they shall make sure they depute their Engineer and the work carried out by them is comprehensively controlled and assured with respect to quality, coordination and delivery.
33. Major defect / fault if any occurs in the installation shall be intimated to Engineer in-charge by the contractor within the stipulated time.
34. Care shall be taken by the contractor during execution of the work to avoid damage to the building. Care shall also be taken by the contractor to avoid the damage to any existing service/service lines, any part of the building etc.

The agency is expected to maintain all the installations in systematic and scientific manner. In case any of any breakdown /damage to any equipment / accessories on account of negligence / fault of the contractor's staff, the same will have to be made good by the agency. Otherwise, the department shall arrange to get it rectified at the risk and cost of the contractor through some other agency.

The amount spent on this shall be recovered from the contractor's bills. The

- decision of the Engineer-in-charge in this regard shall be final & binding. He shall also remove all unwanted and waste materials arising out of the work after attending the complaints from the site of work from time to time.
35. The complaint register, log books and preventive maintenance register registers shall be produced as and when asked or at a regular interval, duly completed, as decided by the Engineer-in-charge or his authorized representatives. All the register etc. connected with the work shall be returned to the department. Failing recovery @500/- per month shall be made if any register/log book not produced.
36. The complaints received at site shall be attended by the contractor within 24 hours, else penalty of Rs. 500 /- per complaint per day shall be imposed for non attending the complaint within 24 hours, hindrance if any to attend the complaint, shall be reported to Engineer in-charge with proper record.
37. Following recovery shall be made:-
- i) Failure to attend break down complaints @ Rs.1000/- per day after 24 Hrs. of complaint.
 - ii) Failure to do fortnightly and monthly visit @ Rs.2000/- Per visit per Month.
 - iii) Failure to do Quarterly and half yearly visit @ Rs.5000/- Per visit per Month.
- Additionally a recovery @ Rs. 1000/- per day per fault shall be recovered from the bill. If the system is not made operational with reasonable period, the same shall be got done immediately by department for which necessary recoveries shall be made from the bill of the contractor/ firm and will be binding on the contractor.
38. The material required for maintenance work shall be issued from department free of cost which is not covered in the schedule of work. Contractor shall maintain the record of material at site including record of dismantled materials received from site. All Dismantle materials received from site shall to be returned back to department duly accounted and shall be stacked neatly in the stores.
39. Necessary work permits shall be got issued through CPWD from the PNB authorities for all personnel of OEMs/Authorised service provider/channel partners to be engaged under the contract for which the agency shall produce the list of all personnel deployed indicating the details of name, address, qualification, designation, mobile number, photo. All the personnel shall display the Id card and work permit for security check as and when demanded by security authorities of Bank.
40. Shut down for maintenance shall be taken with prior approval of the client department.
41. It shall be binding upon the contractor to follow court-decisions & orders, without claim of any additional payment.
42. The department shall be at liberty to terminate the contract in between also if the performance of the contractor is found unsatisfactory or otherwise without assigning any reason, by giving a 30 days advance notice at any time during the period of contract and the decision of the Engineer-in-charge in this respect shall be final and binding on the contractor and no claim of the contractor of being put to loss by the department because of premature termination of the contract shall be entertained by the department. In case of termination of contract, S.D deducted from the contractor bills shall be totally forfeited.

43. All the materials to be used in the work shall be new and of good quality and same make of preferred list of materials in original work or better. It shall be got approved from the Engineer-in-Charge before use at site.
44. Either OEM or his authorised service centres or Contactor will intimate in writing, by Fax/mail about schedule for preventive maintenance. In the event that OEM or his authorised service centres is called for any Breakdown Maintenance, OEM or his authorised service centres can carry out Preventive maintenance at that time, provided such Breakdown Maintenance is called for within two weeks before a scheduled Preventive Maintenance.
45. In case any equipment is under repairs, the firms will provide standby arrangement for the same within the same cost and nothing extra will be paid on this account.
46. Replacement of all spares and consumables except replacement materials shall be carried out within the quoted rate and nothing will be paid extra on this account. **The contractor shall keep adequate stock of consumable items for quick repair/ replacement works and shall ensure proper operation/ maintenance of the equipment entrusted to him.** The Engineer-in-charge shall have the right for access to these consumables for inspection to satisfy himself of the genuineness of the items.
47. The Comprehensive maintenance of all major services VRF/VRV system etc. covered in the scope of contract shall be got maintained through respective manufacturer's i.e. OEMs or their authorised service centres of respective equipments. For other services the work shall be got maintained through OEMs or their authorised service centres or certified channel partners in comprehensive maintenance field. All spares and accessories to be replaced shall be procured only from the authorized dealers / manufacturers of OEM of the respective equipments. Materials procured by the department for the work, which are under exclusion list and are supplied by the department shall be replaced by the contractor at no extra cost.
48. All maintenance work including replacement of spares shall be got executed through OEM or authorized service provider or certified channel partners and service report to that effect shall be got signed from the AE(E)/JE(E) and the in charge officer designated for the purpose by Bank authorities.
49. Materials procured by the client/department for the maintenance work, which are under exclusion list and are supplied by the department shall be replaced by the contractor at no extra cost.
50. On the expiry of contract/termination of the contract, the contractor shall hand over back the installation in proper working condition with all the fittings in intact position.

ADDITIONAL TERMS & CONDITIONS FOR MAINTENANCE

L.T. PANELS

Details of installation: All LT panels & Equipments under original work

The Comprehensive maintenance of LT Panels shall be done by contractor through panel manufacturer /Authorized service provider/firms with experience only as per below mentioned scope of work.

1. **Preventive Maintenance:-** This consists of measures regarded by panel manufacturer as necessary to maintain the equipment in a proper operating condition. Preventive maintenance includes functional checking, necessary adjustments, etc. As far as possible, the preventive maintenance shall be carried out in every month during the term of this Contract. The contractor will intimate about schedule for such maintenance.

The following activities in general are to be carried out:

- a) The contractor shall clean HT/LT switchgears, bus-bars regularly in a week with cloth and with air blower once in three months.
 - b) The Contractor shall clean the contact points of L.T switchgears including ACB, contactors and relays of DG panel etc. with the help of CTC every three months.
 - c) Complete Servicing of ACBs shall be done once in a year.
 - d) The contractor shall maintain the TRIP supply battery unit as per the recommendation of battery manufacturer. The contractor shall check specific gravity of electrolyte in each cell, DC voltage per cell and final output DC voltage of battery bank with the help of suitable Hydrometer and cell testing voltmeter. This shall be done once in a fortnight.
 - e) Necessary inspections and checking shall also be done in respect of cell terminal post, cell connection, battery joints, interior connection and action for prompt cleaning/ replacing damaged connection, nut & bolts and petroleum jelly shall be applied as and when required. The contractor shall maintain the distilled water level in the batteries. All the entries for the above shall be recorded in the log-book of batteries.
2. **Breakdown Maintenance:-**This is to be carried out in the event of malfunction, which prevents the satisfactory operation of the equipment and its useful life. Work to be carried out during the service coverage time as per the conditions of agreement. Breakdown Maintenance includes fault finding, repair or replacement of defective parts and functional checking. Response Time shall be two hours and Turnaround Time for attending to breakdown call shall be 6 Hours.
 3. **Spares & Materials:-**Defective parts discovered during maintenance could either be repaired or replaced by new parts. Spares replaced will preferably be either of the same makes or equivalent make. OEM or his authorised service centres shall decide whether defective parts are to be replaced or repaired in consultation with Engineer-in- charge. If on repair of defective parts, the faults persists or gets

repeated frequently, then the defective part is to be replaced. The following parts indicating lamps, MCBs, MCCBs, Fuse, relays, contactors, metering devices, power meters, multifunction meters, load mangers, CTs, selector switches, control switches, push buttons, emergency stops buttons, all contactors, coils, contacts, timers, ammeters, voltmeters, releases, battery chargers, hooters, annunciators, heaters, thermostats, cooling fans, APFC relays, semiconductor fuse links, thyrist or switching modules, reactors, capacitors, neutral CTs, allied accessories etc are covered in scope for replacement, if required.

4. All the spares except those are not covered as specified in the exclusions- will be supplied by OEM or his authorised service centres of firms, as a part of Service Contract and these spares will be kept with OEM or his authorised service centres or firms office/stores. Additions/ Deletions of these spares, if any, would be done by OEM or his authorised service centres, to ensure minimum downtime of equipment in consultation with Engineer-in-charge.

VRF/VRV systems:

Details of installation : Equipments under original work

The Comprehensive maintenance of VRF/VRV Air conditioners shall be done by contractor through OEM/Authorized service centre of OEM only as per below mentioned scope of work.

Routine preventive maintenance, inspection, checking of all units shall be carried out monthly. The service report /card shall be submitted to the Engineer in charge. The contractor will use only genuine spare parts what so ever required for replacement for proper maintenance and satisfactory performance of the units including required gas.

The following preventive maintenance shall be carried out once in a month:

1. Cleaning of Air filter with water.
2. Cleaning of Front panel, grills by using cloth and detergent.
3. Check drain pan, host, the line of internal unit devices and clean if dirty.
4. ~~Check for smooth flow of condenser water flow out.~~
5. Clean fins of evaporator and indoor air flow.
6. Gas pressure of the devices should be suitable with the Device and Liquid Line account.
7. There should be no apertures on the pipe isolations.
8. Check running amperes and voltage normal or not. The device must be able to draw amps in accordance with the factory values at minimum and maximum capacities.
9. Check electrical connections, fixed if loose.

10. For outdoor units- check refrigerant pressure, compressor noise, fan noise, Cleaning of ODU coil fins, PCB status, pressure sensor, Refrigerant gas make up etc.
11. Serpentine of the external unit device should be clean.
12. External unit motherboards must be isolated from external factors.
13. For indoor units- Check drain pump, clean drain pan, check piping and insulation, PCB status, inspect indoor coil fins etc.
14. Tightening of bolts of equipment, alignment of belts, check safety controls mechanical, Electrical, Electronics and interlocking to various equipments.
15. To check all piping/insulation/proper positioning/damage and rectifying the same where ever required.
16. Inspect/check entire line for leakage and rectification of leakage, if any
17. Check the performance of equipment of VRF plant for proper functioning
18. Checking / setting / rectification of all safety and automatic controls
19. Complete Overhauling of indoor/outdoor units, FCU, Fans.
20. Functional checks & calibration of all switches, thermostats, humidistat and other instruments rectification of the same if required.
21. Any other job required to be attended during course of Checking and to keep the plant in perfectly working conditions.
22. The Comprehensive maintenance includes in addition to normal servicing, repairs, replacement of all defective parts and nothing extra will be paid for repairs or replacement.

In case of any fault/ break down/ fault in system along with all the equipments, the same shall be attended immediately.

1. Preventive Maintenance Work Need to be done on Monthly Basis: (VRF/VRV units)

- a) Cleaning of Heat Exchangers, Air Filters, indoor unit grills and filters through air blower.
- b) Cleaning of the indoor unit body by wiping out the dust etc. with a wet cloth.
- c) Refrigerant check & if required then top-up.
- d) Check the unit Current (Amps)
- e) Check the indoor unit motor noise
- f) Check the drain pipe & clean (There should not be any water leakage)
- g) Check the swing motor & flap

- h) Check the return air sensor & coil sensor
- i) Check the remote battery and replacement.
- j) Check electrical connections, motor bushing etc.

2. Preventive Maintenance Work Need to be done on Quarterly Basis:

a) Every machine shall be serviced at least once every quarter. A record of such services duly checked by the person using the machine or in his absence, in charge of the location of the AC shall be maintained.

b) Quarterly PMS shall include the following services:

- i) Replacement of filter if found damaged/unusable
- ii) Checking the selector switch, thermostat, relays, remote control, capillary etc.
- iii) Check the motor winding with the help of a megger and rewind if needed.
- iv) Checking of all ground connections.
- v) Checking and cleaning of blower and condenser fans
- vi) Cleaning of the cooling/evaporator and condenser coils with the help of vacuum/blower and water pressure.
- vii) Use the fin comb to straighten the coil fin if needed.
- viii) Checking and tightening of nuts and bolts
- ix) Lubricate, grease motor, and blower bearing.
- x) Checking of the backup electrical power outlet/MCB, etc.
- xi) Checking of the drive motors and fans
- xii) Overhauling of the AC, with a chemical washing process (if required)
- xiii) Checking of cooling efficiency in terms of grill temperature, room temperature and current drawn.
- xiv) Checking firmness of the supporting arrangement for the compressor, blower motor, air conditioners casing and fixing of the air conditioners
- xv) Replacement of any component of air conditioners (indoor and outdoor units, inlet and outlet pipes, electrical connections etc) found defective after the above checks and tests.
- xvi) Charging of Refrigerant gas during the period of contract if need arises, a maintenance schedule mutually agreed upon will be prepared before commencement of the CMC.
- xvii) Condenser fins to be cleaned with Flushing water jet.

xviii) Use the fin comb to straighten the coil fin if needed.

3. Comprehensive maintenance services:

The scope of work shall include all checks and tests as detailed under routine maintenance services. In addition, comprehensive maintenance services shall also include:

- a) Cleaning the condenser and evaporator coils with suitable detergent/ chemical solution and flushing with high pressure jet water
- b) Greasing of blower motors and all moving parts.
- c) Insulation work if needed.
- d) Regular maintenance, cleanliness & upkeep of all the equipments under CAMC and cleanliness of nearby area of equipments is in the scope of the contractor.
- e) The grills / diffusers of ductable VRV should be cleaned on quarterly basis or as per requirement.

4 Breakdown Services:

On-call CAMC services shall include attending to any complaint at any time of the year on receipt of verbal/written complaint from the coordinating officer of NABARD, BKC Bandra East. A record of the breakdown calls attended duly acknowledged by the occupant or user of the Air Conditioner in his absence by the person in charge of the location.

5. This comprehensive contract includes replacement of any faulty spares like compressors, starting capacitors, running capacitors, relays, Thermostats, Fan Capacitors, Fan Motors, Selector switches, power contractors, control contractors, external time switch units provided for specific time running of AC's, PCBs, Thermostatic Expansion valves (TXV) , EXV, Rewinding of motors, providing ball bearing of motors, fan blades, electronic control circuitry, remote control units, drain motor, Refrigerant piping, gas charging etc at contractor's cost including gas charging and complete repair and maintenance of their related voltage stabilizers, attending all complaints and breakdowns of all types of air conditioners.

6. Defective spares compressors/condensers are to be replaced with new compressors/condensers and repairing of the old compressors is not permitted. Whenever new compressors/condensers are used, the contractor has to produce the original invoice and warranty card of the new compressor/condenser at the discretion of NABARD, BKC Bandra East. The compressor/condenser being replaced should match with the original star rating of the air conditioner.

7. The following registers/documents are to be maintained by the contractor:

- a) Service/Breakdown Register: The air conditioners serviced/maintained/repared has to be recorded in register and endorsement from End User Department has to be obtained in register. Also, further service reports are to be made after carrying out periodical servicing and endorsement (with sign) to be obtained from the End User Department.

b) Complaint Register: All complaints received with respect to air conditioners under CAMC are to be recorded with time and date of receipt, as and when complaints are received from end user departments.

c) History sheet / card of equipments: All equipments should have their history cards with details of work/repair/service executed on them.

Preventive Maintenance Work Need to be done on Monthly Basis: (AHU & Other allied works):-

Agency is to carry out the general maintenance and any part found malfunctioning/damaged will be repaired / replaced by agency under their scope of work. (Parts will be provided by OEM/Authorized partner). Sl. No Time Line Description AIR HANDLING UNITS 1

1.Weekly. Check for coil and filters if found faulty/ damage, rectify or replace as required.

2. Weekly. Cleaning of AHU pre-filters

3. Weekly. Check for air and water leakage

4. Weekly. Check condensate drain for any blockage, clean if required.

5 Weekly. Check drain pan for any blockage.

6 Weekly Check fan Belt for correct tension and sign of wear and alignment of fan and motor. 7 Monthly Inspect coils and clean, if required

8 Monthly Check functioning of lights and limit switch interlocking & proper Illumination

9 Monthly Check for bearing of motor and blower

10 Monthly Check for tightness of V-belts and alignment of pulleys.

11 Monthly Check looseness of any bolt in fan casing motor base etc

12 Monthly Check for vibration in blower and motors.

13 Monthly Check access doors and hinges for easy operation.

14 Monthly Check cleanliness of the filters and clean.

15 Monthly Check the looseness of any bolt in the fan or casing etc.,

16 Monthly Check the associated damper flap movement and apply grease for the bearing housing, if required.

17 Monthly check running current of the motor.

18 Quarterly Check/Add grease or lubricate to the Fan shaft bearing, motor bearing blower bearing if required.

19 Quarterly Check the alignment of Fan and Motor, If necessary, correct the same.

20 Quarterly Inspect the condensate drain pan and ensure that it is clean and water freely flows to the drain.

21 Quarterly inspect the coils for cleanliness. Wash the coil with a low pressure water hose or low pressure air.

22 Quarterly Check tightness of electrical connections

23 Quarterly Check flexible connections spool piece for leakage

24 Quarterly Check for condition of inlet strainers and clean (if required)

26 Half yearly Check in motors full load current, fan motor running current and tightness of terminals

27 Half yearly Check blower shaft, scroll, impeller and bearing.

28 Yearly Check and clean cooling coils & fins.

29 Yearly Clean interiors and check for corrosion, check tightness of all sections

30 Yearly Check anti-vibration mounting & flexible connections

31 Yearly Check operation & condition of all electrical connections.

32 Yearly Check alignment of drive pulleys, adjust the same if required

33 Yearly Combing of fins to be done after coil cleaning (if required)

34 Yearly Check all bellows, replace if any crack/water leakage observed

35 Yearly Check insulation resistance (Megger) of motor

36 Yearly Checking, servicing, calibration and validation of all VFDs along.

4 Breakdown Services:

On-call CAMC services shall include attending to any complaint at any time of the year on receipt of verbal/written complaint from the coordinating officer of NABARD, BKC bandra East. A record of the breakdown calls attended duly acknowledged by the occupant or user of the Air Conditioner in his absence by the person in charge of the location.

.This comprehensive contract includes replacement of any faulty spares like motor, VFD, power and control cables, electrical panels accessories, fire dampers, cable tray, cables, volume control dampers, ACBs, Distribution boards, MCBs, MCCBs, faulty spares of ductable units, replacement of Dx-coil, filters, blowers of AHUs, replacement of belts etc. at contractor's cost including complete repair and maintenance of their related low side works, attending all complaints and breakdowns of all types of air conditioners.

Central Public Works Department

NIT NO: - 09/CE/MUMBAI-II/2023-24

PART C

**O/o CHIEF ENGINEER, MUMBAI-II
CENTRAL PUBLIC WORKS DEPARTMENT**

Schedule of Work

Name of Work :- Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai.

Sl. No.	Description of Items	Qty	Unit	Rate	Amount	Remarks
	<u>Part : I Replacement of existing Central air conditioning plant with latest VRV system</u>					
	VRF System					
1	Supply Installation, Testing & Commissioning of modular type Variable Refrigerant Flow/Variable Refrigerant Volume air cooled Outdoor units suitable for cooling only having all hermetically sealed inverter type Scroll/Twin rotary Compressor(s), minimum two compressors for above 14 HP modules, microprocessor based Controller, top discharge type condensing unit(s), with R410A Refrigerant, vibration isolators, with suitable foundation etc. complete as required. The unit shall deliver the rated capacity at AHRI Conditions and work even at 50°C ambient temperature without tripping. The unit shall be suitable to work on 400V +/- 10%, 3 Phase, 50Hz AC power supply. The unit shall be filled with first charge of the refrigerant and ready for use as required. The COP at AHRI conditions shall not be less than 3.1 and IEER not less than 6.5.					
1.1	1200 HP	1200	HP	20677	24812400.00	MR

2	Supply, Installation, testing and commissioning including vaccumiazation and Nitrogen testing of following nominal sizes of soft/hard drawn copper refrigerant piping for VRV/VRF system, complete with fittings, with suitable adjustable ring type hanger supports, jointing/brazing including accessories, insulated with XPLE Class-O tubular insulation/with Class-O closed cell elastometric nitrile rubber tubular sleeves sections of specified thickness as given below for Suction and Liquid lines, all accessories as per specifications etc. as required :					
2.1	6.4 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	25	Mtr.	245	6125.00	DSR VRF/VRV 2019 Item 5.1
2.2	9.5 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mmthick insulation	43	Mtr.	331	14233.00	DSR VRF/VRV 2019 Item 5.2
2.3	12.7 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	90	Mtr.	466	41940.00	DSR VRF/VRV 2019 Item 5.3
2.4	15.86 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	70	Mtr.	588	41160.00	DSR VRF/VRV 2019 Item 5.4
2.5	19 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	200	Mtr.	707	141400.00	DSR VRF/VRV 2019 Item 5.5
2.6	22.2 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	300	Mtr.	865	259500.00	DSR VRF/VRV 2019 Item 5.6
2.7	25.4 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	600	Mtr.	1022	613200.00	DSR VRF/VRV 2019 Item 5.7
2.8	28.58 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	800	Mtr.	1108	886400.00	DSR VRF/VRV 2019 Item 5.8
2.9	31.8 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	160	Mtr.	1170	187200.00	DSR VRF/VRV 2019 Item 5.9

2.10	34.9 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	1000	Mtr.	1230	1230000.00	DSR VRF/VRV 2019 Item 5.1
2.11	38.1 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	950	Mtr.	1265	1201750.00	DSR VRF/VRV 2019 Item 5.11
2.12	41.27 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	810	Mtr.	1309	1060290.00	DSR VRF/VRV 2019 Item 5.12
3	Supply, installation, testing and commissioning of following minimum capacity and external static pressure VRF/VRV ceiling mounted ductable type Indoor unit equipped with washable synthetic media pre-filter, fan section with low noise fan/dynamically balanced blower, multispeed motor, coil section with DX copper coil, electronic expansion valve, corded remote control, outer cabinet, vibration isolators, drain pan, other necessary supports etc., suitable for operation on single phase AC supply 230 V \pm 10%, 50 Hz complete as required. The unit shall have automatic force shut down provision in case of fire on receiveing signal from BMS System. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19 Degree C WB temperature.					
3.1	1.1 TR Low static ductable units (minimum 25 pascal external static pressure)	2	Nos	32610	65220.00	DSR VRF/VRV 2019 Item 4.6
3.2	2.3 TR Mid Static Ductable units (minimum 45 pascal external static pressure)	3	Nos	39669	119007.00	DSR VRF/VRV 2019 Item 4.12
	Air Handling Unit					

4	<p>Supply, testing and commissioning of factory built floor mounted double skin and DX type horizontal/vertical air handling units of following capacity suitable for outdoor VRV/ VRF made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation of density not less than 38kg/cu. factory injected between them by injection moulding machine, complete with blower section with blower suitable for static pressure as required, minimum 2 bend GSS/PVC eliminators, cooling coil section with aluminium finned copper tubes (tubes thickness not less thn 0.5mm) cooling coil of 6 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air prefilters and fine filter, belt drive package with TEFC drive motor with IP54 protection class of efficiency class IE3 suitable for 415 + 10% Volts, 50Hz, 3 phase AC supply suitably designed for variable frequency drive applications, drain connections, stainless steel(18G) drain pan with PUF insulation, necessary vibration arrangement etc. Complete as per specification and of following capacities:-</p>					
	<p>1) AMCA certified DIDW backward curve fans (belt driven)/ plug fans (direct driven) with minimum 70% efficiency shall be used in all floor mounted AHUs.</p>					
	<p>2) All the floor mounted/ ceiling suspended AHUs shall have 6 row deep cooling coil and AHU motors shall have efficiency rating of IE3 as per IS 12615. The fan impeller assembly shall be statically and dynamically</p>					

	balanced.					
	3) Noise level at a distance of 2M from AHU shall not exceed 75dB.					
	4) The air outlet velocity from the blower fan shall not exceed 610m/min.					
	5) The fins shall be of aluminium. The minimum thickness of the fins shall be 0.15 mm nominal. The no. of fins shall not be less than 4.7 per cm length of coil. Fins may be of either spiral or plate type.					
	6) For 100% F.A application fins shall be hydrophilic coated. The line item specification shall be complete in compliance with the CPWD specifications. 7) Fan to be supplied with control panel. 8) ESP - 50mm wg					
4.1	Mininum 3000 CFM	2	Nos	201832.00	403664.00	MR
4.2	Mininum 5000 CFM	2	Nos	290789.00	581578.00	MR
4.3	Mininum 6000 CFM	6	Nos	317261.00	1903566.00	MR
4.4	Mininum 7000 CFM	5	Nos	364965.00	1824825.00	MR
4.5	Mininum 8000 CFM	2	Nos	387943.00	775886.00	MR
4.6	Mininum 9000 CFM	9	Nos	435646.00	3920814.00	MR
4.7	Mininum 10000 CFM	1	Nos	454996.00	454996.00	MR
4.8	Mininum 13000 CFM	1	Nos	598375.00	598375.00	MR
4.9	Mininum 15000 CFM	12	Nos	673626.00	8083512.00	MR
5	SITC of AHU Kits for connecting AHU to VRF ODU / DX CONDENSING UNIT. The kits should have built in arrangement of EXVs/EEV (included in item) and allied controlling systems. These kits has to be compatible for any third party BMS and should release open protocol like BACnet / MODBUS. The cost shall also include the communication cable (In pvc conduit) from condenser unit to the kit. These kits shall be located inside the MS powder coated sheet metal casing and located					

	near AHU's.(As per OEM recommendation)					
5.1	For 3000 CFM	2	Nos	13944.00	27888.00	MR
5.2	For 5000 CFM	2	Nos	15075.00	30150.00	MR
5.3	For 6000 CFM	6	Nos	15075.00	90450.00	MR
5.4	For 7000 CFM	5	Nos	29958.00	149790.00	MR
5.5	For 8000 CFM	2	Nos	29958.00	59916.00	MR
5.6	For 9000 CFM	9	Nos	29958.00	269622.00	MR
5.7	For 10000 CFM	1	Nos	29958.00	29958.00	MR
5.8	For 13000 CFM	1	Nos	29958.00	29958.00	MR
5.9	For15000 CFM	12	Nos	29958.00	359496.00	MR
6	SITC of AHU Communication kit along with control box complete etc. as required. (As per OEM recommendation)	40	Nos	28123.00	1124920.00	MR
7	SITC of Corded Remote/Thermostat for AHU units which indicate and control temperature, fan speed etc as required.	40	Nos	3664	146560.00	MR
8	SITC of Cordless Remote for Ductable Type units which indicate and control temperature, fan speed etc as required	5	Nos	4885	24425.00	MR
9	SITC of Refnet joints for branching of refrigerant . (Sizes As per OEM Design)					MR
9.1	for indoor to outdoor	45	Nos	2404	108180.00	
9.2	between outdoor unit	49	Nos	9518	466382.00	
10	Supplying, laying, fixing, testing and commissioning of following thickness closed cell elastometric nitrile rubber of class 'O' applied by suitable adhesive, as per specifications and as required complete in all respect.					
10.1	19mm	1000	Sq Mtr	665	665000.00	DSR 2022 16.5.2

11	Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required.					
11.1	Thickness 0.80 mm sheet	847	Sq Mtr	1263	1069761.00	DSR 2022 16.12.1.2
11.2	Thickness 0.63 mm sheet	138	Sq Mtr	1080	149040.00	DSR 2022 16.12.1.1
12	Supply, installation, testing and commissioning of GI volume control duct damper complete with neoprene rubber gaskets, nuts, bolts, screws linkages, flanges etc, as per specifications.	50	Sq Mtr	7046	352300.00	DSR 2022 16.13
13	Supplying, Fixing, testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring, the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as required and as per specifications.					
13.1	Fire damper	50	Sq Mtr	10659	532950.00	DSR 2022 16.20.1
13.2	Actuator	40	Nos	9948	397920.00	DSR 2022 16.20.2
14	Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications.	4.5	Sq Mtr	9105	40972.50	DSR 2022 16.15

15	Supply and fixing of acoustic lining of supply air duct and plenum with 25 mm thick resin bonded glass wool having density of 32kg/ m ³ , with 25 mm X 25 mm GI section of 1.25 mm thick, at 600 mm centre to centre covered with Reinforced Plastic tissue paper and 0.5 mm thick perforated aluminum sheet fixed to inside surface of ducts with cadmium plated nuts, bolts, stick pins, CPRX compound etc. complete as required and as per specifications.	200	Sq Mtr	708	141600.00	DSR 2022 16.21
16	Supplying, fixing acoustic lining on wall and ceiling of AHU rooms with 50mm thick, density 32 kg/cu.m resin bonded glass fiber insulation friction fixed in 610mm x 610 mm frame work made of 25X50X50X50X25 mm made out of 0.6mm thick GI sheet U shaped channel and covered with reinforced fiber glass tissue and finished with 0.80 mm perforated aluminium sheet etc. complete as required and as per specifications.	400	Sq Mtr	1229	491600.00	DSR 2022 16.22
17	Supplying, laying, fixing, testing of Rigid PVC Pipes , duly insulated with 9 mm Thick Nirtile rubber pipe section, complete with all necessary fittings such as elbows, tees, reducers, serviceable 'P'traps. Etc and supports such as clamps etc complete as per required.					
17.1	32 mm dia	120	Mtr.	349	41880.00	MR
18	Supplying, Fabrication, painting of various sizes of G.I "C" channel/ Angle in the existing ceiling/wall/ floor along with all necessary mounting accessories, nut bolts i/c testing etc. complete as required.	400	Kg	110	44000.00	MR
19	Supplying and top up of refrigerant gas R-410a for existing New System I/c testing etc. as required	800	Kg	852	681600.00	MR

20	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.					
20.1	150 mm width X 50 mm depth X 1.6 mm thickness	250	Mtr.	716	179000.00	DSR 2022 4.6.2
20.2	300 mm width X 50 mm depth X 1.6 mm thickness	300	Mtr.	963	288900.00	DSR 2022 4.6.4
20.3	450 mm width X 50 mm depth X 2.0 mm thickness	1000	Mtr.	1325	1325000.00	DSR 2022 4.6.6
21	Supply, Installation, Testing and commissioning of Touch type controller for monitoring and controlling all Indoor and Outdoor Units. The Controller should have following functions :1. Individual control (On, Off / Operation mode / Fan speed / Temp control, Swing / Air flow control).2. Lock Function (Entire system / Temp / Mode /Fan / Clear).3. Temperature Set Point Range limit: Prevents the set point from being set to extremes that can result in overcooling or overheating of the space.4. Emergency Stop: function is to stop all connected equipments when an emergency stop situation occurs.5. Energy save mode: When using this function, operation mode changes from cooling to fan or heating to off mode.6. Scheduling: condition the space only when necessary. Schedule program (Max. 100 events) Weekly, Monthly, Exception day. 7. Historical Information:	5	Nos	171885	859425.00	MR

	<p>a. Event log (Maximum months).</p> <p>b. Error history (Maximum 3 months).</p> <p>c. Operation Trend (Maximum 3 months).</p> <p>8. Auto control</p> <p>a. Peak demand control.</p> <p>b. Time limit Control.</p> <p>c. Device interlocking(Maximum 40)</p> <p>9. Login: 10 different user login is possible.</p> <p>10. E-mail: max 20 address can be registered.</p>					
22	<p>Supply, Installation, Testing and Commissioning of variable speed drives with panel for AHU Fan Motor(s) with 1 no. dedicated microprocessor based controller with software duly downloaded, earthing stud on both sides of panel, Adjustable frequency drives, differential pressure sensor/transmitters as necessary and as described in the specifications and complete with:-</p>					
22.1	<p>5HP VFD BYPASS STARTER [DOL STARTER]:1</p>					
	<p>1)VFD panel shall be fabricated with main structure 2mm sheet and door as per IS:8623 PTTA standard. panel shall be dust and vermin proof, 415 V , 50 HZ, wall amouting, indoor type, single front, non-draw out Compartmentized as per IP -42 construction. shall be powder coated with Siemens Grey RAL-7032 with 9 tank process for cleaning and Phosphating before powder coating.</p> <p>2)10A TP 50KA MPCB with ROHM - 1 no. 3)25A TP Contactor 230V AC with ADD-ON Block -2 no. 4)ON/OFF/TRIP Indication Lamp 230V AC -1 no. 5)Start/Stop Push Button -1 no.</p>	2	Nos	71472	142944.00	MR

	6)6A VFD/Bypass Selector Switch -1 no. 7)Auto/Manual Selector Switch -1 no. 8)Auxiliary Relay 230V AC- 3 nos. 9)5HP VFD -1 no. 10)Ventilation Fan with Filter 230V AC -1 no. 11)6A SP 10KA MCB -1 no.					
22.2	7.5HP VFD BYPASS STARTER [DOL STARTER] : 1					
	1)VFD panel shall be fabricated with main structure 2mm sheet and door as per IS:8623 PTTA standard. panel shall be dust and vermin proof, 415 V , 50 HZ, wall amouting, indoor type, single front, non-draw out Compartmentized as per IP -42 construction shall be powder coated with Siemens Grey RAL-7032 with 9 tank process for cleaning and Phosphating before powder coating. 2)13A TP 50KA MPCB with ROHM - 1 no. 3)25A TP Contactor 230V AC with ADD-ON Block -2 no. 4)ON/OFF/TRIP Indication Lamp 230V AC -1 no. 5)Start/Stop Push Button -1 no. 6)6A VFD/Bypass Selector Switch -1 no. 7)Auto/Manual Selector Switch -1 no. 8)Auxiliary Relay 230V AC- 3 no. 9)7.5HP VFD -1 no. 10)Ventilation Fan with Filter 230V AC -1 no. 11)6A SP 10KA MCB -1 no.	13	Nos	77947	1013311.00	MR
22.3	10 HP VFD BYPASS STARTER [DOL STARTER] : 1					

	<p>1)VFD panel shall be fabricated with main structure 2mm sheet and door as per IS:8623 PTTA standard.panel shall be dust and vermin proof, 415 V , 50 HZ, wall amouting, indoor type, single front, non-draw out Compartmentized as per IP -42 construction.shall be powder coated with Siemens Grey RAL-7032 with 9 tank process for cleaning and Phosphating before powder coating.</p> <p>2)16A TP 50KA MPCB with ROHM - 1 no.</p> <p>3)25A TP Contactor 230V AC with ADD-ON Block -2 no.</p> <p>4)ON/OFF/TRIP Indication Lamp 230V AC -1 no.</p> <p>5)Start/Stop Push Button -1 no.</p> <p>6)6A VFD/Bypass Selector Switch -1 no.</p> <p>7)Auto/Manual Selector Switch -1 no.</p> <p>8)Auxiliary Relay 230V AC- 3 no.</p> <p>9)10HP VFD -1 no.</p> <p>10)Ventilation Fan with Filter 230V AC -1 no.</p> <p>11)6A SP 10KA MCB -1 no.</p>	12	Nos	98119	1177428.00	MR
22.4	15 HP VFD BYPASS STARTER [DOL STARTER] : 1					
	<p>1)VFD panel shall be fabricated with main structure 2mm sheet and door as per IS:8623 PTTA standard.panel shall be dust and vermin proof, 415 V , 50 HZ, wall amouting, indoor type, single front, non-draw out Compartmentized as per IP -42 construction.shall be powder coated with Siemens Grey RAL-7032 with 9 tank process for cleaning and Phosphating before powder coating.</p>	13	Nos	125637	1633281.00	MR

	<p>2)25A TP 50KA MPCB with ROHM - 1 no. 3)40A TP Contactor 230V AC with ADD-ON Block -2 no. 4)ON/OFF/TRIP Indication Lamp 230V AC -1 no. 5)Start/Stop Push Button -1 no. Selector Switch -1 no. 7)Auto/Manual Selector Switch -1 no. 8)Auxiliary Relay 230V AC- 3 no. 9)15HP VFD -1 no. 10)Ventilation Fan with Filter 230V AC -1 no. 11)6A SP 10KA MCB -1 no.</p>					
	Allied Electrical distribution works					
23	Supplying and fixing of following ways surface/recess mounting, vertical type, 415 V, TPN MCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 250 A tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCBs (but without MCBs and incomer) as required. (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.)					
23.1	8 way, Double door	9	Nos	20918.00	188262.00	MR
23.2	12 way, Double door	1	Nos	24635.00	24635.00	MR
24	Providing and fixing following rating and breaking capacity and pole MCCB with microprocessor/electronic release and terminal spreaders in existing distributions board, making connections, etc. as required.					
24.1	250 A, 36KA, FP MCCB	10	Nos	31738	317380.00	MR
25	Supplying and fixing 5 A to 63 A rating, 240/415 V, 10 kA, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning					

	etc. as required.					
25.1	Triple pole 63AMP Rating	84	Nos	1640.00	137760.00	MR
26	Supply & installation of control cum transmission wiring of 2 core x 1.5 sq.mm. armoured copper cable in between indoor and out door unit.	1200	Mtrs.	180.00	216000.00	MR
27	Supplying , Laying and fixing of one number PVC insulated and PVC sheathed/ XLPE armoured Copper power cable of 1.1 KV grade of following size on wall surface as required.					
27.1	4C x 6 sq.mm (From TPDB to Outdoor unit)(Clamped with 1 mm thick saddle)	1200	Mtr.	756.00	907200.00	MR
27.2	3.5C x 70 sq.mm (From Panel to TPDB)	380	Mtr.	6336.00	2407680.00	MR
28	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.	3160	Mtr.	70.00	221200.00	DSR 2022 5.16
29	POWER LT PANEL					
	Fabrication, supplying, installation, testing and commissioning of factory built floor mounted front and back openable cubical type panel compartmentalized fabricated out of 14SWG CRCA sheet for main frame, door and partitions, totally enclosed, dust and vermin proof lockable doors with stiffeners wherever required, having vibration free structure and the control wiring using approved make FRLS colour coded wires of minimum 2.5 sq.mm and using push on terminals. The panel shall be complete with name plates of each feeder, danger plate, solid bus connections, cable alleys. The panel shall be all					

	complete with interconnections by using wrought aluminium of high conductivity suitable for required fault level, colour coded heat shrinkable PVC sleeves.					
	The Panel shall be painted with Powder Coated granular finished painting with 7/9 tank process with shade as per approval from inside and outside all , provision of ventilation as per specification and panel shall be tested for high voltage test complete as per drawings, technical specifications and final approval. The degree of protection panel should be IP42 and should be extendable on both sides. All MCCBs are (Ics=Icu=100%) to be provided with extended rotary handles and spreader terminals for proper termination of cables. All MCBs are to be 'C' series with breaking capacity of minimum 10kA					
	Note:-All MCCB ratings up to 250A shall be provided with Thermal Magnetic release having adjustable settings for Overload and instantaneous Short Circuit Protections. For ratings above 250A protection release should be Microprocessor based having inbuilt adjustable protections against Over Load (L) and Short Circuit (S). If used as incomer then it should have earth fault protection and time delay in addition to above protection.					
29.1	INCOMER :-					
	R/Y/B Phase Indication Lamp 230V AC-1					
	0-500V Digital Voltmeter with Inbuilt S/S -1					
	0-2000A Digital Ammeter with Inbuilt S/S-1					

	Digital Multifunction Meter-1					
	2000/5A 15VA Class:1 CT's-3 set					
	2A SP 10KA MCB-7 nos.					
	2000A FP 50KA EDO ACB Microprocessor Based Release O/L, S/C & E/F Protection with U/V Release & Microswitch-1 nos.					
	Breaker Control Switch (TNC Switch)-1					
	Auto/Manual Selector Switch-1					
	ON-Delay Timer 230V AC-1					
	ON/OFF/TRIP Indication Lamp 230V AC-1					
	2000/5A 15VA Class:1 CT's (For APFCR Relay)-3 set					
29.2	OUTGOING :-					
	250A FP 36KA MCCB Microprocessor Based Release O/L, S/C Protection with ROHM & Spreader Link- 10 nos.					
	100A FP 36KA MCCB Microprocessor Based Release O/L, S/C Protection with ROHM & Spreader Link- 2nos.					
	63A FP 36KA MCCB Microprocessor Based Release O/L, S/C Protection with ROHM-2nos					
	40A DP 10KA MCB-6nos.					
29.3	22KW WATER PUMP [STAR/DELTA STARTER] : 3nos.					
	63A TPN SFU with Suitable Fuse-3nos.					
	25A TP Contactor 230V AC with ADD-ON Block-6nos.					
	18A TP Contactor 230V AC with ADD-ON Block-3nos.					
	Star/Delta Timer 230V AC- 3nos.					
	0-30A Digital Ammeter with Inbuilt S/S-3nos.					
	50/5A 15VA Class:5 CT's- 9nos.					

	Current Sensing Type Single Phase Preventor Relay-3nos.						
	Current Sensor (up to 25 H.P.) (40 Amp.)-3nos						
	ON/OFF/TRIP Indication Lamp 230V AC-3nos.						
	Start/Stop Push Button-3nos.						
	Auto/Manual Selector Switch with OFF-3nos.						
	6A SP 10KA MCB-3nos.						
29.4	13KW WATER PUMP [STAR/DELTA STARTER] :5nos.						
	32A TPN SFU with Suitable Fuse-5nos.						
	18A TP Contactor 230V AC with ADD-ON Block-10nos.						
	12A TP Contactor 230V AC with ADD-ON Block-5nos.						
	Star/Delta Timer 230V AC-5nos.						
	0-30A Digital Ammeter with Inbuilt S/S-5nos.						
	50/5A 15VA Class:5 CT's-15nos.						
	Current Sensing Type Single Phase Preventor Relay-5nos.						
	Current Sensor (up to 25 H.P.) (40 Amp.)-5nos.						
	ON/OFF/TRIP Indication Lamp 230V AC-5nos.						
	Start/Stop Push Button-5nos.						
	Auto/Manual Selector Switch with OFF-5nos.						
	6A SP 10KA MCB-5nos						
29.5	SPARE :						
	250A FP 36KA MCCB Microprocessor Based Release O/L, S/C Protection with ROHM & Spreader Link-4 set	1	Job	2979241.00	2979241.00	MR	

30	APFC PANEL (400 kVAR Capacitor Panels-1)					
30.1	INCOMER :					
	R/Y/B Phase Indication Lamp 230V AC-1 no.					
	6A SP 10KA MCB-3nos.					
	800A TP 50KA MCCB Microprocessor Based Release O/L, S/C Protection with ROHM & Spreader Link- 1nos.					
30.2	APFCR RELAY :					
	16 Stage APFCR Relay 230V AC-1					
	Auxiliary Contactor 230V AC with ADD-ON Block-2					
	ON-Delay Timer 230V AC-1					
	Auto/Manual Selector Switch-1					
	6" Cooling Fan with Filter-2					
	Thermostat For Cooling-1					
	6A SP 10KA MCB-5					
	800/5A 15VA Class:1 APFC CT's-3					
30.3	CAPACITOR SECTION OUTGOING :					
30.3.1	100KVAR CAPACITOR BANK :-2nos.					
	200A TP 25KA MCCB Thermal Magnetic Release O/L, S/C Protection with ROHM & Spreader Link-2					
	100KVAR Capacitor Duty Contactor 230V AC with ADD-ON Block-2					
	100KVAR Heavy Duty Cylindrical Type Capacitor Bank 440V (25KVAR*4)-2					
	ON/OFF Indication Lamp 230V AC-2					
	Start Push Button (1NO)-2					
	Stop Push Button (2NC)-2					
30.3.2	50KVAR CAPACITOR BANK :-2					
	100A TP 25KA MCCB Thermal Magnetic Release O/L, S/C Protection with ROHM & Spreader Link-2					

	50KVAR Capacitor Duty Contactor 230V AC with ADD-ON Block-2					
	50KVAR Heavy Duty Cylindrical Type Capacitor Bank 440V (25KVAR*2)-2nos					
	ON/OFF Indication Lamp 230V AC-2nos					
	Start Push Button (1NO)-2nos					
	Stop Push Button (2NC)-2nos.					
30.3.3	25KVAR CAPACITOR BANK :					
	63A TP 10KA MCB-1no.					
	25KVAR Capacitor Duty Contactor 230V AC with ADD-ON Block-1no.					
	25KVAR Heavy Duty Cylindrical Type Capacitor Bank 440V-1no.					
	ON/OFF Indication Lamp 230V AC-1no.					
	Start Push Button (1NO)-1no.					
	Stop Push Button (2NC)-1no.					
30.3.4	20KVAR CAPACITOR BANK :-1no.					
	50A TP 10KA MCB-1no.					
	20KVAR Capacitor Duty Contactor 230V AC with ADD-ON Block-1no.					
	20KVAR Heavy Duty Cylindrical Type Capacitor Bank 440V-1no.					
	ON/OFF Indication Lamp 230V AC-1no.					
	Start Push Button (1NO)-1no.					
	Stop Push Button (2NC)-1no.					
30.3.5	15KVAR CAPACITOR BANK-2nos.					
	40A TP 10KA MCB-2nos.					
	15KVAR Capacitor Duty Contactor 230V AC with ADD-ON Block-2nos.					
	15KVAR Heavy Duty Cylindrical Type Capacitor Bank 440V-2nos.					
	ON/OFF Indication Lamp 230V AC-2nos.					
	Start Push Button (1NO)-2nos.					

	Stop Push Button (2NC)-2nos.					
30.3.6	10KVAR CAPACITOR BANK-2nos.					
	25A TP 10KA MCB-2nos.					
	10KVAR Capacitor Duty Contactor 230V AC with ADD-ON Block-2nos.					
	10KVAR Heavy Duty Cylindrical Type Capacitor Bank 440V-2nos.					
	ON/OFF Indication Lamp 230V AC-2nos.					
	Start Push Button (1NO)-2nos.					
	Stop Push Button (2NC)-2nos.					
30.3.7	5KVAR CAPACITOR BANK-1no.					
	16A TP 10KA MCB-1no.					
	5KVAR Capacitor Duty Contactor 230V AC with ADD-ON Block-1no.					
	5KVAR Heavy Duty Capacitor Bank 440V-1no.					
	ON/OFF Indication Lamp 230V AC-1no.					
	Start Push Button (1NO)-1no.					
	Stop Push Button (2NC)-1no.	1	Job	919250.00	919250.00	MR
31	Buyback for the following Unserviceable Parts/Materials of existing Centralized Air Conditioning Chiller (Air Cooled & Water Cooled) Plant including dismantling of Parts/Materials of the plant on as is where basis and carting away from site complete including loading, unloading, transportation without damages to the Building etc complete.					
31.1	Water Cooled Chiller Unit Capacity-120 TR	5	Nos	-250000.00	-1250000.00	MR
31.2	Air Cooled Chiller Unit Capacity- 120 TR	5	Nos	-350000.00	-1750000.00	MR
31.3	Cooling Tower Unit Capacity-200 TR	3	Nos	-100000.00	-300000.00	MR
31.4	Chilled water Pumps capacity-15 HP	10	Nos	-20000.00	-200000.00	MR
31.5	Condenser Pumps Capacity-15 HP	5	Nos	-20000.00	-100000.00	MR

31.6	Assorted Size GSS Ducting (Thickness 1 mm to 0.6 mm)	100	Kg	-20.00	-2000.00	MR
31.7	Assorted Size MS Pipeline (Size 250 mm to 150 mm)	400	Mtr	-150.00	-60000.00	MR
31.8	Assorted Size MS Pipeline (Size 100 mm to 80 mm)	300	Mtr	-120.00	-36000.00	MR
31.9	Assorted Size MS Pipeline (Size 65 mm to 40 mm)	200	Mtr	-80.00	-16000.00	MR
31.10	Assorted size Butter Fly/Gate Valves (Size 250 mm to 150 mm)	66	Nos	-150.00	-9900.00	MR
31.11	Assorted size Butter Fly/Gate Valves Valves (Size 100 mm to 50 mm)	80	Nos	-100.00	-8000.00	MR
31.12	Angle Iron Pipe supports	500	Kg	-20.00	-10000.00	MR
31.13	GI Volume Control Damper	15	Sq Mtr	-200.00	-3000.00	MR
31.14	Air Handling Unit Nominal Rating 3000 CFM to 5000 CFM	4	Nos	-10000.00	-40000.00	MR
31.15	Air Handling Unit Nominal Rating 6000 CFM to 8000 CFM	13	Nos	-15000.00	-195000.00	MR
31.16	Air Handling Unit Nominal Rating 9000 CFM to 10000 CFM	10	Nos	-20000.00	-200000.00	MR
31.17	Air Handling Unit Nominal Rating 12000 CFM to 15000 CFM	13	Nos	-25000.00	-325000.00	MR
31.18	1.1 TR ductable units	2	Nos	-1000.00	-2000.00	MR
31.19	2.3 TR ductable units	3	Nos	-1500.00	-4500.00	MR
31.20	Main Electrical Panel (3 Phase, 415 Volt , 50 HZ Supply) With Incomer- 2000 Amp ACB- 1 No, Outgoings - 63 amp 4 Pole SFU - 17 Nos 150 HP Star Delta Starter - 5 Nos 400 A SFU - 1 No 32 amp SFU - 5 Nos	1	No	-100000.00	-100000.00	MR
31.21	AHUs Stater Panel with DOL/ Star Delta Starter	40	Nos	-1500.00	-60000.00	MR
31.22	100 KVAR Capacitor panel	1	No	-20000.00	-20000.00	MR
31.23	Assorted Size Aluminium Conductor Armoured Cables	1000	Kg	-30.00	-30000.00	MR

	Total				66969856.50	
	ADD : COST INDEX @24% ON DSR (VRF/ VRV) -2019 item no 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 3.1 & 3.2 (i.e. on Rs. 5867425)				1408182.00	
	ADD: GST enhancement on DSR(VRF/ VRV) -2019 (item 2.1 to 2.12 & 3) & DSR (E&M)-2022 (item 10.1,11.1,11.2,12,13.1,13.2, 14,15,16,20.1,20.2,20.3,28 (i.e. on Rs. 5867425 + Rs 5855243.50 = Rs. 11722668.5) @0.0633				742044.92	
	Total (after GST enhancement and cost index)				69120083.42	
	Add labour cess @1%				691200.83	
	Total of Part -I				69811284.25	
	Part-II (ANNUAL COMPREHENSIVE MAINTENANCE OF EQUIPEMENT)					
32	Annual comprehensive maintenance of following equipments including maintaining and upgrading all the associated accessories, coordination with the OEMs of equipments /Authorized service provider after completion of one year of guarantee period and as per additional conditions specifications etc attached .(As per actual quantity executed in original agreement)					
32.1	VRF/VRV System					
	1)VRF Outdoor units 2)Ductable units 3)Refrigerant piping 4)AHU kit including EEV/EXV etc. 5)communication kit and control wiring 6)wired remote control and central Monitoring units.					
32.1.1	1st Year	1200	HP	3835.00	4602000.00	MR

32.1.2	2nd Year	1200	HP	4026.75	4832100.00	MR
32.1.3	3rd Year	1200	HP	4228.09	5073712.08	MR
32.1.4	4th Year	1200	HP	4439.49	5327388.48	MR
32.1.5	5th Year	1200	HP	4661.47	5593766.40	MR
32.2	AHU system					
	1)AHU units 2)fire dampers, actuators 3)volume control dampers 4)variable frequency drives 5)AHU filters 6)electrical panel and distribution system					
32.2.1	1st Year	387000	CFM	5.90	2283300.00	MR
32.2.2	2nd Year	387000	CFM	6.20	2397465.00	MR
32.2.3	3rd Year	387000	CFM	6.50	2517339.05	MR
32.2.4	4th Year	387000	CFM	6.83	2643205.36	MR
32.2.5	5th Year	387000	CFM	7.17	2775364.67	MR
	Total				38045641.04	
	Add labour cess @1%				380456.41	
	Total of Part -II				38426097.45	
	Total of Part-I & Part-II				108237381.70	
	Grand Total				108237382.00	
	Say				108237382.00	

Assistant Engineer (E)
O/o CE (Mumbai)-II
CPWD, Mumbai-20

Executive Engineer
O/o CE (Mumbai)-II
CPWD, Mumbai-20

Price Bid

PART D



Central Public Works Department



NIT No. : 09/CE/MUMBAI-II/2023-24

Name of Work : Replacement of existing chiller plant with latest VRV/ VRF unit alongwith comprehensive Maintenance of VRV/VRF Units for 5 years at NABARD, BKC, Bandra East, Mumbai

Bid sheet

Name of the Contractor					
Sl.No.	Name of component	Estimated cost	Percentage above or below the estimated cost	% in Figures	Total Cost
	Electrical Portion	10,82,37,382/-			-
	Grand Total	10,82,37,382/-			-