

NIT NO	HYD/2026-27/008
DATE	21.05.2025



STATE BANK OF INDIA

TENDER DOCUMENT FOR

SITC OF VRF AIR CONDITIONING WORKS FOR LHPC MOULAALI, HYDERABAD.

THROUGH E-TENDERING PROCESS

The Assistant General Manager (P&E),
State Bank of India,
Premised and Estate Department,
Local Head Office, Koti,
Hyderabad - 500001.

NOTICE INVITING TENDER (NIT)

State Bank Of India, **LHO Hyderabad** invites online percentage tenders for the following work in TWO BID SYSTEM from the Air conditioning of the respective category empanelled with SBI only need to apply

1.	Name of the Work	SITC OF VRF AIR CONDITIONING WORKS FOR LHPC MOULAALI, HYDERABAD.	
2.	Estimated cost of work	SITC - ₹48,63,840.00 Plus GST as applicable Plus CAMC for 5 years.	
3.	Scope of Work	1. SITC of Air conditioners as per the BOQ. 2. Comprehensive AMC of the above ACs for 5 years after the warranty period.	
4.	Time for Completion of work	45 DAYS from the date of PO or handover of the site whichever is earlier.	
5.	Eligibility of the contractor	1. Air conditioning vendors of the respective category empanelled with SBI. 2. The vendor should have a valid digital signature to participate in the online tendering process.	
6.	Preferred make of ACs	1. Voltas 2. Bluestar 3. Carrier 4. LG 5. Panasonic	6. Mitsubishi Heavy 7. Daikin 8. O'General 9. Toshiba 10. Hitachi
7.	Earnest Money Deposit (EMD)	Rs.48,700.00/- all Drafts/BCs shall be in favour of "The Assistant General Manager(P&E), LHO Hyderabad , payable at Hyderabad .	
8.	Address for submission of EMD	Original EMD should be submitted (before due date) physically at the office of " <u>The Assistant General Manager(P&E), 3rd Floor, Premises & Estate Dept, Koti, Hyderabad.</u> Technical Bid of those firms / contractors who do not submit EMD shall be rejected.	
9.	Tender documents available for download from the websites:	1) https://www.sbi.co.in under "SBI in the News" link "procurement news" 2) https://etender.sbi	
10.	Availability for download from the above web site	From 22.05.2026 to 03.06.2026	
11.	Last date and time for submission of online e-tender at https://etender.sbi	03.06.2026 by 3.00 P.M.	
12.	Date and Time of opening of e-Tenders:	03.06.2026 at 3.10 P.M. (IST).	
13.	Payment terms	i) No advance payment. ii) a. 70% payment after Supply of all materials at	

		<p>site,</p> <p>b. 25% payment after installation , testing & Commissioning of all AC units,</p> <p>c. 5% will be retained as security deposit, subject to deductions as applicable.</p>
14.	Initial Security Deposit (ISD)	2% of the Contract value
15.	Total Security Deposit	<p>i) 5 % of contract value which will be retained till the completion of the defects liability period</p> <p>ii) For AMC - 3 months AMC amount in the form of PBG as required by Bank.</p>
16.	Defects Liability Period	12 Months (Twelve months) from the date of completion or commissioning and handover of the work.
17.	Liquidated Damages for delay in work	If the work is delayed beyond the scheduled completion date, then 0.50% of the total value of the contract per week of delay will be deducted from the final bill value subject to max 5%of the value of work
18.	Validity of tender	90 days.
19.	Tax Deduction	As applicable
20.	Price quoted by bidder	<ol style="list-style-type: none"> 1. The Contractor should quote + / - % Percentage on the given total. 2. The given rate are inclusive of Cost of materials, all taxes(excluding GST), wastages, Octroi, machinery, temporary works such as scaffolding, cleaning, overheads, profit, statutory expenses, incidental charges and all related expenses required for the completion of the work. 3. Additional claims other than the quoted amount will not be entertained. 4. The given rates shall be firm throughout the completion of the project
21.	Check list of documents to be uploaded	<ol style="list-style-type: none"> 1. Scanned copy of DD/BC of EMD 2. Bidders are required to upload the NIT in PDF as uploaded by the Bank. This will satisfy digital signing of the terms and condition of the tender by the bidder. 4. Scanned copy of the AC Technical Data Sheet. 5. Details of the Bidder – Duly filled in and signed in all the pages. 6. Scanned copy of Authorization letter from Manufacturer /OEM to participate in the tender (or) Scanned copy of Valid dealership certificate (validity shall be for the current year or valid on the date of tender notice)
22.	Any additional information	<ol style="list-style-type: none"> 1. The make of materials should be chosen strictly from the approved makes as given in the tender. Using of the multi brands for the same item is not permissible. Single brand should be used for entire project. No change of brand will be permitted during the progress of the project 2. Any clarifications sought after opening of the tenders will not be entertained at any cost. Firm

		<p>should be visit the website till last date of submission for changes/ corrigendum, if any</p> <p>3. The Bank reserves the right to cancel or postpone the tenders at any stage without assigning any reason.</p> <p>4. Claims for revision of the Quoted price by any bidder after the tender will not be entertained.</p>
23.	For any queries or support in connection with the online tendering process, please contact our E-procurement solutions agency	e-Procurement technologies Limited, Ahmedabad. Primary Contact Numbers :- +91-9081000427, 9904407997 -
24.	The tender will be summarily rejected if the Bidder	<ol style="list-style-type: none"> 1. Failed to pay the required tender fee and submit the proof. 2. Failed to submit the original EMD at above office before due date. 3. Failed to upload Entire tender document, which is downloaded from the website as a proof of accepting the terms and conditions. 4. Failed to upload the Scan copy of required documents as mentioned in the documents to be uploaded. 5. Partly or fully Modifies, alters or corrects the tender document uploaded by the Bank.
25.	EVALUATION OF PRICE BIDS AND FINALIZATION	<ol style="list-style-type: none"> 1. Only those Bidders who qualify in Technical evaluation would be shortlisted and the online price bid submitted by the bidder will be opened. 2. The L1 Bidder will be selected on the basis of net total of the price evaluation as quoted in the Online bidding. 3. In case, the L1 amount quoted by two or more contractors is the same, such lowest contractors will again be asked to submit sealed / online “ Revised + Percentage Offers” on the original Estimated Cost of tender but the revised percentage shall, in no case, be higher than the percentage quoted during their initial offer for the project. The L1 shall be decided on the basis of revised offers. 4. The process of online rebidding amongst the two or more contractors offering same rates shall continue till L1 bidder is discovered. If required, PL shall conduct reverse auction to discover the L1 bidder. 5. In case, any of such contractors or all contractors (who have quoted same tender amount in the initial bidding or subsequent bidding) refuse to submit revised offer, it shall be treated as “Withdrawal of tender” by the Contractor before

		<p>acceptance by PL and the EMD of such contractors shall be forfeited and they shall not be allowed to participate in the re-tendering process for the work.</p> <p>6. If the final L1 bid is below 10.00% of the estimated cost then the L-1 contractor has to submit Additional Security Deposit (ASD)/Additional Performance Guarantee (APG). The amount of such ASD / APG shall be the difference between 90.00 % of estimated cost put to tender and the quoted price.</p> <p>Bank Guarantee or FDR receipt favoring Asst.General Manager, SBI, but drawn on any other Nationalized Bank may also be accepted as ASD / APG.</p> <p>7. If the L1 bidder refuses to give the PBG, then the EMD will be forfeited and the tender will be re-invited. The L1 bidder will not be allowed to participate in the retendering process.</p>
26.	Bank reserves the right to accept or reject any or all bids without assigning any reasons there even after opening of the bids.	

The Assistant General Manager(P&E),

GENERAL CONDITIONS OF CONTRACT

INTERPRETATION

In constructing these conditions, the specifications, the schedule of quantities, tender and agreement, the following words shall have the meaning herein assigned to them except where the subject or context otherwise requires.

In this connection, the following terms shall be interpreted as indicated below:

- i. **“The Employer/Bank”** ‘means the State Bank of India (including branches and other offices) and any of its employees representative authorized on their behalf.
- ii. **“The Architect / Consultant”** means M/S ABHIKRAM-S Architects, Interior Designers, Urban Planners, Valuers & Project Managers. #3-6-134, Flat No-302, SVC Royal DM Apartments, Street No-18, Himayat Nagar, Hyderabad-500029.
- iii. **“Bidder”** means an eligible entity/firm submitting the Bid.
- iv. **“The Contract”** means the agreement entered into between the Bank and the Contractor, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- v. **“Vendor/Contractor”** is the successful Bidder to whom the work has been awarded.
- vi. **“The Contract Price/Project Cost”** means the price payable to the Vendor under the Contract for the full and proper performance of its contractual obligations.
- vii. **“The Equipment/Product”** means all the Air conditioners along with the accessories which the Vendor is required to supply to the Bank under the Contract.
- viii. **“The Works/Project”** shall mean the works to be executed or done under this contract.
- ix. **“The Project Site”** means locations where the ACs are to be supplied and installed and services as desired in this tender document are to be provided.
- x. **“The Schedule of Quantities/BOQ”** shall mean the schedule of quantities as specified and forming part of this contract.

Words importing persons include firms and corporations. Words importing the singular only, also include the plural and vice versa where the Context requires.

1.0 SCOPE OF WORK

The detailed scope of the work is given in the BOQ

2.0 SITE AND ITS LOCATION

The proposed work is to be carried out at the site whose address is given in the NIT.

3.0 BID DOCUMENTS

3.1 The work has to be carried out strictly according to the conditions stipulated in Bid consisting the following documents and in the most workman like manner,

- NIT
- General Conditions of Contract
- Special conditions of Contract
- Price Bid

3.2 The above documents shall be taken as complementary and mutually explanatory of one another but in case of ambiguities or discrepancies, shall take precedence in the order given below :

- Price Bid
- Special conditions of Contract
- General Conditions of Contract
- NIT

3.3 Complete set of Bid documents can be downloaded from the Bank's website <http://www.sbi.co.in> under "SBI in the News" link "procurement news" and also at our e-procurement agency's portal <https://etender.sbi> during the period mentioned in the NIT.

4.0 BID PREPARATION:

4.1 The Bidder is advised to inspect the site and satisfy himself on his own responsibility and his own expenses all the following information and data which may be required for the purpose of preparation and submission of their bids:

- i) The location of indoor and outdoor units of the proposed ACs
- ii) Required civil work like making opening in the wall,
- iii) feasibility for laying the refrigerant pipes and its route
- iv) Availability of drain water point at the site
- v) Availability of Power near the proposed AC location
- vi) Security gate pass requirements
- vii) Storage space for the new ACs
- viii) Permissible working hours at the site
- ix) any other adverse conditions or hindrance to the installation
- x) Any demo or presentation is required by Bank before installation
- xi) traffic regulations, law & order situations in the area
- xii) Whether AC has to be installed in coordination with other agencies like interior etc

4.2 The Bidder will be fully responsible for considering the financial effect of any or all the above factors while submitting his Bid. The Bank shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder regardless of the conduct or outcome of the bidding process.

5.0 CLARIFICATION /AMENDMENTS AND CORRIGENDUM:

5.1 Bidder requiring any clarification of the bidding document may notify us in writing at the address/by e-mail given in the NIT within the date/time mentioned.

5.2. The clarifications to the queries received or amendments in the tender will be posted on the Bank's website and e-tender portal as a corrigendum/Addendum. No individual communication will be conveyed to the Bidders. The interested parties/Bidders are advised to check the above website regularly till the date of submission of Bid document and ensure that clarifications / amendments issued, if any, have been taken into consideration before submitting the Bid. Such amendments/clarifications, if any, issued by the Bank will be binding on the participating Bidders. Bank will not take any responsibility for any such omissions by the Bidder. Bank at its own discretion, may extend the deadline for submission of Bids in order to allow prospective Bidders a reasonable time to prepare the Bid, for taking the amendment into account.

5.3 Depending upon the site conditions and the Bank's requirements, a pre-Bid meeting, if required, will be held on the date and time specified in the tender which may be attended by the interested Bidders or their representatives and get their queries clarified.

5.4. Bank reserves the right to amend, rescind or reissue the tender, at any time prior to the deadline for submission of Bids.

5.5. No request for change in commercial/legal terms and conditions, other than what has been mentioned in the tender or any addenda/corrigenda or clarifications issued in connection thereto, will be entertained and queries in this regard, therefore will not be entertained.

5.6. Queries received after the scheduled date and time will not be responded/acted upon.

6.0 EARNEST MONEY DEPOSIT (EMD):

6.1 The Bidder shall submit, as part of its Bid, an EMD as stipulated in the form of Demand Draft or Banker's Cheque in favour of **“The Assistant General Manager(P&E), LHO Hyderabad, Hyderabad”** drawn on any Bank in India

6.2 EMD in any other form other than as specified above will not be accepted. **Bid not accompanied by the EMD as above shall be rejected.**

6.3 No interest will be paid on the EMD.

6.4 The EMD of the unsuccessful Bidder shall be refunded soon after the decision to award the contract is taken.

6.5 EMD of successful Bidder will be retained as a part of security deposit. EMD will be returned by the Bank.

6.6 The EMD shall stand absolutely forfeited :-

a. If the finally selected bidder revokes his Bid at any time during the period when he is required to keep his Bid open for acceptance by the Bank.

(or)

b. After the bid is accepted by Bank, the vendor fails to enter into a formal agreement with the Bank

(or)

c. The bidder fails to pay the initial security deposit as stipulated

(or)

d. The bidder fail to supply the ACs or complete the works within the stipulated time.

6.7 If the tendering process is delayed for any reason, the Bank will insist on the revalidation of the DD and the bidder has to get it revalidated and submit again.

7.0 BID SUBMISSION

7.1 Only those bidders satisfying the eligibility criteria given in the NIT need to apply. Tenders should be submitted online in the website <https://etender.sbi>. **Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission. Bidder will be responsible for any delay due to other issues.**

7.2 The bidders should submit their bids online with their valid digital certificate, which confirms that the bidders have read and understood the tender terms and conditions. Claiming ignorance of all the terms and conditions in this tender either before or after the PO is issued or during the progress of the work will not be accepted.

7.3 The bidder shall submit the documents enlisted in the checklist in the NIT in the softcopy format. ie scanned copy of the documents either in PDF or JPEG format as required. The Bank

will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders. The bidder should see that the bid documents submitted should be free from virus and if the documents could not be opened, due to virus, during tender opening, the bid is liable to be rejected.

7.4 The documents submitted online in the **Technical Bid should NOT contain any price information.** Such Bid, if received, will be rejected.

7.5 The bidder shall submit his quotes **online** through the PRICE BID in the e-procurement portal. The price bid will be opened only if the Bid is **unconditional** and the bidder qualifies as per eligibility criteria and meets technical specifications.

7.6 If required, Bank shall conduct e-reverse auction among the qualified bidders and the same shall be communicated to the bidders.

7.7 No claim for submission of offline bids will be entertained. Such bids will not be considered.

7.8 If any Bidder submits Bid on behalf of an OEM / brand, the same Bidder shall not submit a Bid on behalf of another OEM / brand.

8.0 PRICE BID: PERCENTAGE QUOTED BY BIDDER

8.1 The contractor shall satisfy himself before Bidding as to the correctness and sufficiency of his Bid for the works and the rates/ amounts stated in the schedule of quantities and / or the schedule of rates and amount as provided covering all his obligations under the contract and all matters necessary for proper completion of the works expected in this document.

8.2 The rates given shall be firm and shall include costs of all materials, loading, transport, unloading, Installation charges, wastage of materials during execution, levies, Octroi(if applicable), local body taxes(if applicable), all type of Insurance Charges, temporary works such as scaffolding, cleaning, overheads, profit, statutory expenses, incidental charges and all related expenses to complete the work etc..

8.3 Unless otherwise provided in the Schedule of Quantities/Specifications, the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the work and No extra charges will be paid over and above the contract amount on account of any other charges (existing or future addition) or on any other account.

8.4 The GST shall be paid extra as applicable.

8.5 Rate Revision in the contract amount is not permitted during the validity period of the contract for any reason including during the extended period, if any.

8.6 Any request for review of the price bid after the bid opening will not be entertained.

9.0 OPENING AND EVALUATION OF BIDS

9.1 The online Bids will be opened at the office of **the Assistant General Manager(P&E)**, Representatives of Bidder may be present during opening of Bids. However, Bids would be opened even in the absence of any or all the bidder's representatives.

9.2 In the two bid system, the technical bids will be opened at the scheduled time mentioned in the NIT. In case, if the date of opening is declared as nonworking day or Holiday, the bids will be opened on the next working day. The price bid of the qualified vendors will be opened on a subsequent date which will be intimated to the bidders.

9.3 VALIDITY OF BID

Bids shall remain valid and open for acceptance for a period stipulated in this document from the date of opening of price bid. If the Bidder withdraws his/her offer during the validity period or makes modifications in his/her original offer, which are not acceptable to the Bank, without prejudice to any other right or remedy, the Bank shall be at liberty to forfeit the EMD.

10.0 PRELIMINARY EXAMINATION

10.1 M/s Bank will examine the Bids to determine whether they are complete, on required formats & accompanied by supporting Documents and the Bids are conforming to all the terms and conditions of the Bidding Document without any deviations and are generally in order.

10.2 If a Bid is not conforming to the terms and conditions, it will be rejected. However, Bank will have right to demand submission of more information as required, if any of the document is partly submitted. If the bidder does not respond within the stipulated time, BANK will reject or disqualify the bid.

11.0 TECHNICAL EVALUATION

11.1 Only those Bidders and Bids who have been found to be in conformity of the eligibility terms and conditions during the preliminary evaluation would be taken up for further detailed evaluation. Those Bids who do not qualify the eligibility criteria and all terms during preliminary examination will not be taken up for further evaluation.

11.2 The Bank will evaluate the bids on technical & functional parameters including site or factory visit and witness demos of the system and verify functionalities, response times etc from the previous employers or users of the equipment.

11.3 During evaluation of bids, the Bank may, at its discretion ask the bidders for clarification of its bid. The request for clarification shall be in writing and no change in prices or substance of the bid shall be sought, offered or permitted. No post bid clarification at the initiative of the bidder shall be entertained.

11.4 The tenders must be unconditional. Conditional tenders leading to unknown / indefinite liability may be summarily rejected.

12.0 EVALUATION OF PRICE BIDS AND FINALIZATION

12.1 Only those Bidders who qualify in Technical evaluation would be shortlisted and the online price bid submitted by the bidder will be opened.

12.2 The L1 Bidder will be selected on the basis of net total of the price evaluation as quoted in the On line bidding.

12.3 In case, the L1 amount quoted by two or more contractors is the same, such lowest contractors will again be asked to submit sealed / online quotes on the original Estimated Cost of tender but the revised percentage shall, in no case, be higher than the percentage quoted during their initial offer for the project. The L1 shall be decided on the basis of revised offers.

12.4 The process of online rebidding amongst the two or more contractors offering same rates shall continue till L1 bidder is discovered.

12.5 In case, any of such contractors or all contractors (who have quoted same tender amount in the initial bidding or subsequent bidding) refuse to submit revised offer, it shall be treated as “ Withdrawal of tender” by the Contractor before acceptance by BANK and the EMD of such contractors shall be forfeited and they shall not be allowed to participate in the re-tendering process for the work.

13.0 CONTACTING THE BANK:

13.1 No Bidder shall contact BANK or Bank on any matter relating to its Bid, from the time of opening of Price Bid to the time the Contract is awarded.

13.2 Any effort by a Bidder to influence Bank in its decisions on Bid evaluation, or contract award may result in rejection of the Bid.

14.0 AWARD OF WORKS

14.1 BANK will award the Contract to the successful Bidder whose Bid is the lowest evaluated Bid. If required, Bank will issue separate PO for the AMC of the ACs to the contractor after the completion of the warranty period.

14.2 The Bank reserves the right at the time of award of contract to increase or decrease the quantity of goods and / or services from what was originally specified while floating the tender without any change in unit price or any other terms and conditions.

14.3 BANK'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

BANK reserves the right to accept or reject any Bid in part or in full or to cancel the Bidding process and reject all Bids at any time prior to award of the contract, without incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Bank's action.

14.4 The acceptance of a tender rests with the Competent Authority, who does not bind himself to accept the lowest tender and reserves to himself the authority to reject any or all of the tenders received, without assigning any reasons. All tenders in which any of the prescribed conditions are not fulfilled, or are incomplete in any respect are liable to be rejected.

14.5 The notification of award will constitute the formation of the Contract. The selected Bidder should convey acceptance of the award of contract by returning duly signed and stamped duplicate copy of the award letter within 15 days of receipt of the communication and to enter into an agreement with the Bank.

15.0 INITIAL SECURITY DEPOSIT

15.1 Initial security deposit shall be 2% of contract value in favour of the Bank, unless or otherwise specified.

15.2 The successful Bidder will have to submit ISD by means of D/D within a period of 15 days of acceptance of Bid

15.3 No interest shall be paid on the amount retained by the Bank as Security Deposit.

15.4 Security deposit shall be refunded to the contractors without interest after sixty days after the end of contract period provided the contractor has satisfactorily attended to all defects in accordance with the conditions of contract including site clearance.

16.0 SIGNING OF CONTRACT DOCUMENTS

The successful Bidder shall be bound to execute the Agreement within 15 days from the receipt of intimation of acceptance of his Bid by BANK. However, the written acceptance of the Bid by the Bank will constitute a binding agreement between the Bank and successful Bidder pending execution of formal agreement. All expenses, stamp duty and other charges/ expenses in connection with the execution of the Agreement as a result of this tendering process shall be borne by the successful bidder.

For AMC separate agreement will have to be entered with the Bank against the issue of PO.

17.0 INSTALLATION OF AIR CONDITIONERS:

17.1 The Contractor shall carry out and complete the AC installation work as per standard specifications / as stipulated in this contract and OEM's recommendations and to the satisfaction of the Bank. The Bank with approval of Bank issue further written instructions, detailed directions and explanations with respect to the specifications, quality or quantity of works or the addition or omission or substitution of any work.

18.0 MATERIALS, WORKMANSHIP, SAMPLES, TESTING OF MATERIALS

18.1 All the works specified and provided for in the specifications or which may be required to be done in order to perform and complete any part thereof shall be executed in the best and most workman like manner with materials of the best and approved quality of the respective kinds in accordance with the particulars contained in and implied by the specifications and as represented by the drawings or according to such other additional particulars, and instructions as may from time to time be given by BANK during the execution of the work and to his entire satisfaction. The Contractor shall use only products bearing ISI marking in the work for those materials for which no makes are mentioned in the tender.

18.2 No refurbished, second hand and spurious materials should be used. If required, the contractor has to submit the details of the source of his purchase of materials to BANK. BANK reserves its right to enquire and collect data from the supplier to confirm the authenticity of the materials. BANK has the right to stringent action against the contractor, as deemed fit, in addition to suspend / cancel the contract.

18.3 Contractor should get approval of the samples of materials in advance with BANK's Engineer before use of the same in the work. Should be contractor desire to substitute any specified materials with "Equal" or "Other approved" etc., he/they must obtain the specific approval of the Bank in writing for any such substitution, well in advance.

18.4 Samples of all materials to be used must be submitted when so directed by BANK. If required, the contractor shall have to carry out tests on materials in approved materials testing laboratories or as prescribed by Bank at his own cost to prove that the materials etc., under test conform to the relevant I.S Standards or as specified in the specifications. The necessary charges, transporting, testing etc., shall have to be borne by the contractor. No extra payment on this account will be entertained.

18.5 If the contractor has used any material which is not complying with the specifications, or the workmanship is bad or the material used is substandard or second hand etc, Bank shall during the progress of the work have power to order the removal and substitution of the material or proper re-execution of the work within a reasonable time. In case the contractor refuses to comply with the order, Bank shall have the power to employ other agencies to rectify or re-execute the work at the cost and risk of the contractor.

18.6 Any damage (during the work) to any part of the work or to the premises for any reasons due to rain, storm or neglect of contractor shall be rectified by the contractor in an approved manner at no extra cost.

18.7 Should the work be suspended by reason of rain, strike, lock-outs or any other cause, the contractor shall take all precautions necessary for the protection of work and at his own expenses shall make good any damage arising from any of these causes.

18.8 When the employer observes that the progress of the work is not satisfactory or very slow or not in a workmanship manner or of poor quality or violative of safety protocols etc, the contractor shall be issued a suitable advise to rectify the same or replace the materials or redo the entire work, within a reasonable time frame. If the contractor could not rectify the things within the time frame given, in the interest of the work, the Employer reserves the right to execute any part of the work included in this contract or the entire work by any other Agency or

persons and contractor shall allow all reasonable facilities and extend cooperation for the execution of such work.

18.9 All expenses consequent thereon or incidental thereto as certified by BANK shall be borne by the contractor or may be deducted from any money due to or that may become due to the contractor. No certificate, shall relieve the contractor from his liability in respect of unsound work or bad materials.

19.0 PERIOD OF CONTRACT & EXTENSION OF TIME

19.1 Time is the essence of the contract. The Contract shall be executed within the stipulated period in the NIT. No request for extension will be entertained and the bidder has to plan and mobilize his resources for the satisfactory completion of the project within the time period agreed in the tender.

19.2 If in the opinion of the Employer, the work is delayed due to the following reasons not attributable to the contractor, the employer shall make a fair and reasonable extension of time, for completion of the Contract works

- a) By force majeure (or)
- b) By reason of any exceptionally inclement weather (or)
- c) By reason of proceedings taken or threatened by or dispute with adjoining or neighboring owners of public authorities arising, than through the Contractor's own default (or)
- d) By the works not referred in the Schedule of Quantities or specifications (or)
- e) By reason of civil commotion, workmen strike or lock-out (or)
- f) In consequence of the Contractor not having in due time, necessary instructions from the Employer for which he shall have specifically applied in writing ahead of time, giving reasonable time to prepare such instructions

19.3 In case of such strike or lock-out, the Contractor shall as soon as possible give written notice thereof to the employer, but the Contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all they may reasonably be required, to the satisfaction of the employer to proceed with the work.

19.4 In case the work is held up for any site conditions not attributable to the contractors or for any decisions instructions / want of details from Employer or for any of the conditions, the contractor shall be allowed reasonable extension of time by the employer but any claim for idle labour shall not be entertained by the employer. Contractor's quoted price should include for all such contingencies.

20.0 PAYMENT TERMS

20.1 For the SITC of ACs

- i) No advance payment.
- ii) No part payment. For certain works, part payment will be considered if stipulated in the NIT.
- iii) Payment shall be made by way of Electronic fund transfer and the bill will be paid by the Branch.
- iv) Bidder should furnish details of the bank a/c no, IFSC code along with their invoices.

For the AMC

- i) No advance payment.
- ii) Quarterly payments will be released after the end of the quarter subject to deductions for shortfall in services

- iii) Field reports of the PM and breakdown maintenance reports shall be enclosed to the Invoices

20.2 Part/Interim payment is paid as per the payment terms mentioned in the NIT. All the interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed, and shall not preclude the requiring of bad, unsound, and imperfect or unskilled work to be removed and taken away and reconstructed, or re-erected or be considered as an admission of the due performance of the contract, or any part thereof in any respect or the accruing of any claim, nor shall, it conclude, determine or affect in any way the power of the Employer under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract.

20.3 If the Bank has supplied any materials or goods to the contractor, the cost of any such materials or goods will be progressively deducted from the amount due to the contractor in accordance with the quantities consumed in the work.

20.4 The final bill shall be accompanied by a certificate of completion or Commissioning report signed by an official of the Bank. Payments of final bill shall be made after deduction of Retention Money as specified, which shall be refunded after the completion of the Defects Liability Period provided the contractor has rectified all defects to the satisfaction of the Bank. The acceptance of the payment of the final bill by the contractor would indicate that he has no further claim in respect of the work executed.

20.5 **GST as applicable shall be paid extra** and the same shall be clearly shown in the invoices.

20.6 Statutory deduction towards income tax and other taxes as and when directions from statutory bodies are received will be made at the time of making payments. Currently, I.T. will be recovered @ 2 % plus surcharge or as applicable as per Government Rules. GST-TDS as per applicable rates will be deducted, wherever applicable.

20.7 **GST:**

- a. It is the responsibility of the bidder to ensure that the GST is valid and active. Payments will not be made to inactive or invalid GST invoices.
- b. Reimbursement of GST will be made only on submission of proper GST invoice as per applicable GST provision. Non-GST invoices will not be accepted. The contractor should comply with the following.
- c. Contractor should have GST Registration Number
- d. Invoice should specifically disclose the amount of GST levied at applicable rate as per GST provision
- e. In case of Correction in the bills after scrutiny, contractor should submit fresh bills for payment
- f. Contractor should timely file his GST return in accordance with GST provisions to enable the bank to claim the credit of GST paid to the contractor
- g. The GST Number of State Bank of India for Telangana State -36AAACS8577K1ZQ

20.8 The works will be paid for as “measured work” on the basis of actual work done and not as “lump sum” contract, unless otherwise specified.

20.9 All items of work described in the schedule of quantities are to be deemed and paid as complete works in all respects and details including preparatory and finishing works involved, directly related to and reasonably detectable from the drawings, specifications and schedule of quantities and no further extra charges will be allowed in this connection. In the case of lump-

sum charges in the tender, in respect of any items of work, payment will be made for the actual work done, on the basis of lump sum charges, as will be assessed by BANK.

21.0 SECURITY DEPOSIT

21.1 Retention Money: From each running bill, an amount at the rate of 8% of the gross value of the running bill shall be recovered as retention money, till the total retention amount including the ISD amount already with the Bank become 5% of the value of the contract amount. This amount is called as Total Security Deposit, which consists of two components

- a) ISD - Initial Security Deposits.
- b) RM - Retention Money.

21.2 The total security deposit (5%) will be kept with the Bank. The total security deposit amount shall be refunded without interest to the contractor 15 days after the end of defects liability period, provided he has satisfactorily carried out all the works and attended to rectification of all defects in accordance with the conditions of the contract.

21.3 The contractor shall make good at his own cost and to the satisfaction of the Employer all defects, which may appear within the defects liability period. In case of failure on the part to do so, the cost of rectifying the defects through any other agency shall be deducted from the amount of security deposit due to the contractor.

21.4 During the contract period, all compensation or other sums of money payable by the Contractor to Bank under the terms of this contract, will be deducted from the security deposit, or from any sum that may become due to the Contractor on any account whatsoever.

21.5 In the event of the Security Deposit being reduced by reasons of any such deductions, the Contractor shall within 7 days of being asked to make good, by DD, any sum which have been deducted from his security deposit.

21.6 For AMC - 3 months AMC amount in the form of PBG as required by Bank will have to be submitted by the contractor.

22.0 PENALTY CLAUSE

The successful bidder shall execute the work in a workmanship like manner and complete the work within the stipulated period in the NIT. If the work is delayed beyond the stipulated period for reasons attributable to the bidder, BANK shall penalize them a penalty @ 0.5% per week for every week of delay or part thereof beyond the scheduled date of completion, in any case, not exceeding 5% of the contract value or the completed value of work.

Where the contractor is undertaking the AMC, the penalty clause will be as per the special terms and conditions.

23. VARIATION IN QUANTITY / SUBSTITUTION OF ITEM

23.1 The Schedule of Quantities unless otherwise stated shall be deemed to have been prepared in accordance with the Standard Procedure shall be considered to be approximate and no liability shall attach to the employer for any error which may be discovered therein.

23.2 The Employer reserves the right to increase or decrease or delete or omit or execute only a part or the whole or any excess thereof, as per the site requirements, without assigning any reason therefor at the time of allotment / execution of work. Contractor will be paid for the actual work done at the site. No variation shall vitiate the contract.

23.3 The tender rates shall be fixed and applicable for any increase or decrease in the tendered quantities. Nothing extra will be paid by the Bank on account of omission / deletion of items or decrease in the quantity of items. The Bank shall not entertain any claim whatsoever

from the contractor on this account. Payment will be made on actual measurement of the work done. All measurements shall be as per relevant I.S. standards

23.4 Bank reserves the right to order more quantities than what is mentioned in this tender (at the same rate and terms and conditions) either at the same site or other sites as per the need within the validity of this tender.

23.5 The price of all additional items/non-tendered items will be worked out on the basis of rates quoted for similar items in the contract wherever existing. If similar items are not available, the rates for such items will be derived as per standard method of rate analysis based on prevalent fair price of labour, material and other components as required with 15% towards contractor's profit and overheads.

24. CONTRACTOR'S EMPLOYEES

24.1 The Contractor shall employ technically qualified / having appropriate skill and competent persons fully trained and adequately experienced technicians, who are medically fit. They should be free from any contagious diseases. The technicians shall be well mannered and properly dressed with shoes etc.

24.2 The contractor shall provide necessary training on safety measures while executing the work wherever necessary so as to avoid accident. The Bank 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 risk insurance policy including third party insurance as may be necessary to cover the risk.

24.3 The contractor / firm shall be held responsible for any misdeeds / misbehaviour of their employees within the premises. Bank is not responsible for any damages or claims on account of the misbehavior / misdeeds of his employees. For this purpose, any person supplied by the contractor to be engaged on the work on regular basis or as an alternate arrangement, under the direct order or control of the Employer or his representative shall be deemed to be a person employed by the contractor.

24.4 The contractor shall on the request of the Employer immediately dismiss from works any person employed thereon by him, who in the opinion of the Employer be unsuitable or incompetent or who may misconduct. Such discharges shall not be the basis of any claim for compensation or damages against the Employer or any of their officer or employee.

24.5 No employee of the Bank is allowed to work as a contractor for a period of 2 years of his/her retirement from Bank Services without previous permission of the Bank. This contract is liable to be cancelled, if either the contractor or any of his employees is any time to be such a person who had not obtained the permission of Bank as aforesaid before submission of the tender or engagement in the contractor's service.

24.6 Contractor should not engage child labour in any of the activities in this contract.

24.7 The contractor shall not employ person who is not an Indian National.

24.8 The technician shall not over stay in the Bank premises or in the odd hours or holidays unless or otherwise required by the Branch for specific reasons like maintenance, repair works etc.

24.9 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 his 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.

24.10 The Contractor's workmen will not have any right whatsoever to get absorbed in the Bank. The Contractor shall be responsible for all the claims of the employees of the Contractor and shall not make and claim whatsoever against the Bank. The Contractor shall be responsible for all statutory requirements e.g. ESI, PF, labour registrations, Insurance coverage etc. The operator is responsible for compliance of all the rules & safety regulations etc.

Minimum wages as prescribed by the Labour Act shall be payable to the operator(s) by the contractor as the case may be. The Contractor shall bind himself and keep the Employer saved harmless and indemnified against claims if any of the workmen and all costs and expenses as may be incurred by the Employer in connection with any claim that may be made by any workmen.

25. WORKING HOURS AT THE SITE

As instructed by Bank. Contractor to ensure that the routine operations at the site are not affected by the contract work. If required, they have to work on the Bank Holidays in coordination with other agencies and Bank.

26.0 SUBCONTRACTING

26.1 The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein nor, shall take a new partner, without written consent of the Employer and no subletting shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the work during their progress

27.0 STORAGE OF MATERIALS

27.1 The contractor shall store their materials like AC machines, copper pipes, wires, refrigerant gas cylinders, tools etc in the site with the permission of the Bank. However, the contractors shall be responsible for the custody and security of all materials and equipment at site. No claim for loss or theft will be entertained by the Bank.

27.2 Shelter or stay and other amenities for the labors have to be arranged by the contractor at his own expense and responsibility.

27.3 On completion of the works, the contractor shall remove all tools, surplus materials, rubbish and temporary works of every kind and leave the whole of the site and the works clean and in a workmanlike condition to the satisfaction of the Bank

28.0 FORCE MAJEURE

28.1 Notwithstanding the provisions of General terms and conditions of the Contract, the Vendor shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default if and to the extent that the delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

28.2 For the purposes of this clause, 'Force Majeure' means and includes wars, insurrections, revolution, civil disturbance, riots, terrorist acts, public strikes, hartal, bandh, fires, floods, epidemic, quarantine restrictions, freight embargoes, declared general strikes in relevant industries, Vis Major Act of Government, impeding reasonable performance of the Contractor and / or Sub-Contractor but does not include any foreseeable events, commercial considerations or those involving fault or negligence on the part of the party claiming Force Majeure.

28.3 If a Force Majeure situation arises, the Vendor shall promptly notify the Bank in writing of such condition and the cause thereof. Unless otherwise directed by the Bank in writing, the Vendor shall continue to perform its obligations under the Contract as far as is reasonably

practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

29.0 COMPLIANCE OF STATUTORY REGULATIONS

29.1 The contractor shall conform to the provisions of any Acts of the Legislature relating to the work, and to the Regulations and Bye-Laws of any authorities like Electricity, Pollution Control Boards, Municipal Authorities, water and Sewerage boards and shall before making any variations from the drawings or specifications that may be associated to so conform, give the Employer written notices specifying the variations proposed to be made and reasons for making them and apply for instruction thereon. The Employer on receipt of such intimation shall give a decision within a reasonable time.

29.2 The contractor/s shall arrange to give all notices required for by the said Acts, Regulations or Bye-laws to be given to any authority, and to pay to such authority or to any public officer all fees that may be properly chargeable in respect of the work and lodge the receipts with the Employer. The Contractor shall indemnify the Employer against all claims in respect of patent rights, designs, trademarks or name or the protected rights in respect of any equipment, machine, work or material used for or in connection with the works or temporary works and from and against all claims, demands, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto. The Contractor shall defend all actions arising from such claims, unless he has informed the Employer, before any such infringement and received their permission to proceed and shall himself pay all royalties, license fees, damages, coat and charges of all and every sort that may be legally incurred in respect thereof.

29.3 The contractor should strictly abide by the Central/State labour regulation for the Minimum Wages, Payment of wages, Workmen Compensation, PF, ESI, Contract labour, including the latest amendments, if any and other safety regulations.

29.4 The contractor shall keep the Employer saved harmless and indemnified against claims if any of the workmen and all costs and expenses as may be incurred by the Employer in connection with any claim that may be made by any workmen.

30.0 INSURANCE & DAMAGE TO PERSONS AND PROPERTY ETC

30.1 The insurance shall be for an amount equal to 110 percent of the value of the Products from "Warehouse to final destination" on "All Risks" basis, valid until the Completion of the project or handing over whichever is later.

30.2 Should any loss or damage occur, the Vendor shall initiate and pursue claim till settlement and promptly make arrangements for repair and / or replacement of any damaged item to the satisfaction of the Bank, irrespective of settlement of claim by the underwriters.

30.3 The contractor shall be responsible for all injury to the work or workmen to persons, animals or things and for all damages to the structural and / or decorative part of property which may arise from the operations or neglect of himself or of any sub-contractor or of any of his or a sub-contractor's employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of this contract.

30.4 The contractor shall reinstate all damages of every sort mentioned in this clause so as to deliver the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damages to the property of third parties.

30.5 The contractor shall affect the insurance necessary and indemnify the Employer entirely from all responsibility in this respect.

30.6 The contractor shall be responsible for anything, which may be excluded from damage to any property arising out of incidents, negligence or defective carrying out of this contract.

30.7 The Employer shall be at liberty and is hereby empowered to deduct the amount of any damages, compensations, costs, charges and expenses arising or accruing from or in respect of any such claim or damages from any sums due to or to become due to the contractor.

31. TERMINATION OF CONTRACT BY BANK

If the contractor being a company go into liquidation whether voluntary or compulsory or being a firm shall be dissolved or being an individual shall be adjudicated insolvent or shall make an assignment or a composition for the benefit of the greater part, in number of amount of his creditors or shall enter into a Deed or arrangement with his creditors, or if the Official Assignee in insolvency, or the Receiver of the contractor in insolvency, shall repudiate the contract, or if a receiver of the contractor's firm appointed by the court shall be unable within fourteen days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Bank that he is able to carry out and fulfill the contract, and if so required by the Bank to give reasonable security therefore, or if the contractor shall suffer execution to be issued, or shall suffer any payment under this contract to be attached by or on behalf of and of the creditors of the contractor, or shall assign, charge or encumber this contract or any payments due or which may become due to contractor, there under, or shall neglect or fail to observe and perform all or any of the acts matters of things by this contract, to be observed and performed by the contractor within three clear days after the notice shall have been given to the contractor in manner hereinafter mentioned requiring the contractor to observe or perform the same or shall use improper materials of workmanship in carrying on the works, or shall in the opinion of the BANK not exercise such due diligence and make such progress as would enable the work to be completed within due time agreed upon, and shall fail to proceed to the satisfaction of the BANK after three clear das notice requiring the contractor so to do shall have been given to the contractor as hereinafter mentioned or shall abandon the contract, then and in any of the said cases, the BANK may notwithstanding previous waiver determine the contract by a notice in writing to the effect as hereinafter mentioned, but without thereby effecting the powers of the BANK of the obligations and liabilities of the contractor the whole of which shall continue in force as fully as if the contract, had not been so determine and as if the works subsequently executed by or on behalf of the contractor (without thereby creating any trust in favor of the contractor) further the Bank or his agent, or servants, may enter upon and take possession of the work and all plants tools scaffolding sheds machinery, steam, and other power, utensils and materials lying upon premises or the adjoining lands or roads and sell the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by employing any other contractors or other persons or person to complete the works, and the contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other contractors or other persons or person employed from completing and finishing or using the materials and plants for the works when the works shall be completed, or as soon thereafter as conveniently may be the Bank shall give notice in writing to the contractor to remove his surplus materials and plants and should the contractor to remove his surplus materials after receipt by him the Bank may sell the same by Public Auction and shall give credit to the contractor for the amount so realized. Any expenses or losses incurred by the contractor for the amount so realized. Any expenses or losses incurred by the BANK in getting the amount payable to the contractor by way of selling his tools and plants or due on account of work carried out by the contractor prior to engaging other contractors or against the Security Deposit.

32.0 DISPUTES/ARBITRATION:

32.1 All disputes or differences whatsoever arising between the parties out of or in connection with this contract or in discharge of any obligation arising out of the Contract (whether during the progress of work or after completion of such work and whether before or

after the termination of this contract, abandonment or breach of this contract), shall be settled amicably.

32.2 If however, the parties are not able to solve them amicably, either party (SBI or Vendor), give written notice to other party clearly setting out there in specific dispute(s) and/or difference(s) and shall be referred to a sole arbitrator mutually agreed upon, and the award made in pursuance thereof shall be binding on the parties.

32.3 In the absence of consensus about the single arbitrator, the dispute may be referred to joint arbitrator; one to be nominated by each party and the said arbitrators shall nominate a presiding arbitrator, before commencing the arbitration proceedings. The arbitration shall be settled in accordance with the applicable Indian Laws. Any appeal will be subject to the exclusive jurisdiction of courts at Hyderabad.

32.4 The Vendor shall continue work under the Contract during the arbitration proceedings unless otherwise directed by the Bank or unless the matter is such that the work cannot possibly be continued until the decision of the arbitrator is obtained.

32.5 Arbitration proceeding shall be held at Mumbai, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be in English.

33. Governing Language:

All communication with respect to the Bid, clarifications, replies, contract documents etc shall be in English.

34. Safety Guidelines for the Contractor:

The Contractor should follow the following General safety Guidelines while executing the work:

34.1 Smoking is strictly prohibited at workplace.

34.2 No one is allowed to work at or more than three meters height without wearing safety belt and anchoring the lanyard of safety belt to firm support preferably at shoulder level. Chinstrap of safety helmet shall be always on and safety boot is worn.

34.3 Usage of eye protection equipment shall be ensured when workmen are engaged for grinding, chipping, welding and gas-cutting. For other jobs eye protection has to be provided as per the need.

34.4 All safety appliances like Safety shoes, Safety gloves, Safety helmet, Safety belt, Safety goggles etc. shall be arranged before starting the job.

34.5 Excavated pits for earthing, cable laying shall be barricaded till the backfilling is done. Safe approach to be ensured into every excavation.

34.6 Preferably the work shall be carried out during the daytime. However, adequate illumination at workplace shall be ensured in case any work is carried out at night.

34.7 All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded.

34.8 Ladders being used at site shall be adequately secured at bottom and top. Ladders shall not be used as work platforms.

34.9 Debris, scrap and other materials to be cleared from time to time from the workplace and at the time of closing of work every day. Dismantled Material shall not be thrown from the height and shall be properly disposed off to prevent any injury to public/staff.

34.10 Other than electricians no one is allowed to carry out electrical connections, repairs on electrical equipment or other jobs related thereto.

34.11 All electrical connections shall be made using 3 or 5 core cables, having a earth wire.

34.12 Inserting of bare wires for tapping the power from electrical sockets is completely prohibited and plug tops of suitable capacity only shall be used.

34.13 All the unsafe conditions, unsafe acts identified by contractors, reported by SBI/ to be corrected on priority basis.

34.14 No children or physically challenged persons shall be allowed to enter the workplace and shall not be utilized for any service during execution of the work.

34.15 All the Gas cutting, sharp tools, flammable materials and tackles shall be stored properly and safely when not in use.

34.16 Clamps shall be used on Return cables to ensure proper earthing for welding works.

34.17 Return cables shall be used for earthing.

34.18 All the pressure gauges used in gas cutting apparatus shall be in good working condition and in case of any leakages, the same shall not be used.

34.19 Proper eye washing facilities shall be made in areas where chemicals are handled.

34.20 Connectors and hose clamps are used for making welding hose connections.

34.21 Tapping of power by cutting electric cables in between must be avoided. Proper junction boxes must be used.

READ, UNDERSTOOD AND ACCEPTED

FORM OF SUBMISSION OF TENDER

(To be filled by the tenderer)

The Assistant General Manager(P&E),

State Bank of India,

LHO,

.....

Dear Sir/s,

Ref: TENDER FOR

I/We have examined the above tender and subsequent pre-bid clarifications/ modifications / revisions, if any, furnished by The BANK and I/We have inspected the site of works and have made me / us fully acquainted with the local conditions in and around the sites of works and offer to undertake Contract as detailed in this tender by submitting my/our online bids in the Bank's e-tender portal.

2. While submitting this Bid, I / We certify that:
 - i) The undersigned is authorized to sign on behalf of the Bidder and the necessary support document delegating this authority is uploaded along with the bid.
 - ii) We certify that we have not made any changes in the contents of the tender document read with its amendments/clarifications provided by the Bank, submitted by us in our Bid document.
 - iii) The rate quoted in the *price Bids are as per the tender* and subsequent pre-Bid clarifications/ modifications/ revisions furnished by the Bank, without any exception.
3. We agree to abide by all the Bid terms and conditions, contents of Agreement and the rates quoted in the bid, which shall remain binding upon us.
4. If our Bid is accepted, we undertake to enter into and execute at our cost, when called upon by the Bank to do so, a contract in the prescribed form and we shall be jointly and severally responsible for the due performance of the contract.
5. Until a formal contract is prepared and executed, this Bid, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.
6. It is further certified that the contents of our Bid are factually correct. We also accept that in the event of any information / data / particulars proving to be incorrect, Bank will have the right to disqualify us from the Bid.

7. We understand that you are not bound to accept the lowest or any Bid you may receive and you may reject all or any Bid without assigning any reason or giving any explanation whatsoever.
8. We hereby undertake that our name does not appear in any “**Caution**” list of RBI / IBA or any other regulatory body.
9. We also confirm that we have not been **blacklisted** by any Bank / PSU / State or Central Govt departments for any reasons.
10. We confirm that we do not have any **litigation / cases** pending against us in any Bank / PSU / State or Central Govt departments.
11. We confirm that we are submitting bid on behalf of the OEM, and we are not submitting bid on behalf of another OEM for this tender.
12. We confirm that we are responsible to obtain all necessary licenses, permission, NOC from all the statutory /local authorities for the smooth execution of this contract in SBI premises.
13. We hereby confirm that all the components/spare parts/equipment etc. to be supplied /used as a part of this contract shall be original new components / parts / equipment only, from respective OEMs of the products and that no refurbished / duplicate / second hand components /parts/ equipment shall be supplied or shall be used
14. For any type of deviation (to any of above or subsequent instructions), it will be my/ our responsibility to obtain the written instruction of the Engineer-in-charge for the same failing which it shall be deemed that I have carried out any such deviations at my own and I shall be duty bound to replace the all deviated material/ works from the site at my/ our cost as well as I shall be liable to penalized by the BANK as deemed fit and for all such loses made thereof, I/ we shall not have any right to arbitrate in any manner.

Yours Faithfully,

**Signature of
Witness:**

Contractor’s Signature _____

1.

Name: _____

2.

Address: _____

3.

FORM OF AGREEMENT

ARTICLES of AGREEMENT made this _____ day of _____ year
2025 between

_____(Hereinafter referred to as the "Employer/Bank" which expression shall, unless excluded by or repugnant to the context, includes its successors and assigns) of the ONE PART and _____ of _____ (Hereinafter referred to as "Contractor" unless excluded by or repugnant to the context, includes its successors and assigns) of the OTHER PART.

WHEREAS the Employer intends to carry out

_____ and shall herein after referred to as "Project".

AND WHEREAS for the purpose of the above said project, the Employer invited sealed tenders from experienced, resourceful and bonafide contractors through Bank, Hyderabad vide its Notice Inviting Tender (No. _____ dated. _____).

WHEREAS the contractor submitted his Online Tender containing Notice Inviting Tender, General Conditions of Contract, Special conditions, Bill of Quantities, Form of Agreement, Preferred makes of materials, Form of Submission of tender, Technical Specifications etc. for the above said project, (Hereinafter collectively referred to as the "said conditions"), digitally signed as a token of his acceptance of the same, along with requisite Cost of tender and Earnest Money Deposit.

AND WHEREAS out of the Tenders received, the Tender of the contractor was found to be most suitable for the project.

AND WHEREAS the Employer through the Bank has accordingly issued the work order (No. _____ dated. _____) to the contractor subject to his furnishing the requisite Security Deposit.

AND WHEREAS the Contractor has accepted the aforesaid Work Order vide his letter of acceptance NO. _____ dt. _____ and has also deposited with the Employer a sum of Rs. _____ which with the Earnest Money of Rs. _____ forms the requisite Security Deposit @2 % of the accepted Tender Value of Rs. _____.

NOW, therefore, it is hereby agreed to and between the parties as follows:

1) Contract documents

The following documents shall constitute the Contract Documents.

I. This Article of Agreement.

II. Tender Document submitted by the Contractor including the "said conditions", N.I.T and Schedule of quantity.

III. All correspondence between the Employer and the Contractor from the date of issue of N.I.T and the date of issue of work order.

IV. Work order No. _____ dt. _____

2) In consideration of the payments to be made to the Contractor as hereinafter provided the Contractor shall upon and subject to the said conditions, execute and complete the contracted project works and such further detailed drawings as may be furnished to the contractor by the said Employer and described in the said Specifications and the said Schedule of Quantities.

3) Notwithstanding what are stated in the N.I.T conditions of Tendering, Conditions of Contract of herein stated before, the Employer reserves itself the right of altering the nature of the work and addition to or omitting any items of work or of having portions of same carried out through another agency or otherwise and such alterations or variations shall be carried out without prejudice to this contract.

4) As mentioned above, the "said conditions" shall be read and be treated as forming part of this agreement and parties hereto will respectively be bound thereby and to abide by and submit themselves to the conditions and stipulations and perform the same on their parts to be respectively observed and preferred.

5) Any dispute arising under this agreement shall be referred to the Arbitration in a manner specified in the General Conditions of the Contract and all legal disputes shall be limited within the territorial jurisdiction of the Hyderabad thereto. The decision of the arbitration shall be final and binding on both the parties.

6) The Vendor / Contractor shall promptly notify SBI of any changes in the constitution of their firm. It shall be open to SBI to terminate the agreement on the death, retirement, insanity or insolvency of any person/s is being director/s or partner/s in the said company / firm, or on the addition or introduction of a new partner without the previous approval in writing of SBI. But in absence of and until its termination by SBI as aforesaid, this agreement shall continue to be of full force and effect notwithstanding any changes in the constitution of the firm by death, retirement, insanity or insolvency of any of its partners or the addition or introduction of any new partners. In case of retirement / death the surviving or remaining partners of the firm shall be jointly and severally liable for the due and satisfactory performance of the terms and conditions of the agreement.

7) The Contractor agrees and hereby keeps the Bank indemnified against all claims, actions, loss, damages, reputation loss, costs, expenses, charges, including legal expenses (Attorney, Advocates fees included) which the Bank may suffer or incur on account of any deficiency in Services rendered by The Contractor or breach of any obligations under this contract, including without limitation, breach of confidentiality obligations or any acts of commission / omission on the part of employees, agents, representatives or Sub-Contractors of the Contractor. The Contractor agrees to make good the loss suffered by the Bank.

IN WITNESS WHEREOF THE PARTIES to their present have here under set and subscribed their hands, the day, month and year first above written.

Signed and delivered for and on behalf of
Shri.

_____ its duly authorized official, In the presence of –
1. (Name and Address)

2. (Name and Address)

Signed and delivered for and on behalf of

The Contractor _____ by Shri _____ his
duly authorized official, in the presence of –

1. (Name and Address)

2. (Name and Address)

TECHNICAL SPECIFICATIONS

CHAPTER-1

ELECTRICAL WORK

1.0 SCOPE

The scope of work covers the requirements for the electrical works associated with air conditioning applications, namely, switch boards (MCCs), power cabling, control wiring, earthing, and remote control-cum-indicating panels. Electric motors are not covered here, as these are covered as part of the respective equipment specifications.

GENERAL

Unless otherwise specified in the tender specifications, all equipments and materials for electrical works shall be suitable for continuous operations on 415 V / 240 V \pm 10% (3 phase / single phase), 50 Hz. AC system. Where the use of high voltage equipments is specified in particular works, all the respective equipments shall be suitable for continuous operation on such specified high voltage.

All electrical works shall be carried out complying with the Indian Electricity Rules, 1956 as amended to date.

All parts of electrical works shall be carried out as per appropriate CPWD General Specifications for Electrical work, namely, Part I (Internal) 2005 and National Building Code 2005 all as amended to date.

All materials and components used shall conform to the relevant IS specifications amended to date.

1.2 SWITCH BOARDS / MOTOR CONTROL CENTRE

The main switch board in the Each AHU room shall be floor mounted, free standing cubical type and shall be factory built fabricated by one of the reputed switch board manufacturer. It shall be suitable for termination of the incoming cable(s)/ bus trunking from top/ bottom as per site conditions. The switchboards in air handling unit (AHU) rooms shall be wall mounted, or floor mounted as feasible at site and as approved by the Engineer-in-Charge, but they shall be cubical designed, unless otherwise specified and from open able from front.

The capacity of switch gear, starters etc. shall be suitable for the requirements of loads fed/controlled. Starting currents shall be duly considered in case of motor loads.

MPCB shall be used up to and including 63 A for motor applications and MCCB shall be used for other loads. ACB shall be used for 630 A and above ratings.

All MCCBs / MPCBs shall be of AC 23 duty as per IS: 4064-1978 as amended up to date.

Switch boards controlling motors shall house starters for motors, unless otherwise specified. The starter shall be located adjacent to the controlling switch gear.

vi) One-volt meter with selector switch, a set of indicating lamps and fuses for voltmeter and lamps shall be provided at each switchboard. One ammeter with CTS, and selector switch shall be provided with each motor starter. Instruments shall be flush mounted with the panel and have a glass index not higher than 1.5. The instruments and accessories shall be provided whether or not specifically indicated in the tender specifications.

vii) The fabrication of switchboard shall be taken up only after the drawings for the fabrication of the same are approved by the Engineer-in-Charge.

viii) Switchboards shall be fabricated as per specifications indicated in sub-para above.

ix) The layout of bus bars and cable alleys shall be designed for convenient connections and inter-connections with the various switchgear. Connections from individual compartments to cable alleys shall be such as not to shut down healthy circuits in the event of maintenance work becoming necessary on a defective circuit.

x) Care shall be taken to provide adequate clearances between phase bus bars as well as between phase bus bars, neutral and earth.

Where terminations are done on the bus bars by drilling holes therein, extra cross section shall be provided for the bus bars. Alternatively, terminators. Cables connected to the upper tiers shall be duly clamped within the switchboard.

Provision shall be made for proper termination of cables at the switchboards such that there is no strain either on the cables, or on the terminators. Cables connected to the upper tiers shall be duly clamped with the help of PVC cable ties within the switchboard.

Identification labels shall be provided against each switchgear and starter compartment, using plastic engraved labels.

Metallic danger conforming to relevant IS shall be fixed on each electrical switchboard / MCC.

1.3 POWER CABLING

i) Unless otherwise specified, the power cables shall be XLPE insulated, PVC outer sheathed aluminium / copper conductor, armoured cables rated for 1100 V grade as per IS: 1554 (Part 1) - 1988. The power cables shall be of 2 core for single phase, 4 core for sizes up to and including 25 sq.mm, 3-1/2 core for sizes higher than 25 sq.mm for 3 phase. Where high voltage equipments are to be fed, the cables shall be rated for continuous operation at the voltages to suit the same.

ii) Power cables shall be of sizes as indicated in the tender specifications. In all other cases, the sizes shall be as approved by the Engineer-in-Charge, after taking into consideration the load, the length of cabling and the type of load.

iii) Cables shall be laid in suitable metallic trays suspended from ceiling, or mounted on walls, or laid directly in ground or clamped on structures, as may be required. Cable ducts shall not be provided in plant rooms. Cable trays shall be sheet steel with adequate structural strength and rigidity type, designed with adequate dimensions for proper heat dissipation and also access to the cables with necessary supports and suspenders shall be provided by the Air-conditioning contractor as required.

Cable laying work shall be carried out in accordance with 15.3(iii) above. The scope of work for the Air-conditioning contractor shall include making trenches in ground and refilling as required, but excludes any masonry trenches for the cable work.

CONTROL WIRING

i) Control wiring in the plant rooms and AHU rooms shall be done using ISI marked PVC insulated and PVC sheathed, 1.5 sq.mm copper conductor, 250V grade, cables drawn in ISI marked steel or PVC conduits. Alternatively, armoured multi-core copper conductor cables may also be used for the purpose. The control cables interconnecting the plant room and the AHU rooms shall be of multi-core armoured type only, and suitable for laying direct in ground.

ii) The number and size of the control cables shall be such as to suit the control system design adopted by the Air-conditioning contractor.

iii) ISI marked steel conduits pipes, wherever used, shall be of gauge not less than 1.6 mm thick for conduits upto 32 mm dia and not less than 2.0mm thick of higher sizes. All conduit accessories shall be threaded type with substantial wall thickness.

Control cables shall be of adequate cross section to restrict the voltage drop.

In the case of control wires drawn through steel conduits, the wire drawing capacity of conduits as specified under the CPWD general specifications for Electrical Works (Part I) 2005 shall not be exceeded.

Runs of control wires within the switchboard shall be neatly bunched and suitably supported/clamped. Means shall be provided for easy identification of the control wires.

Control wiring shall correspond to the circuitry/sequence of operations and interlocks approved by Engineer-in -Charge.

EARTHING

- i) Provision of earth electrodes and the type of earthing shall be as specified in the tender specifications.
- ii) The earth work shall be carried out in conformity with CPWD Specifications for Electrical works (Part-I), Internal 2005 / NBC 2005.
- iii) Metallic body of all medium voltage equipments and switch boards shall be connected by separate and distinct earth conductors to the earth stations of the installations; looping of such body earth conductors is acceptable from one equipment, or switch board to another.
- iv) G.I. plate earthing shall be provided for PTAC plants and reciprocating central AC plants upto 100 TR capacity. Above 100 TR reciprocating units, copper plate earthing shall be provided.

- v) The size of earth conductors for body earthing of equipments shall be as under:-
Motor upto and including 10 HP rating 2Nos.3mm dia copper wire / 2 nos. 4mm dia

GI wire

12.5 HP to 40 HP 2Nos.4mm dia copper wire / 2 nos. 6mm dia GI wire

50HP to 75 HP 2Nos.6mm dia copper wire / 2 nos. 25x3mm GI strip

Above 75 HP 2Nos.25mm x 3mm copper strip / 2 nos. 25x6mm GI strip

Switch boards with incoming rating upto

100 A 2Nos.3mm dia copper wire / 2

nos. 4mm

dia GI wire

125 A to 200 A rating 2Nos.6mm dia copper wire / 2 nos. 25x3mm GI strip

Above 200 A rating 2Nos.25mm x 3mm copper strip / 2 nos. 25x6mm GI strip

Armouring of cables shall be connected to the body of the equipments/switch board at both the ends. Compression type glands shall be used for all such terminations in the case of PVC cables.

MOTOR STARTER

- i) The motor starter shall conform to IS: 1822 "Motor starters of voltage not exceeding 1000 volts" and shall be air insulated and suitable for 415 volts, $\pm 10\%$, 50 Hz, 3 phase AC supply. Enclosures shall have protection of IP 52 for Indoor applications and IP 55 for outdoor applications.

- ii) Starter for the motor shall be direct on line (D.O.L) for motors up to and including 7.5 H.P. rating and automatic star-delta close transition type for motors of higher ratings unless otherwise specified in the tender specifications. Starters shall be rated for intermittent duty. Starting current should not exceed two times the full load current. The starter shall be mounted on the main electrical control panel/ unit mounted / self mounted as specified.

Each starter shall be provided with the following protections:-

Thermal overload on all the three phases with adjustable settings,

Under voltage protection, and

Independent single phasing preventor. (current sensing type)

Adequate number of extra NO / NC contacts for interlocks, indicating lamps etc. shall be provided on the starter / contractor.

1.7 PAINTING

All panels shall be supplied with the manufacturer's standard powder coating .

CHAPTER- 2.0 INSPECTION, TESTING AND COMMISSIONING

2.0 SCOPE

This chapter covers the initial inspection and testing of condenser, AHUs at manufacture's works, initial inspection of other equipments/ materials on receipt at site, final inspection testing & commissioning of all equipment at site & description of testing requirements & procedure.

2.1 INITIAL INSPECTION AT MANUFACTURE'S WORKS

Compressor

- i) Salient features such as model, No. of cylinders, capacity control, provision of crank case heaters, type of lubrication etc. shall be verified against the requirements visually without opening the compressors.
- ii) Manufacturer's internal test certificates shall be scrutinized to check compliance with the requirements as specified in the order.
- iii) Rate of leak test shall be checked by developing 7 Kg/sq.cm (gauge) pressure on HP side and 1 Kg/ sq.cm on LP side using dry Nitrogen air or carbon dioxide. The leakage through the valves, shaft seal, cylinder heat gasket etc should not be more than 0.3 Kg/sq.cm per cylinder in 4 minutes time. Alternatively this may be demonstrated through vacuum.
- iv) Pneumatic pressure test shall be carried out at 22 Kg/ sq.cm and by submerging the compressor in water for 1 hour & there shall be no leakage.
- v) Free running test shall be carried out at the rated speed specified in contract. This test shall be carried out for 30 minutes in open space. During this running test following operations are to be noted:

Manual loading / unloading of capacity control

Lubrication oil pressure

Safety valve operation

Vacuum test for the compressor for 0.5mmHg..

Condensers

- i) Salient features like number of tubes, inside diameter of tubes (from which the gauge of the tube can be verified), no. of passes, material of fins, length of condenser, provision of fittings like safety valve, water, gas connection shall be verified during stage inspection. The tube thickness shall be checked.
- ii) Manufacturer's internal test certificates shall be furnished and it shall be verified against contract requirements.
Pneumatic pressure test at twice the normal condensing pressure for gas side of condenser shall be carried out.

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 authorized 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.

2.4 INITIAL INSPECTION AT SITE

Ducting

i) The sheet used for ducting shall be checked for physical test at site. The physical test should include the sheet thickness and bend test as per relevant IS specifications.

ii) Zinc coating of GSS sheet as mentioned in the tender documents may be got tested from a laboratory to verify that same meets the contract requirements.

Switch Gear, Control Gear, and Measuring Instruments

These should be of specified make. For air circuit breaker manufacturer's test certificate shall be furnished by contractor and the same shall be verified as per contract requirements.

Electric Motors

Electric motors should be of specified make, manufacturer's test certificate for electric motor shall be furnished.

Insulation and acoustic lining

i) Physical verification for thickness and make should be made as per contract before application of insulation.

ii) Manufacturer's test certificate for density should be furnished.

Note: Accuracy of testing instruments shall be as mentioned in the final inspection procedure.

FINAL INSPECTION

i) After completion of the entire installation as per specification in all respects, the AC contractor shall demonstrate trouble free running of the AC equipments and installation for a period of minimum 120 hours of running as detailed under following points:
After the installation work has been completed by the contractor, he will conduct tests and make adjustments as may be necessary to satisfy himself that the plant including low side equipments is capable of continuous running. There after he will offer to the department a running-in period of 7 days subject to a minimum aggregate of 120 hrs at his cost. The duty cycle of the plant during this running in period shall be same as that specified in the tender documents. In case of multiple compressor installations, all the compressors should be run by rotation. The plant will be operated and a log of all parameters will be maintained during this period. The contractor will be free to carry out necessary adjustments etc during this period without stopping the plant. Record of inside conditions will be made during this period to check the same are as per NIT requirements. The plant will be said to have successfully completed the running-in-period, if no break down or abnormal/ unsatisfactory operation of any machinery occurs during this period. After this the plant will be made available for beneficial use. After the plant has operated without any major break down/ trouble and inside conditions are maintained as per NIT requirements for the above specified running in period, it shall be taken over by the department subject to guarantee clause mentioned else where in the tender. This date of taking over of plant after trouble free operation during the running in period shall be the date of acceptance.

TESING REQUIREMENTS AND PROCEDURES

Balancing of all air systems and all tests as called for in the specification shall be carried out by the HVAC contractor in accordance with the specifications and relevant local codes if any.

Performance

tests of individual equipment and control shall be carried out as per manufacturer's recommendation.

All tests and balancing shall be carried out in the presence of Engineer-in-Charge or his Authorized representative.

The whole system balancing shall be tested with microprocessor based hi-tech instruments with an accuracy $\pm 0.5\%$.

The instrument shall be capable of storing data and then down loading into a P.C. The HVAC contractor shall provide a minimum but not limited to the following instruments:

- Microprocessor based calculation meter to measure DB and WB temperature, RH and Dew Point
- Velo meter to measure air volume and air velocity
- Pitot tube
- Electronic rotary vane Anemometer
- Accubalance flow measuring hood

The contractor shall be responsible to provide necessary sockets and connections for fixing of the testing instruments, probes etc.

Air Systems

Systems are to be balanced by first adjusting the total flow at the fan, then by adjusting main dampers and branch dampers. Only final minor adjustments are to be made with register and diffuser dampers. Balancing of the air system shall be accomplished without causing objectionable air noise. Baffles and orifice plates required for proper air balance shall be furnished and installed by the contractor. Basically the following tests and adjustments are required.

- i) Test all fan systems to provide proper cfm/ cmh.
- ii) Adjust fresh air, return air and exhaust dampers to provide proper air quantities in all modes of control.
- iii) Test and record fresh air, return air and mixed air temperature at all air handling units. Test and record data at all coil after air and hydronic systems are balanced. Measure wet and dry bulb temperature on cooling coils.
- iv) Make point tube transverse at all main supply and return ducts to set proper air quantities. Adjust all zone and branch dampers to proper cfm /cmh. Test and adjust each register, grills, diffusers or other terminals equipments to within 5% of design air quantity. Each opening shall be defined on the test report by size, manufacturer's model, room location, design cfm and actual cfm. Outlets shall be adjusted to minimize objectionable drafts.

Test and record static pressure drop across all filters and major coils.

High velocity duct systems shall be tested for leakages. If excessive or audible leakage is detected, the defect shall be repaired by the contractor. Sufficient static pressure readings shall be taken from the air handling units to the terminal units to establish system static pressure.

Balancing Tolerance

System shall be balanced with in the following tolerance:

1. Duct leakage rates (at operating pressures)
 - Low pressure ducts (0 to 0.5 Kpa) 5% of full flow
 - Medium pressure ducts (0.5 to 3 Kpa) 1% of full flow
 - High pressure ducts (greater than 3 Kpa) 1% of full flow
2. Air flow rates
 - Under 70 L/S 10% of flow
 - Over /at 70 L/S 5% of flow
3. Water flow rates
 - Chilled Water 2% of flow
 - Other 5% of flow
4. Heat flow rates
 - Heat exchangers 5% of design capacity

Procedure:

Review all pertinent plants, specifications, shop drawings and other documentation to become fully familiar with the systems and their specified and intended performance.

Furnish equipment and instruct sheet metal trade on proper use for conducting duct leakage tests. Conduct first test as a way of instructing the above trades in the presence of the Department's representative.

Test performance and continuously record on a 24 hour basis, temperature and humidity levels where control equipment is provided for that purpose in certain critical areas. Before commissioning of the equipment, the entire electrical installation shall be tested in accordance with relevant BIS codes and test report shall be furnished by a qualified and authorized person.

Reports

Provide 3 copies of the complete balancing and testing reports to the department. Report shall be neatly typed and bound suitable for a permanent record. Report forms shall contain complete test data and equipment data as specified and safety measures provided as follows :

i) Safety measures

All equipments shall incorporate suitable safety provisions to ensure safety of the operating personnel at all times. The initial and final inspection reports shall bring out explicitly the safety provisions incorporated in each equipment.

Final documentation

The contractor shall leave the system operation in complete balance with water and air quantities as shown on drawings. Set stops on all balancing valves and lock all damper quadrants in proper position. Secure all automatic damper and valve linkages in proper positions to provide correct operating ranges. Proper damper positions shall be marked on ducts with permanent indication. Notify the department of any areas marginal or unacceptable system performance.

The above tests and procedures are mentioned herein, for general guidance and information only, but not by way of lamination to the provisions of conditions of contract and design/ performance criteria.

Upon commissioning and final handover of the installation, the HVAC contractor shall submit (within 4 weeks) to the Engineer-in-Charge/ department 6 (six) portfolios of the following

indexed and bound together in hard cover ring binder (300 x 450 mm) in addition to the completion drawings as follows:

Completion Drawings

Three sets of following laminated drawings shall be submitted by the contractor while handing over the installation to the Department. Out of this one of the sets shall be laminated on a hard base for display in the AC plant room. In addition one set will be given on compact disc.

- a) Plant installation drawings giving complete details of all the equipments, including their foundations,
- b)
- c) Pipeing layout drawings including insulation giving sizes and lengths of all the pipes and the sizes and locations of all types of valves, and including isometric drawings for entire piping including pipe connections to the various equipments and insulation details wherever required.
- d) Duct layout drawings with their sizes and locations, and sizes and locations of all dampers, grills and diffusers.
- e) Line diagram and layout all electrical control panels giving switchgear ratings and their disposition, cable feeder sizes and their layout,
- f) Control wiring drawings with all control components and sequence of operations to explain the operation of control circuits.
- g) Comprehensive operation and maintenance manual
- h) Test certificates, consolidated control diagram and technical literature on all controls.
- i) Equipment warranties from manufacturers
- j) Commissioning and testing reports
- k) Rating charts for all equipment
- l) Log books as per equipment manufacturers standard format
- m) List of recommended spares and consumables
- n) Any special tools required for the operation or the maintenance of the plant shall be supplied free with the plant.

At the close of the work and before issue of final certificate of completion by the Engineer –in-Charge, the contractor shall furnish a written guarantee indemnifying the department against defective materials and workmanship for the Defects liability period. The contractor shall hold himself fully responsible for re installation or replaced free of cost to the department.

Any defective material or equipment supplied by the contractor.

Any material or equipment supplied by the department which is proved to be damaged or destroyed as a result of defective workmanship by the contractor.

Cassette type indoor units.

These units shall be installed between the bottom of finished slab & top of false ceiling.

The maximum allowable height for the cassette type units shall not exceed 350 mm.

The unit shall be pre charged with first charge of R 32 / R 134A / R 407 / R 410 refrigerant. Additional charge shall be added as per refrigerant piping at site.

The unit must have in built drain pump, suitable for vertical lift of 750 mm.

The unit casing shall be Galvanized Steel Plate / or as per manufacturer's specifications.

Unit must be insulated with sound absorbing thermal insulation material, Polyurethane foam. The noise level of unit at the highest operating level shall not exceed 42 dB(A), at a vertical distance of 1.5 m from the grille of the unit.

Unit shall have provision of connecting fresh air without any special chamber & without increasing the total height of the unit (288 mm maximum).

The unit shall be supplied with suitable decorative panel.

The unit shall be supplied with Resin Net filter with Mold Resistance. The filter shall be easy to remove, clean & re install.

The unit will be connected in series to a suitable outdoor unit & it must be possible to Operate the unit independently, through corded/ cordless remote specified in the "Bill of quantities". The unit will be further connected to Intelligent Building Management System (To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

The unit shall be supplied with following from the factory with following:

Operation Manual
Installation Manual
Paper pattern for installation
Drain hose/ Clamp metal/ Washer fixing plate/ Sealing pads/ Clamps/ Screws/
Washer for hanging bracket/ Insulation for fitting

B. Wall Mounted Units.

Wall mounted units must be compact & stylish design that does not detract from the Décor of the room.

The unit shall be precharged with first charge of R 32 / R 134A / R 407 / R 410 refrigerant.

Additional charge shall be added as per refrigerant piping at site.

Each indoor unit must have electronic expansion valve operated by microprocessor thermostat based temperature control to deliver cooling/ heating as per the heat load of the room.

The unit must have provision of adding drain pump kit if required & specified. The drain pump must be suitable to lift drain up to 1000 mm from the bottom of the unit.

Unit must be insulated with sound absorbing thermal insulation material, polystyrene/Polyethylene foam. The noise level of unit at the highest operating level shall not exceed 46 dB(A), at a vertical distance of 1.5 m from the grille of the unit.

The unit shall be supplied with Resin Net filter with Mold Resistance. The filter shall be easy to remove, clean & re install.

The unit grille must be washable with soap solution.

It shall be possible to set minimum 5 steps of discharge angle by remote controller.

It shall be possible to fit drain pipe from either side of the unit (Left or right)

The unit will be connected in series to a suitable outdoor unit & it must be possible to Operate the unit independently, through corded/ cordless remote specified in the bill of quantities. The unit will be further connected to Intelligent Building Management System(To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

The unit shall be supplied with following from the factory with following:

Operation Manual
Installation Manual
Installation panel
Paper pattern for installation
Insulation tape/ Clamps/ Screws

A – 1: COPPER TUBING.

The parent material used for air – conditioning system refrigerant tubing should be Copper tubes, tubes and fittings conforming to following specifications:

1. Material composition should be conforming to C-1220 (JIS-H-3300) or C-12200 (ASTM). It should have a minimum Copper content of 99.9 % and Phosphorus content between 0.015 % and 0.040 %. It should have low residue (below 0.038 gm / sq mtr). The material should also be as per the RoHS norms specified by EU; that is, Mercury, Chromium and Lead contents below 1000 ppm, and Cadmium content below 100 ppm.
2. Physical properties of the material should conform to JIS-H-3300 or ASTM-B-68 & B-75, should be tested for Tensile / elongation / hardness / grain size tests as per ASTM B –280.
3. Dimensional tolerance should be as per JIS-H-3300 or ASTM-B-251. The tubes should be tested using non-destructive Eddy current test before the final anneal, as per JIS- H-3300 or ASTM-E-243.
4. Heat treatment should be carried out in non-oxidizing atmosphere to ensure oxygen free and Cuprous oxide-free surface.
5. Proper certificates describing composition and results of all tests carried out must be supplied with each consignment. These certificates, along with check results for dimensional and thickness accuracy are recommended to be carried out for every delivered lot, should be maintained till handing over of the project.
6. Tubes should have 360 degree concentric wall thickness along their entire length.
7. Wall thickness for soft tubes (bright annealed mirror finish) should be 0.8 mm for ¼”, 3/8” & ½” tubes, 1.0 mm for 5/8” tubes, 1.2 mm for ¾” tubes. Wall thickness for hard tubes should be 1 mm for 7/8”, 1” and 1.1/8” tubes, 1.1 mm for 1.1/4”, 1.2 mm for 1.3/8” and 1.3 mm for 1.5/8” tubes.
8. Wall thickness for elbows and fittings should be minimum 0.2 mm more than corresponding tube / tube size.
9. For 1/4” to sizes up to ¾”, pulley type benders should be used for soft tubes and brazed joints should be avoided as far as possible. Similarly, for half hard tubes of size 3/4” or more, one side expanded tubes must be used and use of couplings should be avoided as far as possible.

A -2 : TUBING DESIGN:

1. Contractor should study the tender / GFC drawings carefully, and should carry out detailed survey of site, relating the drawings with site, and understand the system design and site limitations.
2. Contractor should also collect final architectural and reflected ceiling plans from client and study the drawings for any mismatches with the HVAC drawings received.

3. Contractor should discuss any such mis- matches and any doubts regarding system design with the consultant and get all doubts clarified.
4. Before commencement of tubing work, proper shop drawings must be generated by the contractor, and same should be got approved from the consultant. The drawings must clearly indicate schematic flow diagrams for various circuits, tube sizes, description and quantities for refrigerant joints, indoor and outdoor unit models and room / block /floor names, tube routes, levels for horizontal tubes, details regarding insulation type and thickness and surface treatment for insulation, typical and critical sections and any other details to explain the entire tubing layout to the installer.
5. Tube sizing and routing must be carried out taking into consideration various site constraints and system manufacturer's recommendations.
6. Care should be taken to design tubing as per the manufacturer's recommendation for maximum tubing total length, maximum tubing length after first tapping, vertical height difference between outdoor and indoor units etc. and necessary corrections should be carried out in outdoor unit capacity if required.

A – 3 : REFRIGERANT TUBING INSTALLATION WORK:

1. The installer must first study the shop drawings in detail with respect to the site condition and point out any fouling / alternatives to the agency prepare shop drawing and necessary revisions must be carried out in the drawings, to be approved by consultant.
2. The layout must be marked on the true ceiling and any civil openings required should be marked and got done from concerned agency.
3. Supports as described in BOQ / specifications should be installed, leaving adjustable free length for supports.
4. Before installation, the tubes and tubes must not be removed from their original packing. Proper storage of tubing is a must to maintain the temper of the tubes / tubes. Any abrasion on ends / surface, or any in grace of dirt / dust must be avoided. Proper Polyethylene sheets should be used for covering the tubes and tubes, while wooden pellets and soft expanded Polyethylene / rubber sheets should be used as floor supports.
5. Necessary loops / slopes must be followed as recommended by system manufacturer.
6. Tubes must be cut to required sizes using cutting tools recommended by system manufacturer.
7. Using proper quality of brazing set, Oxygen / Acetylene and Copper brazing rods having minimum 2% Silver content.
8. During brazing, Nitrogen must be filled in the Copper tubing at a mild positive pressure and must be kept bleeding out continuously, to prevent any oxidation of parent material.
9. After tubing work, each circuit should be pressure tested as per the system manufacturer's recommendation and as per the procedure described in the following paragraphs. A certificate mentioning the test pressure, time of first and final pressure readings, make, model, serial number, range and least count of the gauge used, along with a copy of valid calibration certificate must be maintained, duly signed by the inspecting technician, and client /PMC representative.

10. After pressure testing, insulation must be completed as per the material, make and thickness mentioned in the approved shop drawing. The joints of insulation must be sealed by minimum 50 mm wide Aluminium adhesive tape. Care should be taken to avoid any air gaps between tube / tube and insulation sleeves, and between two insulation sleeve joints.

11. Proper tagging must be carried out to trace the tubing to respective indoor and outdoor circuits.

12. The tubes exposed to sunlight must be covered / cladded / treated to prevent damage from UV radiation and bird pecks / tampering, as mentioned in the BOQ. The cladding should be made out of 26 G Aluminium sheet or G.S.S. sheet. While cladding, care should be taken to avoid penetrating the insulation by screws. Short screws Of metallic straps should be used for securing cladding sheets. Instead of cladding, glass cloth, with two coats of protective resin should be used.

13. While charging refrigerant, manufacturer's recommendations must be strictly followed, and charging must be carried out using proper charging hose, gauge manifold with calibrated gauges and electronic weigh scale. Further leak check using a gas leak detector should be carried out. Charging must be carried out after proper evacuation of the tubing. The quantity of refrigerant to be charged should be calculated by totalizing the liquid tube volume as per the manufacturer's recommendation.

A – 4 : RECOMMENDATIONS FOR PRESSURE TESTING:

Refrigerant tubes carry refrigerant at pressures different from atmospheric pressure.

When pressure inside tubes is more than atmospheric pressure, refrigerant may escape to the atmosphere, causing commercial loss due to loss of refrigerant, inefficient system performance or even system breakdown and contamination of surroundings. When pressure inside the tubes is less than atmospheric pressure, such as in case of suction tubes of some low temperature refrigeration machines, or during pump-down cycle of normal air-conditioning systems, leakages in tubes leads to ingress of air and moisture, causing severe system damage. Therefore, it is a must that the refrigerant tubing is thoroughly tested for leakages. Pressure testing for any tubing must be carried out at a pressure higher than the maximum operating pressure within the system. It is recommended that the pressure recommended by manufacturer be followed very strictly. Testing at lower pressures may lead to non-detection of some small leakages, while testing at higher pressures may lead to damage to some factory manufactured components within the system. Generally, for R-410 systems a pressure of around 650psig is used. Nitrogen is the most common gas used for carrying out pressure testing. It has numerous advantages, some of which are listed below:

1. Nitrogen is easily available as a commercial gas packed in easy to handle cylinders.
2. Nitrogen, being the most abundant component of the atmosphere, is safe for leaking out without contaminating the atmosphere.
3. Nitrogen is less costly as compared with other gases.
4. Nitrogen is safe for handling and testing.
5. Nitrogen does not readily react with system components Pressure gauge/s used for testing must be calibrated and a calibration certificate with traceability to a Government(National) Physical Laboratory must be documented. The gauge should be capable of measuring pressure at least 10% above the reading to be recorded.

A – 5 : PROCEDURE FOR CARRYING OUT PRESSURE TEST

- 1) Ensure that the tubing to be tested is properly secured/supported and the openings have been sealed off as per manufacturer's recommendation.
- 2) Install pressure gauge/s at strategic location/s where it shall not be tampered with, at the same time, should be easily visible.
- 3) Install a valve and connecting tubing so that the open end of the tube reaches the cylinder outlet without moving the cylinder.
- 4) Connect the tube to the cylinder and after ensuring proper connection, crack open the cylinder valve, keeping an eye on the pressure gauge. Let the pressure rise to around 10 psig.
- 5) Check for proper sealing of all flanged / flare nut joints or valves/ valve glands looking for noise of escaping Nitrogen and seal same.
- 6) Open the cylinder valve again and raise the pressure to 200 psig.
- 7) Check the tube line for major leakages at brazed joints, elbows, valve glands, equipment end connections and tube seams with the help of soap water. Make up the leaks by tightening nuts. If the leaks are in brazed joints, flush out Nitrogen and carry out necessary re-brazing.
- 8) Open the cylinder valve again and increase the pressure to 150 psig less than the final test pressure. Repeat leak check as above.
- 9) Open the cylinder valve again and slowly raise the pressure to the manufacturer recommended pressure. Carry out a thorough leak check.
- 10) Record the pressure and time. Let the pressure stand for 24 hours without tampering. Check the pressure again after 24 hours. If pressure has dropped, the tubing should be checked very thoroughly for minor leakages. It is important to follow this 24 hours period as it gives enough time to detect minute leakages, and it removes the doubt created by thermal expansion of Nitrogen (as after exact 24 hours, ambient conditions are generally same).
- 11) In case of tubing extending to lengths more than 30 m and / or having more than 20 site fabricated joints, the pressure should be recorded after 24 hours as well as after 48 hours, so that all leakages are detected and made up.
- 12) After detecting and making up any leak, the pressure testing must be carried out once again from beginning.

A – 6 : DOCUMENTATION RECOMMENDED FOR ENSURING PROPER QUALITY ASSURANCE:

1. Manufacturer's certificate with every Delivery Challan declaring composition of parent material
2. Signed and approved Shop drawings approved by Architect, prior to start of work
3. Pressure test report signed by Architect/ Client / Equipment manufacturer / PMC / Consultant.
4. False Ceiling closure check list duly signed by Architect / Client / Equipment manufacturer/ PMC /Consultant.

GENERAL:

ACR GRADE COPPER TUBES AND FITTINGS : SIZES AND SPECIFICATIONS

Tube material Specification :

(CFC- free refrigerant compatible tubes produced using Total loss lubricants)

1. De-oxidized High Phosphorized copper (DHP grade) raw material, with Chemical Composition of Copper = 99.9 % ; Phosphorus = 0.015 to 0.040 %
2. RoHS Compliant
3. 360 degree concentric Wall thickness along the entire length of the tubes
4. Half hard drawn copper tubes should confirm to ASTM B75/ASTM280 (C12200) / JIS H:3300(C1220) / BS2871 part 3 (C106). Use Half Hard Temper Type for tube sizes above 19.1 mm.
5. Soft copper tubes, bright annealed (mirror finish) should confirm to ASTM B68 / JIS H:3300
6. Super clean quality with low residual content below the permissible levels of 0.038 g/m² for compatibility with use of CFC-free refrigerant.
7. 100 % Eddy Current Tested Tubes are to be used
8. Proper packaging, Storage and Traceability of the tubes.

Copper tube and Fittings Sizes and Insulation Specifications for CFC-free Refrigerant.

S. No	OUTER DIAMETER IN INCH & (MM)	WALL THICKNESS IN GAUGE & (MM)	LENGTH IN FEET & (MTRS.)	TEMPER	WEIGHT PER METER (kg.)	SOCKET AND ELBOW THICKNESS IN SWG & (MM)	RUBBER INSULATION THICKNESS
1.	1/4" (6.4 mm)	21 (0.8 mm)	50' (15.24)	Soft	0.1265	18 (1.2mm)	15mm
2.	3/8" (9.5 mm)	21 (0.8 mm)	50' (15.24)	Soft	0.199	18 (1.2mm)	15mm
3.	1/2" (12.7 mm)	21 (0.8 mm)	50' (15.24)	Soft	0.2714	18 (1.2mm)	15mm
4.	5/8" (15.9 mm)	19 (0.99 mm)	50' (15.24)	Soft	0.4241	18 (1.2mm)	15mm
5.	3/4" (19.1 mm)	19 (0.99 mm)	50' (15.24)	Soft	0.5147	18 (1.2mm)	20mm
6.	1/4" (6.4 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.1265	18 (1.2mm)	15mm
7.	3/8" (9.5 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.199	18 (1.2mm)	15mm
8.	1/2" (12.7 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.2714	18 (1.2mm)	15mm
9.	5/8" (15.9 mm)	19 (0.99 mm)	12' (3.658)	Half Hard	0.4241	18 (1.2mm)	15mm
10.	3/4" (19.1 mm)	21 (0.8 mm)	12'	Half	0.4164	18 (1.2mm)	20mm

	mm)		(3.658)	Hard			
11.	7/8" (22.2 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.489	18 (1.2mm)	20mm
12.	1.0" (25.4 mm)	20 (0.88 mm)	12' (3.658)	Half Hard	0.6054	18 (1.2mm)	20mm
13.	1 1/8" (28.6 mm)	19 (0.99 mm)	12' (3.658)	Half Hard	0.7865	18 (1.2mm)	20mm
14.	1 1/4" (31.8 mm)	18.5 (1.1 mm)	12' (3.658)	Half Hard	0.843	16 (1.6mm)	20mm
15.	1 3/8" (34.9 mm)	18 (1.21 mm)	12' (3.658)	Half Hard	1.155	16 (1.6mm)	20mm
16.	1 1/2" (38.1 mm)	17.5 (1.3 mm)	12' (3.658)	Half Hard	1.340	16 (1.6mm)	20mm
17.	1 5/8" (41.3 mm)	17 (1.43 mm)	12' (3.658)	Half Hard	1.594	16 (1.6mm)	20mm

Use Soft tube only for Indoor Unit Connection

10. INSULATION TO REFRIGERANT PIPING:

FR nitrile rubber / cross linked closed cell polyethylene tube insulation of 13mm upto 1" dia pipes and 19mm thick for 1" and above shall be used for copper piping both for suction line and liquid line. All joints shall be sealed with self-adhesive tape or with heat.

11. COMMUNICATION CABLE AND CONTROL CABLING:

Communication cable and control cabling: Communication cable and control cabling should be of non-polar shielded 2 core cable shall be laid in 20 mm dia PVC conduits of required size. PVC conduit should be clamped neatly maintaining a distance from power cables, Cable terminations and dressing shall be done properly and neatly.

12. DRAIN PIPING:

PVC drain piping shall be used for the drain piping. Proper care shall be taken to lay the drain piping with sufficient slope and should be clamped or supported at 1.5 m interval. All drain pipe joints shall be done with adhesive. Drain piping should be tested for leaks before commissioning. After testing for leaks, drain pipe shall be insulated with 9 mm thick nitrile rubber tube insulation. Insulation shall be finished with self-adhesive black cotton tape.

1. DUCTING

Scope of work

The scope of work under the section comprises the supply, installation, testing and commissioning of all sheet metal ducts, dampers, grilles, diffusers, etc. as shown in the drawings and conforming to the specifications. Governing standards shall be SMACNA-1995 ("HVAC duct construction standards-Metal and Flexible-Second edition 1995" SMACNA) and IS -655.

GI Duct (Factory Fabricated ducting with factory fabricated flanges)

Materials & construction:

a.i.1.

All ductwork including straight sections, tapers, elbows, branches, show pieces, collars, terminal boxes and other transformation pieces must be factory-fabricated or by equivalent technology and shall be made out of galvanized sheet steel coils of Class-VIII (120 GSM). Coil lines to ensure location of longitudinal seams at corners/folded

edges only to obtain the required duct rigidity and low leakage characteristics. No longitudinal seams permitted along any face side of the duct.

b.

All ducts, transformation pieces and fittings to be made on CNC profile cutters for required accuracy of dimensions, location and dimensions of notches at the folding lines.

All ducts wherever specified, shall be factory fabricated in box sections from G.I. continuous coils with all suitable joints, supports, sealing arrangements etc. The thickness of galvanized sheet and type of flange class at 1200 mm spacing shall be as follows.

Size of Duct	Sheet Thickness		Type of Flange / connectors
Up to 450 mm	0.63 mm	24 G	C&S cleats
451 mm to 750 mm	0.63 mm	24 G	Rolamate – E
751 mm to 1000 mm	0.8 mm	22 G	Rolamate – F
1001 mm to 1500 mm	0.8 mm	22 G	Rolamate – H
1501 mm to 1800 mm	1.0 mm	20 G	Rolamate – I
1801 mm to 2100 mm	1.0 mm	20 G	Rolamate – J
2101 mm and above	1.2 mm	18 G	Rolamate – J

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

Ducts larger than 600 mm shall be cross broken or straight beaded. Duct sections up to 1200 mm length may be used with bracing angles omitted.

Changes in section of duct work shall be affected by tapering the ducts with as long a taper as possible. All branches shall be taken off at not more than 45° angle from the axis of the main duct unless otherwise approved by the Consultant / Owner representative.

All ducts shall be supported from the ceiling / slab by means of fully threaded GI rods of 9 mm – 12 mm dia. with M.S. slotted double – C channel of 3.0 mm thickness at the bottom. The rods shall be anchored to R.C.C slab using metallic expansion fasteners.

1.3 GI Duct (Factory Fabricated ducting with angular iron flanges)

1.3.1 Materials & Construction:

All ducts wherever specified, shall be factory fabricated in box sections from G.I. continuous coils with all suitable joints, supports, sealing arrangements etc.

The material and the construction sheet metal ducts shall be as follows.

S.No.	Item Description	Material of Construction (MOC)
1	GI sheet	Cold rolled sheets of factory fabricated (Rolastar/ equivalent) GSS ducting, continuous galvanized with Zinc coating of 120 gsm (Class VIII), sheets conforming to IS-277-2003

2	Flanges, Stiffeners & Supports	Mild Steel structural steel with one coat red-oxide primer and two coats of black enamel paint
3	Gasket	White neoprene rubber of minimum 3.2mm thick (1/8")
4	Bonding / Sealant	Silicon based food grade sealant/ RTV
5	Bolts, Nuts, Rivets & Washers.	Mild steel continuous galvanized with zinc coating (MS with hot dip galvanizing)

The ducts construction shall be Rectangular type of Low/Medium Pressure classification.

The construction of ductwork shall be in accordance with the following schedule.

Schedule of Ductwork Metal Gauges (Galvanized Steel), joints and Bracings:

Dimension of Longest Side Of Duct (mm)	Min. Sheet thickness (mm)	Type Of Transverse Joint Connection	Type Of Bracing
Up to 600	0.63 (24 SWG)	25 x 25 x 3 mm (1" x 1" x 1/8") companion flanges on 2.4 meter centers.	None
601 to 750	0.63 (24 SWG)	25 x 25 x 3 mm (1" x 1" x 1/8") companion flanges on 2.4 meter centers.	25 x 25 x 3 mm (1" x 1" x 1/8") Girth angles @1200mm (48")
751 to 1000	0.80 (22 SWG)	40 x 40 x 4 mm (1 1/2" x 1 1/2" x 3/16") companion flanges on 2.4 meter centers.	25 x 25 x 3 mm (1" x 1" x 1/8") Girth angles @1200mm (48")
1001 to 1500	0.80 (22 SWG)	40 x 40 x 4 mm (1 1/2" x 1 1/2" x 3/16") companion flanges on 2.4 meter centers.	40 x 40 x 4 mm (1 1/2" x 1 1/2" x 3/16") Girth angles @1200mm (48")
1501 to 2250	1.0 (20 SWG)	40 x 40 x 6 mm (1 1/2" x 1 1/2" x 1/4") companion flanges on 1.0 meter centers.	40 x 40 x 4 mm (1 1/2" x 1 1/2" x 3/16") Girth angles @600mm (24")
2251 and above	1.25 (18 SWG)	50 x 50 x 6 mm (2" x 2" x 1/4") companion flanges on 1.0 meter centers.	50 x 50 x 4 mm (2" x 2" x 3/16") Girth angles @600mm (24")
Plenums	1.6 (16 SWG)	50 x 50 x 6 mm (2" x 2" x 1/4") companion flanges on 1.0 meter centers.	50 x 50 x 6 mm (2" x 2" x 1/4") Girth angles @600mm (24")

Ducts larger than 600 mm shall be cross broken or straight beaded. Duct sections up to 1200 mm length may be used with bracing angles omitted

In addition to above the following points should be also taken into account while fabrication of ducts

- Girth angles and companion flanges shall be mitered and welded at corners and riveted to duct sheets at 75mm (3") centers.
- Flanges and joints shall be made with 9.5mm (3/8") GI bolts spaced at 100mm (4") centers and provided with 3.2mm (1/8") white neoprene rubber gasket.
- All joints and seams shall be rendered air tight with mastic sealant. Longitudinal seams shall be inside groove of Pittsburgh type. The use of sheet metal screws is forbidden. Rivets, nuts and bolts or some other device approved by the consultant / Owner.
- All reinforcing angles, bracing, etc. shall be painted with red oxide and black enamel paint after installation.
- All four sides of un-insulated ductwork of dimension 300mm or larger shall be cross-broken.

1.4 Duct work Supports

All horizontal ducts shall be supported by means of trapeze type hangers, consisting of angles and speed nuts and threaded hanger rods affixed to the structure. Hangers shall be affixed to wooden structure by lag screws, to concrete with screw concrete inserts or expansion cases, and to steel with C-clamps. All ducts shall be supported with mild steel rods not less than 6mm dia. The duct supporting details as follows.

Schedule of supporting rods, angle sizes and Spacing:

Duct perimeter (mm)	Rod. Dia. (mm/Inch)	Shelf Angle	Spacing mm
Up to 1500	9.0 (3/8")	40mm x 40mm x 5mm	2400
1501 to 2500	12.5 (1/2")	40mm x 40mm x 6mm	2400
Over 2500	15.0 (5/8")	50mm x 50mm x 6mm	2400

Vertical ductwork fastened on wall shall be supported by means of galvanized band hangers or angle brackets. The hangers shall be fastened to the wall by means of a fastener. The ductwork shall be bolted to the hanger. The angle brackets shall be 25mmx25mmx3mm for duct of longest side up to 600mm, 40mm x 40mm x 4mm for duct of longest side up to 1200mm and 50mm x 50mm x 6mm for duct of longest side over 1200mm. The spacing of angle bracket shall not be more than 2400.

For vertical ductwork, wherever possible shall be supported at floor levels by angle supports projecting beyond the opening in the floor. Angles shall be bolted to ducts. The angles shall be 40mm x 40mm x 4mm for duct of longest side up to 1500mm and 50mm x 50mm x 6mm for duct over 1500mm.

Additional hangers beyond those specified above shall be installed at bends, transformations (reducers / rectangular to circular vice versa) and take-off connections as required.

Notwithstanding the above, certain ductwork located in critical areas shall be supported by means of resilient supports or hangers.

1.5 Installation & testing

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

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

All duct work shall be of high quality approved galvanized sheet steel guaranteed not to crack or peel on bending or fabrication of ducts. All joints shall be air tight and shall be made in the direction of air flow. The ducts shall be reinforced with structured members where necessary, and must be secured in place so as to avoid vibration of the duct on its support.

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

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

Self-adhesive sponge rubber / PVC gaskets of 6 mm maximum thickness shall be installed between duct flanges as well as between all connection of sheet metal ducts to walls, floor column, heater casing and filter casings. Sheet metal connections shall be made to walls and floor by means of wooden member anchored to the building structure with anchor bolts and with the sheet screwed to them.

Flanges & bracing angels shall be made out of M.S angel iron. All flanges and bracing angles shall be pre painted with black enamel paint. The connection shall be 4 bolts slip on type flange system with sealant injected within the flanges. Accessories such as damper blades and access panels are to be of materials of appropriate thickness and the finish similar to the adjacent ducting, as specified.

Joints, seams, sleeves, splitter, branches, take-offs and supports are to be as per duct details as specified, or as decided by client representative.

Hexagon nuts and bolts, stove bolts or buck bolts, rivets, or closed centre top rivets, or spot welding may fix joints requiring bolting or riveting. Self-tapping screws must not be used .All jointing materials must have a finish such as cadmium plating or galvanized as appropriate.

More generally, the ducting shall conform to Leakage Class CL-3 of HVAC Air duct Leakage Test Manual SMACNA 1985. This implies leakage equivalent to or less than 3% of total airflow rate at a static pressure of 50 mm of WC and also corresponds to a leakage rate of about 0.72 cmh-m⁻² of duct surface area. All ducting & AHUs shall be tested at site to prove compliance with the above requirements.

The duct leakage testing rig could consist of a fan with damper (for varying flow rate) the flow measuring devices like Orifice plate assembly with manometer (for measurement of flow rate) and manometer (for measurement of static pressure) together with necessary ducting.

1.6 Duct Masonry

Unless, otherwise noted where ducts are shown connecting to masonry openings and/or along edges of all plenums at floor, walls, etc. There shall be provided a continuous 40mm x 40mm x 6mm pre-painted angle iron which shall be bolted to the structure and made air tight by caulking. This sheet metal at these locations shall be fastened to the angle irons.

➤ Elbows and Bends in Ductwork

On all elbows or turns, the center line radius shall not be less than one and one-quarter times the duct width unless otherwise shown on the drawings. Where right-angle bends are used, double thickness aero foil turning vanes shall be incorporated.

2. DAMPERS

3. GI Volume Control dampers

The dampers shall be manufactured from 16 gauge galvanized sheet steel. The dampers shall be opposed blade type and has heavy cast iron indicating quadrant lever with wing nut. The damper shall complete with PVC knob operation, status indicator locable in closed/ or open position.

Both damper casing & blade shall be made out of 1.6 mm thick Galvanized sheet steel. The damper shall have chrome plated spindles and self-lubricating bronze bushes. The minimum depth of the damper shall be 150mm. For the dampers wider than 1200mm; two or more sections shall be used separated by a mullion and with blade tie rods interconnected. The blades shall be mounted in an integral channel frame which shall be mounted on the duct. The blades shall be center and edge crimped and reinforced as required, and shall be supported on steel shafts running in oil impregnated bronze bearings. The operating shafts shall extend through the duct wall for operation by a hand quadrant lever. Individual blades shall be connected by a mechanical linkage so that they operate in unison. The control arm must be fastened to the shaft by means of a steel dowel shaft key or a similar approved penetrating device.

Set screw alone will not be acceptable. The blades shall have rubber strips fastened securely to the edges to ensure tight enclosure. The complete assembly shall be rigidly constructed, be free from rattles and shall operate freely.

4. Fire Dampers

Fire dampers shall be supplied and fitted as and when shown on the accompanying drawings and within the thickness of the various fire break walls, partitions and floor slabs. The fire dampers shall comply in all respects and confirming to and tested as per UL555S. Fire dampers shall be type tested and approved by CBRI, Roorkee.

All supply/return air ducts at AHU/ fan section shall be provided with approved fire damper of at least 90minutes fire ratings.

- The damper shall be constructed to the following requirements:
- The damper shall be constructed of galvanized sheet steel of 16 gauge with welded joints and flanged ends for connecting to the ductwork.

- The blade shall be single or multi-blade of 16 gauge GI, weighted type steel plate arranged to swing freely and automatically into place when released by the fusible link mechanism.
- Internal small angle iron guide-stops shall be fitted to ensure an efficient seal when the damper blade is closed position.
- The fire damper shall lock shut positively and shall be opened manually.
- The damper shut or opened position shall be indicated by means of an external indicator.
- Fusible links shall be arranged to break at 155°F at (68°C) and shall be connected and anchored to welded internal lugs by means of non-corrodible multicore wire. The position of the fusible links when assembled shall be chosen so that they may be easily inspected and adjusted through access panels cut in the G.S.S. ductwork. In all cases the ductwork access panels shall coincide with the removable portions of the false ceilings whenever they occur. The space between the fire damper body and the opening in the wall shall be filled with an approved compressible non-combustible material for the full thickness of the wall.

5. **Insect Screens**

Non-corrodible insect screens shall be provided and fixed behind all intake and discharge louvers grilles and openings where these occur on the outside of the building. The screens shall be of suitable bronze fine mesh and fixed in such a manner so as to be easily removable for periodic cleaning.

6. **GRILLS /DIFFUSERS**

7. **Fresh Air Intake Louvers With Bird Screen**

The fresh air intake louvers at least 50mm deep will be made of powder coated extruded aluminum construction. Bird / insect screen will be provided with the intake louvers. The blades shall be inclined at 45 degree on a 40mm blade pitch to minimize water ingress. The lowest blade of the assembly shall be extended out slightly to facilitate disposal of rain water without falling on door / wall on which it is mounted. The intake louvers shall be provided with factory fitted volume control dampers in black finish

8. **Diffusers, Register and Grille Finishers**

All diffusers, grilles and registers provided and fixed shall be of natural anodized aluminum construction. Alternative colour finishes shall be provided where specified.

Where steel construction diffuser or grille is specified and supplied, the metal shall be cleaned of all rust and all welded flux and all grease removed and then painted with 1-coat of primer, 2-coat of undercoats and 1-top coat of full gloss paint. The finish shall be baked-enamel or equal approval.

9. **Diffusers, Register and Grille Installation**

All diffusers, grilles and registers must be rigidly fastened to the ducts in a neat and workmanlike manner. The joint between the supply grilles, etc. and the duct must be

fitted with a felt or rubber gasket or other suitable means to make the joint air tight, so that air will not blow out between the grille frame and the duct opening producing duct streaks on the duct or wall.

Grille and register position shown on the drawings are approximate except where otherwise noted. The Contractor shall make such adjustments in position as and when necessary to ensure conformity with the Architectural drawings and the requirement of outlets by other trades without extra charge.

On furred-in ductwork, the sheet metal grille collar shall be suitably reinforced with a wood frame on the outside of the collar in order to prevent it from being forced out of shape.

10. **Sample for Approval**

Fully finish samples of supply and return diffusers/grilles as they will be fitted shall be submitted to the Owner for approval before any bulk manufacture or purchase is commenced.

11. **Testing**

The complete duct system shall be tested for air leakage & complete air distribution system shall be balanced in accordance with air quantities indicated on the approved drawing

Material and Process for Roof Under deck insulation

Unless otherwise noted, all the exposed roofs are thermally insulated with 32 mm thk closed cell nitrile rubber. The thermal conductivity shall be not more than 0.035w/m^ok at mean temperature of 20 °C.

The application of insulation shall be as follows.

a) Roof surfaces shall be cleaned with wire brush & dry mopping cloth and shall be free from dust and other foreign particles.

b) For the cleaned roof surface, cut piece of insulation shall be stuck with fivicol /

Equivalent rubber adhesive and needs to wait up to 10 – 15 minutes and this will help

to form adhesive as a film to stuck.

b) Secure the insulation sheet in portion with the help of screws, rawl plugs, washers and 28G GI cross wire lacing to avoid any kind of sagging. End of net shall be overlapping by at least 25mm. Overlaps shall be screwed with GI screws to avoid rusting.

c) All longitudinal & transverse joints shall be sealed with 50 mm wide self-adhesive aluminum tape.

B. AIR DISTRIBUTION SYSTEM

SCOPE

Supply, Factory fabrication, installation and testing Double Wall thermal insulated of all sheet metal oval ducts & supply, installation, testing and balancing of all grills, registers and diffusers, in accordance with these specifications.

DUCTING

GENERAL

All ducts shall be factory fabricated from galvanized steel sheets of the following thickness as indicated in schedule of quantities & as described in the IS: 655 with latest edition. The ducting shall be made out of Lock former machine or factory fabricated to avoid site work to the minimum.

RECTANGULAR/ROUND DUCT

Dimensions of Ducts(mm)	Gauge G.I	Alumni	Type of Joints	Type of Slip joint
Upto 600	24	22	G.I Flange at 2.5 Center	Cross bracing's
601 to 750	24	22	25 x 25 x 3 mm angle frame with nuts at 1500 mm from and bolt joints	25 x 25 x 3 mm MS angles bracing 6 mm dia
751 to 1000	22	20	25 x 25 x 3mm angle frame with 6mm dia nuts and bolts	25 x 25 x 3 mm MS angle bracing at 1500mm from joints
1001 to 1500	22	20	40x40x5 mm angle frame with 8mm dia nuts and bolts	40 x 40 x 3mm MS angle bracing at 1500mm from joints
1501 to 2250	20	16	50x50x3mm angle to be cross braced diagonally with 10mm dia nuts & bolts at 125 center.	40 x 40 x 3mm MS angle bracing at 1200mm from joints or 40x 40 x 3mm MS angle diagonal bracing.

Sheet metal ducts shall be fabricated as per BIS/SMACNA Standards out of galvanized steel sheets. Sheets used shall be produced by hot dip process and galvanizing shall be Class VIII - Light Coating of zinc nominal 120 gm/sq. m.

Total ducting shall be iron angle flanges

HANGERS FOR DUCT (as per standards)

Duct Size(mm)	Spacing (Mtr)	Size of MS angle (mm x mm)	Size of rod dia (mm)
Up to 750	2.5	40 x 3	10
751 to 1500	2.0	40 x 3	12
1501 to 2250	2.0	50 x 3	15

2251&above	2.0	50 x 3	15
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INSTALLATION

All ducts shall be installed generally as per the drawings prepared by the Contractor. The Contractor shall provide and neatly erect all sheet metal work as may be required to carry out the intent of these specifications. The work shall meet with the approval of Owner’s site representative in all its parts and details.

All necessary Allowances and Provisions shall be made by the Contractor for beams, pipes, or other obstructions in the building, whether or not the same are shown on the drawing. Where necessary to avoid beams or other structural work, plumbing or other pipes, and/or conduits, the ducts shall be transformed, divided or curved to one side, the required area being maintained, all as per the ‘site requirements.’

If a duct cannot be run as shown on the drawing, the contractor shall install the duct between the required points by any path available, in accordance with other services and as per approval of Owners site representatives.

All ductwork shall be independently supported from the building structure. All horizontal ducts shall be rigidly and securely supported, in an approved manner with trapeze hangers formed of galvanized MS rods and angle iron under ducts at not greater than 2 meter centers. All vertical duct work shall be supported by structural members at 2 Meters intervals. Air conditioning contractor shall supply and install all supports made of galvanized steel material and shall be of hi-tech supports only. The supports shall be designed to prevent vibration to be transmitted to the building structure by providing vibration isolation. If duct is passing through in such areas where space between ceiling slab to false ceiling is more than 1500 mm than duct should be supported by wall mounted brackets of 40 x 40 x 3mm angle.

Where metal ducts or sleeves terminate in woodwork, tight joints shall be made by means of closely fitted heavy flanged collars. Where ducts pass through brick or masonry opening, wooden frame work shall be provided within the opening and crossing ducts provided with heavy flanged collars on each side of wooden frame work, so that duct crossing is made leak-proof.

All ducts shall be totally free from vibration under all conditions of operation. Whenever duct work is connected to fans, air handling units or blower coil units that may cause vibrations in the ducts, ducts shall be provided of fire retardant rubberized canvas cloth flexible connection. The flexible connections should be located close to the unit, in mutually perpendicular directions. The flexible sleeve should be at least 15cm long securely bonded and bolted on both sides. Sleeve shall be made smooth and the connecting ductwork rigidly held by independent supports on both ends. The flexible connection shall be suitable for pressures at the point of installation.

Air conditioning unit and exhaust fans shall be connected to duct work by inserting at air inlet and air outlet a double canvass sleeve. Each sleeve shall be minimum 150 mm securely bolted to duct and the connecting ductwork rigidly held in line with unit inlet or outlet.

SPLITTERS AND DAMPERS

Duct / collar dampers shall be opposed blade type of robust construction and tight fitting. They shall be made of G.S. sheet minimum 16swg thick and shall have brass bushes. The design, method of handling and control shall be suitable for the location and service required. Dampers shall be provided with suitable links, levers and quadrants as required for their proper operation. Control or setting devices shall be made robust, easily operate-able and accessible through suitable access doors in the ducts. Every damper shall have an indicating device clearly showing the damper position at all times. Handles will be provided with extended arms to account for insulation thickness. Dampers shall be placed in ducts and at every branch supply or return air duct

connection, whether or not indicated on the drawing, for the proper volume control and balancing of the system.

FIRE DAMPERS

All supply / return air ducts of air handling units and return air openings shall be provided with approved fire dampers of at-least 1 1/2 hour fire rating. These shall be of approved make. The damper shall be fabricated of 16gauge GSS housing with blades formed out of 1.6 mm sheets. The damper shall be pivoted on both ends using chrome plated spindles in bronze bushes. The stop seals shall be provided on top and bottom of the damper housing. The damper blades shall be held in horizontal position using spring actuator bimetallic fusible link. The damper blades shall close in the event of fire by motor actuation capable of taking signal from the controller.

SUPPLY AND RETURN AIR GRILLS

Supply and return air grilles shall be of anodized extruded Aluminium construction with adjustable bars. Supply air grills shall be generally double deflection type backed with GI damper. The supply/return air grills being provided with removable key operated volume control dampers. Aluminium supply and return grills shall be powder coated and should have the color of client's choice as per bill of quantities.

SUPPLY AND RETURN AIR DIFFUSERS

The supply air diffuser shall be provided with removable key operative volume control dampers. Aluminium supply and return air diffusers shall be powder coated and should have the colour of client's choice or shall be extruded Aluminium. Supply/return air linear diffuser shall be Extruded Aluminium construction, square, rectangular, or round diffusers with flush fixed pattern or adjustable flow pattern. Diffusers for different spaces shall be selected in consultation with the Client/Consultants

TESTING / ADJUSTING / BALANCING - TAB -AIR SIDE :

Scope: Scope of this section comprises of the Testing, Adjusting and Balancing (TAB), of Air distribution system confirming to the specifications.

GENERAL CONDITIONS: After completion, all duct systems shall be tested for air leakage.

The entire air distribution system shall be balanced to supply the air quantities as required in the various regions and rooms to maintain the specified room conditions.

The air quantity shall be measured and if need be the motor pulley need to be changed to site requirement when balancing the system.

The entire air distribution system shall be balanced to supply the air quantities as required in the various regions and rooms to maintain the specified room conditions.

The final balance of air quantities and its temperatures through each grille, register or diffuser shall be tested and recorded and submitted to the project manager for approval.

AIR BALANCING: On completion of the work, the system shall be demonstrated to the satisfaction of the Engineer and air flow at each fan outlet and all air distribution outlets is correctly adjusted and regulated, to fulfil its specified functions and as per designed airflow rate.

The work shall be carried out in accordance with the approved commissioning schedule and shall cover, but not necessarily be limited to, the following activities. The entire air distribution system shall be balanced with the help of an anemometer. The measured air quantities at fan discharge and at the various outlets shall be within 5 percent of those specified / quoted. Branch duct adjustments shall be permanently marked after the air balancing is completed so that these can be restored to their correct position if disturbed at any time.

Air circuit clean-up shall be carried out and all internal debris and foreign matter removed prior to the commencement of commissioning. The functioning of the total system and all ancillary units shall be demonstrated and shown to be operating consistently within the prescribed limits.

- After Total System balance, the following values shall be measured and recorded.
 1. FanRPM
 2. Motor voltage and amperes
 3. Static pressure entering the Fan
 4. Static pressure leaving the fan

BALANCING AIR TERMINALS PROCEDURE

- Depending upon location and access to air terminals, various types of airflow measuring instruments will be utilized to record the actual airflow at terminals.
- Assuming adequate access provided, a direct reading balometer would be used which gives a direct reading of volume rather than velocity, which cancels out the need for effective grille areas, terminal configuration consideration and velocity corrections.
- If access is restricted then a rotating vane anemometer shall be used and the velocity reading obtained would be converted to volume (velocity x free area = volume) and a comparison between the pitot traverse reading will be made to obtain a correction factor which would be incorporated to give a true velocity reading.
- Alternatively, the effective area provided by the register / grille manufacturer will be incorporated in the design velocity calculations.
- Test results shall be recorded in the approved test sheets and documents.

3.0 FILL THE TECHNICAL DETAILS FOR ALL OUTDOOR AND INDOOR UNITS

TECHNICAL DETAILS FOR OUTDOOR UNIT			
S.No	Parameter	Unit	Details
1	Make and Origin		
2	Model	Model	
3	Capacity	HP	
4	Operating Ambient Temperature Range	degC	
5	Power Supply		
6	Refrigerant		
7	Refrigerant Precharge Quantity		
8	Number of compressors		
9	Compressor Type		
10	Cooling Capacity	Kw	
11	Cooling Capacity	BTU/HR	
12	Power Input	Kw	
13	Tonnage	TR	
14	EER		
15	ISEER		
16	IKW / TR	Kw	
17	Dimension (In MM)	H x W x D	
18	Net weight	Kg	
19	Shipping Weight (apprx)	Kg	
20	Refrigerant pipe connections		
21	Liquid		
22	Gas		
23	Air cooled condenser		
24	Type		
25	Fan Type		
26	Number of fans		
27	Air Quantity	CFM	
28	Motor Type		

TECHNICAL DETAILS FOR INDOOR UNIT

S.No	Paramater	Unit	Details
1	Tonnage		
2	Make and Origin		
3	Model	Model	
4	Airflow Rate	CFM	
5	Number of speeds		
6	External static	Pa	
7	Capacity at nominal conditions (TR)		
8	Temperature control		
9	Refrigerant control		
10	Operating sound	dB	
11	Power Input	Kw	
12	Number of fan motor in evoporating and rating		
13	Casing material and finish		
14	Dimension in mm	H x W x D	
15	Net weight	Kg	
16	Filter material and rating		
17	Evaporator copper tube size & thickness (OD) and refrigeration		
18	Surface area on air side and refrigeration		

LIST OF APPROVED MANUFACTURERS / NATURAL SOURCES OF MATERIALS TO BE USED IN THE AC WORKS SUBJECT TO THE APPROVAL OF SAMPLES BY THE CONSULTANT.

S.No.	Material Name.	Brand / Manufacturer / Recommended Make.
1.	VRV/F Out Door Unit	AS specified in the NIT
2.	VRV/F- Indoor Units Cassette Type	AS specified in the NIT
3	VRV/F-Indoor Units Hi Wall Type	AS specified in the NIT
4.	Refrigerant Joints / Multi kits	AS specified in the NIT
5.	Refrigerant Piping	Mandev / Rajko
6.	PVC Drain Piping	Mandev / Rajko/Sudhakar pvc
7.	GI Sheets	TATA / HSL / SAIL / NIPPON DENRO
8.	Fire Damper	Caryaire / AirMaster / Air Breeze / Ravistar
9.	Vibration Isolators / FlexibleConnectors	Resistoflex / Dunlop or approved equivalent.
10.	INSULATION / Fibre glass	UP Twiga / Kimmco / Owens corning
11.	Power Cables	CCI / ICC / Gloster / UCL
12.	Control Cables	Finolex / Delton or approved equivalent.
13.	Aluminum Grilles Diffusers /Linear Grilles	Caryaire / Air Master / Air Breeze/SRIFABS
14.	Filters	Klenzaid / Airtech / Aerosol / Anfilco
15.	Cooling Coils / Heating Coils	Bluestar / Rohini / Ethos / Carrier / Jaypee / Coil Company / ZECO
16.	Nitrile rubber	Armaflex / vedoflex /AERO FLEX/ARMACELL

NOTE :

The contractor shall use only above mentioned materials. All other materials shall confirm to the specifications laid down. The tenderer shall take this into account while tendering rates / prices. The Consultant / SBI has got every right to select any of the above Makes for the Project. However the samples of every material including all fixing accessories shall be got approved by SBI / Consultant before Execution.

Payment term for the AMC

- iv) No advance payment.
- v) Quarterly payments will be released after the end of the quarter subject to deductions for shortfall in services
- vi) Field reports of the PM and breakdown maintenance reports shall be enclosed to the Invoices
- vii) For AMC - 3 months AMC amount in the form of PBG as required by Bank will have to be submitted by the contractor.

SPECIAL CONDITIONS OF CONTRACT

Preventive and Breakdown Maintenance during Warranty Period & CAMC:

1. All the Air-conditioners covered in this contract have to be maintained as per the standards of the original manufacturing company during the warranty period as well as CAMC
2. The warranty would be on-site and comprehensive in nature and back to back support from the OEM. The vendor will warrant all the spares against defects arising out of faulty design, materials and workmanship etc. during the period of warranty. After the Warranty period of newly installed AC units expire, then these units are to be maintained by the Contractor till the expiry period of CAMC.
3. In case of CAMC of the existing ACs, the contractor has to repair /service/ maintain the air conditioners under the CAMC in as is where is condition when handed over to them under CAMC.
4. All required tools and tackles (in good working condition) necessary for carrying out repair and maintenance works of Air Conditioners under CAMC have to be provided by the vendor.
5. Professionally qualified personnel who have expertise in the AC supplied by the vendor will be permitted to undertake Preventive Maintenance/repair services during the period of warranty and CAMC period.
6. During the term of the contract, the vendor will maintain the equipment in perfect working order and condition and for this purpose will provide the repairs and maintenance services as under:

Type of Service	Warranty Period	AMC
Preventive Maintenance	Every Quarter	Every Quarter
Breakdown Maintenance	Within 48 hours of complaint	Within 48 hours of Complaint

Preventive maintenance: The Vendor shall conduct the following activities under Preventive Maintenance once within first 90 days of the installation of new ACs and once in every quarter thereafter, during the currency of this agreement or on a day and time to be mutually agreed upon. Notwithstanding the foregoing, the Vendor recognizes Bank's operational needs and agrees that Bank shall have the right to require the Vendor to reschedule preventive maintenance from any scheduled time to a date and time not later than 15 working days thereafter.

Sno	Activity
1.	Inspection of the AC – IDU and ODU for any abnormality in operation, sound etc
2.	Testing the Performance of AC for desired cooling
3.	Testing of Gas pressure if necessary and check for any leakages near the check nut etc or diagnose any other fault
4.	Checking of current consumption
5.	Remove the filter, water service and fix it back after drying
6.	Clean the drain tray and drain pipe and remove any choke for free flow of drain water
7.	Clean the Evaporator with brush and remove the dirt/dust. Check for any fungus

	formation or bad smell and wash it with chemical, if required.
8.	Lubricating /greasing of all Fans
9.	Water washing of Condenser Coil
10.	Topping of Refrigerant gas, if required
11.	Check the swing motor functions and rectify, if required
12.	In addition to the above, any other activity to ensure trouble free operation of AC
13.	Check the temperature setting and operation mode and advise the Branch on the optimum operation levels

7. This comprehensive Contract includes replacement of all faulty spares. Some of the spares are listed as under:

Compressors	Starting Capacitors
Fan Motors	Running Capacitors
Built – in Timer kit	Relays, Thermostats
Selector switches	Fan Capacitors
Contactors (Power / Control)	Gas charging
Micro Swing Motors	Fan blades
Electronic Control Circuitries	Air-Filters
Remote Control Units	Condenser Coils
External Electronic / Analog time switches for timed running of A.C's	Stabilizers
Outdoor unit mounting frames	Cabling from IDU to ODU
Parts of indoor / Outdoor unit enclosures	Existing copper piping from IDU to ODU
Display unit in AC	Existing drain piping from IDU to drain point

Note: The above list is only indicative. However, any parts which are not mentioned in the Tender Schedule of this Contract but required for the smooth and trouble free operation of the AC equipment are also required to be rectified or replaced with in the scope of this contract.

8. Working Hours for Repair and Maintenance:

All activities under the scope of the contract shall be undertaken during working hours i.e. from 10.00 A.M. to 6.00 P.M. on all working days (viz. Monday to Saturday). In case any defects, faults and failures in the AC could not be repaired or rectified during the said period, the technicians are required to accomplish their duties beyond the said schedules in case of any situation, if it warrants.

9. Replacement of Spare parts: The required spares shall be kept as stock with the vendor for readily replacing the faulty spares, without loss of time or delay. In cases where unserviceable parts of the equipment need replacement, the vendor shall replace such parts, at no extra cost to the Bank, with brand new parts or those equivalent to new parts in performance. Any worn or defective parts withdrawn from the equipment and replaced by the vendor during the warranty period shall become the property of the vendor and the parts replacing the withdrawn parts shall become the property of Bank.

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 original invoice and Warranty Card of the new Compressor/ condenser if demanded by the Bank. The compressor/ condenser being replaced should match with the **original star rating** of the air conditioner.

10. Only original spare parts/quality approved by the Bank will be permitted to be used for the maintenance during the AMC Period. If duplicate, refurbished or second hand parts are used by the vendor during the AMC, the contract shall be cancelled immediately without any notice period.

11. It is the responsibility of the Contractor to accurately specify the damaged spare parts to the Bank and to rectification of the fault in A.C under maintenance.

Response Time on receiving the complaint: The maximum response time i.e. time required for Vendor's maintenance technicians to report to the Bank after a request call / fax /e-mail is made or letter is written by Bank shall not exceed 48 hours.

Apart from regular letter communications, all telephonic/E-mail or Whatsapp communications from Bank are to be treated as formal communication for all practical purposes.

Escalation Matrix: The mobile number, land line number and email ID of the Contractor/Supervisor/Help desk to whom the complaints have to be reported and that of Top Management level is to be provided to Bank for communication purpose. Any change in numbers shall be advised then and there to the Bank.

Time taken for Repairs/Rectification: In case of Minor technical problems same are to be rectified within 3 hours of diagnosing of fault. In case of major technical problems, the same are to be rectified within 24 hours of identifying the problem.

In the event of the equipment not being repaired or a workable solution not provided during Warranty period and the AMC period, a penalty as per the penalty clause will be charged to vendor. The vendor may provide temporary equivalent replacement as a workable solution to avoid the above penalty.

Insurance for the Workmen: The technicians deployed under AMC are to be covered by insurance under Workman Compensation Policy through reputed Insurance Companies during the AMC Period. If demanded, Copies of the Insurance Policies are to be submitted to the Bank by the vendor.

Bank is not responsible for any loss of life, damage, injury to the technicians while undertaking the Maintenance activity under AMC contract or during the installation of new AC units. Vendor to ensure that all safety protocols are strictly followed while execution of the work. Vendor shall indemnify the Bank against any claims, damages, compensation for such losses.

12. **Extended Period of AMC:** In case the Bank needs the AMC service beyond the period of AMC, additional AMC Charges will be paid on the pro-rata basis for the period for which these units are to be maintained at the same unit rate as applicable to similar item in the original AMC and on the same terms and conditions of the AMC.

13. **Increase / Decrease of ACs:** If Bank decides that the additional number of air-conditioners other than the quantity mentioned in the tender are to be maintained by the Contractor, the contractor shall agree and maintain the ACs till the expiry period of AMC as per the same terms and conditions of the Contract. Proportionate amount of AMC shall be paid by the Bank for the same.

14. If any units covered under these AMC are removed/dismantled/shifted from this location to another location, the Contract amount as per the unit rate of the Tender will be revised and suitable deductions made from the AMC bills.

Other: The Bank has installed its own transformer for the site premises, hence the power supply is stable and is well regulated. The bank will not admit any claim from the contractor that the fault/damage is caused due to quality of power supply and it will not absolve the responsibility of the contractor in rectifying the fault.

The successful Vendor has to rectify the faults or repairs to the AC machines arising due to rat bites also free of cost within the scope of the contract. Vendor should also analyze the site conditions and take efforts to secure the AC equipment from the rodent bites by proper wrapping of the critical components with suitable glass wool packing or any other material and closing the opening made for the AC piping & drains properly to avoid rodent entry.

15. Details of important programs / functions of the Bank such as Conference, Review Meeting, VVIP functions etc that may be held in the Office will be informed to the contractor and they should assist the Bank in maintaining smooth running of the air-conditioners on that day without failure even if they are held on Bank Holidays. Non-attendance of the technicians on such a day will attract penalty at the discretion of the Bank.

All security and safety regulations and guidelines as per the applicable law are to be followed. All guidelines/directions of Bank's Security Section must be followed.

Complaint / Service / Breakdown Register:

The Bank shall maintain a register at its site in which, the Bank's AC operator / Electrician or any other person identified by Bank shall record each event of failure and / malfunction of the ACs. The Vendor's technician shall enter the details of the air conditioners serviced/ maintained / repaired by him in this register. Additionally, every time a preventive or corrective maintenance is carried out, the Vendor's engineer shall make, in duplicate, a Service call report which shall be signed by him and thereafter countersigned by the Bank's official. One copy of the Service call report shall be handed over to the Bank's official. Spares taken outside the premises also to be recorded with serial number of spare and in and out date and time. The Vendor shall provide replacement equipment if any equipment is out of the premises for repairs.

16. SHIFTING THE AC TO NEW LOCATION OR BRANCH:

18.1 If Bank desires to shift the AC to a new location/floor or department in the same premises or to another branch/office and install it thereof urgently, the Bank shall bear the charges for such shifting and the vendor shall dismantle and reinstall the AC as desired. The terms of this agreement, after such shifting to the alternate site and reinstallation thereof would continue to apply and binding on the vendor. The warranty terms would not be considered as violated due to the above shifting. The vendor, would not unreasonably assume that the causes lie with the shifting activity.

CONTRACTOR'S RESPONSIBILITY AFTER THE CONTRACT HAS EXPIRED

Successful bidder has to handover all the ACs in good running condition before expiring of CAMC contract. Security Deposit will be released only after verifying the same.

PENALTY CLAUSE FOR AMC:

Any penalty due during the Warranty/AMC period will be adjusted against the bills payable or retention money retained by the Bank as per following in case of non-satisfactory services provided under Warranty/AMC:

S. No.	Type of Defective Service	Penalty Amount / LD
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1	Penalty for every air conditioner which is not repaired post completion of 72 hours of reporting the complaint till the day the complaint is rectified.	Rs 100/- per HP per day till the day of rectification
2	Penalty for every air conditioner that breaks down for more than three times in a month	Rs 500/- per HP per month
3	Penalty for not doing the Preventive Maintenance or Vendor does not fulfill the provisions of the contract in a quarter	only the proportionate maintenance charges for that period during the month will be considered payable by Bank without prejudice to the right of the Bank to terminate the contract.
4	Penalty for non-responsiveness to the calls of the Bank to repair or replace the faulty AC. If the vendor could not resolve the issues or not showing any interest to resolve the issue or non-responsive to Bank's calls	Bank will arrange to rectify the same through any other agency and recover the losses from the vendor by suitable deductions from the bills payable to the vendor or from the Security Deposit and contract cancelled.
5	Penalty for losses to Bank's property while performing the PM or repair works on account of any negligence, mishandling, non- adherence to the required safety protocols, commission or omission by the technicians of the Vendor and if any loss or damage caused to the Equipment or any Bank's property	Contractor to rectify or shall make good of the losses suffered by the Bank or Bank will recover the actual amount incurred by Bank

2. If, in any quarter, the invoice was paid to the Vendor without deducting the penalty or LD, the Bank can deduct the same from future payments payable or the Vendor shall refund the amount forthwith to Bank on demand by Bank.

3. Further Bank reserves the right to terminate the contract at any time during the validity of the Contract period by giving 30 days' notice to the Contractor with or without any reason.

6. No term or provision hereof shall be deemed waived and no breach excused, unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to or waiver of a breach by other, whether express or implied, shall not constitute a consent to or waiver of or excuse for another different or subsequent breach.

Date:

Place:

Signature and seal of the Bidder

**BOQAND SPECIFICATION OF VRF AIR CONDITIONING WORKS FOR
PROPOSED LCPC MOULALI, HYDERABAD. (SECOND & THIRD
FLOORS)**

S.NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
A	PART - A - HIGH SIDE				
1	Condensing Unit (Outdoor Unit):				
	The condensing unit shall be capable of assessing the requirement of liquid refrigerant flow of each evaporating unit at all times by means of a micro computer control expansion valve and generating the required total flow of refrigerant liquid for supply to the evaporator units. The condensing unit shall be modular type, designed as per Indian atmospheric conditions and should be capable to perform for outside ambient 50 Deg. C. Outdoor Units should be modular in type and should be equipped with DIP IPM type Inverter Scroll Compressor, all Inverter with variable speed compressors capable of changing the capacity in accordance to the cooling load requirement with highest COPPEER. Provision of setting External Static Pressure up to 60Pa by on site.Unit COP/EER should be high and designed for cooling operation for highest ambient Temperature as per Indian atmospheric conditions.				
	Set of Outdoor Unit should be able to connect up to 64 Indoor Units. Outdoor unit should consists of DC variable speed motor for condenser fan with minimum 25 steps speed control to reduce input power, auto check function for connection error, auto address setting. Unit should be equipped with a double stage highly efficient oil separation management system to ensure minimum oil entrachment and proper lubrication with high reliability and stable operation with long refrigerant piping. The noise level of the base unit shall be less than 60dB (A) when measured horizontally 1 m away from cover surface and 1.5 m above floor level during night shift. Unit should assess demand function automatically and perform with the help of Central Station. Units having Noise reduction mode will be preferred but must be having back up operation function for emergency to avoid complete stop. Outdoor unit should have feature of Rotation Operation function of Compressor to distribute load.				

	The condenser coil should be with internally grooved Cu tubes, mechanically bonded to super slit aluminum fins. The surface of the condenser coil shall be coated with suitable chemical coating to prevent deterioration due to climate. Outdoor unit must have automatic judgment function to check whether or not the refrigerant amount is sufficient in one refrigerant cycle. Reliable Transmission system should be used between outdoor and indoor units. All necessary safety devices shall be provided to ensure safe operation of the system.				
1.1	16 HP Outdoor Unit	Nos	4	410000	1640000
1.2	12 HP Outdoor Unit	Nos	2	280000	560000
2	Supply of CASSETTE UNITS type indoor units comprising with pre-filter, fan section with low noise fan multi speed motor, coil section with DX coil, outer cabinet, drain water lift-up mechanism, insulation, pipe connections etc. of various capacities as per specifications and drawings. WITH CORDLESS REMOTE CONTROL				
2.2	2.0 Ton 4way Cassette	Nos	2	42740	85480
2.5	3.0 Ton 4way Cassette	Nos	12	44600	535200
	4.0 Ton 4way Cassette	Nos	16	48000	7,68,000
3	Multi kits for Indoor units FOR BOTH LIQUID & SUCTION LINE. (only one unit will be considered for both suction and liquid lines)	Nos	30	5000	150000
3.1	Multi kits for ODU units FOR BOTH LIQUID & SUCTION LINE. (only one unit will be considered for both suction and liquid lines)	Nos	7	8500	59500
B	LOW SIDE WORKS				
1	Lifting, Shifting, Positioning & Installation of VRF Outdoor units	Nos	6	6000	36000
2	Lifting, Shifting, Positioning, Installation, Commissioning and Testing of VRF Indoor units	Nos	29	3500	101500
3	Vacuumping the system, Gas filling and topping up with R410-Ozone Friendly and NonCFC Refrigerant, pressure testing and commissioning of above system.	Per / HP	88	1750	154000
4	Supply & installation of suction & discharge Hard copper Refrigerant piping with proper supports/hangers from ceiling/wall as required at site & approved by consultant & duly insulated with closed cell elastomeric nitrile insulation of 19mm thick for pipes above 1" and 13 mm thick for pipes below 1" as suggested by the manufacturer. (only one length will be considered for both suction and liquid lines). The scope of work includes scaffolding work)				
4.1	LO : 19.05 & G.O 31.75	Rmt	21	2000	42000
4.2	LO : 15.90 & G.O 28.58	Rmt	38	1750	66500

4.3	LO : 12.70 & G.O 25.40	Rmt	55	1500	82500
4.4	LO : 9.37 & G.O 22.20	Rmt	40	1250	50000
4.5	LO : 6.35 & G.O 15.90	Rmt	160	1000	160000
5	Supply and Erection of hard CPVC condensated drain piping with 9mm thick Nitrile insulated including support and wall opening of the following sizes etc..				
5.1	a) 40mm Dia	Rmt	65	700	45500
5.2	b) 32mm Dia	Rmt	80	506	40480
5.3	c) 25mm Dia	Rmt	90	384	34560
6	Supply and Laying of Control and communication cable and connecting the VRF IDUs and ODU's (control wiring using 2C X 1.5 Sq.mm copper cable) with conduit	Rmt	250	180	45000
7	Supply and fixing of following size GI perforated cable tray made out of 2mm thick galvanized sheet and the tray covered with 2mm thick cover including GI / MS supports for fixing the tray, anchor fasteners, hi tech supports etc., complete as required. (For Copper pipes and CPVC Pipes)				
7.1	300mm*75 mm	Rmt	100	1900	190000
8	Associated Civil works				
	Chipping ,chasing & Plastering the wall openings in cement mortar 1:6 of 15 mm thick finishing to line and level with sand faced finishing at all levels, including all leads & lifts, scaffolding, curing etc complete (for Copper & Drain openings in all rooms etc.	Lot	1	15000	15000
9	DX SYSTEM				
	SITC OF SPLIT AC Design, Supply, Installation, testing and commissioning of split wall mounted with cordless remote Air conditioners with Inverter Technology (Rating: 5 star or equivalent) with Green Gas/eco friendly & independent evaporator and compressor(copper) with copper coil & condenser . Nominal cooling capacity more than 18000 BTU/Hr (suitable for operation on single phase 220-240 volts, 50Hz , Ac supply). The scope of work includes supply of 5 meters copper pipe				
9.1	1.5 TR	No	2	49500	99000
	COPPER PIPING WORKS: Supply, installation, testing & commissioning of 16 SWG copper Refrigerant Piping for suction & return of suitable dia. The rate shall include Copper pipe and insulation with 19 mm Thick Nitrile rubber tube (i.e. As per Unit Manufacturer recommendation) and necessary Installation accessories such as supports and clamps. The sizes given shall be verified by Supplier for adequacy and size based on manufacturer standards. The scope of work includes supply of	Rmt	20	1200	24000

	& laying of suitable power & communication cable from indoor to out door				
9.2	CABLE: Supply and laying of suitable electrical flexible cable from out door to indoor	Rmt	25	80	2000
9.3	DRAIN PIPE Supply & Erection of CPVC pipe Insulated condensate drain pipe of the following size etc., complete as per the specification	Rmt	30	50	1500
9.4	MS STAND: Supply & Fixing of suitable MS Stand for above high-wall Split Acs	No	2	560	1120
9.5	STABILIZER: Supply and fixing of 4 KVA stabilizer	No	2	2500	5000
	TOTAL AMOUNT FOR ACS				49,93,840
10	Buy back of old VRF System (IDU (24No'S) & ODU(6Nos)	Lum	1	130000	-1,30,000
	GRAND TOTAL AMOUNT				48,63,840

COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT FOR 4 NO'S OF 16 HP, 2NO'S OF 12HP (ODU) AND all above cassette ACs (IDU) and 2Nos 1.5TR Split ACs.

1.1	Comprehensive Annual Maintenance Contract for 1st year which starts after expiry of 1 year defect liability period	Job	1	1,76,000	1,76,000
1.2	Comprehensive annual Maintenance contract for 2nd year	Job	1	1,84,800	1,84,800
1.3	Comprehensive annual Maintenance contract for 3rd year	Job	1	1,94,040	1,94,040
1.4	Comprehensive annual Maintenance contract for 4th year	Job	1	2,03,742	2,03,742
1.5	Comprehensive annual Maintenance contract for 5th year	Job	1	2,13,929	2,13,929
	Total CAMC for 5 years				9,72,511
	GRAND TOTAL				58,36,351
	ABOVE (%) / AT PAR / BELOW				
	GRAND TOTAL				

GST will be extra as per GOVT norms