STATE BANK OF INDIA
Premise & Estate department, Ground Floor, Local Head Office,
Sector 17-A, Chandigarh – 160017.

INVITES ONLINE TENDERS

FOR

REPLACEMENT OF ONE 14000 CFM AND ONE 20000 CFM AIR HANDLING UNIT AT SBI LHO SEC-17 CHANDIGARH

Name of the Firm: _____

Contact No. _____

Email Id.: _____

NOTICE INVITING TENDER (NIT)

SBI invites sealed tenders from OEM, their authorized dealer and distributors and other firms having experience in similar work for supply, installation, testing commissioning of one 14000 CFM and one 20000 CFM AHUs at SBI, Sec-17,LHO Chandigarh. The Details of tender are as under:

1	Name of the work	SBI invites sealed tenders from OEM, their authorized dealer and distributors and other firms having experience in similar work for replacement of one14000 CFM (1st floor) and one 20000 CFM (6th floor) AHU at SBI, LHO Chandigarh.
2	Make of AHU Units	**Edgetech/Zeco/ waves/Bluestar/Ravi aircon /Citizen**
3	Cost of Tender Document fees	NIL
4	Quantum of Earnest Money Deposit (EMD)	EMD of Rs. 15,000/- in form of DD in favor of State Bank of India payable at Chandigarh (To be enclosed in sealed envelope as a part of Technical Bid).
5	Last date and time of submission of Tender	**14.07.2025, 12:00PM**
6	Technical bids, EMD declaration and Financial Bid to be submitted physically at:	Assistant General Manager (P&E), State Bank of India, Local Head Office, Ground Floor, Sector 17-A, Chandigarh – 160017.
7	Tender methodology	Vendors/firms will have to submit their bids(Technical as well as financial) in physical forms to above mentioned address and online on the portal which will be provided by the firm M/s Antares. Technical bid will be opened offline and after evaluation of technical bids, price bids of eligible firms/contractors will be opened online.
8	Digital Signatures	Vendors/firms must have valid digital signature to participate in online tendering process.
9	Validity period of the tender.	Three (3) Months
10	Warranty	1 year from the date of commissioning.

Assistant General Manager (P&E)
SBI, LHO, Chandigarh – 160017.

REPLACEMENT OF ONE 14000 CFM AND ONE 20000 CFM AHU AT SBI, LHO CHANDIGARH

SBI invites sealed tenders in two bid systems for replacement of one14000 CFM (1st floor) and one 20000 CFM (6th floor) at SBI, LHO Chandigarh. The tendering process is through M/s Antares which will be conducted, on our behalf, by an approved e-Tendering Service agency.

The OEM/dealers/distributors/ firms having similar work experisense shall submit the valid certificate along with the tender and other eligibility documents, else the tender will be rejected.

1. The Technical (non-financial) bid in sealed cover shall be submitted, super scribing " **REPLACEMENT OF ONE 14000 CFM AND ONE 20000 CFM AHU AT SBI, LHO CHANDIGARH– TECHINICAL BID**" strictly provided for the purpose. Any other bids submitted along with the technical bid will not be accepted and the tender will be rejected.

2. Vendors/firms are advise to visit the site to enable them to quote rates for dismentalling of existing AHUs and installing new AHUs.

3. The technical bid should reach us at the following address:-
Assistant General Manager (P&E), State Bank of India, Local Head Office, Ground Floor, Sector 17-A, Chandigarh – 160017.

4. **Envelope-I** Consisting covering letter, terms and conditions and the EMD. In case any of the information provided is incomplete and does not found to be satisfactory, the price bid of non-eligible vendor/firm will not be opened. (Part II Price Bid).

5.The technical bid will be evaluated first, after scrutiny of the technical bid, only eligible vendors will be allowed to participate in online tendering process & will be notify accordingly.

6. **Envelope-II** shall contain price bid. In case your firm qualifies the technical bid, the price bid will be opened accordingly.

7. The successful L-1 vendor will have to complete the job/wok within 30 days from date of award of work.

8. **Penalty Clause:-** If the vendor fails to supply, install, testing & commissioning of the AHUs in the office/ branch within the stipulated period of 30 days from the date of award letter/work order, penalty @ 1% of the value of work order per week delay, subject to maximum of 5% of value of work order will be levied from the bills of the vendor.

9. **The cost of dismentalling of existing shall not be paid seperately .** The L1 rates/bidder will finalized on the basis of cumulative rates quoted in online tendering.

10. All pages of the tender document shall be signed by authorized signatory and stamped.

Any corrections shall be duly signed and stamped. Unsigned and un-stamped bids will be rejected. Bids received after the due date and time will not be considered.

11. Tenders quoting for lesser specifications than the specified shall be rejected. No deviation in technical specifications is accepted.

12. Bank reserves the right to reject the offer without assigning any reason what so ever.

13. AHUs shall confirm to the standard specifications supplied with this notice.

14. Payments will be released by the Offices only after successful supply, installation testing and commissioning of AHU units. If found defective, the same will be rejected and should be replaced with new one without any extra cost.

15. If any vendor offers any components /parts /equipments of higher capacity than that specified, it will be considered as equivalent and no weightage or extra cost benefit will be given.

16.Pre-bid meeting will be held 04/07/2025 for discussions on tender related query.Interested bidders may please visit our office.

Date:
Place:

Applicant’s Signature and stamp

ELIGIBILITY CRITERIA

(i) The firm must be registered and have sufficient number of technical employees. The applicant should submit their credentials along with a list of employees, contact details etc.

(ii) The firm requires furnishing their PAN No, GST Registration etc.

(iii) The firm should have carried out installation/replacement work of AHUs in PSU Banks/ Scheduled Banks/ Financial Institutions/ State and Central Govt. Organizations/ reputed MNC/ Private Companies, Insurance companies. The work order must be in the name of the firm only (i.e. sub contracts are not accepted). (Work orders and work completion certificates to be enclosed.)

(iv) Should have successfully completed installation/replacement work of AHUs during the last 7 years ending last day of month previous to the one in which application is submitted (i.e. the completed works up to 31.03.2025 shall only be considered), as under:-

(a) Three works, each costing not less than Rs 6.50 lakhs.
[or]
(b) Two works, each costing not less than Rs.8.0 lakhs.
[or]
(c) One work costing not less than Rs.13.0 lakhs.

(v) The firm must enclose company's certificate of Registration.

- ✓ Average annual financial turnover during the last 3 years ended 31.03.2025 should not be less than 7.0 lacs in similar activities (in case companies with multiple business interests).
- ✓ The Firm must enclose the solvency certificate.
- ✓ **The firm must have a valid digital certificate / signature.**
- ✓ Satisfactory / Completion Certificates and Purchase Order copies or LOI copies from clients etc. from Central / State Govt. / PSU / Banks / Financial Institutions / Reputed MNC/ Private Companies etc. for installation/replacement of AHUs.
- ✓ The applicant must comply to Bank's terms for Payment, delivery, rate contract and penalty.

- ✓ The applicant must comply to Bank's Technical terms.

Interested and eligible firms may submit the applications duly filled and sign and stamp of each page with all the necessary certificates, EMD and documents including **price bid** as per the enclosed Checklist in manual on or before the stipulated date and time. The Bank reserves the right to accept or reject any or all applications without assigning any reason thereof.

Assistant General Manger (P&E)
LHO CHANDIGARH

General Terms & Conditions:

1. The rate should be inclusive of all duties, taxes, levies, transport, transit insurance, loading-unloading etc. Only GST will be paid extra as applicable. No increase in the above is acceptable to the Bank. The rates shall be firm throughout the execution of the order. No variation in the quoted rates subsequently will be allowed and no additional claims other than quoted rates will be entertained. The rates should be inclusive of the delivery and installation charges of the AHUs of mentioned specifications at our sites.

2. Delivery and installation, unless specified, shall be within 30 days from the date of confirmed purchase order.

3. **Liquidated damages for delay in supply & installation:**
If the delivery is not done or the work is not completed within the stipulated time period, a penalty of.05 % of the contracted value per week subject to a maximum of 5% of contract value will be levied to the AC supplier.

4. **Guarantee /Defect liability period**: AHU should carry a minimum warranty of one year from the date of installation or 15 months from the date of delivery whichever is earlier. Onsite warranty should include free replacement of AHU/parts during the warranty period, if not repairable at site within a reasonable period.

5. Agreement on stamp paper: The successful tenderer should enter into formal agreement with Bank on Rs. 100 stamp paper (at successful tenderer's cost) as per the bank's standard format.

6. The cost include supply and fixing of AHUs along with accessories as required and mentioned in specifications, dismentalling of existing AHUs, transportation charges, loading and unloading of material etc.

7. The terms of payment shall be as under: -

i) 70% of the contract price i.e. on supply of the A.H.U along with relevant documents to the satisfaction of bank.

ii) 10% of the contract price shall be made after installation of A.H.U.

iii) 15% of the contract price shall be made after testing and commissioning of the A.H.U. The project may be subjected to "Third Party Inspection" (TPI) by bank at its own cost. The bidder has to provide all necessary help and support in getting the third-party inspection carried out.

iv) retention money of 10% will be deducted from every running bill till the total retention reaches 5% of value of work. Retention will be refunded after successful completion of defects and liability period of 12 months from the date of commissioning.

8. On completion of work the contractor shall furnish to the Engineer Original as built drawings indicating detailed layouts, schematic diagrams, control diagrams, etc. He shall also furnish a completion & test certificate and guarantee in the form required.

9. The contractor is required to comply with all facts of Government relating to labour and the Rules & Regulations made there under from time to time and to submit at the proper times all particulars and statements required to be furnished to the labour Authorities.

10. The work or any part of it shall not be transferred, assigned or sublet in any condition will not be allowed.

11. The Employer (Bank) reserves the right to delete or reduce at any time, any section of the Bill of Quantities without assigning any reasons whatsoever therefor and no claim will be entertained in this regard.

12. The price shall be firm throughout the period of contract and no price variation on any account will be entertained except those brought out by statutory regulation in respect of rate of excise duty or minimum labour wages.

13.We have read and understood all the terms and conditions stipulated by the Bank for all categories of equipment and do hereby agree to each and every item indicated therein. We agree to abide by the proposal and the rates quoted therein for the contract awarded by the Bank. Until a formal contract is prepared and executed, this proposal, together with your written acceptance thereof and your notification of award, shall constitute a binding contract between us. We understand that State Bank of India reserves the right to accept or reject any or all bids without assigning any reason whatsoever thereof.

Date:

Place:

Applicant’s Signature and stamp

CONDITIONS OF CONTRACT

1.0 SCOPE OF CONTRACT:

1.1 These special conditions are intended to amplify the General Conditions of Contract and shall be read in conjunction with the same. For any discrepancies between the General Conditions and these Special Conditions, the more stringent shall apply. Notwithstanding the sub-division of the documents into separate sections and volumes, every part shall be deemed to be supplementary to and complementary of every other part of each shall be read with and into the contract so far as it may be practicable to do so Where any portion of the general conditions of contract is repugnant to or at variance with any provision of the special conditions of contract, then unless a different intention appears, the provision(s) of special condition of contract shall be deemed to override the provision(s) of general conditions of contract only to the extent that such repugnance or variance cannot be reconciled with the general conditions of contract and shall be to the extent of such repugnance of variations, prevail; it being understood that the provisions of general conditions of contract shall otherwise prevail.

2.0 Scope of Work:

2.1 The general character and the scope of work to be carried out under this contract are illustrated in Drawings, Specifications and Schedule of Quantities. The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the Engineer-in-charge. The contractor shall furnish all labour, materials and equipment (except those to be supplied by the department) as listed under Schedule of Quantities and specified otherwise, transportation and incidental necessary for supply, installation, testing and commissioning of the complete air handling units as described in the Specifications and as shown on the drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings / Documents as being furnished or installed, but which are necessary and customary to be performed under this contract. Civil works e.g. dismantling of wall and re-construction, plastering and paint work all are to be done as per the satisfaction of engineer incharge

3.0 ARBITRATION:

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions orders or these conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of the

work or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereinafter:

i) If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the bank or in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or dispute to the Assistant General Manager (Premises & Estate), SBI LHO, Chandigarh . The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the Bank be in any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor to the Asst. General Manager (Premises & Estate) in the manner and within the time as aforesaid. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to the Asst. General Manager (Premises & Estate) in writing in the manner and within the time aforesaid.

ii) The Asst. General Manager (Premises & Estate) shall give his decision in writing on the claims notified by the contractor. The contractor may within 30 days of the receipt of the decision of the Asst. General Manager (Premises & Estate) submit his claims to the conciliating authority namely the Circle Development Office, S.B.I., LHO, Chandigarh for conciliation along with all details and copies of correspondence exchanged between him and the Asst. General Manager (Premises & Estate).

iii) If the conciliation proceedings are terminated without settlement of the disputes, the contractor shall, within a period of 30 days of termination thereof shall give a notice to the concerned Chief General Manager of the Bank for appointment of an arbitrator to adjudicate the notified claims falling which the claims of the contractor shall be deemed to have been considered absolutely barred and waived.

iv) Except where the decision has become final, binding and conclusive in terms of the contract, all disputes or differences arising out of the notified claims of the contractor as aforesaid, and all claims of the Bank shall be referred for adjudication through arbitration by the Sole Arbitrator appointed by the Chief General Manager. It will also be no objection to any such appointment that the Arbitrator so appointed is a Bank Officer and that he had to deal with the matters to which the Contract relates in the course of his duties as Bank Officer. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever, another sole arbitrator shall be appointed in the manner aforesaid by the said Chief General Manager. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of arbitrator.

It is also a term of this contract that no person other than a person appointed by such Chief General Manager as aforesaid should act as arbitrator.

The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules made thereunder.

It is also a term of the contract that if any fees are payable to the arbitrator these shall be paid equally by both the parties. However, no fees will be payable to the arbitrator if he is a Bank Officer.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award (including the fees, if any of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof, shall be paid and fix or settle the amount of costs to be so paid.

4.0 LIQUIDATED DAMAGED FOR DELAY IN COMPLETION:

4.1 If the contractor fails to successfully complete the trial operation within the time fixed under the contract, the contractor shall pay to the Employer as liquidated damages, a sum as specified for such specified period of delay. The details of such liquidated damages are brought out in Annexure.

4.2 The total amount of liquidated damages for delay under the contract will be subject to a maximum of five percent (5%) of the contract price.

5.0 CERTIFICATES & PAYMENTS:

5.1 The detailed measurement for the works done will be jointly measured by the site engineer and the authorized contractor’s representative and recorded by the site engineer in the authorized measurement book. The contractor will sign the measurement book at the end of measurements in token of acceptance of measurements. The contractor will then prepare a bill based on the measurements and submit the bill in triplicate on or before the date fixed by the bank or if no date is so fixed by the 15th of month for the work done during the previous month and the bank shall consistent with the stipulation in the appendix to these conditions of contract regarding "value of work for interim certificates" (or at closer intervals at his discretion), check/take the measurements or cause the measurements to the checked/taken for the purpose of having the same to be verified and to the extent work has been executed in accordance with the contract, issue interim certificate, and the Employer shall make payments to the contractor on the basis of such certificates (in the appendix to these conditions of contract), subject to retention of such sums at the percentage marked in the said appendix till the whole of the

retention money is collected where after the installments (interim payments) shall be up to the full value of the work subsequently so executed and fixed.

5.2 The bank may in his discretion certify 80% of the claim immediately on receipt of an interim bill prior to checking/taking measurements and issue the full certificate after duly checking/taking measurements as aforesaid.

5.4 When the works have been virtually completed and the shall have certified in writing that they have been so completed, the contractor shall submit the final bill in respect of the contract works within one month thereafter and in accordance with the certificate to be issued by the payment shall be made by the Employer within the time period of three months. And the contractor shall be entitled to the payment of the final balance in accordance with the final certificate to be issued in writing by the after the expiration of the period referred to as "The defects liability period" in the appendix hereto from the date of virtual completion or as soon after the expiration of such defects made good according to the true intent and meaning thereof whichever shall last happen. All measurement will have to be got certified by the physical check on site by the Banks Engineers in the presence of the Site Engineer & Contractor between the period of interim certificate after virtual completion a final certificate. Provided always that the issue by the of any certificate during the progress of the works or at or after their completion shall not relieve the contractor from his liabilities under clause 24, Section-4 nor relieve the contractor of his liability in case of fraud, dishonesty, or fraudulent, concealment relating to the works or materials or to any matter dealt with in the certificate and in case of all defects and insufficiencies in the works or materials which are reasonable examination would not have been disclosed. No certificate of the shall of itself be conclusive evidence that any work or materials to which it relates are in accordance with the contract neither will the contractor have a claim for any amounts which the s might have certified in any interim bill and paid by the employer and which might subsequently be discovered as not payable and in this respect the, employer's decision shall be final and binding.

5.5 The shall have power to with hold any certificate if the works or any part thereof, are not being carried out to his satisfaction.

5.6 Employer shall make the payment of the bills as certified by the s after getting it scrutinized through the Employer's, Engineers and shall have power to withhold/reduce amounts certified in the bill in case of errors, deficiencies or mistakes noticed in the certification.

5.7 Any amounts payable by the Employer to the contractor in pursuance of any certificate given by the hereunder shall if not paid within the "Period of honoring certificate" named in the appendix as the "Rate of Interest" for delayed payment from the date upon which sum ought to have been paid by the Employer until payment.

6.0 ASSOCIATED SERVICES WORKS

6.1 All associated ELECTRICAL WORKS listed below are excluded from the scope of this contract. These shall be installed by other agencies in accordance with approved shop drawings of, and under direct supervision of the air conditioning contractor.

- Providing power supply with earthing at the incoming of control panel in A/C plant room.

6.2 All associated PLUMBING WORKS listed below are excluded from the scope of this contract. These shall be installed by other agencies, in accordance with approved shop drawings of, and under direct supervision, of the air conditioning contractor.

- Providing soft makeup water at cooling tower.
- Providing sump pumps and necessary piping for drainage of plant room located below ground level.

7.0 PROJECT EXECUTION AND MANAGEMENT:

7.1 The Contractor shall ensure that senior planning and erection personnel from his organization are assigned exclusively for this project. They shall have minimum 3 years' experience in this type of installation.

The project management shall be through modern technique. The Contractor's office at site shall be fully equipped with fax, modem, computers, plotter etc. Erection engineer and supervisors shall be provided with mobile communication system so that they can always be reached.

The Contractor shall arrange to have mechanized & modern facilities of transporting material to place of installation for speedy execution of work.

9.0 PERFORMANCE GUARANTEE:

9.1 The contractor shall carry out the work in accordance with the Drawings, Specifications, Schedule of Quantities and other documents forming part of the Contract.

The contractor shall be fully responsible for the performance of the selected equipment (installed by him) at the specified parameters and for the efficiency of the installation to deliver the required end result.

The contractor shall guarantee that the HVAC system as installed shall maintain the inside conditions in the air-conditioned spaces as described under "Basis of Design" in the specifications.

The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing over and guarantee period.

10.0 BYE-LAWS AND REGULATIONS:

10.1 The installation shall be in conformity with the Bye-laws, Regulations and Standards of the local authorities concerned, in so far as these become applicable to the installation. But if these Specifications and Drawings call for a higher standard of materials and / or workmanship than those required by any of the above regulations and standards, then these Specifications and Drawings shall take precedence over the said regulations and standards. However, if the Drawings and specifications require something which violates the Bye-laws and Regulations, then the Bye-laws and Regulations shall govern the requirement of this installation.

11.0 FEES AND PERMITS:

11.1 The contractor shall obtain all permits / licenses and pay for any and all fees required for the inspection, approval and commissioning of their installation.

12.0 DRAWINGS:

12.1 The HVAC Drawings issued with tenders, are diagrammatic only and indicate arrangement of various systems and the extent of work covered in the contract. These Drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these Drawings. The interiors drawings and details shall be examined for exact location of equipment, controls, grilles and diffusers. The contractor shall follow the tender drawings in preparation of his shop drawings, and for subsequent installation work. He shall check the drawings of other trades to verify spaces in which his work will be installed. Maximum headroom and space conditions shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the Engineer in charge before proceeding with the installation. In case installation is carried out without notifying, the work shall be rejected and contractor shall rectify the same at his own cost. The contractor shall examine all interior, structural, plumbing, and electrical and other services drawings and check the as-built works before starting the work report to the Engineer in charge any discrepancies and obtain clarification. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Engineer in charge without additional cost to the Owner. The data given in the Drawings and Specifications is as exact as could be procured, but its accuracy is not guaranteed.

13.0 TECHNICAL DATA:

13.1 Each tenderer shall submit along with his tender, the technical data for all items. Failure to furnish complete technical data with tenders may result in summary rejection of the tender.

15.0 QUIET OPERATION AND VIBRATION ISOLATION: All equipment shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer in charge. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own room, shall be

considered objectionable. Such conditions shall be corrected by the Contractor at his own expense.

16 ACCESSIBILITY:

16.1 The Contractor shall locate all equipment which must be serviced, operated or maintained in fully accessible positions.

17.0 MATERIALS AND EQUIPMENT:

17.1 All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be strictly in conformity with list of approved manufacturers as per attached list.

18.0 MANUFACTURERS INSTRUCTIONS:

18.1 Where manufacturer has furnished specific instructions, relating to the material and equipment used in this project, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

19.0 ELECTRICAL INSTALLATION:

19.1 The electrical work related to air conditioning services, shall be carried out in full knowledge of, and with the complete coordination of the contractor. The electrical installation shall be in total conformity with the control wiring drawings prepared by the contractor and approved by the Engineer in charge. All air conditioning equipment shall be connected and tested in the presence of an authorized representative of the contractor. The system shall be commissioned only after the contractor has certified in writing that the electrical installation work has been thoroughly checked, tested and found to be totally satisfactory and in full conformity with the contract Drawings, Specifications and manufacturer's instructions. It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements, of the electrical installation work for air conditioning services, lies solely with the contractor.

20.0 COMPLETION CERTIFICATE:

20.1 On completion of the Electrical installation for air conditioning, a certificate shall be furnished by the contractor, counter signed by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authority.

The contractor shall be responsible for getting the entire electrical installation for air conditioning system duly approved by the local authorities concerned, and shall bear expenses if any, in connection with the same.

21.0 BALANCING, TESTING AND COMMISSIONING: Balancing of all air and water systems and all tests as called for the Specifications shall be carried out by the contractor through a specialist group, in accordance with the Specifications and ASHRAE Guidelines and Standards. Performance test shall consist of three days of 10 hour each operation of system for each season. Cost of performance witness test of major equipment such as

chillers, at factory with two personnel from Owners shall be included. The results for summer, monsoon and winter air conditioning in quadruplicate shall be submitted for scrutiny. Four copies of the certified manufacturer performance curves for each piece of equipment, high lighting operational parameters for the project, shall be submitted along with the test certificates. Contractor shall also provide four copies of record of all safety and automatic control settings for the entire installation. The installation shall be tested again after removal of defects and shall be commissioned only after approval by the Engineer in charge. All tests shall be carried out in the presence of the representatives of the Engineer in charge

22.0 AS BUILT DRAWINGS:

22.1 Contractor shall submit as built drawings as and when work in all respects is completed in a particular area. These drawings shall be submitted in the form of two sets of CD's and four portfolios (300 x 450 mm) each containing complete set of drawings on approved scale indicating the work as - installed. These drawings shall clearly indicate complete plant room layouts, wiring and other services. Each portfolio shall also contain consolidated control diagrams and technical literature on all controls. The contractor shall frame under glass, in the air-conditioning plant room, one set of these consolidated control diagrams.

23.0 OPERATING INSTRUCTION & MAINTENANCE MANUAL:

23.1 Upon completion and commissioning of system the contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Engineer in charge and two for Owners Operating Personnel.

24.0 ON SITE TRAINING:

24.1 Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labor and helpers for operating the entire installation for a period of fifteen (15) working days of ten (10) hours each, to enable the Owner's staff to get aquatinted with the operation of the system. During this period, the contractor shall train the Owner's personnel in the operation, adjustment and maintenance of all equipment installed.

25.0 MAINTENANCE DURING DEFECTS LIABILITY PERIOD:

25.1 Complaints: The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

26.0 REPAIRS:

26.1 All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Owner.

27.0 STORAGE AT SITE:

27.1 Plant room, if available, can be used by the contractor for storage of equipments/ materials brought to site for execution of the work. However, watch and ward of the same shall be at contractor's risk.

28.0 INITIAL RUN TEST:

28.1 Initial run test for a period of 24 Hours for 3 continuous days (8 hours each day) immediately on commissioning to demonstrate the capacity and power consumption of water chilling machine.

29.0 SEASONAL TESTS:

29.1 One Major capacity test during Summer / Monsoon for 24 Hours for 3 continuous days (8 hours each day) during warranty period. The successful pass of seasonal test is mandatory for release of Performance BG.

30.0 GUARANTEE, DEFECTS & LIABILITY:

30.1 The contractor shall guarantee that the equipment & materials will be brand new & in accordance with the contract documents (specifications) & be free from defects in materials & workmanship for a period of twelve (12) months from the date of satisfactory commissioning of the work. The contractor shall be liable for replacement/repair of any defective part or material in the equipment of his own manufacture & those of his sub-contractors, under normal use & arising solely from faulty design, materials and/or workmanship. No repairs or replacement shall normally be carried out by the Employer when the plant is under the defects liability period.

30.2 The repaired or new parts/equipment shall be furnished & erected free of cost by the contractor.

30.3 If the defects be not remedied within a reasonable time (as shall be stated therein) after notice in writing by the employer/, the employer may proceed to get the defects remedied at the contractor's risk & costs, but without prejudice to any other rights which the employer may have against the contractor in respect of such defects.

30.4 The guarantee (defects & liability) clause shall apply to the portions of the plant or entire equipment so replaced or renewed till the expiration of twelve months from the date of such replacement or renewal. '

30.5 The cost of any special or general overhaul necessary during the guarantee period due to normal wear & tear or due to defects in the plant or defective work carried out by the contractor shall be borne by the contractor.

30.6 In case of the defective parts/equipment which is not repairable at site but is essential for commercial operation of the equipment, the contractor shall arrange to furnish & install free of cost such parts/equipment on temporary basis till the defective parts/equipment is repaired or renewed & reinstalled & commissioned at site.

30.7 The contractor shall also guarantee that the equipment/plant furnished & installed by him would yield contract capacities & ratings under the contract (specified) design conditions. If the equipment/plant is found to be yielding less than 3 % of contract capacities & ratings, the contractor shall pay compensation to the employers at the rates to be derived from the contract prices.

30.8 Acceptance of equipment/plant/installation by the or Employer shall in no way relieve the contractor of his obligation under this clause.

ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made this _____day of _____between
STATE BANK OF INDIA a company incorporated under the State bank of India Act, 1955 and having its Local Head Office at Chandigarh, Chandigarh 160017, (hereinafter referred to as the "EMPLOYER" which expression shall include its successor or successors and assigns) of the ONE PART.

AND

M/s _____
having its registered office at _____
(hereinafter referred to as the 'CONTRACTOR' of the OTHER PART,

WHEREAS the Employer is desirous of EXECUTING REPLACEMENT OF AIR HANDLING UNITS (2NO.), for Bank's own building at LHO (CHD) (Hereinafter called the WORK).

AND WHEREAS the Employer in order to effectively carry out the said work at LHO (CHD) .

AND WHEREAS the Employer has caused the plans as per list attached specifications, priced schedule of quantities for the Work as per instruction to tenderers, general conditions of contract and special conditions of contract prepared , subject to which the offer of the Contractor shall be accepted.

AND WHEREAS the tender of the Contractor for construction of the said work at LHO (CHD) has been approved by the Employer.

AND WHEREAS the contractor has deposited with the owner Rs. 15,000/- (EMD) as security deposit for the due performance of the Agreement.

AND WHEREAS the BANK has issued work order therefore to the Contractor. AND WHEREAS the relevant drawings inclusive of the specifications. priced schedule of quantities, instruction to tenderer, general conditions of contract and Special Conditions and letters exchanged by &between the parties from submission of tender upto acceptance including letter of order (hereinafter collectively referred to as "the said conditions') have been signed by the parties hereto and the Contractor has agreed to execute upon and subject to the said conditions.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. 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 work as described in the said specifications and the said priced Schedule of Quantities.

2. The Employer will pay to the Contractor the sum of Rs. _____ (Rupees _____)(hereinafter called the 'Contract Sum') or such other sum as shall become payable hereunder at the times and in the manner specified in the said conditions.

3. The agreement and documents mentioned above shall form the basis of this contract and all disputes to be decided in the manner prescribed in the conditions attached hereto.

4 The said contract comprises REPLACEMENT OF TWO AIR HANDLING UNITS as mentioned above and in the tender documents and all subsidiary work connected therewith within the same site as may be ordered to be done from time to time by the said Employer the case may be even though the said work may not be shown on the drawings or described in the said specifications or the priced schedule of quantities.

5 Notwithstanding what is stated herein before or hereinafter or in the instruction to the tenderer, general conditions of contract, special conditions, the Employer reserves to himself the right to alter the nature of the work and of adding to or, omitting any items of work from the contract or of having portions of the same carried out departmentally or otherwise and such alterations or variations shall be carried out without prejudice to this contract.

6 The above conditions shall be read and be treated as forming part of this agreement and the parties hereto will respectively be bound hereby and to abide by themselves to the conditions and stipulations and perform the same on their parts to be respectively observed and preferred.

7 Any dispute arising under this agreement between the parties hereto shall be referred for adjudication to a sole arbitrator in Chandigarh. The award of the arbitrator shall be final and binding on both the parties.

Bank's Representative	Contractor signature
Witness	
1.	1.
2.	2.

BASIS OF DESIGN & SCOPE OF WORK

1.0 Design Parameters for selection of air handling unit & its components shall be as per the specs given in tender BOQ.

2.0 The proposed new AHUs will be put after replacing the old AHUs, which are in running position. The contractor shall have to carry out the work in short span of time (during shut down), preferably during weekends including Sunday. The contractors need to work day and night to ensure minimum disturbance to users.

3.0 The contractor should inspect the site before quoting and ascertain for himself the nature, character and extent of work to be executed and should include all items and services necessary, whether specially mentioned or not in the specifications, scope etc. to meet with the intent and purpose of these specification.

4.0 After award of work contractor should submit the GA drawing as well as data sheet of AHU, parts etc. for engineer's approval. He shall start the manufacturing only after the approval.

5.0 The manufacturer should specify the size and make of transmission belts.

6.0 The static pressure & air flow rate mentioned in the tender are for the purpose of designing the components. However it is contractor's responsibility to prove the airflow rate at the time of commissioning as mentioned in the drawing submitted for approval.

7.0 During the replacement of AHU contractor shall cut/modify the existing header/coil connection as per the new requirement. The new piping shall be paid on RMT/ft basis as per the tender rate. Similarly ducting connection includes cutting/modifying the

existing ducting including making new plenum, if necessary. The new ducting shall be paid on Sqft/sqmtr basis as per tender rate.

8.0 The manufacturer should supply AHU in dismantled condition and assemble at site without any extra charges.

9.0 Floor mounted type AHU should have intermediate anti vibration device to stop transmission of vibration to Floor.

10.0 Power supply shall be given by SBI at AHU motor as per requirement but the termination at motor end (With Copper Lugs) shall be in the scope of contractor.

11.0 It is the responsibility of successful bidder to prove the capacity of each AHU. Mere quoting on the basis of tender will not absolve the successful bidder from proving the capacity of AHUs.

12.0 All welding must conform to the requirements of applicable IS standards. All welding procedures and details shall be subject to the approval of Engineer In-Charge. All necessary arrangements for working at heights above the floor level like scaffolding, rope etc. shall be arranged by the Contractor. All materials, equipment, tools & tackle, shifting and lifting arrangement and other necessary items required to carry out the work shall be arranged by the Contractor. All other necessary equipment, arrangements like welding machine, gas cutter, welding rods, drill bits, drilling machine, grinder, gas cylinders for gas cutting etc. shall be arranged by the Contractor. Electricity & water needed for carrying out the work shall be provided free of cost by SBI.

13.0 The Contractor shall make arrangements to store his tools, equipment etc. in his own toolbox having proper locking arrangements. Material required for carrying out the work such as flanges, nuts and bolts, rubber gasket, pipes etc. shall be provided by the Contractor. All the above material shall be of high standards and subjected to the approval of the Engineer In-Charge.

14.0 The work shall be carried out with least disturbance to the users. The shut down if any required for carrying out the works shall be minimum and advance intimation to be given. Shut down periods will be intimated for the work to be taken up after obtaining the necessary approval from the Users.

14. The Contractor shall inspect the site and ascertain for himself the nature and extent of work to be executed and shall include all the items and services necessary whether specifically mentioned or not in the tender specification, drawing, so as to meet the intent and purpose of this specifications.

TECHNICAL SPECIFICATIONS

1. SCOPE:

The scope of this section comprises the supply, installation, testing and commissioning of double skin air handling units of the size and capacity set forth in the Schedule of Equipment.

2 CABINET TYPE:

2.1 The unit shall be of sectionalized construction consisting of Fan section, coil section, Filter section and drain pan.

2.2 **Drain pan shall be constructed of 18 G stainless steel** with sandwich type insulation in-between bottom plates. Necessary support shall be provided to slide the coil in the drain pan. Outlet shall be provided on both the side of drain pan. An extension drip pan shall be provided at proper location outside the casing to catch all drip from external coil connections and valves. End panel of the coil section casing shall be removable for withdraw of the coil and shall be provided with opening for coil connections.

2.3 Filters shall be cleanable viscous metal AL box type and shall be 50 mm thick. The filter shall be hold with stiffeners in-between made out of hollow SS material.

2.4 Suitable, easily openable service door (for Internal Maintenance) between coil section and fan section to be provided to enable a person to enter inside

2.5 Unit shall be thermally, and sound insulated as in section “Insulation”

2.6 Spring type Anti Vibration Mounting of approved make shall be provided as vibration isolators.

2.7 Sheet metal fresh air louvers with frame, damper, etc. shall be provided in the clear opening in masonry made by the owner.

2.8 The Unit cost shall be complete with all accessories, including the following:

a) Manual air vents at high point and drain at low point.
b) Water Thermometers at Inlet & Outlet.
c) Pressure gauges with siphon cocks at Inlet & Outlet.
d) Canvass Connection

3 PERFORMANCE DATA & TESTING:

Air handling units shall be selected for the lowest operating noise level of the equipment for performance rating and power consumption data with operating points (On Fan Curve) clearly indicated shall be submitted with the tenders and verified at the time of testing and commissioning. The following test result shall be furnished during commissioning in the presence of department’s Engineer.

a) Air Side

- Air Flow Rate in CFM or Cub. M per hour
- Static pressure in mm wg
- Entering Dry bulb & Wet bulb temperature
- Leaving Dry bulb & Wet bulb temperature

b) Water Side

- Inlet temperature in degree C
- Outlet temperature in degree C
- Pressure drop in psig

4. PAINTING:

Unit shall be painted with approved type of Epoxy paint (minimum two coats)

5. CODES & STANDARDS FOR AIR HANDLING UNIT:

The design, manufacture and performance of AHU shall comply all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the requirements of the latest editions of applicable Indian/U.S.A. standards. Nothing in this specification shall be construed to relieve the vendor of this responsibility. In particular the equipment shall conform to the latest editions of the following standards:

a)	ANSI 89.1	Safety code for mechanical refrigeration.
b)	IS:659	Safety code for air-conditioning.
c)	IS:660	Safety code for mechanical refrigeration.
d)	AHRAE	Standard-33 methods of testing for rating forced Circulation air-cooling and air heating coils.
e)	ARI-410	Standard for forced circulation air cooling and air Heating coils.

G.I. insulated condensate drain piping with drain valve, upto sump or floor drain within the air handling unit room. The drain shall be provided with proper 'U' loop. Only piping and valve shall be measured and paid at unit rate.

6. PERFORMANCE DATA:

Air handling units shall be selected for the lowest operating noise level of the equipment. Fan performance rating and power consumption data with operating points clearly indicated shall be submitted with the tenders and verified at the time of testing and commissioning of AHU.

SHEET METAL WORK

1.0 SCOPE:

1.1 The scope of this section comprises the supply and installation of all sheet metal ducts.

1.2 MATERIAL:

1.2.1 Ducts shall be made of galvanized steel sheets. The galvanized steel sheets shall conform to IS 277-1965 with 200gsm Zink coating.

1.2.2 The thickness of sheets shall be as given below:

Dimensions of ducts	Gauge G.I.	Gauge Al	Type of Joints	Type of Bracings
Upto 600	24	22	G.I. Flange at 2.5 centre	Cross bracings.
601 to 750	24	22	25 x 25 x 3 mm Angle iron frame With 6 mm dia. Nuts & bolts	25 x 25 x 3 mm MS angles bracing at 1500 mm from joints
751 to 1000	22	20	25 x 25 x 3 mm Angle iron frame With 6 mm dia. Nuts & bolts	25 x 25 x 3 mm MS angles bracing at 1500 mm from joints
1001 to 1500	22	20	40 x 40 x 5 mm Angle iron frame With 8 mm dia. Nuts & bolts	40 x 40 x 3 mm MS angles bracing at 1500 mm from joints
1501 to 2250	20	16	50 x 50 x 3 mm Angle iron to be Cross braced diagonally with 10 mm dia. nuts and bolts at 125 centre.	40 x 40 x 3 mm MS angle bracing at 1200 mm from joints or 40 x 40 x 3 mm MS angle diagonal bracing
2250 & above	18	14	50 x 50 x 6 mm Angle iron 10 mm dia. nuts and bolts at 125 centre.	50 x 50 x 3 mm MS angle bracing at 1200 mm from joints or 50 x 50 x 3 mm MS angle diagonal bracing

HANGERS FOR DUCT:

Duct Size [mm]	Spacing [M]	Size of MS equal angle [mm x mm]	Size of rod dia [mm]
Upto 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 to above	2.0	50 x 3	15

All the MS angle, use for duct support & brazing etc, shall be painted black

1.3 DAMPERS:

1.3.1 All dampers shall be louver dampers of robust construction & tightly fitted. The design, method of handling and control, shall be suitable for the location and service required.

1.3.2 Dampers shall be provided with suitable links, louvers and quadrants as required for their proper operation, control or setting in any desired position. Dampers & their operating devices shall be made robust, easily operable and accessible through suitable access doors in the ducts. Every damper shall have an indicating device clearly showing the damper position at all times.

1.3.3 Dampers shall be placed in ducts & on main supply or return air duct for the proper volume control and balancing the system

1.4 INSTALLATIONS:

1.4.1 The duct fabrication & installation shall generally conform to I.S. 655-1963.

1.4.2 The contractor shall provide and neatly erect all sheet metal work or as may be required to carry out the intent of these specifications and this shall meet with the approval of the Engineer in all its parts and details.

1.4.3 All necessary allowances and provisions shall be made by the contractor for beams, pipes or other obstructions in the building. Where necessary to avoid beams or other structural work or plumbing or other pipes or conduits the ducts shall be transformed, divided or curved to one side, as approved or directed by the Engineer.

1.4.4 Ducting over furred ceiling shall be supported from the slab above, or from beams. In no case shall a duct be supported from the ceiling hangers or be permitted to rest on a hung ceiling.

1.4.5 If a duct cannot be run as decided, the Contractor shall install the duct between the required point by any path available, subject to the approval of the Engineer.

1.4.6 All ducts shall be rigid and shall be adequately supported and braced where required with standing beams, tees or angles of ample size to keep the ducts true to shape and to prevent buckling, vibration or breathing.

1.4.7 All joints shall be made tight and all interior surfaces shall be smooth. Bends shall be made with radius not less than ½ the width of the duct or with scientifically designed interior curved vanes, as approved. The vanes shall be so spaced that the aspect ratio of each of the individual elbow formed by the vanes will be about five.

1.4.8 All sheet metal connections, partitions & plenums required to confine the flow of air to and through the filters and fans, shall be constructed of 18 G galvanized Iron, thoroughly stiffened with 1" x 1" angle Iron braces and fitted with all necessary doors as required by the Engineer, to give access to all parts of the apparatus. Doors shall be not less than 18" x 20" in size.

1.4.9 Where metal ducts or sleeves terminate in wood work, brick or masonry openings, tight joints shall be made by means of closely fitted heavy flanged collars.

1.4.10 Air handling units shall be connected to duct work by inserting at air inlet and air outlet a double canvas sleeve. Each sleeve shall be minimum 4" long securely bonded and bolted to duct and units. Each sleeve shall be made smooth and the connecting duct work rigidly held in line with unit inlet or outlet.

2.0 INSULATION:

2.1 SCOPE:

The scope of this section comprises the supply and application of insulation as herein specified.

2.2 COLD INSULATION:

2.2.1 All pipes, ducts & equipments operating at temperature lower than the ambient shall be insulated in the manner specified hereinafter.

2.2.2 The insulating material shall be as follows:

a) Pipes:
Rigid preformed sections of expanded polystyrene of uniform density of 24 Kgs./m^3 with a `K' value of not more than 0.23 B.T.U/ Hr./In/Sq.ft./^{0}F at 50^{0}F mean temperature.

2.2.3 No insulation shall be applied on pipes until the pipes are satisfactorily tested.

Thickness of pipe insulation shall be 50mm.

2.2.4 Pipe insulation shall be applied as follows:

a) Pipes shall be thoroughly cleaned with wire brush and rendered free from all rust and grease.

b) Two coats of bitumen shall be applied on the cleaned pipe surface.

c) Rigid pipe sections of insulation shall be fixed tightly to the surface taking care to seal all joints and covered with Polythene sheet.

d) 24 G x 20 mm mesh wire netting shall be applied, butting all joints and shall be laced down with G.I. wire.

e) Insulated surface shall be finished with two layers of sand cement plaster. Each layer shall be not less than 7 mm thick.

2.2.5 All valves, fittings, strainers etc. in chilled water piping shall be insulated to the same thickness as specified for the main run of piping. Valve bonnets, yokes and spindles shall be insulated in such a manner as not to cause damage to insulation when the valve is used or serviced.

2.2.6 Cabinet air handling units shall be insulated as follows.
Fans & coil section panels shall be internally lined with fire retardant quality 25 mm thick, 24 Kgs./m^3 density thermocole slab (with black pigmented neoprene coating).

The insulation should be stuck to the body of AHU without making any hole in the body.

2.2.7 Ducts shall be insulated as follows:

	Type	Location	Insulation
a)	Supply duct	unconditioned space	50 mm, 24 kg/m^3 density TF quality, thermocole slab.
b)	Supply duct	conditioned space	25 mm, 24 kg/m^3 density TF quality, thermocole Slab.
c)	Return duct or plenum	unconditioned space	25 mm, 24 kg/m^3 density TF quality, thermocole slab.

Contractor shall submit the Insulation material test certificate clearly showing density, K value, lot ,etc of material.

2.2.8 Duct insulation shall be applied as follows:

a) Black bitumen paint shall be applied over the surface after cleaning the ducts.
b) 24 kg/m^3 density thermocole slab insulation of specified thickness shall be put by using Bitumen uniformly over Insulation surface.
c) The Thermocol Insulation shall be covered with 40 G AL foil. Al foil should be wrapped on Thermocole uniformly, using Bitumen.
d) The Joints of AL foil shall be overlapped at least 75mm covered with AL tape. Stripping should be done at distance of 1 meter to hold the insulation, wherever required.
e) Wherever necessary and particularly in larger duct, strapping with PVC material should be done after thermocol insulation and before putting AL foil

2.2.9 Acoustic Insulation of Duct:-

The acoustic Insulation shall be done with 48 Kg/cu.m.Density,25mm thick Resin bonded Fibre Glass.

The duct surface shall be cleaned and hot bitumen applied in patches and resin bonded glass wool cut to appropriate sizes and stuck to the duct wall. The insulated face shall be covered with RP tissue papers & perforated AL sheet of 28 Gage thickness having 3mm perforations at 5mm staggered centre and held in position with rivets or galvanized steel bolt with counter sunk heads & 50 x 50 x 2 mm plate washers at not more than 600mm centers.

3.0 PIPING

3.1 SCOPE:

The scope of this section comprises the supply & laying of all pipes required for this project. On the award of the contract, the tenderer shall prepare his own detailed working drawings.

3.2 CHILLED WATER PIPING:

3.3 All chilled water piping and fittings shall be of M.S. Class `C' (heavy class) of **TATA/Jindal make only**. The pipe confirming to BIS 1239 for pipe size upto 150 mm dia. and for pipe size 200 mm dia. and above shall be as per BIS 3589 having minimum 6 mm thickness. All joining in piping shall generally be by welding unless otherwise mentioned or as directed at site. All welding shall be done by qualified welders and shall strictly confirm to Indian Standard code of procedure for manual metallic welding of mild steel as per BIS 823.

3.4 The piping shall be so designed that the water velocity through the piping shall not exceeds maximum 8 fps and also the piping friction drop shall be limited to 4 m per hundred meter of pipe length.
Pipe threads shall be of I.S. 554/1955 and flanges of I.S. 1536/1960.. Pipes shall be sloping towards drain points.

3.5 Fittings shall be new and from standard manufacturers. Fittings shall be malleable casting of pressure ratings suitable for the piping system. Fittings used on welded piping shall be of the weldable type. Flanges shall be new and from standard manufacturers. Supply of flanges shall include bolts, washers etc. as required.

3.6 Tee-off connections shall be through reducing tees, wherever possible. Otherwise ferrules welded to the main pipe shall be used.

3.7 All equipment and valve connections or connections to any other mating pipes, shall be through unions/screwed flanges upto 50 mm dia. And flanges (welded or screwed for G.S.) for larger diameters or as required for the mating connection.

3.8 All welded piping is subject to the approval of the Engineer and sufficient number of flanges and unions shall be provided as required under.

3.9 All the drain piping shall be of G.I. 'C' class of TATA/Jindal make with the Insulation

as specified in the 'Insulation'

3.10 Gate valves shall be provided conforming to the following specifications.

Size	Construction	Ends
12 to 65 mm	Gun metal	Screwed female
65 mm & over	a) Body - Cast Iron	Flanged
	b) Spindle, valves seat, Wedge, nut etc. –	Bronze or Gun Metal

Valves shall conform to I.S. 780/1963 & flanges to I.S. 1536/1960 or as required. Valves shall have non rising spindles unless otherwise specified and shall be suitable for 300 psig test pressure.

3.11 Butterfly valves shall perform the function of isolating valves. Butterfly valves shall have cast iron body with Nitrile rubber bonded bakelite hard back seat. Disc shall be of high duty iron with epoxy coating on nickel plating. All butterfly valves shall be provided with locking devices. The shaft shall be stainless steel AISI 410.

4.0 PIPING INSTALLATION:

4.1 Pipe runs and sizes should to meet the site conditions. The contractor on the award of the work shall prepare detailed working drawings, showing the cross section, longitudinal sections, details of fittings, locations of isolating, drain and air valves etc. They must keep in view the specific openings in buildings and other structures through which the pipes are designed to pass.

4.2 Piping shall be properly supported on or suspended from strands, clamps, hangers etc. as specified and as required. The tenderer shall adequately design all the brackets, saddles, clamps, hangers etc. and be responsible for their structural integrity.

4.3 Pipe supports shall be of steel, adjustable for height and prime coated with rust preventive paint and finish coated black. Where pipe and clamp are of dissimilar material, a gasket shall be provided in between.

Spacing of pipe supports shall not exceed the following:

Pipe (mm)	Sapcing (Meters)
3 to 12	1.22
19 to 25	1.83
32 to 150	2.44
150 and above	3.05

Pipe hangers shall be fixed on walls and ceilings by means of metallic rawl plugs or approved shear fasteners.

4.4 Vertical risers shall be parallel to wall and column lines and shall be straight and plump. Risers passing from floor to floor shall be supported at each floor by clamps or collars attached to pipe and with a 12 mm thick rubber pad or any resilient material. Where pipes pass through the terrace floor, suitable flashing shall be provided to prevent water leakage. Risers shall also have a suitable elbow or concrete pipe support at the lowest point.

4.5 Pipe sleeves of 50 mm diameter shall be provided wherever pipes pass through walls and the annular space filled with felt and finished with retaining rings.

4.6 Insulated piping shall be supported in such a manner as not to put undue pressure on the insulation.

4.7 Cut-outs required in the floor slabs for taking the various pipes are provided. Tenderers shall carefully examine the cutouts provided and clearly point out wherever the cutouts do not meet with the requirements.

4.8 All pipes using screwed fittings shall be accurately cut to the required sizes and threaded in accordance with I.S. 554/1955 and burrs removed before laying. Open ends of the piping shall be blocked as the pipe is installed to avoid entrance of foreign matter. Wherever reducers are to be made in horizontal runs, eccentric reducers shall be used if the piping is to drain freely; in other locations, concentric reducers may be used.

4.9 Drains shall be provided at all low points in the piping system and shall be of the following sizes:

Mains	Drain
Upto 300 mm	25 mm
Over 300 mm	40 mm

Drains shall be provided with gate valves of equal size with rising spindle. Drains shall be piped through equal size G.I. pipe to the nearest drain or floor waste. Piping shall be pitched towards drain points.

5.0 PRESSURE GAUGES:

5.1 The pressure gauges shall be Bourbon tube type confirming to IS : 3624 and shall be with siphon cock and angle valve. Pressure gauges shall be not less than 150 mm dia. and of appropriate range etc. duly calibrated before installation.

5.2 Care shall be taken to protect pressure gauges during pressure testing.

6.0 THERMOMETERS:

6.1 Thermometers shall be either 150 mm dia. dial or direct reading industrial type, of appropriate range, duly calibrated before installation. Thermometers shall be installed in separable wells.

7.0 INSULATION:

7.1 Pipes shall be insulated in accordance with specifications in section `INSULATION'.

8.0 VIBRATION ELIMINATION:

8.1 Piping installation shall be carried out with vibration elimination fittings wherever required.

9.0 TESTING:

9.1 All piping shall be tested to hydrostatic test pressure of at least 1½ times the maximum operating pressure, but not less that 7 Kgs/Sq.Cm. for a period of not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer.

9.2 Piping repaired subsequent to the above pressure test shall be retested in the same manner.

9.3 System may be tested in sections and such sections shall be securely capped.

9.4 The owner shall be notified well in advance by the Contractor of his intention to test a section or sections of piping and all testing shall be witnessed by the Engineer or his authorized representative.

9.5 The contractor shall provide all materials, tools, equipment, instruments, services and labour required to perform the test and to remove water resulting from cleaning and/after testing.

9.6 The contractor shall make sure that proper noiseless circulation of fluid is achieved through all coils and other heat exchanger in the system concerned. If proper circulation is not achieved due to air bound connections, the Contractor shall rectify the defective connections. He shall bear all the expenses for carrying out the above rectifications, including the tearing up and re-finishing of floors, walls, etc. as required.

9.7 No insulation shall be applied to piping until after the completion of the pressure testing to the satisfaction of the Engineer.

10.0 PAINTING:

10.1 After all the piping has been installed, tested and run for at least 10 days of eight hours each, the piping shall be given two finish coats, as follows:

Service	Flow	Colour
Chilled water	supply return	as approved by the Engineer

10.2 The direction of flow of fluid in the pipe shall be visibly marked in White arrows.

11.0 ELECTRICAL EQUIPMENT

11.1 SCOPE:

1.1 The scope of this section comprises the supply & installation of all electrical equipment, such as, electrical motors

11.2 RATINGS & STANDARDS*:*

11.2.1 Rating of the motors shall be as indicated by you in the data sheets and as per the requirements of the airflow and static pressure. Ratings shall be on the basis of the specified ambient temperature and without exceeding the maximum temperature limits set by IS 325/1961.

11.2.2 Unless otherwise stated, Indian Standard Specifications shall apply. Where I.S. specifications are not available, the relevant British Standard Specifications shall be followed.

12.0 SQUIRREL CAGE INDUCTION MOTORS:

12.1 All motors shall be screen protected drip proof type TEFC with Class-C insulation, conforming to I.S. 325/1961 unless otherwise specified.

12.2 The motor shall be statically and dynamically balanced.

12.3 Bearings shall be combination ball and roller type with limit lubricators.

12.4 Termination shall be of ample size housed in a termination box. The terminal box shall be suitable for cable entry. Two earth terminals shall be provided.

12.5 The starting torque shall match with the load torque and the starting current shall not exceed 6 times the full load current.

13.0 INSTALLATION:

13.1 All motors shall be mounted on a common foundation with the driven equipment coupled through flexible couplings or through belt drive. Installation shall be in accordance with I.S. 900/1956.

13.2 Flexible connections shall be provided to all motors terminals wherever the motor is mounted on guide rails and belt drive is adopted. Even in the case of direct drive motors, the connections shall be flexible enough to prevent transmission of vibration.

13.3 All drive arrangements and couplings shall be provided with a safety guard.

14.0 TESTING:

14.1 Motors shall be tested in accordance with the relevant Indian Standard Specifications and test certificates furnished for routine type and high voltage tests.

15.0 PAINTING:

15.1 All motors, starters and the framework shall be painted with two coats of a suitable paint of approved colour.

Signature of Contractor with Seal