STATE BANK OF INDIA

TENDER DOCUMENT

FOR AC WORKS

FOR EXISTING PREMISES FOR SBI BRANCH AT ACB IGLAS (06619), ALIGARH, (U.P.)

CLIENT:

State Bank of India
Regional Business Office- 4, AO – 6
Swarn Jayanti Nagar, Aligarh - 202001(U.P).

Tender ID: RBO-4/AO6-/PREMISES/2026-27/27

Notice Inviting Tender

Tender ID: RBO-4/AO6-/PREMISES/2026-27/27

State Bank of India invites online Tenders from the Bank's empaneled Contractors Delhi Circle category, Air Conditioning Works with data (as required) Category-upto Rs. 10 lakh and above, for the **Air Conditioning work at SBI ACB IGLAS Branch, Aligarh, UP** Details of tenders are as under:

SN	Particulars	Details
1	Name of work	**Air Conditioning work SBI ACB IGLAS Branch, Aligarh, UP**
2	Nature of Work	**Air Conditioning Works**
3	Time allowed for completion	**75 Days from Award of Work**
4	Earnest Money Deposit	**Rs. 8,900/- (Eight Thousand Nine Hundred Only)** by means of Demand Draft /Pay Order (Valid for a period of 75 Days from the last date of submission of the tender) from any scheduled Nationalized Bank drawnin favor of State Bank Of India payable in Aligarh.
6	Last date & time for submission of Technical Bid, **Indicative Price Bid** and **EMD**	**09-07-2026 on or before 2.00 pm.** Note: It is sole responsibility of the bidder to ensure submission of their Tender documents along with EMD / MSME NSIC Reg Certificate, by stipulated date and time at specified address failing which they will not be eligible to participate in Tendering process.
7	Initial Security Deposit	**ISD shall be 2% of the quoted Price including the EMD,Incase L-1 vendor shall submit MSME /NSIC regn. Certificate in lieu of EMD, he has to submit 2% ISD before issue of the Work order.**
8	Submission of Price Bid	·Contractors shall Download the entire Technical Bid to getacquainted with the terms and conditions and **shall submit compulsorily the pages of tender document / undertaking upto 09-07-2026 at 2:00 pm of the technical bid** without fail after putting the signature and seal. Failure to submit the hardcopy of Technical Bid, indicative price bid may render the bidder disqualifies.
9	Date and Time of opening of Tender Document (technical bid)	**09-07-2026 at 03.00 P.M.**
10	Address at which the tenders are to be submitted	*Technical Bid:* *To be submitted in Hard Copy at* **State Bank of India** *Regional Business Office- 4,* *AO – 6 Swarn Jayanti Nagar,* *Aligarh -202001(U.P).* *and its scanned copy to be also uploaded online.* *Price Bid: To be submitted online* ***www.tenderwizard.com/SBIETENDER***

16	Defect Liability period	1-year from the date of installation.
17	Liquidated Damages	0.50% per week subject to max. 5% of contract amount for delay in Completion of work.
18	Validity of offer	90 days from the date of opening of Price-bid
19	Value of Interim Certificate	**NA**.
20	Additional Security Deposit (ASD)/ Additional Performance Guarantee (APG)	**(i) ASD / APG Shall be applicable, if the bid price is below7.50% of the estimated cost put to tender.** **(ii) The Amount of such ASD/APG shall be the differencebetween 92.5% of estimate cost put to tender and thequoted price.** **(iii) Bank Guarantee or FDR receipt favoring our Bank butdrawn on any other Nationalized Bank may also be accepted as ASD/APG.**
		(concerned)
21	**Service Providers**	**M/s. Antares Systems Limited,** Registered Office: #24, Sudha Complex,3rd Stage, 4th Block, Bangalore – 560079, Karnataka. Help Desk: 7503347659 / 9044314492 / 9073677150/ 151/ 152/ 9674758506 / 9674758723/26 Contact Persons: (On working days 9 AM to 6 PM) 1. Mr. Pravesh Mobile No.: +91 9044314492 e-Mail: praveshmani.t@antaressystems.com 2. Mr. Abhay Singh Mobile No.: +91 9708966660 e-Mail: abhaykumar@antaressystems.co

21. The Contractor/ Vendor shall sign and stamp each page of the tender document thereby ensuring the number and sequence of all pages. Tender documents without seal and signature of the authorized tenderer are liable to be rejected.

22. No conditions other than mentioned in the tender will be considered, and if given they will have to be withdrawn before opening of the price-bid.

23. The SBI reserve their rights to accept or reject any or all the tenders, either in whole or in part without assigning any reason(s) for doing so and no claim / correspondence shall be entertained in this regard.

24. In case the date of opening of tenders is declared as a holiday, the tenders will be opened on the next working day at the same time.

Tender ID: RBO-4/AO6-/PREMISES/2026-27/27

In case the date of opening of tenders is declared as a holiday, the tenders will be opened on the next working day at the same time.

State Bank of India has the right to accept / reject any or all tenders without assigning any reasons.

For E-Tender related queries: **Service provider:** M/s Antares Systems Limited, Registered Office at: - #24, Sudha Complex, 3rd Stage, 4th Block, Bangalore – 560079. Ph: - 080-49352000 / 40482000 Fax: - 080-49352034

Help Desk: Contact Person: Mr. Pravesh / Mr. Abhay Singh

Mobile no. 9044314492/ 9708966660

(On working days-9 hours–18 hours)

E-mail: : praveshmani.t@antaressystems.com / abhaykumar@antaressystems.co

For any other queries the vendors may contact RBO-4 Aligarh, at the office Chief Manager (Operation)

State Bank of India

Regional Business Office- 4,

AO – 6 Swarn Jayanti Nagar,

Aligarh -202001(U.P).

Mobile :9625771501

.

NOTE:

If the vendor is found to have delayed the running/in hand project beyond the prescribed time limit specified in related tender document, the vendor will not be issued the new tender until completion of the previous delayed work.

If the vendor fails to submit any of the above mentioned documents/EMD/ISD/Performance Guarantee (ASD) and fails to sign the contract agreement with Bank within stipulated time, the vendor/firm will be debarred to participate in the tendering process for minimum six months period from the event and further no representation in this regard shall be entertained.

SIGNATURE OF THE TENDERER **ON BEHALF OF STATE BANK OF INDIA**

.

Tender ID: RBO-4/AO6-/PREMISES/2026-27/27

INSTRUCTIONS TO THE TENDERERS

1. Scope of Work

State Bank of India invites online Tenders from the Bank's empanelled Contractors in Delhi Circle for Category Air Conditioning Works Category upto Rs. 10 lakh and above for the **Air Conditioning work at SBI ACB IGLAS Branch, Aligarh, UP.**

Site and its Location

The proposed work is to be carried out **at SBI ACB IGLAS Branch, Aligarh, UP.**

Tender Documents

2.1 The work has to be carried out strictly according to the conditions stipulated in the tender consisting of the following documents in the most workmen like manner.

Instructions to Tenderers
General Conditions of Contract
Special Conditions of Contract
Additional Specifications
Drawings
Price Bid

2.2 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:

a) Price Bid
b) Additional Specifications
c) Technical Specifications
d) Drawings
e) Special Conditions of Contract
f) General Condition of Contract
g) Instruction to Tenderers

Complete set of tender documents including relative drawings can be downloaded from e-tendering portal of the e-tendering service provider engaged by SBI. The tender documents are not transferable.

Site Visit

3.1 The tenderer must obtain himself on his own responsibility and his own expenses all information and data which may be required for the purpose of filling this tender document and enter into a contract for the satisfactory performance of the work. The tenderer is requested satisfy himself regarding the availability of water, power, transport and communication facilities, the character quality and quantity of the materials, labour, the law and order situation, climatic conditions, liaison requirements with local authorities/ authorities maintaining the campus, security agencies guarding the campus, traffic regulations in and around the site etc;

The tenderer will be fully responsible for considering the financial effect of any or all the factors while submitting his tender.

4. Earnest Money

4.1 The tenderers are requested to submit the Earnest Money of ₹ 8,900/- (Eight Thousand Nine hundred Only) in the form of Demand Draft/ Bankers' Cheque in favour of State Bank of India payable at Aligarh drawn on any Bank in India.

1. EMD in any other form other than as specified above will not be accepted. Tender not accompanied by the EMD in accordance with clause 4.1 above shall be rejected.
2. No interest will be paid on the EMD.
3. EMD of unsuccessful tenderers will be refunded/ returned within 30 days of award of Contract.
4. EMD of successful tenderer will be retained as a part of security deposit.

5. Initial Security Deposit

The successful tenderer will have to submit a sum equivalent to 2% of contract value less EMD, by means of Demand Draft drawn in favour of State Bank of India payable at Firozabad within a period of 7 days of acceptance of tender.

6. Security Deposit

6.1 Total security deposit shall be 5% of contract value. Out of this 2% of contract value is in the form of initial security deposit, which includes the EMD. Balance 3% shall be deducted from the running account bill of the work at the rate of 10% of the respective running account bills i.e. deduction from each running bill account will be 10% till total 3% of contract value is reached. The total security shall be paid to the contractors after the defects liability period as specified in the contract provided he has carried out all the work and attended to all the defects in accordance with the condition of the contract and clearance, if any, of the observations of the CTE of CVC. No interest shall be paid to the amount retained by the Bank as Security Deposit.

7. Signing of Contract Documents

The successful tenderer shall be bound to implement the contract by signing an agreement and conditions of contract attached herewith within 7 days from the receipt of intimation of acceptance of his tender by the Bank. However, the written acceptance of the tender by the Bank will constitute a binding agreement between the Bank and successful tenderer whether such formal agreement is subsequently entered into or not.

8. Completion Period

Time is essence of the contract. The work should be completed in all respects in accordance with the terms of contract within a period of 75 Days from the date of handing over of the site.

9. Validity of Tender

Tenders shall remain valid and open for acceptance for a period of ninety days from the date of opening price bid. If the tenderer 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. Liquidated Damages

The liquidated damages shall be 0.5% per week subject to a maximum of 5% of the accepted Contract Value.

11. Rate and Prices:

11.1 The amount of each item shall be calculated and the requisite total is given. In case of discrepancy between the unit rate and the total amount calculated from multiplication of unit rate and the quantity the unit rate quoted will govern and the total amount will be corrected.

11.2.1 The tenderers need not quote their rates for which no quantities have been given. In case the tenderers quote their rates for such items those rates will be ignored and will not be considered during execution.

11.2.2 The tenderers should not change the units as specified in the tender. If any unit is changed the tenders would be evaluated as per the original unit and the contractor would be paid accordingly.

11.3 The tenderer should not change or modify or delete the description of the item. If any discrepancy is observed he should immediately bring to the knowledge of the Consultant/Bank.

11.4 Each page of the BOQ shall be signed by the authorized person and cutting or over writing shall be duly attested by him.

11.5 Each page shall be totaled and the grand total shall be given.

11.5.1 The rate quoted shall be firm and shall include all costs, allowances, taxes, levies etc. and deduction at source for Income Tax, Work Contract Tax etc. will be made as per statutory rules.

11.5.2 The contractor shall be required to conduct necessary tests of the water brought from tube well or any other outside source, from approved laboratory.

11.5.3 The contractor is required to comply with all act of the Government relating to labour and the rules and 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 appropriate authorities.

12. Vendor has to submit in Hard copy the tender document along with all terms & Conditions, Specifications and subsequent annexure and corrigendum's duly signed and stamped by authorized representative/ signatory on becoming L1. However we accept all the terms and conditions along with the specifications, Drawings, Layouts etc defined in the tender documents.

Nominated Contractor for Allied work, if any: The contractor shall get allied works executed only through Contractors already in SBI's Panel, for different categories of works.

13. If the L1 Price quoted is more than 7.5% below the estimated cost the vendor has to submit the additional security deposit as performance guarantee of the amount of total % value less than the estimated value. The Performance guarantee will be released after successful completion of the work.

14. Dedicated person at site: The contractor has to appoint one or two site supervisors (for 2 shifts of works) at site, who will be available at site all the time (Whenever work is getting executed); so that he can be contacted at any point of time to resolve the issues at site. Contractor has to ensure that, the person or persons are not getting changed in between the ongoing job, and they are accessible all the time on phone and at site. Their contact numbers to be shared with SBI, building management team and architect.

15. Covid Protocol: Considering the present pandemic situation, all the contractors and their workforce has to follow all the COVID protocols set by Govt. of India as well as well by the Building owner & management team and by SBI. Contractor has to enquire about all the protocols before-hand and the entire workforce has to follow and implement the same at site. If the protocols are getting changed or revised time to time as per govt. instruction; contractor has to follow the same in consultation with SBI and building management team. Nothing will be paid extra for this and are inclusive within the quoted rate by contractor.

16. Building guideline – security & discipline: Contractor and his workforce have to follow security and discipline guidelines set by building management team. Contractor has to enquire about all the protocols before-hand and the entire workforce has to follow and implement the same at site.

17. Use of toilet and bathroom: Contractor and his workforce have to follow building guideline set by the building management team for use of toilet and bathroom. Contractor has to enquire about all the protocols before-hand and the entire workforce has to follow and implement the same at site. Any issues raised in this regard by building management team have to be addressed/ resolved by the contractor on most urgent basis. If any damage is caused to the building or building's infrastructure by contractor or contractor's workforce, same has to be repaired/ replaced as per requirement; by the contractor without any extra cost. The toilets and wash areas which the contractor's work force will use during construction works, have to be cleaned on daily basis to maintain hygiene as per building management team's guideline. All costs are inclusive with in the quoted rates of contractor.

18. Building guideline - Use of Water: Contractor and his workforce has to follow building guidelines set by the building management team for use of water, for construction purpose and for their daily requirements. Contractor has to enquire about all the protocols before-hand and the entire workforce has to follow and implement the same at site. Any issues raised in this regard by building management team have to be addressed/ resolved by the contractor on most urgent basis. All costs are inclusive with in the quoted rates of the contractor.

19. Building guideline – Movement restriction of workers: Contractor has to ensure the restricted movement area, path and timing of his work force as suggested by building management team. Contractor has to enquire about all the protocols before-hand and the entire workforce has to follow and implement the same at site. Any issues raised in this regard by building management team have to be addressed/ resolved by the contractor on most urgent basis. All costs are inclusive within the quoted rates.

20. Building guideline – HVAC, sprinkler, etc (for changing/ relocation of existing features) duct:

The contractor has to follow building guidelines for changing or relocation of existing features like HVAC ducts and system; sprinklers, fire detection system, CCTV, networking, earthing route, voice line etc. The contractor has to follow the existing service/ route system of the building. Contractor has to enquire about all the existing systems/ protocols before-hand and the entire workforce has to follow and implement the same at site. At any circumstances, the building structure or existing infrastructure system should not be tempered or altered without written consent of building management team & SBI.

21. **Working time:** The contractor has to follow the time restrictions of work at site as per building norms set by the building management team. As per preliminary discussions with building management team; it was agreed that the contractor can work on weekends and on holidays, all through the day & night; but during working days they can carry out all type of works in between 8 PM to 8 AM only (means during nightshift after office working time) and during day time 8 AM to 8 PM works can be carried out which will not create any sound or vibration.

The contractor has to enquire about all the existing systems/ protocols before-hand and the entire workforce has to follow and implement the same at site.

For the above-mentioned time restrictions nothing will be paid extra and no extra time will be permitted for completion of work. The contractor should study all the aspects in detail before quoting their rates.

22. **Malba removal & dumping:** The contractor has to follow the guidelines set by the building management team for malba removal and temporary storage place & duration for the same. Contractor has to ensure daily clearance of malba from the floor area (site area) and dumping the same and removal of the same as per building guideline.

Technique for carrying of malba, route and timing for removal of malba has to be discussed with management team before initiation of work at site. All building guidelines shall be strictly followed for the same.

23. Use of lift as per building guideline: The Contractor and his workforce can use only the service lift during construction work for accessing the 1st floor of the building; and to come down to ground floor. Movement of contractor and his workforce is strictly prohibited in other floors. In case of requirement, permission has to be obtained for the same from building management team before-hand. Conditions for using service lifts and staircase to be discussed and clarified with the building management before hand. All service lifts and staircase to be cleaned by the contractor's team on daily basis (in case they are getting dirty due to Contractor's use) to minimize inconvenience to other users of the building.

24. **No cooking or any other fire related activity :** As per preliminary discussion with building management team work can be carried out 24 X 7 with conditions (refer point no: 8 for details); the workers can stay and work at site for fast work process; but all kinds of fire related activity is strictly prohibited in the building at any circumstances. The contractor and his team have to ensure compliance of the same.

25. **Cleaning of glasses and all other part of the floor after completion:** The contractor and his team have to take extreme precaution for safeguarding the existing glazing system of the building, while carrying out work with in the building. In case of any damage of glazing system the responsible contractor has to get the damaged part repaired in coordination with building management team without any extra cost. All other parts of the floor (1st floor, site area) and the other areas which got used by contractor as part of the project, have to be cleaned by the contractor's workforce after completion of the project; with out any extra cost.

26. **Timing of transportation of material:** The contractor has to work out timing, route and place of loading and unloading of raw materials with building management team, beforehand. All the works will be strictly carried out as per building management team's guidelines. Nothing will be paid extra for these restricts (if any).

27. **Material sample:** The contractor has to get all the samples of materials checked at site beforehand from SBI engineer or architect. One item of each of the approved material sample should be available at site all the time with the site supervisor. If not available on demand, it will be treated that the material sample has not been approved.

28. **Procurement of material:** All materials which are of critical type or of unique in nature to be ordered at initial days itself of the project. If the contractor fails to procure the desired product within the time limit; then the same work will

be executed by 3rd party contractor/ vendor at the cost of the responsible contractor (what so ever amount 3rd party demands); and nothing extra will be paid for the same to the responsible contractor. Delay of project for unavailability of materials will not be entertained at any circumstances.

29. **Junction boxes at floor:** All junction boxes (of raceway) are to be placed under furniture. Later-on no excuses will be entertained. No junction box to be placed at any circulation route at any circumstances. Incase of special conditions the contractor has to take prior written permission from architect/ engineer for the same. Incase of non compliance the work (along with associated jobs) will be redone at contractor's expense. All floor junction boxes (of raceway) are to be covered with SS cover plates which are to be fixed with junction box/ floor, with SS screws and plastic rawl plugs (at least 2 nos., for each cover). Fixing of covers with double sided tape will not be entertained at any circumstances.

30. **Bends at floor and wall junctions:** All conduit bends at floor level under table and at wall junctions are to be done through PVC or GI bends. They should be properly fixed with GI saddle clamps in such away so that they are not visible from external side at normal visual eye level. No flexible pipes are to be used for the above-mentioned works.

31. **Other vendors: Fire, IT & CC vendors:** The other vendors related to the project (like : Fire, IT &CC TV vendors etc.) are to be guided as per Interior, Electric & HVAC layout drawings. Without prior approved drawings by architect/ engineer, for the related job works; no work to be carried out at site at any circumstances. Incase any vendor carries out any work without prior approved drawing by architect/ engineer; the same has to be revised as per requirement of design scheme; at concerned contractor's/ vendor's cost without any extra payment.

32. Before quoting rates, the contractor should visit the site and inspect in details, and should understand & analyse all the items and context of work and terms and conditions of the building management team. If any ambiguity found or clarification needed, then it should be raised to SBI authority before submission of the tender. Otherwise, no issues/ arguments/ claims will be entertained later on.

33. Before initiation of work at the site, contractor should inspect the site thoroughly for clear understanding of the site condition. During initial supervision of site or during construction work; if any kinds of structural defects or primary building service related issue/ defects getting observed, then the contractor should raise the issue to SBI and building management team immediately for appropriate action.

Tender ID: RBO-4/AO6-/PREMISES/2026-27/27

Annexure-I

UNDERTAKING

(To be submitted along with the technical Bid)

To
The Regional Manager
State Bank of India
Regional Business Office- 4,
AO – 6 Swarn Jayanti Nagar,
Aligarh -202001(U.P).

Dear Sir,

Sub.: Air Conditioning work at SBI ACB IGLAS Branch, Aligarh, UP

1. I/ We refer to the tender notice issued by you for Air Conditioning Works and allied works in connection with the above.
2. **I undertake to submit in Hard copy the tender document along with all terms & Conditions, Specifications and subsequent annexure and corrigendum's duly signed and stamped by authorized representative/ signatory on becoming L1. However, we accept all the terms and conditions along with the specifications, Drawings, Layouts etc. defined in the tender documents.**
3. I/ We hereby offer to perform, provide, execute, complete and maintain the works in conformity with the drawings, designs, conditions of contracts & specifications schedule of quantities relating to the works.
4. I/ We have satisfied myself/ ourselves as to the site conditions, examined the drawings and all aspects of the tender conditions, subject to above, I/ We do hereby agree, should this tender be accepted in whole or in part, to:

a. Abide by and fulfill all the terms and provisions of the said conditions annexed hereto

b. Complete the works within **75 Days** as per the work program enclosed with the tender in two or three shifts if considered necessary by the Employer/ Consultants at no extra cost to the Employer.

5. I/ We have deposited an ₹ **8,900/- (Eight Thousand Nine hundred Only)** in the form of Demand Draft/ Banker's Cheque drawn in favour of SBI payable at Aligarh and State Bank of India payable at Aligarh, respectively which I/ We note, will not bear any interest and is liable for forfeiture.

1.If our offer is withdrawn within the validity period of acceptance by the Employer.
Or
2.If the contract agreement is not executed by us within 7 days from the date of receipt of the letter of acceptance.
Or
3.If we fail to pay the initial security deposit as stipulated.
Or
4.If the work is not commenced within 3 days after issue of work order.

6. I/ We understand that you are not bound to accept the lowest or any tender you receive.

7. The intending bidders shall be asked to quote their offers in terms of Individual item wise unit rate and amount for that item and the total cost of the project he will be willing to execute the work.

8. The "Percentage discount Offer" (if any discount provided by contractor) shall be uniformly applicable to each and every item including all sections/ sub-sections/ sub heads of the Tender.

9. Ln case, the Lowest Tendered Amount of two or more contractors is same, such lowest contractors will again be asked to submit sealed/ online, "revised offers" for all sub sections/ sub heads as the case may be, but the revised cost (of the total job and of the individual items) shall in no case, be higher than the cost quoted during their initial offer for the project. The lowest tender shall be decided on the basis of revised offers.

10. The process of online re-bidding amongst two or more contractors offering same rates shall continue till L-1 bidder is discovered.

11. Incase any of such contractor(s) (quoted same tender amount during initial bidding or subsequent re-bidding) refuses to submit revised offer, it shall be treated as "withdrawal of tender by the Contractor before acceptance. The earnest money of such contractors shall be forfeited.

12. Incase all the lowest contractors those have quoted same tendered amount, refuse to participate in online revised bidding process for the project, the EMD of such Contractors shall be forfeited and the tenders shall be re-invited for the project.

13. The Contractor(s), whose earnest money is forfeited because of non-submission of revised offer, shall not be allowed to participate in the re-tendering process for the said project.

14. Further, to deal with Contractors/bidders submitting erratic and unreasonably low offers i.e. below 7.5% or more of estimated cost, provisions for submission of Additional Security Deposit (equal to difference in estimated cost vis-d-vis final tender amount quoted) as Performance Guarantee in the form of "Unconditional Bank Guarantee" or Demand Draft favoring SBI shall continue.

The names of **DIRECTORS** of our Firm are:

1. _____
2. _____
3. _____
4. _____

Yours faithfully,

Signature ……..

Designation ……..

Name of Partner/ Director of the Firm, authorized
to sign or name of person having power of attorney
to sign the contract. (Certified true copy of power
of attorney should be attached)

Signature and address of witnesses:

a.
……

Name …….

Address …….

b. Signature……

Name …….

Address …….

c. Signature……

Name …….

Address …….

AGREEMENT

This agreement made on the _____day of _____Two Thousand _____ BETWEEN State Bank of India a corporation constructed under the State Bank of India Act, 1955 and having its Local Head Office at New Delhi and many other places, (hereinafter called "the Employer") of the one part and M/s _____ through its _____ having its registered office at _____ (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer is desirous of executing Certain Works to be carried out **Air Conditioning work at SBI ..... Branch, UTTAR PRADESH** as per Schedule-I, to this agreement and has caused Drawings, Bills of Quantities and Specification describing the work to be done.
AND WHEREAS the said Drawings, the Bills of Quantities marked pages _____ to ____ (inclusive) and the Specifications as stated have been signed by or on behalf of the parties hereto:
AND WHEREAS the Contractor has agreed to execute the work upon the Conditions of Tender and the Conditions of Contract and further subject to the Special Conditions set forth in Schedule-II hereto attached (hereinafter collectively referred to as "the said Conditions") as per the said Drawings and as described in the said Specification and included in the said Bills of Quantities for the sum of Rupees _____

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the sum of Rupees _____ to be paid at the time and in the manner set forth in the said Conditions, the Contractor shall upon and subject to the said Drawings and described in the said Specification and Bills of Quantities.

2. The Employer shall pay to the Contractor the said sum of Rs._____
_____
___ or such other sum as shall become payable hereunder at the times and in the manner specified hereinafter.

3. The term "The Consultant" in the said conditions shall mean ***M/s*** **-**or in the event of their ceasing to be Consultants for the purposes of this Contract, such other persons as shall be nominated for that purpose by the Employer, not being a person to whom the contractor shall object for reasons considered to be sufficient by the Employer mentioned in the said Conditions. Provided always that no persons subsequently appointed to be Consultants under this Contract shall be entitled to disregard or overrule any decision or approval or direction given or expressed by the Consultants for the time being.

4. The said Conditions, Specifications and Priced Bills of Quantities shall be read and construed as forming part of this agreement, and the parties hereto shall respectively abide by and submit themselves to the conditions and stipulations and perform the agreement on their parts respectively in such Conditions, Specifications and Priced Bills of Quantities contained.

This agreement is subject to jurisdiction of courts in Aligarh only.

The Regional Manager, *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh - 202001(U.P).* shall exercise powers on behalf of the said Employer for the purpose of the Contract

Agreement Whereas both the parties agree to sign the following annexure Annexed to this Agreement in token of their acceptance.

i. Agreement
ii. General Conditions of contract.
iii. Special Condition of Contract.
iv. Safety Codes.
v. Specifications.
vi. Material Testing & Their Frequency.
vii. List of Approved Makes/ Brands
viii. Priced Bill of Quantities.
ix. Drawings.

The Bank shall pay the contractor such sum as shall become payable hereunder at the times and in the manner specified in the said Conditions mentioned in the General Conditions of Contract.

Whereas the Contractor hereby undertakes and agrees to carry out and complete the works within 75 Days from the date of handing over site or 15 days from the date of issue of letter of acceptance of whichever is later. The Contractor agrees and has deposited the sum of Rs. _____ by way of Initial Security Deposit for due fulfillment of this Contract for the Works. It is agreed that the Security Deposit shall be deducted from each running bills and refunded to the contractor as per clause 2 of the General Conditions of the Contract Annexed herewith.

5. Whereas it is agreed that the earnest money amounting to **8,900/- (Eight Thousand Nine hundred Only)** deposited by the Contractor in the form of Demand Draft along with the tender shall be forfeited in full in case the Contractor does not remit the Initial Security Deposit within the stipulated period of the start of the works by the stipulated date mentioned in the award letter.

6. Whereas Shri _____ is the accredited representative(s) of the Contractor who would be responsible for taking instructions from the Employer in relation to the Works. The Contractor agrees to pay Sales Tax or any other Tax on material or finished works like Works Contract Tax, Turnover Tax etc. including Income Tax in respect of this Contract of the Works and the Employer will not entertain any claim whatsoever in this report nor the Employer shall be responsible to pay any Tax as mentioned above. If due to non – payment of any of the aforesaid Tax or other Taxes connected with the Works, the Contractor suffers any loss or damages occurred to the Contractor and the Employer will be entitled to claim damages from the contractor for non completion of the Work within ***12 calendar months*** stipulated in Para 9, above.

7. Whereas the Contractor hereby declares the list of all the relative working with the Employer which is annexed herewith.

OR

Whereas the Contractor declares that none of his relative is working with the Employer.

OR

Whereas the Contractor declares that he has associated himself with the agencies of the appropriate classes of person for Sanitary and Water Supply Installation etc. or any other specialized job to complete the works.

The Plans, Drawings, Specifications, Contract Documents and the Documents above mentioned shall form basis of this Contract and the decision of ***The*** **Regional Manager,** *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh -202001(U.P).* for the time being as mentioned in the Conditions of Contract in reference to all matters of dispute as to material, workmanship or account and as to the intended interpretation of the clauses of the Agreement or any of the document attached hereto shall be final and binding on both parties and may be made rule of the court.

13. The work comprises of the **Air Conditioning work at SBI ACB IGLAS Branch, Aligarh, UP** *as mentio*ned above and all subsidiary and other works connected therewith on the same site as may be ordered to be done from time to time by The **Regional Manager,** *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh -202001(U.P).*for the time being even though such works may not have been shown on the, Plans or described in the said Specifications or Schedule of Quantities of various classes of Work to be done. The Employer through the **The Regional Manager,** *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh -202001(U.P).*

14. reserves himself the right of altering the Plans, Drawings and nature of Work of adding to or omitting any items of work or having portions of the same carried out departmentally or otherwise and such alterations or variations shall be carried out without prejudice to this Contract.

15. All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in Aligarh and only the courts Aligarh shall have jurisdiction to determine the same

16. The several parts of this Contract have been read to us and fully understood by us.
In Witness whereof the parties above named have executed these presents today and year first hereinabove written.

Signed, Sealed and Delivered by:

Authorized Representative of Employer **Authorized Representative of Contractor**

SCHEDULE I

Air Conditioning work at SBI ACB IGLAS Branch, Aligarh, UP all as described in Tender and Drawings inclusive hereto as Specifications.

SCHEDULE II

The following Letters/ Correspondence form a part of Agreement:

1.
2.
3.

As witness our hands the day and year first written above,

In presence of

Signature:	Signature by the said Employer
Name:	Name:
Occupation:	Designation:
Address:	Address:

In presence of

Signature:	Signature by the said Contractor
Name:	Name:
Occupation:	Designation:
Address:	Address:

GENERAL CONDITIONS OF CONTRACT

1.0 Definitions:

Contract means the documents forming the tender and the acceptance thereof and the formal agreement executed between State Bank of India (client) and the contractor, together with the documents referred therein including these conditions, the specifications, designs, drawings and instructions issued from time to time by the architects/ Bank and all these documents taken together shall be deemed to form one contract and shall be complementary to one another.

1.1 In the contract the following expressions shall, unless the context otherwise requires, have the meaning hereby respectively assigned to them.

1.1.1 'SBI' shall mean *State Bank of India (client) having its Corporate Centre at State Bank Bhavan, Madame Cama Road, Mumbai-400 021* and includes the client's representatives, successors and assigns.

1.1.2 'Architects/ Consultants' shall mean ***M/s -***

1.1.3 'Site Engineer' shall mean an Engineer appointed by the Bank as their representative to give instructions to the contractors.

1.1.4 'The Contractor' shall mean the individual or firm or company whether incorporated or not, undertaking the works and shall include legal personal representative of such individual or the composing the firm or company and the permitted assignees of such individual or firms of company.
The expression 'works' or 'work' shall mean the permanent or temporary work described in the "Scope of work" and/ or to be executed in accordance with the contract and includes materials, apparatus, equipment, temporary supports, fittings and things of all kinds to be provided, the obligations of the contractor hereunder and work to be done by the contractor under the contract.

1.1.5 'Engineer' shall mean the representative of the Architect/ Consultant.

1.1.6 'Drawings' shall mean the drawings prepared by the Architects and issued by the Engineer and referred to in the specifications and any modifications of such drawings as may be issued by the Engineer from time to time.

1.1.7 'Contract Value' shall mean the value of the entire work as stipulated in the letter of acceptance of tender subject to such additions thereto or deductions there from as may be under the deductions there from as may be made under the provision herein after contained.

1.1.8 'Specifications' shall mean the specifications referred to in the tender and any modifications thereof as may time to time be furnished or approved by the architect/ consultant "Month" means calendar month.

1.1.9 "Week" means seven consecutive days.

1.1.10 "Day" means a calendar day beginning and ending at 00 Hrs. and 24 Hrs. respectively.

2.0 Total Security Deposit

Total Security Deposit shall comprise of
Earnest Money Deposit
Initial Security Deposit
Retention Money

3.0 Earnest Money Deposit:

The tenderer shall furnish EMD of **₹ 8,900/- (Eight Thousand Nine hundred Only)** in the form of Demand Draft drawn in favour of State Bank of India payable at Aligarh on any Scheduled

Bank on any Scheduled Bank. No tender shall be considered unless the EMD is so deposited in the required form. No interest shall be paid on this EMD. The EMD of the unsuccessful tenderer shall be refunded after the decision to award the contract is taken without interest. The EMD shall stand absolutely forfeited if the tenderer revokes his tender at any time the period when he is required to keep his tender open acceptance by the SBI or after it is accepted by the SBI the contractor fails to enter into a formal agreement or fails to pay the initial security deposit as stipulated or fails to commence the work within the stipulated time.

4.0 Initial Security Deposit (ISD)

The amount of ISD shall be 2% of accepted value of tender including the EMD in the form of D/D drawn on any scheduled Bank and shall be deposited within 7 days from the date of acceptance of tender.

5.0 Retention Money:

Besides the ISD as deposited by the contractor in the above said manner the retention money shall be deducted from the running account bill at the rate of 10% of the gross value of work done by the contractor and claimed in each bill provided the total security deposit i.e. the ISD plus Retention Money shall both together not exceed 5% of the contract value. the total security deposit shall be refunded to the contractor without any interest after the end of defects liability period provided the contractor has satisfactorily attended to all defects in accordance with the conditions of contract including site clearance.

6.0 Language

The language in which the contract documents shall be drawn shall be in English.

7.0Errors, Omissions and Discrepancies

In case of errors, omissions and / or disagreement between written and scaled dimensions on the drawings or between the drawings and specifications etc., the following order shall apply.

i Between scaled and written dimension (or description) on a drawing, the latter shall be adopted.

ii. Between the written or shown description or dimensions in the drawings and the correspondence one in the specification the former shall be taken as correct.

iii Between written description of the item in the specifications and descriptions in bills of quantities of the same item, the former shall be adopted.

iv In case of difference between rates written in figures and words, the rate in words shall prevail.

v Between the duplicate / subsequent copies of the tender, the original tender shall be taken as correct.

8.0Scope of Work:

The contractor shall carryout complete and maintain the said work in every respect in strictly accordance with this contract and with the directions of and to the satisfaction of the Bank/ SBI to be communicated through the Consultant/ architect. The Consultant/ architact at the directions of the Bank from time to time issue further drawings and/ or written instructions, details directions and explanations which are hereafter collectively referred to as Consultant's/ Consultant's instructions in regard to the variation or modification of the design, quality or quantity of work or the addition or omission or substitution of any work. Any discrepancy in the drawings or between the BOQ and/ or specifications. The removal from the site of any material brought thereon by the contractor and any substitution of any other materials therefore the removal and/ or re-execution

of any work executed by him. The dismissal from the work of any person employed/ engaged thereupon.

9.0 Letter of Acceptance:

Within the validity period of the tender the Bank shall issue a letter of acceptance either directly or through the Consultant by registered post or otherwise depositing at the address of the contractor as given in the tender to enter into a Contract for the execution of the work as per the terms of the tender. The letter of acceptance shall constitute a binding contract between the SBI and the contractor.

10.0 Contract Agreement:

On receipt of intimation of the acceptance of tender from the SBI/ Consultant the successful tenderer shall be bound to implement the contract and within **7 days** thereof he shall sign an agreement in a non-judicial stamp paper of appropriate value.

11.0 Ownership of Drawings:

All drawings, specifications and copies thereof furnished by the SBI through its Consultants/ consultants are the properties of the SBI. They are not to be used on other work.

12.0 Detailed Drawings and Instructions:

The SBI through its Consultants/ consultant shall furnish with reasonable promptness additional instructions by means of drawings or otherwise necessary for the proper execution of work. All such drawings and instructions shall be consistent with the contract documents, true developments thereof and reasonably inferable there from.

The work shall be executed in conformity therewith and the contractor prepare a detailed programme schedule indicating therein the date of start and completion of various activities on receipt of the wok order and submit the same to the SBI through the Consultant / consultant.

13.0 Copies of Agreement

Two copies of agreement duly signed by both the parties with the drawings shall be handed over to the contractors.

14.0 Liquidated Damages:

If the contractor fails to maintain the required progress in terms of clause 30 of GCC or to complete the work and clear the site including vacating their office on or before the contracted or extended date or completion without justification in support of the cause of delay, he may be called upon without prejudice to any other right of remedy available under the law to the SBI on account of such breach to pay a liquidated damages at the rate of 0.5% of the contract value per week which is subject to a maximum of 5% of the contract value.

15.0 Materials, Appliances and Employees

Unless or otherwise specified the contractor shall provide and pay for all materials, labour, water, power, tools, equipment transportation and any other facilities that are required for the satisfactory execution and completion of the work. Unless or otherwise specified all materials shall be new and both workmanship and materials shall be of best quality. The contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him. Workman whose work or behavior is found to be unsatisfactory by the SBI / Consultant/ Consultant he shall be removed from the site immediately.

16.0 Permits, Laws and Regulations:

Permits and licenses required for the execution of the work shall be obtained by the contractor at his own expenses. The contractor shall give notices and comply with regulations, laws, and ordinances rules, applicable to the contract. If the contractor observes any discrepancy between the drawings and specifications, he shall promptly notify the SBI/ - in writing under intimation of the Consultant / Consultant. If the contractor performs any act which is against the law, rules and regulations he shall meet all the costs arising there from and shall indemnify the SBI any legal actions arising there from.

17.0 Setting out Work:

The contractor shall set out the work and shall be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions, and alignment of all parts thereof and get it approved by the Consultant/ consultant before proceeding with the work. If at any time any error in this respect shall appear during the progress of the works, irrespective of the fact that the layout had been approved by the Consultant / consultant the contractor shall be responsible for the same and shall at his own expenses rectify such error, if so, required to satisfaction of the SBI.

18.0 Protection of Works and Property:

The contractor shall continuously maintain adequate protection of all his work from damage and shall protect the SBI's properties from injury or loss arising in connection with contract. He shall make good any such damage, injury, loss, except due to causes beyond his control and due to his fault or negligence.

He shall take adequate care and steps for protection of the adjacent properties. The contractor shall take all precautions for safety and protections of his employees on the works and shall comply with all applicable provisions of Govt. and local bodies safety laws and building codes to prevent accidents, or injuries to persons or property on, about or adjacent to his place of work. The contractor shall take insurance covers as per clause 26.0 at his own cost. The policy may take in joint names of the contractor and the SBI and the original policy may be lodged with the SBI.

19.0 Inspection of Work:

The SBI /-/ Consultant / Consultant or their representatives shall at all reasonable times have free access to the work site and/ or to the workshop, factories, or other places where materials are lying or from where they are obtained and the contractor shall give every facility to the SBI/ -, Consultant / consultant and their representatives necessary for inspection and examination and test of the materials and workmanship. No person unless authorised by the SBI/ Consultant / Consultant except the representative of Public authorities shall be allowed on the work at any time. The proposed work either during its construction stage or its completion can also be inspected by the Chief Technical Examiner's organisation a wing of Central Vigilance Commission.

20.0 Assignment and Subletting

The whole of work included in the contact shall be executed the contractor and he shall not directly entrust and engage or indirectly transfer, assign or underlet the contract or any part or share thereof or interest therein without the written consent of the SBI/ - through the Consultant

and no undertaking shall relieve the contractor from the responsibility of the contractor from active superintendence of the work during its progress.

21.0 Quality of Materials, Workmanship & Test

All materials and workmanship shall be best of the respective kinds described in the contract and in accordance with Consultant/ Consultant instructions and shall be subject from time to time to such tests as the Consultant/ consultant may direct at the place of manufacture or fabrication or on the site or an approved testing laboratory. The contractor shall provide such assistance, instruments, machinery, labour, and materials as are normally required or examining measuring sampling and testing any material or part of work before incorporation in the work before incorporation in the work or testing as may be selected and required by the Consultant/ Consultant.

i) Samples

All samples of adequate numbers, size, shades and pattern as per specifications shall be supplied by the contractor without any extra charges. If certain items proposed to be used are of such nature that samples cannot be presented or prepared at the site detailed literature/ test certificate of the same shall be provided to the satisfaction of the Consultant / Consultant. Before submitting the sample / literature the contractor shall satisfy himself that the material / equipment for which he is submitting the sample / literature meet with the requirement of tender specification. Only when the samples are approved in writing by the Consultant / consultant the contractor shall proceed with the procurement and installation of the particular material / equipment. The approved samples shall be signed by the Consultant / Consultant for identification and shall be kept on record at site office until the completion of the work for inspection / comparison at any time. The Consultant / Consultant shall take reasonable time to approve the sample. Any delay that might occur in approving the samples for reasons of its not meeting the specifications or other discrepancies inadequacy in furnishing samples of best qualities from various manufacturers and such other aspects causing delay on the approval of the materials / equipment etc. shall be to the account of the contractor.

ii) Cost of Tests

The cost / expenditure required for the tests shall be borne by the contractor if such test is intended by or provided for in the specification or BOQ.

iii) Costs of Tests not provided for

If any test is ordered by the Consultant / architect which is either

If so intended by or provided for or (in the cases above mentioned) is not so particularized, or though so intended or provided for but ordered by the Consultant / Consultant to be carried out by an independent person at any place other than the site or the place of manufacture or fabrication of the materials tested or any Government / approved laboratory, then the cost of such test shall be borne by the contractor.

22.0 Obtaining Information Related to Execution of Work

No claim by the contractor for additional payment shall be entertained which is consequent upon failure on his part to obtain correct information as to any matter affecting the execution of the work nor any misunderstanding or the obtaining incorrect information or the failure to obtain correct information relieve him form nay risks or from the entire responsibility for the fulfillment of contract.

23.0 Contractor's Superintendence

The contractor shall give necessary personal superintendence during the execution of the works and as long, thereafter, as the Consultant / consultant may consider necessary until the expiry of the defects liability period stated hereto.

24.0 Quantities

The Bill of Quantities (BOQ) unless or otherwise stated shall be deemed to have been prepared in accordance with the Indian Standard Method of Measurements and quantities. The rate quoted shall remain valid for variation of quantity against individual item to any extent subject to maximum variation of the contract value by 25%. The entire amount paid under Clause 20, 21 hereof as well as amounts of prime cost and provisional sums, if any, shall be excluded.

Variation exceeding 25%: The items of work executed in relation to variation exceeding 25% shall be paid on the basis of provisions of clause 22 (e) hereof.

25.0 Works to be measured

The Consultant / Consultant may from time to time intimate to the contractor that he required the work to be measured and the contractor shall forthwith attend or send a qualified representative to assist the Consultant in taking such measurements and calculations and to furnish all particulars or to give all assistance required by any of them. Such measurements shall be taken in accordance with the Mode of measurements detailed in the specifications. The representative of the Consultant/ Consultant shall take joint measurements with the contractor's representative and the measurements shall be entered in the measurement book. The contractor or his authorised representative shall sign all the pages of the measurement book in which the measurements have been recorded in token of his acceptance. All the corrections shall be duly attested by both representatives. No over writings shall be made in the M book should the contractor not attend or neglect or omit to depute his representative to take measurements then the measurements recorded by the representative of the Consultant / consultant shall be final. All authorized extra work, omissions and all variations made shall be included in such measurement.

26.0 Variations

No alteration, omission or variation ordered in writing by the Consultant / consultant shall vitiate the contract. In case the SBI / -/ Consultant / Consultant thinks proper at any time during the progress of works to make any alteration in, or additions to or omissions from the works or any alteration in the kind or quality of the materials to be used therein, the Consultant / Consultant shall give notice thereof in writing to the contractor or shall confirm in writing within seven days of giving such oral instructions the contractor shall alter to, add to, or omit from as the case may be in accordance with such notice, but the contractor shall not do any work extra to or make any alterations or additions to or omissions from the works or any deviation from any of the provisions of the contract, stipulations, specifications or contract drawings without previous consent in writing of the Consultant / Consultant and the value of such extras, alterations, additions or omissions shall in all cases be determined by the Consultant / Consultant and the same shall be added to or deducted from the contract value, as the case may be.

27.0 Valuation of Variations

No claim for an extra shall be allowed unless it shall have been executed under the authority of the Consultant / Consultant with the concurrence of the SBI as herein mentioned. Any such extra is herein referred to as authorized extra and shall be made in accordance with the following provisions.

a) i) The net rates or prices in the contract shall determine the valuation of he extra work where such extra work is of similar character and executed under similar conditions as the work priced herein.
ii) Rates for all items, wherever possible should be derived out of the rates given in the priced BOQ.

b) The net prices of the original tender shall determine the value of the items omitted, provided if omissions do not vary the conditions under which any remaining items of works are carried out, otherwise the prices for the same shall be valued under sub-clause (c) hereunder.

c) Where the extra works are not of similar character and /or executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items or works are carried out, then the contractor shall within 7 days of he receipt of the letter of acceptance inform the Consultant / consultant of the rate which he intends to charge for such items of work, duly supported by analysis of the rate or rates claimed and the Consultant / Consultant shall fix such rate or prices as in the circumstances in his opinion reasonable and proper, based on the market, rate.

d) Where extra work cannot be properly measured or valued the contractor shall be allowed day work prices at the net rates stated in the tender of the BOQ or, if not, so stated then in accordance with the local day work rates and wages for the district; provided that in either case, vouchers specifying the daily time (and if required by the Consultant / Consultant) the workman's name and materials employed be delivered for verifications to the Consultant / consultant at or before the end of the week following that in which the work has been executed.

e) It is further clarified that for all such authorized extra items where rates cannot be derived from the tender, the Contractor shall submit rates duly supported by rate analysis worked on the market rate basis" for material, labour, hire / running charges of equipment and wastage etc. plus 15% towards establishment charges, contractor's overheads and profit. Such items shall not be eligible for escalation.

28.0 Final Measurement

The final measurement, valuation and payment in respect of the contract shall be completed within 1 months of the virtual completion of the work.

29.0 Virtual Completion Certificate (VCC)

On successful completion of entire woks covered by the contract to the full satisfaction of the Consultants / SBI/ -, the contractor shall ensure that the following works have been completed to the satisfaction of the Consultants / SBI/ -.

a. Clear the site of all scaffolding, wiring, pipes, surplus materials, contractor's labour, equipment and machinery.

b. Demolish, dismantle and remove the contractor's site office, temporary works, structures including labour sheds/camps and constructions and other items and things whatsoever brought upon or erected at the site or any land allotted to the contractor by the SBI and not incorporated in the permanent works.

c. Remove all rubbish, debris etc. from the site and the land allotted to the contractor by the SBI and shall clear, level and dress, compact the site as required by the SBI.

d. Shall put the SBI in undisputed custody and possession of the site and all land allotted by the SBI.

e. Shall hand over the work in a peaceful manner to the SBI.

f. All defects / imperfections have been attended and rectified as pointed out by the SBI/ - to the full satisfaction of SBI/ -.

Upon the satisfactory fulfillment by the contractor as stated above, the contractor shall be entitled to apply to the Consultant / consultant is satisfied of the completion of the work. Relative to which the completion certificate has been sought, the Consultant / consultant shall within fourteen (14) days of the receipt of the application for virtual completion certificate, issue a VCC in respect of the work for which the VCC has been applied.

This issuance of a VCC shall be without prejudice to the SBI's rights and contractor's liabilities under the contract including the contractor's liability for defects liability period nor shall the issuance of VCC in respect of the works or work at any site be construed as a waiver of any right or claim of the SBI against the contractor in respect of works or work at the site and in respect of which the VCC has been issued.

30.0 Work by other Agencies

The SBI / Consultant / Consultant reserves the rights to use premises and any portion of the site for execution of any work not included in the scope of this contract which it may desire to have carried out by other persons simultaneously and the contractor shall not only allow but also extend reasonable facilities for the execution of such work, the contractor, however, shall not be required to provided any plant or material for the execution of such work except by special arrangement with the SBI/ -. Such work shall be carried out in such manner as not to impede the progress of the works included in the contract.

31.0 Insurance of Works

Without limiting his obligations and responsibilities under the contract, the contractor shall insure in the joint names of he SBI and the contractor against all loss of damages from whatever cause arising other than the excepted risks, for which he is responsible under the terms of contract and in such a manner that the SBI and contractor are covered for the period stipulated in clause 28 of GCC and are also covered during the period of maintenance for loss or damage arising from a cause, occurring prior to the period of maintenance for loss or damage arising from a cause, occurring prior to the commencement of the period of maintenance and for any loss or damage occasioned by the contractor in the course of any operations carried out by him for the purpose of complying with his obligations under clause.

a) The works for the time being executed to the estimated current Contract value thereof, or such additional sum as may be specified together with the materials for incorporation in the works at their replacement value.

b) The constructional plant and other things brought on to the site by the contractor to the replacement value of such constructional plant and other things.

c) Such insurance shall be effected with an insurer and in terms approved by the SBI which approval shall not be unreasonably withheld and the contractor shall whenever required produce to the Consultant / consultant the policy if insurance and the receipts for payment of the current premiums.

32.0 Damage to Persons and Property

The contractor shall, except if and so far as the contract provides otherwise indemnify the SBI/ - against all losses and claims in respect of injuries or damages to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution and maintenance of he works and against all claims proceedings, damages, costs,

charges and expenses whatsoever in respect of or in relation thereto except any compensation of damages for or with respect to:

a. The permanent use or occupation of land by or any part thereof.

b. The right of SBI/ - to execute the works or any part thereof on, over, under, in or through any lands.

c. Injuries or damages to persons or properties which are unavoidable result of the execution or maintenance of the works in accordance with the contract.

d. Injuries or damage to persons or property resulting from any act or neglect of the SBI their agents, employees or other contractors not being employed by the contractor or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the responsibility of the SBI/ -, their employees, or agents or other employees, or agents or other contractors for the damage or injury.

33.0 Contractor to Indemnify SBI

The contractor shall indemnify SBI against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the matters referred to in the provision sub-clause 26.2 of this clause.

34.0 Contractor's Superintendence

The contractor shall fully indemnify and keep indemnified the SBI/ - against any action, claim, or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties which may be payable in respect of any article or part thereof included in the contract. In the event of any claim made under or action brought against SBI/ - in respect of such matters as aforesaid the contractor shall be immediately notified thereof and the contractor shall be at liberty, at his own expenses to settle any dispute or to conduct any litigation that may arise there from, provided that the contractor shall not be liable to indemnify the SBI/ - if the infringement of the patent or design or any alleged patent or design right is the direct result of an order passed by the Consultant / Consultant in this behalf.

35.0 Third Party Insurance

Before commencing the execution of the work the contractor but without limiting his obligations and responsibilities under clause 26.0 of GCC shall insure against his liability for any material or physical damage, loss or injury which may occur to any property including that of SBI/ SBI, or to any person, including any employee of the SBI/ SBI, by or arising out of the execution of the works or in the carrying out of the contract, otherwise than due to the mattes referred to in the provision to clause 26.0 thereof.

36.0 Minimum amount of Third Party Insurance

Such insurance shall be effected with an insurer and in terms approved by the SBI/ SBI which approval shall not be reasonably withheld and for at least the amount stated below. The contractor shall, whenever required. Produce of the Architect / consultant the policy or policies of insurance cover and receipts for payment of the current premiums.

36.1 The minimum insurance cover for physical property, injury, and death is Rs. 5 lacs per occurrence with the number of occurrences limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

36.2 Accident or Injury to Workman

The SBI/ SBI shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workmen or other person in the employment of the contractor or any sub-contractor, save and except an accident or injury resulting from any act or default of the SBI/ SBI or their agents, or employees. The contractor shall indemnify and keep indemnified SBI/ SBI against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

36.3 Insurance against Accidents etc. to Workmen

The contractor shall insure against such liability with an insurer approved by the SBI/ SBI during the whole of the time that any persons are employed by him on the works and shall, when required, produce to the architect / consultant such policy of insurance and receipt for payment of the current premium. Provided always a that, in respect of any persons employed by any sub-contractor the contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub contractor shall be insured against the liability in respect of such persons in such manner that SBI/ SBI in indemnified under the policy but the contractor shall require such sub-contractor to produce to the Architect / Consultant when such policy of insurance and the receipt for the payment of the current premium.

36.4 Remedy on Contractor's failure to Insure:

If the contractor fails to effect and keep in force the insurance referred to above or any other insurance which he may be required to effect under the terms of contract, then and in any such case the SBI/ SBI may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the SBI as aforesaid from any amount due or which may become due to the contractor, or recover the same as debt from the contractor.

Without prejudice to the others rights of the SBI against contractors. In respect of such default, the employer shall be entitled to deduct from any sums payable to the contractor the amount of any damages costs, charges, and other expenses paid by the SBI/ SBI and which are payable by the contractors under this clause. The contractor shall upon settlement by the insurer of any claim made against the insurer pursuant to a policy taken under this clause, proceed with due diligence to rebuild or repair the works destroyed or damaged. In this event all the monies received from the insurer in respect of such damage shall be paid to the contractor and the contractor shall not be entitled to any further payment in respect of the expenditure incurred for rebuilding or repairing of the materials or goods destroyed or damaged.

37.0 Commencement of Works:

The date of commencement of the work will be reckoned as the date of handing over site or three days from the date of issue of letter of acceptance of the tender by the SBI whichever is later.

38.0 Time for Completion

Time is essence of the contract and shall be strictly observed by the contractor. The entire work shall be completed within a period of 75 Days from the date of commencement. If required in the contract or as directed by the Architect / Consultant. The contractor shall complete certain portions of work before completion of the entire work. However the completion date shall be reckoned as the date by which the whole work is completed as per the terms of the contract.

39.0 Extension of Time

If, in the opinion of the Architect/consultant, the work be delayed for reasons beyond the control of the contractor, the Architect/consultant may submit a recommendation to the SBI/ SBI to grant a fair and reasonable extension of time for completion of work as per the terms of contract. If the contractor needs an extension of time for the completion of work or if the completion of work is likely to be delayed for any reasons beyond the due date of completion as stipulated in the contract, the contractor shall apply to the SBI/ SBI through the Architect / Consultant in writing in detail and his justification if any, for the delays. The Architect/Consultant shall submit their recommendations to the SBI in the prescribed format for granting extension of time. While granting extension of time the contractor shall be informed the period-extended time which will qualify for levy of liquidated damages. For the balance period in excess of original stipulated period and duly sanctioned extension of time by the SBI/ SBI the provision of liquidated damages as stated under clause10.0 of Instructions to the Tenderers shall become applicable. Further the contract shall remain in force even for the period beyond the due date of completion irrespective whether the extension is granted or not.

40.0 Rate of Progress

Whole of the materials, plant and labour to be provided by the contractor and the mode, manner and speed of execution and maintenance of the works are to be of a kind and conducted in a manner to the satisfaction of the Architect / Consultant should the rate of progress of the work or any part thereof be at any time be in the opinion of the Architect / consultant too slow to ensure the completion of the whole of the work by the prescribed time or extended time for completion the Architect / Consultant to expedite progress so as to complete the works by the prescribed time or extended time. Such communications from the Architect / Consultant neither shall relieve the contractor from fulfilling obligations under the contract nor will he be entitled to raise any claims arising out of such directions.

41.0 Work during Nights and Holidays

Subject to any provision to the contrary contained in the contract no permanent work shall save as herein provided be carried on during the night or on holidays without the permission in writing of the Architect/ Consultant, save when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the work in which case the contractor shall immediately advise the Architect/ consultant. However the provisions of the clause shall not be applicable in the case of any work which becomes essential to carry by rotary or double shifts in order to achieve the progress and quality of the part of the works being technically required / continued with the prior approval of the Architect/ Consultant at no extra cost to the SBI/ SBI.

All work at night after obtaining approval from competent authorities shall be carried out without unreasonable noise and disturbance.

42.0 No Compensation or Restriction of Work.

If at any time after acceptance of the SBI/ SBI shall decide to abandon or reduce the scope of work for any reason whatsoever and hence not required the whole or any part of the work to be carried out. The Architect / Consultant shall give notice in writing to that effect to the contractor and the contractor shall act accordingly, in the matter. The contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which

he might have derived from the execution of the work fully but which he did not derive in consequence of the foreclosure of the whole or part of the work.

Provided that the contractor shall be paid the charges on the cartage only of materials actually and bonafide brought to the site of the work by the contractor and rendered surplus as a result of the abandonment, curtailment of the work or any portion thereof and then taken back by the contractor, provided however that the Architect / consultant shall have in such cases the option of taking over all or any such materials at their purchase price or a local current rate whichever is less.

In case of such stores having been issued for SBI/ SBI stores and returned by the contractor to stores, credit shall be given to him at the rates not exceeding those at which were originally issued to the contractor after taking into consideration and deduction for claims on account of any deterioration or damage while in the custody of the contractor and in this respect the decision of Architect / consultant shall be final.

43.0 Suspension of Work

i) The contractor shall, on receipt of the order in writing of the Architect/ consultant (whose decision shall be final and binding on the contractor) suspend the progress of works or any part thereof for such time and in such manner as Architect/ consultant may consider necessary so as not to cause any damage or injury to the work already done or endanger the safety thereof for any of following reasons.

a) One account any default on the part of the contractor, or

b) for proper execution of the works or part thereof for reasons other then the default of the contractor, or for safety of the works or part thereof.

c) The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by the Architect / consultant.

ii) If the suspension is ordered for reasons (b) and (c) sub-para (i) above: the contractor shall be entitled to an extension of time equal to the period of every such suspension. No compensation whatsoever shall be paid on this account.

44.0 Action when the whole Security Deposit is forfeited

In any case in which under any clause or clauses of this contract, the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit the Architect / consultant shall have the power to adopt any of the following course as they may deem best suited to the interest of the SBI/ SBI.

a) To rescind the contract (of which rescission notice in writing to the contractor by the Architect / consultant shall be conclusive evidence) and in which case the security deposit of the contractor shall be forfeited and be absolutely at the disposal of SBI/ SBI.

b) To employ labour paid by the SBI and to supply materials to carry out the work, or any part of the work, debiting the contractor with the cost of the labour and materials (the cost of such labour and materials as worked out by the Architect /Consultant shall be final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same manner and at the same rates as if it had been carried out by the contractor under the terms of this contract the certificate of Architect / Consultant as to the value of work done shall be final and conclusive against the contractor.

c) To measure up the work of the contractor, and to take such part thereof as shall be unexecuted, out of his hands, to give it to another contractor to complete in which case any expenses which

may be incurred in excess of the sum which would have been paid to the original contractor, if the whole work had been executed by him (of the amount of which excess the certificates in writing of the Architects / Consultant shall be final and conclusive) shall be borne by original contractor and may be deducted from any money due to him by SBI/SBI under the contract or otherwise, or from his security deposit or the proceeds of safe thereof, or sufficient part thereof. In the event of any of above courses being adopted by the SBI/ SBI the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any material or entered into any engagements or make any advances on account of, or with a view to the execution of the work or the

performance of the contract and in case the contract shall be rescind under the provision aforesaid, the contractor shall not be entitled to recover or to be paid any sum or any work thereto for actually performed under this contract, unless, and until the Architect / consultant will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

45.0 Owner's Right to Terminate the Contract

If the contractor being an individual or a firm commit any 'Act of Insolvency' or shall be adjusted an insolvent or being an incorporated company shall have an order for compulsory winding up voluntarily or subject to the supervision of Govt. and of the Official Assignee of the liquidator in such acts of insolvency or winding up shall be unable within seven days after notice to him to do so, to show to the reasonable satisfaction of the Architect/ Consultant the at the is able to carry out and fulfill the contract, and to give security therefore if so required by the Architect/ consultant.

Or if the contractor (whether an individual firm or incorporated Company) shall suffer execution to be issued or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor.

Or shall assign or sublet this contract without the consent in writing of the SBI/ SBI through the Architect / consultant or shall charge or encumber this contract or any payment due to which may become due to the contractor thereunder:

a) Has abandoned the contract; or

b) Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for days after receiving from the SBI through the Architect / Consultant written notice to proceed, or

c) Has failed to proceed with the works with such diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or has failed to remove the materials from the site or to pull down and replace work within seven days after written notice from the SBI/ SBI through the Architect/ Consultant that the said materials were condemned and rejected by the Architect/ Consultant under these conditions; or has neglected or failed persistently to observe and perform all or any the acts, matters or things by this contract to be observed and performed by the contractor for seven days after written notice shall have been given to the contractor to observe or perform the same or has to the determent of good workmanship or in defiance of the SBI's or Architect's/ Consultant's instructions to the contrary subject any part of the contract. Then and in any of said cases the SBI/ SBI and or the Architect / Consultant, may not withstanding any previous waiver, after giving seven days notice in writing to the contractor, determine the contract, but without thereby affecting the powers of the SBI or the Architect / Consultant or the obligation and liabilities of the contractor the whole of which shall

continue in force as fully as if the contract had not been so determined and as if the works subsequently had been executed by or on behalf of the contractor. And further the SBI/ SBI through the Architect / consultant their agents or employees may enter upon and take possession of the work and all plants, tools, scaffoldings, materials, sheds, machineries lying upon the premises or on the adjoining lands or roads use the same by means of their own employees or workmen in carrying on and completing the work or by engaging any other contractors or persons to complete the work and the contractor shall not in any was interrupt or do any act, matter or thing to prevent or hinder such other contractor or other persons employed for completing and finishing or using the materials and plant for the works.

When the works shall be completed or as soon thereafter as convenient the SBI or the architect / consultant shall give a notice in writing to the contractor to remove his surplus materials and plants and should the contractor fail to do so within 14 days after receipt thereof by him the SBI/ SBI sell the same by public auction after due publication, and shall adjust the amount realised by such auction. The contractor shall have no right to question any of the act of the SBI/ SBI incidental to the sale of the materials etc.

46.0 Certificate of Payment

The contractor shall be entitling under the certificates to be issued by the Architect/ Consultant to the contractor within 14 working days from the date of certificate to the payment from SBI/ SBI from time to time. The SBI/ SBI shall recover the statutory recoveries towards Income tax, Work contract tax as per the prevailing bye laws and other dues including the retention amount from the certificate of payment.

Provided always that the issue of any certificate by the Architect/ Consultant during the progress of works or completion shall not have effect as certificate of satisfaction or relieve the contractor from his liability under clause.

The Architect/ Consultant shall have power to withhold the certificate if the work or any part thereof is not carried out to their satisfaction.

The Architect/ Consultant may by any certificate make any corrections required in previous certificate.

The SBI/ SBI shall modify the certificate of payment as issued by the Architect/ Consultant from time to time while making the payment.

The contractor shall submit the bills only after taking actual final measurements and property recorded in the measurement books

The contractor shall not submit interim bills when the approximate value of work done by him is less than **Rs. 2.75 lacs** and maximum one bill shall be submitted..

The final bill may be submitted by contractor within a period of one month from the date of virtual completion and Architect/ Consultant shall issue the certificate of payment within a period of two months. The SBI shall pay the amount within a period of three months from the date of issue of certificate provided there is no dispute in respect of rates and quantities.

The contractor shall submit the interim bills in the prescribed format with all details.

47.0 Settlement of Disputes and 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 those 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.

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 Architect 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 **Regional Manager,** *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh - 202001(U.P).* , and endorse a copy of the same to the Architect, within 30 days from the date of disallowance thereof or the date of deduction or recovery. 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 **Regional Manager,** *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh -202001(U.P).* , 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 **AGM Regional Manager,** *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh - 202001(U.P).*, in writing in the manner and within the time aforesaid.

Regional Manager, *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh - 202001(U.P).***i** 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 **Regional Manager,** *Regional Business Office- 4, AO – 6 Swarn Jayanti Nagar, Aligarh -202001(U.P).*

i submit his claims to the conciliating authority namely the **Deputy General Manager, SBI AO** for conciliation along with all details and copies of correspondence exchanged between him and the Regional Manager.

ii) 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 failing which the claims of the contractor shall be deemed to have been considered absolutely barred and walved.

iii) 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 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 of the Bank,** It will also be the 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 **Chief General Manager of the Bank,** 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 **Chief General Manager of the Bank,** 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 there under.

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.

48.0 Water Supply

The contractor shall make his own arrangements for water required for the work and nothing extra will be paid for the same. This will be subject to the following conditions.

That the water used by the contractor shall be fit for construction purposes to the satisfaction of the Architect / Consultant.

The contractor shall make alternative arrangements for the supply of water if the arrangement made by the contractor for procurement of water in the opinion of the Architect/ Consultant is unsatisfactory.

The contractor shall construct temporary well / tube well in SBI land for taking water for construction purposes only after obtaining permission in writing from the SBI. The contractor has to make his own arrangement for drawing and distributing the water at his own cost. He has to make necessary arrangements. To avoid any accidents or damages caused due to construction and subsequent maintenance of the wells. He has to obtain necessary approvals from local authorities, if required, at his own cost. He shall restore the ground to its original conditions after wells are dismantled on completion of work or hand over the well to the SBI without any compensation as directed by the SBI/ Architect/ Consultant.

49.0 Power Supply

The contractor shall make his own arrangements for power and supply / distribution system for driving plant or machinery for the work and for lighting purpose at his own cost. The cost of running and maintenance of the plants are to included in his tender prices. He shall pay all fees and charges required for the power supply and include the same in his tendered rates and hold the owner free from all such costs. He has to obtain necessary approval from the appropriate authorities, if required.

50.0 Treasure Trove etc.

Any treasure trove, coin or object antique which may be found on the site shall be the property of SBI and shall be handed over to Bank immediately.

51.0 Method of Measurement

Unless otherwise mentioned in the schedule of quantities or in mode of measurement, the measurement will be on the net quantities or work produced in accordance with up to date. Rules laid down by the Bureau of Indian Standards. In the event any dispute / disagreement the decision of the Architect / consultant shall be final and binding on the contractor.

52.0 Maintenance of Registers

The contractor shall maintain the following registers as per the enclosed Performa at site of work and should produce the same for inspection of SBI/ SBI/ Architect/ Consultant whenever desired by them. The contractor shall also maintain the records / registers as required by the local authorities / Govt. form time to time.

i) Register for Cement / Paint / Lead / Specific Materials

ii) Register for Steel

iii) Register for Secured Advance

iv) Register for Bulkage of Sand

v) Register for Silt Test

vi) Register for Sieve Analysis for Fine Aggregate

vii) Register for Sieve Analysis for Course Aggregate

viii) Register for Slump Test.

ix) Register for Concrete Cube Test.

x) Register for Hindrance to Work.

xi) Register for Consumption of Cement

xii) Register for Running Account Bill

xiii) Register for Labour

53.0 Force Majeure

a) Neither contractor nor SBI/ SBI shall be considered in default in performance of their obligations if such performance is prevented or delayed by event such as butnot to war, hostilities revolution, riots, civil commotion, strikes, lockout, conflagrations, epidemics, accidents, fire, storms, floods, droughts, earthquakes or ordinances or any act of god or for any other cause beyond the reasonable control of the party affected or prevented or delayed. However a notice is required to be given within 30 days from the happening of the even with complete details, to the other party to the contract, if it is not possible to serve a notice, within the shortest possible period without delay.

c) As soon as the cause of force majeure has been removed the party whose ability to perform its obligations has been affected, shall notify the other such cessation and the actual delay incurred in such affected activity adducing necessary evidence in support thereof.

d) From the date of occurrence of a case of force majeure obligations of the party affected shall be suspended during the continuance of any inability so caused. With the cause itself and inability resulting there from having been removed, the agreed time of completion of the respective obligations under this agreement shall stand extended by a period equal to the period of delay occasioned by such events.

e) Should one or both parties be prevented from fulfilling the contractual obligations by a state of force majeure lasting to a period of 6 months or more the two parties shall each other to decide regarding the future execution of this Agreement.

54.0 Local Laws, Acts, Regulations:

The contractor shall strictly adhere to all prevailing labour laws inclusive of contract labour (regulation and abolition act of 1970) and other safety regulations. The contractor shall comply with the provision of all labour legislation including the latest requirements of all the Acts, laws, any other regulations that are applicable to the execution of the project.

i) Minimum wages Act 1948 (Amended)
ii) Payment of wages Act 1936 (Amended)
iii) Workmen's compensation Act 1923 (Amended)
iv) Contact labour regulation and abolition act 1970 and central rules 1971 (Amended)
v) Apprentice act 1961 (Amended)
vi) Industrial employed (standing order) Act 1946 (Amended)
vii) Personal injuries (Compensation insurance) act 1963 and any other modifications
viii) Employees' provided fund and miscellaneous provisions Act 1952 and amendment thereof.
ix) Shop and establishment act
x) Any other act or enactment relating thereto and rules framed there under from time to time.

55.0 Accidents

The contractor shall immediately on occurrence of any accident at or about the site or in connection with the execution of the work report such accident to the Architect / consultant. The contractor shall also such report immediately to the competent authority whenever such report is required to be lodged by the law and take appropriate actions thereof.

Signature of Contractor & Seal

SPECIAL CONDITIONS OF CONTRACT

1.0 Scope of Work

The scope of work is to carry out **Air Conditioning work at SBI ACB IGLAS Branch, Aligarh, UP.**

Address of Site

The site is located **at SBI ACB IGLAS Branch, Aligarh, UP**

Dimension and Levels

All dimensions and levels shown on the drawing shall be verified by the contractor on the site and he will be held responsible for the accuracy and maintenance of the entire dimension and the levels. Figured dimensions are in all cases to be accepted and no dimension shall be scaled. Large-scale details shall take precedence over small – scale drawing. In case of discrepancy the contractor shall ask for clarification from the Architect / Consultant before proceeding with the work.

2.0 Notice of Operation

The contractor shall not carry out any important operation without the consent in writing from the Architect / Consultant.

3.0 Construction Records

The contractor shall keep and provide to the Architect/ Consultant full and accurate records of the dimension and positions of all new work and any other information necessary to prepare complete drawings recording details of the work as constructed.

4.0 Safety of adjacent Structures and Trees

The contractor shall provide and erect to the approval of the Architect/ Consultant such supports as may be required to protect effectively all structures and protective guards to trees which may be endangered by the execution of the works or otherwise take such permanent measures as may be required by the Architect to protect the trees and structures.

5.0 Temporary Works

Before any temporary works are commenced, the contractor shall submit at least 7 days in advance to the architect/ consultant for approval complete drawings of all temporary works he may require for the execution of the works. The contractor shall carry out the modifications relating to strength, if required by the Architect/ Consultant may require in accordance with the conditions of contract at his own cost. The contractor shall be solely responsible for the stability and safety of all temporary works an unfinished works and for the quality of the permanent works resulting from the arrangement eventually adopted for their execution.

6.0 Temporary Roads

The contractor shall provide access roads to the site from the nearest main road at no extra cost and as directed by the Architect/ Consultant. The contractor shall also responsible for proper maintenance of this access road and would take all care to see that existing services, if any, are maintained in working order at his own cost. The laying and maintaining the temporary roads within the site area shall be the contractor's responsibility and the contractor shall take such measures that are necessary and as directed by the Architect/ Consultant.

7.0 Water, Power and Other Facilities

a) The rate quoted by the contractor shall include all expenses that are required for providing all the water required for the work and the contractor shall make his own arrangements for the supply of good quality water suitable for the construction and good quality drinking water for their workers. If necessary, the contractor has to sink a tube well / open well and bring wa-

ter by means of tankers at his own cost for the purpose. The SBI/ SBI will not be liable to pay any charges in connection with the above.

The rate quoted in the tender shall include the expenses for obtaining and maintaining power connections and shall pay for the consumption charges.

The contractors for other trades directly appointed by the SBI/ SBI shall be entitled to take power and water connections from the temporary water and power supply obtained by the contractor. However, the concerned contractor shall make their own arrangements to draw the supply and pay directly the actual consumption charges at mutually agreed rates between them. All municipal charges for drainage and water connection for construction purposes shall be borne by the contractor and charges payable for permanent connections, if any, shall be initially paid by the contractor and the SBI will reimburse the amount on production of receipts.

b) The SBI/ SBI as well as the Architect / Consultant shall give all possible assistance to the contractors to obtain the requisite.

c) Permission from the various authorities, but the responsibility for obtaining the same in time shall be of the contractor.

8.0 Office Accommodation

a) The contractor shall provide and maintain all necessary offices, workshops, stores, shelters, sanitary facilities, canteens and other temporary structures for themselves in connection with the work at the site own cost after getting the approval from the architect / consultant.

b) All temporary buildings and facilities as mentioned above shall be removed on completion of the work or at any other earlier date as directed by the architect / consultant.

All the expenses for obtaining statutory approvals and maintenance of the above facilities as well as running expense shall be borne by the contractor at no extra cost. It is also the responsibility of the contractor to obtain statuary approvals for providing the above facilities.

9.0 Facilities for Contractors' Employees

The contractor shall make his own arrangement for the housing and welfare of his staff and workmen including adequate drinking water facilities. The contractor shall also make his arrangements at his own cost for transport where necessary for his staff and workmen to and from site of work at his own cost.

10.0 Lighting of Works

The contractor shall at all times provide adequate and approved lighting as required for the proper execution and supervision and inspection of works.

11.0 Fire Fighting Arrangements

i) T

he contractor shall at all times provide suitable arrangements for the fighting at his own cost. For this purpose he shall provide requisite number of fire extinguishers and adequate number of buckets, some of which are of be always kept filed with sand and some with water. These equipment shall be provided atsuitable prominent and easily accessible places and shall be properly maintained.

ii) A

ny deficiency in the fire safety or unsafe conditions shall be corrected by the contractor at his own cost and to the approval of the relevant authorities. The contractor shall make the following arrangements at his own cost but not limited to the following :

a)

roper handling, storage and disposal of combustible materials and waste.

b)
orked operations which can create fire hazards.

c)
ccess for the fire fighting equipment's.

d)
ypes, number and location of containers for the removal of surplus materials and rubbish.

e)
ype size, number and location of fire extinguishers or other firefighting equipment.

f)
eneral housekeeping.

12.0 Site Order Book

A site order book shall be maintained at site for the purpose of quick communication between the Architect/ Consultant. Any communication relating to the works may be conveyed through Records in the site order book. Such a communication from one party to the other shall be deemed to have been adequately served in terms of contract. Each site order book shall have machine numbered pages in triplicate and shall carefully maintained and preserved by the contractor and shall be made available to the Architect/ Consultant as and when demanded. Any instruction which the Architect/ Consultant may like to issue to the contractor or the contractor may like to bring the Architect/ Consultant may like to issue to the Contractor or the Contractor may like to bring to the Architect/ Consultant two copies of such instructions shall be taken from the site order book and one copy will be handed over to the party against proper acknowledgment and the second copy will be retained for their record.

13.0 Site Meetings

Site meetings will be held to review the progress and quality evaluation. The contractors shall depute a senior representative along with the site representative staff of approved subcontractors and suppliers as required to the site meetings and ensure all follow up actions. Any additional review meetings shall be held if required by the Architect/ Consultant.

14.0 Disposal of Refuse

The contractor shall cart away all debris, refuse etc. arising from the work from the site and deposit the same as directed by the Architect/ Consultant at his own cost. It is the responsibility of the contractor to obtain from the locate authorities concerned to the effect that all rubbish arising out of contractor's activities at the construction site or any other off-site activities borrow pits has been properly disposed off.

15.0 Contractor to Verify Site Measurement

The contractor shall check and verify all site measurements whenever requested by other specialists contractors of other sub contractors to enable them to prepare their own shop drawings and pass on the information with sufficient promptness as will not in any way delay the works.

16.0 Displaying the Name of the Work

The contractor shall put up a name board of suitable size as directed by the Architect/ Consultant indicating there in the name of the project and other details as given by the Architect/ Consultant at his own cost remove the same on completion of work.

17.0 Bar Bending Schedule

The contractor shall prepare a detailed bar bending schedule for all reinforced concrete works and got them approved by the Architect/ Consultant well in advance.

18.0 As Built Drawings

i) For the drawing issued to the contractor by the Architect/Consultant. The Architect / Consultant will issue two sets of drawings to the contractor for the item for which some changes have been made. From the approved drawings as instructed by the SBI / SBI/ Architect / Consultant. The Contractor will make the changes made on these copies and return these copies to the Architect/ Consultant for their approval. In case any revision is required or the corrections are not properly marked the Architect/ Consultant will point out the discrepancies to the contractor. The contractor will have to incorporate these corrections and /or attend to discrepancies either on the copies as directed by the Architect/ Consultant and resubmit to him for approval. The Architect / Consultant will return one copy duly approved by him.

ii) For the drawings prepared by the Contractor, the Contractor will modify the drawing prepared by him wherever the changes are made by the SBI/ SBI Architect/ Consultant. And submit two copies of such modified drawings to the Architect/ Consultant for approval. The Architect/ Consultant will return one copy of the approved drawing to the Contractor.

19.0 Approved Make

The Contractor shall provide all materials form the list of approved makes at his own cost. The Architect/ Consultant may approve any make / agency within the approved list as given in the tender after inspection of the sample / mock up.

20.0 Procurement of Materials

The Contractor shall make his own arrangements to procure all the required materials for the work. All wastage's and losses in weight shall be to the contractors account.

21.0 Excise Duty, Taxes, Levies etc.

The contractors shall pay and be responsible for payment of all taxes except GST, duties, levies, royalties, fees cess, or charges in respect of the works including but not limited to sales tax, tax on works contract excise duty, and octroi, payable in respect of materials, equipment's plant and other things required for the contact. All of the aforesaid taxes except GST, duties, levies, fees and charges shall be to the contractors account and the SBI shall not be required to pay any additional or extra amount on this account. Variation of taxes, duty fees, levies etc if any, till completion of work shall be deemed to be included in the quoted in the quoted rates and no extra amount on this account. Variation of taxes, duties, fees, levies, etc if any till completion of work shall be deemed to be included in the quoted rates and no extra claim on this account will in any case be entertained. If a new tax or duty or levy or cess or royalty or octroi is imposed under as statue or law during the currency of contract the same shall be borne by the contractor.

22.0 Acceptance of Tender

The SBI/ SBI shall have the right to reject any or all tenders without assigning any reason. They are not to bound to accept the lowest or any tender and the tenderer shall have no right to question the acts of the SBI/ SBI. However, the adequate transparency would be maintained by the SBI/ SBI.

SPECIAL CONDITIONS OF CONTRACT FOR AIR CONDITIONING WORK

1. **SCOPE OF WORK:-**

The scope of work to be carried out under this contract comprises of the supply, installation, testing and commissioning of Air Conditioning work complete as listed out in Schedule of Quantities. The general character and scope of work to be carried out under this contract is presented in drawings and specifications. The contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with direction of and to the satisfaction of the bank engineer/ Consultant/ Consultant. The contractor shall furnish labour, materials, equipment, transportation and incidentals necessary for the completion of work as described in the Tender Documents.

2. **FEES AND PERMITS**:-

The Contractor shall obtain all permits/licenses and pay for any and all fees required for the installation, inspection and the commissioning of the work.

3. **DRAWINGS**:-

The Drawings prepared by the consultants are indicative only of the general arrangement of the installation work. The Contractor shall follow these drawings and specifications & preparing his shop drawings, SLDs and their approval and subsequent installation. He shall check the drawings of other trades to verify space for his installation.

1. Shop drawings shall be provided of the Main and Sub-Main Switchboards, Distribution Boards, Cable Trays, Reactive Power Compensation Panel, AC units and any other switchboards and panels, wherever applicable and approval shall be obtained from the Consultant / Developer before commencing fabrication or procurement.
2. Any equipment or switchboard manufactured without the written consent of the Consultant / Developer prior to the approval drawings shall be liable for rejection.

Drawings show general run of cables/pipes, approximate locations of outlets and equipment, utility symbols and schematic diagrams of no dimensional significance. Refer to the Consultant drawings for locations and also obtain approval from the Consultant / Developer wherever dimensions are not shown, or locations cannot be determined from the drawings. Do not scale drawings to obtain locations

4. **MEASUREMENTS OF WORK**:-

Payment for conduiting, cables, earth strips and wires etc. will be made on linear measurements and will be measured upto and including the bends.

5. **TESTING**:-

On completion of the installation the testing will be done in conformity with the stipulated performance specifications. Any shortcoming detected in the system/ materials/ workmanship shall be rectified by the contractor to the entire satisfaction of the consultant without any extra cost to the owner. The installation shall be tested again after removal of the defects and shall be commissioned only after approval by the competent inspecting authority and the Consultant/Owner.

1. The Contractor shall notify the Consultant at least 7 working days before testing of each system. The Consultant reserves the right to be present

when such tests are being made.

2. If the Electrical Inspectorate requires manufacturer's test reports for any equipment used in the project, the Contractor shall obtain such approvals at no extra cost to the client. Such approved reports shall be handed over to the Consultant / client.

Calibration certificates shall be obtained from the Meter and Relay Testing Department of the Electricity Board for all relays and meters used in the project at no extra cost to the client

6. **COMPLETION CERTIFICATE:**-

On completion of the installation a certificate in an approved form shall be furnished by the contractor. The contractor shall be responsible for getting the entire installation duly approved by the Electrical Inspector or other concerned authorities, if any, and shall bear all expenses in connection with the same.

7. SCOPE OF WORK

The scope of work to be carried out under this contract briefly comprises of:

HVAC Work : Supply, Installation, connecting, testing and commissioning of the following :

a.

l.

s Per th BOQ

b) The contractor shall carry out and complete the work under this contract in every respect in confirming with the current rules and regulations of the local Electricity Authority, stipulations of the Indian Standard Institution, and with the directions of and to the satisfaction of the owner. The contractor shall furnish all labour, material, appliances, equipment, transportation and incidentals necessary for providing, installing, testing and commissioning of the whole electrical installation as specified herein and shown as drawings.

This also includes any materials, appliances, equipment and incidential work not specifically mentioned herein or noted on the drawings/documents as being furnished or installed but which are customary to make the installation in working order. The work shall include all incidentals and jobs connected with Electrical installation such as earthing work and cutting chases/holes and making good the same and grouting and equipment.

All Civil works in connection with the Electrical Installation including supply, laying and fixing of necessary inserts, hooks, brackets and sleeves etc

On completion of the work and before issuing of virtual completion certificate the contractor shall submit to owner “As installed drawings” showing all the details of work done by him.

The contractor shall have a valid contracting licence before starting the work and till the completion of work.

TECHNICAL SPECIFICATION

1 SPECIFICATIONS FOR INTERNAL WIRING

1.1. SYSTEM OF WIRING:

The system of wiring shall consist of single/multi core FRLS PVC insulated stranded copper conductor wires in non-metallic FRLS PVC conduits/ metallic M.S. conduits as called for in the BOQ. All conduits shall be on the surface, (supported from the Ceiling), in the False Ceiling and concealed in other areas where RCC slab is provided unless otherwise called for in the drawings. All Down conduits shall be concealed unless otherwise called for.

1.2. GENERAL

Prior to laying of conduits, the Contractor shall get approved the conduit layout indicating the route of conduit, number and size of conduits, location of junction/ inspection/pull boxes, size and location of switch boxes, point outlet boxes and other details. These conduit layouts shall be got approved by the Consultant and then only conduit layout should be started. Any modification or suggestions shall be approved by the Consultant before the laying of conduits.

1.3. MATERIALS:

M.S. conduits shall conform to Indian Standards IS : 1653 - 1964 -Specification for Rigid Steel conduits for Electrical wiring with the latest amendments.

M.S. CONDUITS:

M.S. conduits shall be solid drawn or lap welded conduits. Stove enameled inside and outside with minimum wall thickness of 1.6 mm for conduits upto 25 mm diameter and 2.0 mm wall thickness for conduits 32 mm diameter and above.

FRLS PVC conduits to be used for concealed work for all systems except Fire Alarm & Computer system where M.S. conduits shall be used. FRLS PVC conduits shall conform to Indian Standards IS : 9537(Part-3)-1983 -Specification for conduits for Electrical Installation (Part-I) General Requirements.

FRLS PVC CONDUITS:

FRLS PVC conduits shall be rigid, unplasticised, heavy gauge having 1.8 mm wall thickness upto 20 mm diameter and 2.0 mm wall thickness for all sizes above 20 mm diameter. Minimum size of conduit shall be 20 mm dia. Minimum size of conduit for Power point wiring shall be 25 mm dia. The conduits shall be delivered to the site of construction in original bundles and each length of conduit shall bear the label of the manufacturer. The number of insulated copper wires that may be drawn into the conduits of various sizes are given below and the fill shall not exceed 40% the maximum permissible number of 650/1100 volts grade single/multi core PVC insulated copper conductor wires of different sizes, that may be drawn into rigid metallic or non-metallic conduits.

SIZE OF WIRE	**SIZE OF CONDUITS (MM)**				
Nominal cross-Sectional area of wires in sq. mm	20	25	32	40	50 nominal dia in mm
	(Maximum number of wires)				
1.5	5	6	18	-	-
2.5	3	4	10	-	-
4.0	2	3	5	10	-
6.0	-	4	6	8	-
10.0	-	-	3	4	-

16.0	-	-	-	3	5
25.0	-	-	-	2	3

1.4 FRLS PVC CONDUIT ACCESSORIES & CONNECTIONS:

The accessories used for FRLS PVC conduits shall conform to Indian Standards IS : 3419-1988-(Specification for fittings for non-metallic conduits).PVC conduits shall be joined by means of screwed or plain couplers. Where there are long runs of straight conduits, inspection boxes shall be provided at intervals as approved by the consultant. The threads of the pipe and sockets shall be free from grease and oil. It shall be thoroughly cleaned before making the screwed/plain joints. Proper jointing materials as recommended by manufacturers shall be used for jointing of FRLS PVC pipes. Use PVC couplers and connectors for FRLS PVC pipe connections and terminations in boxes. All the joints shall be fully water tight. Junction boxes and running joints shall be provided at suitable places to allow for subsequent extensions if any, without undue dismantling of conduit system. As far as possible diagonal run of conduits shall be avoided. Junction between conduit and adapter boxes, back outlet boxes, switch boxes and the like must be provided with entry spouts and smooth PVC bushes. Joints between conduit and iron clad Distribution Boards or control gear shall be effected by means of conduit couplers into each of which will be coupled smooth PVC bush from the inside of box or case. Conduit system shall be erect and straight as far as possible. All jointing methods shall be subject to the approval of the consultant.

BENDS IN CONDUITS:

Where necessary bends or diversions may be achieved by means of bends and or circular inspection boxes with adequate and suitable inlet and outlet screwed joints. In case of recessed system each junction box shall be provided with a cover properly secured and flush with the finished wall surface, so that the conductors inside the conduits are easily accessible. No bend shall have a radius of less than 2.5 times the outside diameter of the conduit. Conduits shall be cold bend by means of a Bending spring available with the manufacturers. In case it is not available then Heat may be used to soften the PVC conduits, by filling sand in the pipe. Use of PVC conduit in places where ambient temperature is 60 degrees or above is prohibited. PVC Solvent shall be used for joints between conduits, conduits & Junction box etc. PVC checknuts and bushes shall be used for joining conduit with outlet boxes. PVC Closures shall be provided on unused mouths of Junction boxes.

Separate conduits shall be provided for the following system.

i) Lights, Exhaust fans & 5A Light sockets.
ii) Power sockets
iii) Telephone System
iv) Television, Computer & Music system
v) Emergency System.
vi) Public Address System
vii) Fire Alarm System.

Separate switchboards/outlets shall be provided for the following system.

i) Lights, Exhaust fans & 5A Light sockets.
ii) Power sockets & A/C outlets
iii) Telephone System
iv) Television, Computer & Music system

v) Emergency System.
vi) Public Address System
vii) Fire Alarm system .

1.5 FIXING CONDUITS:

Conduits and junction boxes shall be kept in position and proper holdfasts shall be provided. Conduits shall be so arranged as to facilitate easy drawing of wires through them. Adequate junction boxes of approved shape and size shall be provided. All conduits shall be installed so as to avoid steam and hot water pipes. After the conduits, junction boxes, outlet boxes & switch boxes are installed in position their outlets shall be properly plugged so that water, mortar, insects or any other foreign matter does not enter into the conduit system. Exposed conduits shall be fixed by means of spacer bar/ saddles at intervals of not more than 600 mm in normal run and 500 mm from both sides of fitting or accessories. The saddles shall be of 3 mm x 19 mm mild steel flat, properly treated with primer and painted, securely fixed to support by means of nuts and bolts/rawl bolts and MS screws as required.

Conduits shall be laid in a neat and organised manner as directed and approved by the Consultant. Conduit runs shall be planned so as not to conflict with any other service pipe lines/ducts.

Where exposed conduits are suspended from the structure they shall be clamped firmly and rigidly to hangers of design to be approved by the Consultant. Where hangers are to be anchored to reinforced concrete appropriate inserts and necessary devices for their fixing shall be provided at the time of fixing. Making holes or openings in the concrete will generally not be allowed. In case it is unavoidable prior permission of the Consultant shall be obtained. Conduits shall be fixed in the chase by means of staples not more than 600 mm apart and the chase filled with cement mortar 1 : 4 . Cutting of horizontal chases in walls is prohibited.

1.6. PROTECTION

To minimize condensation or sweating inside the conduit pipes all outlets of conduit system shall be adequately ventilated as directed and approved by the Consultant. All screwed and socketed connections shall be adequately made fully water tight by the use of proper jointing materials i.e. Tropolin for PVC conduits & white lead for metal conduits.

1.7. SWITCH-OUTLET BOXES AND JUNCTION BOXES

All boxes shall conform to Indian Standards IS : 5133(Part-1)-1969 (Specification for boxes for enclosure of Electrical accessories) with the latest amendments. All outlet boxes for switches, sockets & other receptacles shall be fabricated from 1.6mm thick mild steel sheets duly painted with rust proof paint (zinc passivated) as called for, having smooth external & internal surfaces to true finish. Junction boxes and outlet boxes in contact with earth or installed in areas exposed to the weather shall be of 2mm thick mild steel and painted. Where called for, outlet boxes for receiving switches, telephone outlets T.V. outlets, power plugs etc. shall be fabricated to proved shape and size to suit the cover plates of approved make for different utilities. The cover plates shall be of best quality Hylam sheets or ISI grade Urea Formaldehyde Thermosetting insulating material which shall be both mechanically strong and fire retardant, as approved by the Consultant. Proper supports shall be provided in the outlet boxes to fix the cover plates of switches as required. Separate screwed earth terminal shall be provided inside the box for earthing purpose. All boxes shall have adequate number of knockout holes of required diameter for conduit entry. Where called for outlet boxes for receiving switches and fan regulators in one box, shall be fabricated to approved shape and size to accommodate fan regulators and switches to be fixed on grid plates. These boxes shall be covered with Hylam sheets or ISI grade Urea

Formaldehyde Thermosetting insulating material which shall be both mechanically strong and fire retardant. All junction boxes, pull boxes and outlet boxes shall be provided with sheet cover Urea Formaldehyde Thermosetting insulating material. The box cover shall be secured to the box with adequate number of round head brass screws of approved make. Outlets exposed to the weather shall be fully weather tight, complete with rubber gasketed covers, glass where used shall be fully heat resistant for the duty. The outlet boxes shall be painted with two coats of bitumasticpaint before they are fixed in position. All Outlet boxes fixed in concrete/recessed in wall shall be of a minimum depth of 55mm.

1.8. INSPECTION BOXES

Rust proof (Zinc passivated) inspection boxes of 1.6mm thick mild steel sheet and of required size, having smooth external and internal finish shall be provided to permit periodical inspection and to facilitate removal and replacement of wires when required. Inspection boxes shall be mounted flush with ceiling/walls finished surface and shall be provided with screwed covers of Urea Formaldehyde Thermosetting insulating material sheet cover secured to the box with brass screws. Adequate holes shall be provided for ventilation in the inspection box covers.

1.9. CONDUCTORS

FRLS PVC insulated multi-strand copper conductor wires of 1100 Volts grade shall be used for three phase distribution and FRLS PVC insulated multistrand copper conductor wires of 1100 V grade shall also be used for Single phase distribution and shall conform to IS : 694 -1964 with the latest amendments and shall be ISI marked.

1.10. BUNCHING OF WIRES

Wires carrying current shall be so bunched in the conduit that the outgoing and return wires are drawn into the same conduit. Wires originating from two different phases shall not be run in the same conduit.

1.11. DRAWING OF CONDUCTORS

The drawing and jointing of copper conductor wires shall be executed with due regard to the following precautions, while drawing insulated wires into the conduits. Care shall be taken to avoid scratches and kinks which cause breakage of conductors. There shall be no sharp bends.

Insulation shall be shaved off for a length of 15mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or ringing.

FRLS PVC insulated copper conductor wire ends before connection shall be properly soldered (at least 15mm length) with special Cu solder for copper conductor or shall be properly crimped with copper lugs/sockets as the case may be. Strands of wires shall not be out for connecting to the terminals. All strands of wires shall be soldered at the end before connection. The connecting brass-screws shall have flat ends. All looped joints shall be soldered and connected through terminal block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors having nominal cross sectional area exceeding 6 Sq mm shall always be provided with cable sockets.

At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections.

Only certified wiremen and cable jointers shall be employed to do jointing work. All wire shall bear the manufacturer's label and the voltage grade at one meter intervals for the full length of coil, and shall be brought to site in new and original packages.

The sub-circuit wiring for points shall be carried out in looping system and no joint shall be allowed in the length of the conductors. No wire shall be drawn into any conduit, until all work of any nature, that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Before the wires are drawn into the conduits the conduits shall be thoroughly cleared of moisture, dust, and dirt or any other obstruction by

Drawing dry cloth through the conduits. The minimum size of FRLS PVC insulated stranded copper conductor wire for all sub circuit wiring for lights, exhaust fans, ceiling fan and 5A Light sockets points shall be 1.5 Sq mm. In case of power circuit not more than two 15 Amp power outlets shall be grouped in one circuit, wiring for the first power outlet shall be carried out with FRLS PVC insulated 6.0 sq mm copper conductor wires. Wiring for the second power outlet shall be carried with FRLS PVC insulated 4.0 sq mm copper conductor wires. All power outlets shall be connected with 4.0 sq mm FRLS PVC insulated copper conductor wires to the earth terminal of outlet. Separate circuit shall run with FRLS PVC insulated 4.0 sq mm copper conductor wires for water heaters, kitchen equipment, window Air conditioners and similar outlets at locations as shown on drawings.

The minimum size of wire from final distribution board to first tapping point in the circuit shall be 2.5 Sq mm FRLS PVC insulated stranded copper conductor wires. Circuit shall not have more than a total of 8 points of fans, 5A Light sockets and Light points and its load shall not exceed 800 watts. Not more than two power circuits shall be drawn through the same conduit. Separate earth wire shall run for each circuit. In case two circuits of the same phase are running in the same conduit then a common earth wire is permissible. The size of earth wire for all the light points, ceiling fans, exhaust fans , light sockets, outlet boxes etc. shall be 1.5 sq mm FRLS PVC insulated copper conductor wires.

1.12. JOINTS

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joints shall be made inside conduits and junction boxes. Conductors shall be continuous from outlet to outlet. Joints where unavoidable, due to any specified reasons, prior permission in writing shall be obtained from the Consultant before making such connections.

1.13. MAINS AND SUB-MAINS

Mains and sub-mains wires where called for shall be of the rated capacity and approved make. Every main and sub-main shall be drawn into an independent adequate size conduit. Adequate size draw boxes shall be provided at convenient locations to facilitate easy drawing of the mains and sub-mains. An independent earth wire of proper rating shall be provided. The earth wires shall run along the entire length of the mains and sub-mains. The earth wires shall be fixed to conduits by means of suitable copper clips at not more than 1000mm distance. Where mains and sub-main cables are connected to switch gears, sufficient extra length of sub-main and main cable shall be provided to facilitate easy connections and maintenance.

1.14. LOAD BALANCING

Balancing of circuits in three phase installation shall be planned before the commencement of wiring, shall be got approved by the Consultant and shall be strictly adhered to.

1.15. COLOUR CODE OF CONDUCTORS

Colour code shall be maintained for the entire wiring installation; red, yellow, blue for three phases and “off” circuit black for neutral and green for earth (or bare earth wire)

Telephone Multicore cables shall be of approved make and shall conform to following specifications.

i) Type of conductor ….. Electrolytic Annealed Tinned Cu conductor. (ATC)

ii) Diameter of Conductor ... 0.61 mm diauniform (minimum size)

iii) Weight of conductor .... 2.52 Kg/Km minimum. iv) Resistance of conductor at 20 degree... 60 Ohms/Km, v) Radial Thickness of PVC insulation...0.3mm $\pm$ 0.05mm uniform

vi) Radious
Thickness of PVC sheathing ... 1.2mm uniform $\pm$ 0.2mm
vii) Overall
diameter of insulated conductor.. 1.2mm uniform
viii) High
voltage Test. Able to withstand upto 500 volts D.C. up to 12 hours immersion in water.

1.16 **M.S.CONDUIT ACCESSORIES & CONNECTIONS**:

The accessories used for M.S. conduits shall conform to Indian Standards IS : 3837-1966-(Specification for fittings for Rigid steel conduits with the latest amendments. M.S. conduits shall be joined by means of screwed or plain couplers. Where there are long runs of straight conduits, inspection boxes shall be provided at intervals as approved by the Consultant. The threads of the pipe and sockets shall be free from grease and oil. It shall be thoroughly cleaned before making the screwed/plain joints.

Proper jointing and Cleaning materials as recommended by manufacturers shall be used for jointing and cleaning of M.S. pipes. Use M.S. couplers and connectors for M.S. pipe connections and terminations in boxes. All the joints shall be fully water tight. Junction boxes and running joints shall be provided at suitable places to allow for subsequent extensions if any, without undue dismantling of conduit system. As far as possible diagonal run of conduits shall be avoided. Junction between conduit and adapter boxes, back outlet boxes, switch boxes and the like must be provided with entry spouts and smooth M.S. bushes and M.S. Checknuts. Joints between conduit and iron clad Distribution Boards or control gear shall be effected by means of conduit couplers into each of which will be coupled smooth M.S. bush from the inside of box or case. Conduit system shall be erect and straight as far as possible. All jointing methods shall be subject to the approval of the Consultant.

M.S. CONDUIT CONNECTIONS:

Conduit connections for MS conduits shall be screwed metal to metal and be painted with one coat of self etching zinc chromate primer and two coats of enamel paint. The threads and sockets shall be free from grease and oil. Connections between screwed conduit and sheet metal boxes shall be by means of a brass hexagon smooth bore bush, fixed inside the box. Check-nuts to be provided on inside and outside of box and connected through a coupler to the conduit or as directed by the Consultant. The joints in the conduits shall be free of burrs to avoid damage to insulation of conductors while pulling them through the conduits. Connections between PVC and MS conduits shall be through a junction box. Direct connection between PVC and MS conduits is not allowed.

2 CABLES

- **GENERAL**

MV Cables shall be supplied, laid tested and commissioned in accordance with drawing specifications, relevant Indian Standards specification, Indian Electricity Act and manufacturers instructions. The cable shall be delivered at site in original drums with manufacturers name clearly written on the drums.

- **MATERIAL**

MV CABLES : MV Cables shall be FR XLPE PVC insulated aluminium conductor armoured and unarmoured cables conforming to IS: 1554 (part I&II)-1976 & IS : 694-1977 (PVC Insulated cables for working voltages upto and including 1100 volts (second revision) with latest amendments. MV cables shall be suitable for under ground use and laid in trenches, ducts, cable trays, under roads and paved areas. MV Cables shall be termite resistant and shall be of approved make.

- **JOINTS IN CABLES**

The contractor shall take care to see that all the cables are apportioned to various locations in such a manner as to ensure no straight joints in the cable run. If the straight joint in cable is unavoidable due to any specified reasons, prior permission in writing shall be obtained from the Consultant before the use of such straight joints in cable.

- **JOINTING BOXES FOR CABLES**

Cable jointing boxes shall be of appropriate size, suitable for PVC insulated cables of particular voltage ratings, and shall be manufactured by approved manufacturers.

- **JOINTING OF CABLES**

All cable joints shall be made in suitable approved cable joint boxes. Jointing of cables in the joint boxes and the filling in of compound shall be done in accordance with the best practice in trade, in accordance with manufacturer's instructions and in an approved manner. All straight Joints shall be done in epoxy mould boxes with TROPOLIC/ M-Seal resin or approved equal. All terminal ends of conductors shall be heavily soldered upto at least 50mm length.

All cables shall be jointed colour to colour and tested for insulation resistance and continuity before jointing commences. The seals of cables must not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged.

- **FILLING OF EPOXY COMPOUND**

Equal quantities of resin and hardner shall be taken and mixed thoroughly by hand until the mixture is free from white patches and has uniform colour. No water, oil or any other liquid shall be added to the mixture to make it soft as this will effect the properties of the compound. The mixture shall be used within 30-40 minutes of mixing. The surface on which epoxy compound is to be used shall be free from dust, rust, oil, grease and shall be dry. No disturbance or movement of joint shall be made till the epoxy compound has completely hardened. A smooth surface can be made by rubbing a damp cloth smoothly on the compound before it sets. The joints shall be painted after it has completely hardened.

- **CABLES TERMINATION**

Cable termination shall be done in terminal cable box using cable glands and the cable ends sealed with sealing compound.

- **BONDING OF CABLES**

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armoured clamps and gland. The clamps must grip the armouring firmly to the gland or casing, so that in the event of ground movement no undue stress is passed on to the cable conductors. The glands shall be either to the lead sheath by means of 'Plumbing Joint' as on a cone of approved materials, capable of being compressed into lead sheath. The gland or cone shall be capable of effecting a good electrical bond between both the armouring and lead of the cable and the casing.

2.9. LAYING OF CABLES

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cable to avoid forming kinks. The drums shall be unrolled and cables run over wooden rollers in trenches at intervals not exceeding 2 meters. Cables shall be laid at depth of 750mm depth below ground level in the case of MV Cables. A cushion of sand, not less than 75mm shall be provided both above and below the cable, joint boxes and other accessories. HV and MV cables shall not be laid in the same trench and/or along side of water main. The cable shall be laid in excavated trench 80mm layer of sand shall be spread over the cable. The cable then shall be lifted and placed over the sand bed. The second layer of 80mm

sand then be spread over the cable. The relative position of the cables laid in the same trench shall be preserved and the cables shall not cross each other as far as possible. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius of bend not less than 12 times the diameter of cable. Minimum 3 M long loop shall be provided at both sides of every straight joint and 5 Meters at each end of the cable. Distinguishing marks shall be made on the cable ends for identification. Insulation tapes of appropriate voltage and in red, yellow and blue colours shall be wrapped just below the sockets for phase identification. Aluminium Labels etched with the size of cable shall be provided around the two ends of each cable.

2.10. PROTECTION OF CABLES

The cable shall be protected by placing burnt bricks over the cables 600mm wide on the top layer of sand for the full length of underground cable. Where more than one cable is running in the same trench, the bricks shall cover all the cables and shall project a minimum of 80mm on either side of the cable.

Cable under road crossings and any surfaces subjected to heavy traffic, shall be protected by running them through Hume pipes of suitable size and Heavy grade quality.

Cables under paved areas (which form part of the building) shall be protected by running them through Stoneware/Hume pipes of 150 mm dia(minimum size) one meter below road level.

2.11. CABLES INSIDE BUILDINGS

Cables inside buildings shall be laid either in masonry trenches or carried on through trays or brackets. Where cables run in ducts inside the buildings the cables shall be adequately clamped to angle iron brackets, secured to the wall, as directed and approved by the Consultant. Where cables are suspended from ceilings they shall be carried over troughs or trays as directed and approved by the Consultant. The supports shall be placed not more than 1.0 meter apart. All cables passing through walls below paved area, and concrete shall run through stone ware pipes or Hume pipes of adequate diameter recessed or exposed as directed. Cables running along walls shall be supported and clamped to saddles, or hanger rigidly anchored at close intervals. Clear space between parallel cables shall be equal to the diameter of the cable but not less than 50 mm. Where called for cable trenches shall be filled with fine sand. The contractor shall ensure that hangers, brackets and other supporting arrangements for cables are placed in proper position at the time of building the walls, concreting slabs, etc. cutting holes or opening in concrete may be carried out only with prior permission of the Consultant.

All excavations and back fill including timbering, shoring and pumping required for the installation of the cables shall be carried out as per the drawings and requirements laid down elsewhere. Trenches shall be dug true to line and grades. Back fill for trenches shall be filled in layers not exceeding 150mm. Each layer shall be properly rammed and consolidated before laying the next layer. The Contractor shall restore all surfaces roadways, side walks, curbs, walls or other works cut by excavation of their original condition, to the satisfaction of Consultant.

2.12. MARKERS AND WARNING PLATES

Approved CI cables markers shall be provided along the route of the cables at every 30 meter distance and at both ends of road crossing, indicating HV cables and MV cables as applicable. Special CI markers shall be provided at all buried cable joints indicating “Electrical Cable Joints. GI plates engraving the size of cable and the place it serves shall be tied to the cable at regular intervals of 2 meters for easily identification of the cables.

2.13. TESTING OF CABLES

Prior to burying of the cables, following tests shall be carried out:

a. Insulation test between phases and phase to earth for each length of cable before and after jointing.

On completion of cable laying work and jointing the following tests shall be conducted in the presence of the Consultants.

a. Insulation Resistance test (Sectional and Overall)
b. Continuity Resistance Test.
c. Sheath continuity Test.
d. Earth Test.
e. Physical Dimensions Test.

All tests shall be carried out in accordance with relevant Indian Standard Codes of practice and Indian Electricity Rules. The contractor shall provide necessary instruments, equipment and labour for conducting the above test and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Consultant / Consultant.

3.0 EARTHING

3.1 EARTHING

All the non-current metal parts of electrical installation shall be earthed properly. All metal conduits, trunking, cable sheaths, switchgear, outlet boxes, distribution boards, light fittings, fans and all other parts made of metal or conductive material shall be bonded together and connected by means of specified earthing system. All earthing will be in conformity with the relevant provision of Rules 33 and 61 of the Indian Electricity Rules 1956 and Indian Standard Specifications IS:3043-1987 with latest amendments.

3.2. EARTHING CONDUCTORS

All earthing conductors shall be of high conductivity electrolytic copper of 99 % purity and shall be protected against mechanical injury or corrosion.

3.3. SIZING OF EARTHING CONDUCTORS

The cross sectional area of copper earthing conductor shall be same as the active conductor for sizes of active copper conductor upto 4.0 sqmm and shall be half the size for 16 sq mm active copper conductor and above. All fixtures, fans, outlet boxes and junction boxes shall be earthed with 1.5 sqmm PVC Insulated copper conductor wires. All power sockets and single phase A/C units shall be earthed with 4.0 PVC Insulated copper conductor wires. All Three phase Final Distribution Boards shall be earthed with 2 nos 4 mm dia bare copper conductor wires. The sizes of the earth continuity conductors should not be less than half of the largest current carrying conductors.

The Sub-Distribution Board shall be earthed to 2 nos 600mm x 600mm x 3mm copper plate earthing stations through 25m x 3 mm copper strips.

3.4. CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main switchboards to an earth electrode with which the connection is to be made. Submainearthing conductors shall run from the main switchboard to the sub-distribution boards. Final distribution boards earthing conductors shall run from sub-distribution boards.

3.5. PROHIBITED CONNECTIONS

Neutral conductor, sprinkler pipes, or pipes conveying gas, water, or inflammable liquid, structural steel work, metallic enclosures or cables and conductors, metallic conduits and lightning protection system conductors shall not be used as a means of earthing an installation or even as a link in an earthing system. The electrical resistance of metallic enclosures for cables and conductors measured between earth connections at the main switchboard and any other point on

the completed installation shall be low enough to permit the passage of current necessary to operate fuse or circuit breakers and shall not exceed 1 ohm.

3.6. PROTECTION FROM CORROSION

Connections between copper and galvanised equipment shall be made on vertical face and protected with paint and grease. Galvanised fixing clamps shall not be used for fixing earth conductors. Only copper fixing clamps shall be used for fixing earth conductors. When there is evidence that the soil is aggressive to copper, buried earthing conductors shall be protected by suitable serving and sheathing.

3.7. EARTHING STATION

Plate Electrode Earthing: Earthing electrode shall consist of a tinned copper plate not less than 300mm x 300mm x 3mm thick as called for in the Schedule. The plate electrode shall be buried as far as practicable below permanent moisture level but in any case, not less than 4.2 meters below ground level. Wherever possible earth electrodes shall be located as near the water tap, water drain or a down take pipe as possible. Earth electrodes shall not be installed in proximity to a metal fence. It shall be kept clear of the buildings foundations and in no case shall it be nearer than 2 meters from the outer face of the wall. The earth plate shall be set vertically and surrounded with 150mm thick layer of charcoal, dust and salt mixture. 20mm GI pipe shall run from the top edge of the plate to the ground level. The top of the pipe shall be provided with a funnel and a mesh for watering the earth through a pipe. The funnel over the GI Pipe shall be housed in a masonry chamber, approximately 300mm x 300mm x 300mm deep. The masonry chamber shall be provided with a cast iron cover resting over a GI frame embedded in masonry. Refer Sketch for additional details.

Pipe Electrode Earthing: Earthing electrode shall consist of a GI Pipe (class 'A') Indian Tube Company make or approved equal not less than 40mm dia and 4.5 meters long. GI Pipe electrode shall be cut tapered at the bottom and provided with holes of 12mm dia drilled at 75mm interval upto 2.5 meters length from bottom. The electrode shall be buried vertically in the ground as far as practicable below permanent moisture level with its top not less than 1.25 M below ground level. The electrode shall be in one piece and no joints shall be allowed in the electrode. Wherever possible earth electrodes shall be located as near water tap, water drain or a down take pipe. Earth electrodes shall not be located in proximity to a metal fence. It shall be kept clear of the building foundations and in no case shall be nearer than 2 meters from the outer face of the wall. Refer Sketch for additional details.

The pipe earth electrode shall be kept vertically and surrounded with 150mm thick layer of charcoal dust and salt mixture upto a height of 2.5 meters from the bottom. At the top of the electrode a funnel with a mesh shall be provided for watering the earth. The main earth conductors shall be connected to the electrode just below the funnel, with proper terminal lugs and check nuts. The funnel over the GI pipe and earth connection housed in a masonry chamber, approximately 350 mm deep. The masonry chamber shall be provided with a cast iron cover resting over a CI frame embedded in masonry.

3.8. EARTH CONNECTION

All metal clad switches and other equipment carrying single phase current, shall be connected to earth by a single connection. All metal clad switches carrying medium voltage and high voltage shall be connected with earth by two separate and distinct connections. The earthing conductors inside the building wherever exposed shall be properly protected from mechanical injury by running the same in GI Pipe of adequate size.

Earthing conductors outside the building shall be laid 600mm below the finished ground level. The over lapping in copper strips at joints where required, shall be minimum 75mm. The joints shall be riveted and brazed with copper rivets and greased in approved manner. Sweated lugs of

adequate capacity and size shall be used for all termination of wires above 1 Sq mm size and bare copper wire above 2.0mm dia. Lugs shall be bolted to the equipment body after the metal body is cleaned of paint and other oily substance and properly tinned. The earth wires entering the Final Distribution Boards shall be terminated with copper sockets crimped to its ends and tightened to the terminal with the help of flat end brass screws.

3.9. EARTH RESISTANCE

The earth resistivity of the soil where the earthing stations are located shall be submitted to the Consultant before the earthing work starts and get the approval of the Consultant/Owner. If the earth resistance is too high and multiple electrode earthing does/not give adequate low resistance to earth, than the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions as directed by the consultants.

3.10. RESISTANCE TO EARTH

The resistance of each earth system shall not exceed 1.0 ohm in the case of Medium Voltage system and 0.5 ohm in the case of High Voltage system.

4 TESTING

- **GENERAL**

On completion of the work the entire installation shall be subject to following tests:

a) Wiring Continuity Test
b) Insulation Resistance Test
c) Earth Continuity Test
d) Earth Resistively Test

Besides the above any other test specified by the local Authority shall also be carried out.

All tested and calibrated instruments for testing, labour, materials and incidentals necessary to conduct the above tests shall be provided by the Contractor at his own cost.

- **TESTING OF WIRING**

All wiring systems shall be tested for continuity of circuits, short circuits and earthing after wiring is complete and before energising. The Test Certificates for the complete wiring shall be submitted in the Format and the Total Electrical Installation shall be got approved by the Electrical Inspector.

- **INSULATION RESISTANCE TEST**

The insulation resistance shall be measured by applying between earth and the whole system of conductors, or any section thereof with all fuses in place and all switches closed (except in concentric wiring) all lamps in position of both poles of the installation, otherwise electrically connected together, a direct current pressure of not less than twice the working pressure(provided that it does not exceed 660 volts for medium voltage circuits) be applied. Where the supply is derived from A.C. three phase system, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured as above shall not be less than 50 divided by the number of points on the circuit provided that the whole installation shall not be required to have an insulation resistance greater than one mega ohm. The insulation resistance shall not be measured between all conductors connected to one phase conductor of the supply and all the conductors connected to the middle wire or to the neutral or to the other phase conductors of the supply. Such a test shall be carried out after removing all metallic connections between the two poles of the installation and in these

circumstances the insulation resistance between conductors of installation shall not be less than that specified above.

The insulation resistance between the case of frame work of housing and power appliances, and all live parts of each appliance shall not be less than that specified in the relevant Indian Standard Specifications or where there is no such specification shall not be less than half a mega ohm.

- **TESTING OF POLARITY OF NON-LINKED SINGLE POLE SWITCHES**

In a two wire installation a test shall be made to verify that all non-linked single pole switches have been fitted in the same conductor through out, and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply. In the three or four wire installation a test shall be made to verify that every non-linked single Pole switch is fitted in a conductor to one of the outer or phase conductor of the supply. The entire electrical installation shall be subject to the final acceptance of the Consultant as well as the local authorities.

4.5. EARTH RESISTIVITY TEST

Earth resistivity test shall be carried out in accordance with Indian Standard code of practice for earthing IS:3043:1987. All tests shall be carried out in the presence of the Consultant/Owner.

4.6 TEST CERTIFICATES

The Electrical Installation shall be tested as per relevant Indian Standards and Test Certificate to this effect shall be submitted to the Owner. The Contractor has to get the Total Electrical Installation approved by the Electrical Inspector and the permission to energise the same shall be submitted to the Owner.

5 SAFETY REQUIREMENTS

5.1 **SCOPE**

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

5.2 **REQUIREMENTS**

Safety provisions shall be generally in conformity with the relevant Indian Standards and I.E. Rules and Regulations. In particular the following items shall be provided.

(a) Insulation Mats

Insulation Mats conforming to IS : 5424-1969 shall be provided in front of main switch boards and other control equipment as specified.

(b) First Aid Charts and First Aid Box

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

(c) Danger Plate

Danger plates shall be provided on HV and MV equipments. MV danger notice plate shall be 200mm x 150mm made of mild steel atleast 2mm thick vitreous enameled white on both sides and with inscriptions in signal red colour on front side as required.

(d) Fire Extinguishers

Portable CO2 conforming to IS: 2878-1976 dry chemical conforming to IS 2171-1976 extinguishers shall be installed in the sub-station at suitable places as specified.

(e) Fire Buckets

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

(f) Tool Box

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

(g) Caution Board

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

(h) Key Board

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

6.0 M V PANELS, SUB-DISTRIBUTION BOARDS & FINAL DISTRIBUTION BOARDS

6.0 The PANELSs shall be suitable for operation on 3 phase, 4 wire, 415 Volts, 50 cycles, neutral grounded at transformer and short circuit level not less than 31 MVA at 415 volts.

The PANELS shall comply with the latest edition of relevant Indian Standards and Indian Electricity Rules and Regulations. All PANELSs shall be fabricated by the contractor by using specified components as per the specifications given below:

6.1. CONSTRUCTION FEATURES

The PANELSs shall be metal enclosed sheet steel cubical, indoor, dead front, floor mounting type. The distribution boards shall be totally enclosed, completely dust and vermin proof. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof. PANELSs shall be preferably arranged in multitier formation. All doors and covers shall be fully gasketed with foam rubber and/or rubber strips and shall be lockable. All MS sheet steel used in the construction of PANELSs shall be 2mm thick and shall be cut to different sizes and bolted as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be bolted type and not welded type.

All covers shall be properly fitted and square with the frame, and holes in the PANELS correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with hank nuts. Self threading screws shall not be used in the construction of PANELSs. A base channel of 75mm x 40mm x 5mm thick shall be provided at the bottom. A minimum of 200 mm between the floor of MV PANELS & Distribution board and lower most unit shall be provided. The PANELS shall be of adequate size with a provision of 20% spare space to accommodate possible future additional switchgear in addition to spare feeders.

Knockout holes of appropriate size and number shall be provided in the PANELSs in conformity with the location of incoming and outgoing cables.

PANELSs shall be provided with removable aluminium plates at top and bottom to drill holes for cable entry at site.

The PANELSs shall be suitable for IP 42 protection.

6.2. CIRCUIT COMPARTMENTS

Each circuit breaker, MCCB and switch fuse units shall be housed in separate compartments and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duly interlocked with the ACB/MCCB/switch fuse unit in ‘on’ and ‘off’ position. Safety interlocks shall be provided for air circuit breakers to prevent the breaker from being drawn out when the breaker is in ‘on’ position. The door shall not form an integral part of the draw out position of the ACB. All instruments and indicating lamps shall not be mounted on the ACB compartment door. Sheet steel barriers shall be provided between the tiers in a vertical section. The Knobs for holding the cubicle door in closed position shall be spring operating rotating type and not screwed type.

6.3. INSTRUMENT ACCOMMODATION

Separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contractors and control fuses etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, bus bar and connections.

6.4. BUS BARS & BUS BAR CONNECTION

The bus bar and interconnections shall be of electrolytic Copper of 99.9 % purity of rectangular cross sections suitable for full load current for phase bus bars and full rated current for neutral bus bar and shall be extendible on either side. Minimum 200 Amps capacity bus bars shall be provided in the distribution boards. The bus bars and interconnections shall be insulated with PVC heat shrinking sleeves and colour coded. The bus bars shall be supported on unbreakable, nonhygroscopic insulated SMC supports at regular intervals to withstand the forces arising from short circuit in the system. All bus bars shall be provided in a separate chamber and properly ventilated. The current density of copper shall not be more than 1.6 Amps per sq.mm cross sectional area of Bus bar. If Aluminium bus bars are provided the current density of Aluminium shall not be more than 0.8 Amps per sq. mm cross section of Aluminium bus bar. Maximum allowable temperature for the Bus bar to be restricted to 85^0 C.

All bus bar connections in PANELS shall be done by drilling holes in bus bars and connecting by cadmium plated M.S. bolts and nuts . 20% Additional cross section of bus bars shall be provided in all distribution boards to cover up the holes drilled in the bus bars. Spring and flat washers shall be used for tightening the bolts.

Automatically operated safety shutters to screen the live cluster when the breaker is withdrawn from cubicle is to be provided.

All connections between bus bars and switches and between switches and cable alley terminals shall be through solid copper strips of proper size to carry full rated current and insulated with PVC heat shrinking sleeves . All the PANELSs shall be completely factory wired, ready for connection. All the terminals shall have adequate current rating and size to suit individual feeder requirements. Each feeder shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and feeders shall be distinctly marked with a small description of the service installed. Minimum width of busbar Alley shall be 300 mm and that of cable alley shall be 450 mm.

6.5. TERMINALS

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the PANELS front. The current transformer for instruments metering shall be mounted on the terminal blocks. Cable compartments shall be provided for incoming and outgoing cables with suitable bus bar extension and supports.

6.6. WIREWAYS

A horizontal wire way with screwed covers shall be provided at the top to take interconnecting control wiring between different vertical sections.

6.7. CABLE COMPARTMENTS

Cable compartment of adequate size shall be provided in the PANELSs for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate proper supports shall be provided in cable compartments to support cables. All incoming and outgoing switch/MCCB's terminals shall be brought out to terminal blocks in the cable compartment. The switch board shall have in each PANELS thermostatically controlled space heaters/ ventilation fans.

6.8. METERS

All meters shall be housed in a separate compartment and accessible from front only. Lockable doors shall be provided for the metering compartment. The details of other meters and indicating

lamps are as described in each switch board and neutral selector switch of appropriate range and scale. Wiring for meters shall be colour coded and labeled with approved plastic ferrules for easy identification. All meters shall be digital.

6.9. CURRENT TRANSFORMERS

Where ammeters are called for CT's shall be provided for current measuring more than 60 Amps. Each phase shall be provided with separate current transformer of accuracy class I and suitable V.A. Burden for operation of associated metering and Relays. Current transformers shall be in accordance with IS:2705-1964 as amended upto date and Cast Resin Type. Tape wound CTS are not acceptable. The name plate of CT's. Shall be fixed in such a way it can be easily readable without dismantling.

6.10. INDICATING PANELS AND METERING EQUIPMENT

All meters and indicating instruments shall be accordance with relevant Indian Standards. The meters shall be flush mounted and drawout type. Indicating lamps shall be neon type and of low burden. Indicating lamps shall be backed up with fuses of 5 Amps and toggle switch.

6.11. EARTHING

Copper earth bars of 25mm x 3mm shall be provided for all PANELS for the full length and connected to the frame work of the PANELS.

Provision shall be made for connection from this earth bar to the main earthing bar on both sides of the PANELS.

6.12. PAINTING

All sheet steel work shall under go a process of degreasing pickling in acid, cold rinsing, phosphating, passivating and then sprayed with a high corrosion resistant primer. The primer shall be baked in an oven. The finishing paint treatment shall be by powder coating.

6.13. LABELS

Engraved anodized aluminium labels shall be provided on all incoming and outgoing feeder switches. Circuit diagram showing the control wiring shall be pasted on inside of the PANELS door and covered with transparent laminated plastic sheet. The Label shall indicate the name of the feeder, the specific area it is feeding, ampere rating and the cable size it is receiving. The Labels shall be provided on the backside of the PANELS in case of back access.

All the PANELS shall be subject to tests specified in relevant Indian Standards and test certificate shall be furnished.

6.14. SHOP DRAWING

Before fabricating the PANELS the contractor has to submit shop drawing showing the general arrangements, bill of materials and the wiring diagram for all the PANELS to the Consultant and get approval from the Consultant.

6.15. INSPECTION

At all reasonable times during production and prior to shipment of equipment the contractor shall provide and secure for Consultant/ Owners representative every reasonable access and facility at their plant for inspection.

6.16. TEST CERTIFICATES

Testing of PANELSs shall be carried out at factory and at site as specified in Indian Standards. The test certificates for the tests carried out at factory shall be submitted in duplicate.

6.17 MINIATURE CIRCUIT BREAKER (MCB)

Miniature circuit breaker shall be quick make and break type and confirm with Indian Standards IS : 8828 – 1978 (Specifications for Miniature Air Break Circuit breakers for voltage not exceeding 1000V) The housing of MCB's shall be heat resistant and having a high impact strength. The fault current of MCB's shall not be less than 9000 Amps at 230 volts. The MCB's

shall be flush mounted and shall be provided with trip free manual operating mechanism “ON” and “OFF” indications.

The MCB contacts shall be silver nickel and silver graphite alloy coated with silver. Proper arc chutes shall be provided to quench the arc immediately. MCB’s shall be provided with magnetic fluid plunger release for over current and short circuit protection. The over load or short circuit devices shall have a common trip bar in the case of DP and TPN Miniature circuit breakers. The MCB shall be tested and certified as per Indian Standards prior to installation.

6.18 LV MCCB (Moulded Case Circuit Breakers)

6.18.1 General

1. Moulded case circuit breakers shall be incorporated in the switch board wherever specified. MCCB shall conform to the latest IEC 60947-Part 1&2 & IS 13947:1993 in all respects.
   - They shall be of Category A with a rated service breaking capacity (Ics) rating.
   - MCCBs shall be available in fixed or plug-in/withdrawable versions as well as in 3-pole and 4-pole versions. For plug-in/withdrawable versions, a safety trip shall provide advanced opening to prevent connection and disconnection of a closed circuit breaker.
   - MCCBs shall be designed for both vertical and horizontal mounting, without any adverse effect on electrical performance. It shall be possible to supply power either from the upstream or downstream side
   - MCCBs shall provide class II insulation (according to IEC 60664-1 standard) between the front and internal power circuits.
   - Rated insulation voltage shall be 750V AC (50/60 Hz).
   - The circuit breaker shall comply with the isolation function requirement of IEC 60947-2 section 7.1.2 to marked as suitable for isolation/disconnection to facilitate safety of operating personnel while the breaker is in use.
   - All MCCBs required as per BOQ shall have Ics – rating not Icu rating.

1.

- **Construction**
  - For maximum safety, the power contacts shall be insulated in an enclosure made of a thermosetting material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries.
  - The operating mechanism of MCCBs shall be of the quick-make, quick-break type with fault tripping overriding manual operation. All poles shall operate simultaneously for circuit breaker opening, closing and tripping
  - MCCBs shall be actuated by a toggle or handle that clearly indicates the three positions: ON, OFF and TRIPPED in order to ensure suitability for isolation complying with IEC 60947-2
  - The operating mechanism shall be designed such that the toggle or handle can only be in OFF position if the power contacts are all actually separated, in OFF position, the toggle or handle shall indicate the isolation position. Isolation shall be provided by a double break on the main circuit

- MCCB shall be equipped with a “push to trip” button in front to test operation and the opening of poles.

6.18.4 Current Limiting, Discrimination & Endurance

- MCCBs shall comprise a device, designed to trip the circuit-breaker in the event of high-value short-circuit currents. This device shall be independent of trip unit.
- The electrical endurance of MCCBs, as defined by IEC 60947-2 standard, shall be at least equal to 3 times the minimum required by the standard
- The MCCB shall employ maintenance free double break contact system to minimize the let-through energies and capable of achieving discrimination up to the full short circuit capacity of the downstream MCCB.The manufacturer shall provide both the discrimination tables (with test certificates) and let-through energy curves.

6.18.5 Accessories

MCCB shall be provided with the following accessories, as specified in schedule of quantities.

i) Under voltage trip
ii) Shunt trip
iii) Alarm switch
iv) Auxiliary switches

All the accessories shall be rated for continuous operation. These Auxiliaries shall be common for the similar type and range of MCCBs.

It should be possible to fit MCCBs with a motor mechanism for electrically controlled operation.

6.18.6 Interlocking

Moulded, case circuit breakers shall be provided with the following interlocking devices.

a) Extended door handle.
b) Handle interlock to prevent unnecessary manipulations of the breaker.
c) Door interlock to prevent the door being opened when the breaker is in ON position.
d) Defeat-interlocking device to open the door even if the breaker is in ON position.

The MCCB shall be current limiting type and comprise of quick make – Break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. All MCCBs shall have adjustable short circuit pick-up.

The trip command shall override all other commands.

Protection Functions Wherever Spec-

ified

26.

- All the MCCBs shall be with microprocessor based trip units with adjustable Overload & Short circuit protection . Earth fault/Earth leakage protection shall be provided in the MCCB.
- Trip units shall be fully interchangeable type and it should be possible to upgrade the trip unit anytime without any modifications in the installation.
- In case of overload, Pre alarm indication shall be provided on the MCCB.

1.

- Trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings.
- Trip units shall comply with appendix F of IEC 60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc.)

1.

- Protection settings shall apply to all circuit breaker poles.

1.

- Trip units shall be equipped with Thermal memory feature to reduce the stress on the installation in case of repetitive overloads.
- All electronic components shall withstand temperatures up to 125 °C.

1.

2. **6.18.7 Testing**

3.

4.

a) Original test cert

a. P

re-commissioning tests on the switch board PANELS incorporating the MCCB shall be done as per standard specifications.

1.

2.

7. PUBLIC ADDRESS DEVICES

7.1 Speakers:

All speakers shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts.

Speaker in corridors and public spaces shall produce a nominal sound output of 84 dBA at 3 meter.
Frequency response shall be a minimum of 400 HZ to 4000 HZ.

The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

- **Fixed Emergency Telephone Handset**

The telephone cabinet shall be painted red and clearly labeled as “Emergency Telephone”. The cabinets shall be located where shown on drawings.

The handset cradle shall have a switch connection so that lifting the handset off of the cradle shall send a signal to the fire command center which shall audibly and visually indicate its on-line (off-hook) condition.

On activating the remote phone, the phone earpiece shall sound a telephone ring signal until the master handset is lifted.

The two-way emergency telephone system shall support a minimum of seven (7) handsets on line without degradation of the signal.

POINT WIRING

The rates for all point wiring items shall include:

1. Conduits, Conduit specials, bushes and other fittings concealed or exposed as called for.

2. Embedding conduit and allied fittings including the outlet boxes in walls, floors etc., during construction and/or in chases including cutting chases and making good with cement mortar as necessary in the case of concealed conduit work.

3. Providing and fixing approved fixing devices, saddles and grouting the same as required for exposed conduits.

4. Fabrication and Supply of G.I .boxes for switches, ceiling fan hooks, Exhaust fans outlet and lighting fixtures with 1.6 mm thick sheet steel.
5. Providing and fixing junction boxes with 3mm Hylam or 3mm/5mm thick Perspex sheet cover duly painted from inside to match the colour of the walls. All Junction boxes shall be MS only.
6. All fixing accessories such as clips, brass screws/brass washersrawl plugs etc.

7. All work & material necessary (including circuit wiring from DB to first tapping point of each circuit with 2.5 sq. mm wires) in complete wiring of a switch circuit of any length from the distribution board to the following via the switch:
   a) Ceiling rose b) Connector c) Back plate d) Socket outlet e) Lamps Holder f) Any other terminal outlet boxes g) Ceiling fan and Exhaust fan

8. Switch, socket outlet as called for.
9. Cable/wire as required upto lamp holder.
10. All metal boxes and boards concealed or surface mounted including those required for housing fan regulators.
11. All accessories necessary to complete wiring as specified.
12. FRLS PVC Insulated stranded Copper conductor earth wire for fixtures, switch outlet boxes and third pin of 5/15 Amps. socket to common earth.

13. Painting all exposed M.S. conduits, outlet boxes and junction boxes.
14. M.S. conduit for concealed and exposed wiring.

15. 2 mm dia G.I. pull wires in conduit work, wherever necessary.
16. The switch plate shall be made of I.S.I. grade Urea Formaldehyde Moulding powder. The base of the switches shall be made from high heat resistant phenol formaldehyde powder. The cost of switches shall include the cost of cover plates, cadmium fixing screws etc.
    The switches/sockets shall be rocker operated.
17. Separate Earth wire shall run along with each circuit both for power and light circuits.
18. Cutting of floor and making good for carrying conduits also.
19. Numbering of Circuits with ferrules for all circuits at both ends.

1. Providing 15 Amps capacity Bakelite terminal Blocks for terminating the phase, neutral and earth wire at each fixture location.

1. PVC insulated copper conductor wire ends before connection shall be properly soldered (at least 15 mm length) with special Cu solder for copper conductor or shall be properly crimped with copper lugs/sockets as the case may be. Strands of wires shall not be out for connecting to the terminals. All stands of wires shall be soldered at the end before connection. The connecting brass-screws shall have flat ends. All looped joints shall be soldered and connected through terminal block/connectors.
2. Provide embossing on the sockets engraving "UPS" and "RAW"

EARTHING

The rates for earthing items include:

1. All fixing accessories such as brass saddles, brass screws, raw plugs etc.

2. Jointing by riveting in case of copper earth strips (2 per joint) and by welding in case of GI strips.

3. Cutting chase, making holes and making good the same wherever required.

4. All masonry work including earth work for earthing stations, earthing tapes and wires.

5. Effecting adequate and proper interconnections.

6. Use of copper thimbles for all wire terminations in the Distribution Boards, switches and sockets.

CABLES, MAINS AND SUB-MAINS

The rates for all items of work shall include:

1. Embedding conduits and allied fittings in walls, floors, etc., during construction and/or in chases including cutting chases and making good as necessary in the case of concealed conduit work.

2. Providing and fixing approved saddles, hangers, trays etc., and grouting the same as required for exposed conduits where called for. Providing dash fasteners for the threaded MS down rods(primer coated) used for hanging the cable \trays.

3. Providing and fixing junction boxes with 5 mm thick 'Hylem' sheet covers.

4. Effecting adequate and proper connections at terminations.

5. Ensuring that provision is left in various buildings components and trenches as the work proceeds, for incorporation of cable supports at a later date.

6. Providing all fixing accessories such as clamping devices, nuts and bolts, screws etc.

7. Clamping to supports where laid in trenches.

8. Excavation of trenches and bringing the trenches to exact level as required.

9. Providing sealing compound, thimble, solder etc., at joints and terminations as called for.

10. Providing proper supports for cable terminal boxes as called for.

11. Wherever cables pass through walls, ceiling, paved area or below roads provide sleeves/ hume pipes and making good as necessary.

DISTRIBUTION BOARDS

The rates for the following items of work generally include :

1. The supporting rigid steel frame work.

2. 1.6 mm thick MS boxes complete with dust proof and vermin proof covers and locking arrangements, mounted flush with surfaces.

3. All fixing accessories such as dash fasteners , bolts, nuts, screws, etc. as required.

4. Building into masonry/ concrete work including all necessary cutting and grouting with cement mortar 1:2.

5. Effecting adequate and proper connections.

6. Effecting proper bonding to earth.

7. Painting/ lettering on switches and distribution boards the location they serve and providing on each board its circuit diagram.

8. Touching up all damaged paint over exposed work with one coat of red oxide primer and two finishing coats of approved synthetic enamel paint.

9. Main Distribution Board and Final Distribution Boards shall be fabricated by Contractor with the specified equipment.

1. Provide 6 Amps. SP MCB for Light Points Circuits, 20 Amps.

SP MCB for Power Circuits and 32 Amps. SP MCB for 1.5 Ton AC Unit .

SUPPLY & FIXING OF LIGHTING FIXTURES

The rate for fixing of lighting fixtures and fans shall include:

1. Receiving the fixtures from the Owner's stores and assemble the same at site and testing the fixture before fixing.

2. All components that may be required to make the installation complete in all respects such as:

   a. Suitable length of down rod, hanger and connecting wires, where called for.

   b. Wires for connecting the fixtures to the point through connector blocks.

   c. All wood and metal blocks to serve as base of fixtures.

   d. Bonding with common earth wires.

3. Drilling holes in supports where required.

4. Fixing clamps, GI bolts and nuts, clips, brass screws, dash fasteners and other fixing accessories as required, including leaving necessary provision for fixing at time of concreting.

5. Approved enamel painting for hanger rods, clamps and other components and fixing accessories as called for.

6. Testing and commissioning of all fixtures and fans after installation.

7. The lighting fixtures shall be suitable for 230 Volts, single phase 50 cycles A.C. supply system.

1. Incandescent lamps shall be 100 Watts (maximum) and fluorescent lamps shall be 18 watts and 36 watts.

9. Use G.I. suspenders and clamping to the slab with dash fasteners (4 per fitting), including turn buckle arrangements for adjustable heights for hanging. They should be the same suspenders as used for hanging the False Ceiling grid ceiling.

10. The contractor to mark the size of light fittings, speaker and fire alarm components on the false ceiling for the interior contractor to cut holes.

SPECIFICATIONS

- All the works specified and provided for in the tender/ schedule and drawing or which may be required to be done in order to perform and complete any part there of shall be executed in accordance with the technical specification, workmanship, quality control, as prescribed whether enclosed/ not enclosed in this document, in the specification & codes, with up to date amendments, in the following order:-

  a) CPWD/ DSR

  b) IS (BIS) Codes

- All works under this contract (wherever grey cement is used) have to be executed in OPC.

- The quantities given in the tender are approximate. However the payment shall be made on the basis of actual measurements taken on site and in conformity with CPWD Specification and BIS Codes. It is clarified that all quantities are subject to change and no claims whatsoever on this behalf shall be entertained.

- All materials used in the works shall be of their respective kind and quality specified in the tender document or approved by the SBI and/ or Architect and shall comply strictly with the requirements of the latest specifications of CPWD and Indian Standard Codes.

- The work shall be executed and measured as per metric dimensions given in the Schedule of Quantities, Drawings etc. (FPS units wherever indicated are for guidance only).

Signature of Contractor & Seal

SPECIFICATIONS FOR SERVICES

- **General**

1.1 The drawings for services are diagrammatic but shall be followed as closely as actual construction permits. Any deviations from the drawings shall be in conformity with Consultant and structural drawings. The dimensions designated by the manufacturers shall take precedence over the drawings.

- At completion of work the Contractor shall submit one set of tracings and two sets of prints of "As-Built-Drawings". These drawings shall, among others, include invert levels, pipe runs, diameters, location of valves, access panels, layout of equipment, piping connections and such other information for maintenance & future extensions. Guarantees given by manufacturers shall be assigned to the Employer along with names & addresses of manufacturers, suppliers and information about spare parts.
- All site test shall be carried out with prior intimation to the Bank Engineer/ Consultant. All defects shall be rectified and tests conducted again to the satisfaction of the Bank Engineer / Consultant. In addition to the test required by the specifications, the Contractor shall also conduct tests required by the Consultant and by the Municipal or other Authorities.
- All work shall be executed by competent and licensed persons. The contractor shall maintain liaison with Municipal and other controlling Authorities. He shall obtain their approvals and certificates as required by the bye – laws at appropriate stages.
- No cutting / chasing shall be done in load bearing structural members without prior approval of the Asstt. Engineer. Sleeves and openings shall be provided during the progress of construction in preference to cutting at later date.
- The Consultant may require typical mock up(s) to be installed in advance for approval. Undamaged materials from the mock up shall be allowed to be reused in the work.
- Unless otherwise described in the item CI / SCI pipes and fittings shall be a spigot and socket type.
- G.I. pipe spouts shall be paid as per item of G.I. pipes (internal work). Cutting and making good is included. The free ends may be skew-cut.
- Wherever use of G.I. pipes is called for the same shall be medium class (class – B)

- **<u>Materials :</u>**

2.1 The materials shall conform to the specifications and in absence thereof to Indian Standards. The products should bear the ISI Mark.

2.2 The makes of materials for use in this work are broadly approved as per list given below. The Contractor shall, however, get particular makes and samples approved before ordering:

2.3 Notwithstanding any interim or final approval the Contractor remains responsible for satisfactory performance of all fittings & fixtures. The liability of the Contractor is not limited by any approval of the make of materials.

2.4 The item rate of mirror includes extra packing piece of AC plain sheet, where required due to off set between plaster & glazed tiles surface.

- **<u>Testing</u>**
- The sand cast iron soil, waste and vent pipes and fittings including joints shall be tested by pumping smoke into the pipe at the lowest end.

- All G.I pipes and fittings including joints shall be tested to hydraulic pressure of 6 kg / cm2 (60 meters) avoiding water hammer. The test pump having been stopped the test pressure should maintain without loss for at least half an hour. The pipes and fittings shall be tested in sections as the work of laying proceeds keeping the joints exposed for inspection during the testing.
- All stone ware pipes shall be tested with water pressure of 1.5m head of water at the highest point of the section under test.

SPECIAL CONDITIONS OF CONTRACT (HVAC)

PART- I

1.0 QUALITY ASSURANCE OF MATERIALS AND WORKMANSHIP

1.1 Materials

The contractor will supply the equipments as indicated in the list of approved makes in the tender. Furthermore, all equipments must strictly conform to the relevant IS code specified in the tender. However, the contractor shall submit Vendors data in the approved format and obtain prior approval from the Engineer in-charge before placing the orders for these equipments. All the materials brought to the site shall correspond with the approved samples. All the rejected material should be removed from the site of work, without delay.

The contractor shall furnish test certificates of the materials procured for the work. Testing of materials shall also have to be done at contractors cost as and when necessary and required by the Engineer in-charge. If the test result of any material does not comply with the results stipulated in the relevant latest IS code, the materials shall be rejected and no claim shall be entertained on any account what so ever.

Where manufacturer have furnished specific instructions relating to the materials used in this job and covering points not specifically mentioned in these documents, manufacturer's instructions shall be followed.

1.2 Quantum of Materials to be ordered

The Schedule of Rates shall not be used as a basis for ascertaining the quantum of materials to be ordered. The Contractor shall be his own resources to assess the quantities of materials to be ordered and shall be entirely responsible for the same.

1.3 Manufacturer Instruction

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

2.0 INSTALLATION INSPECTIONS & TESTING

2.1 When the installation is deemed by the Contractor to be complete, he shall arrange with the Engineer in-charge for inspection and testing of the installation. Test results shall be recorded in the format approved by the Engineer in-charge. An installation shall not be accepted until the Engineer in-charge is

satisfied about its compliance with the requirements of the specifications and performance of the system.

The Contractor shall cause interim/stage inspection during execution of the works as and when so called for and carry out any rectification / modification as may be suggested by the Engineer in-charge.

Soon after the work is completed, the Contractor shall inform in writing to the Engineer in-charge for getting the complete system including all sub-systems and instrumentation, control panels etc. thoroughly inspected and tested for satisfactory performance. After satisfactory completion of tests of the system by the Engineer in-charge, the Contractor shall be required to carry out all start up trails of the system provided by him.

Any defects noticed during these tests shall be speedily rectified by the Contractor without any extra claim /cost.

All instruments and materials including consumables required for testing shall be the responsibility of the Contractor.

2.2 Balancing of all air and all tests as called for in the specifications shall be carried out by the contractor in accordance with the specifications and relevant local codes if any. Performance test shall consist of seven days operation of system for each season.

Testes shall be carried out in peak summer and monsoon season

The results for summer/monsoon and winter air conditioning in duplicate shall be submitted for scrutiny. Two copies of the certified manufacturers performance curves for each piece of equipment shall be submitted along with the test results. The contractor shall also provide two copies of record of all safety and automatic control settings for the entire installation.

The contractor shall pay for the arrange, without any extra cost to the Employer, all necessary balancing and testing equipments, instruments, materials, accessories, refrigerant and the requisite labour. Any defects in materials and/or in workmanship detected in the course of testing shall be rectified by the contractor, entirely at his own cost, to the satisfaction of the Engineer in-charge.

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.

2.3 All civil works like foundations for the equipment, breaking and making good of openings for pipes and ducts shall be carried out by Air-conditioning Contractor and nothing extra shall be paid on this account.

3.0 STANDARD OF WORK

The work shall be carried out to the satisfaction of the Engineer in-charge and in accordance with the regulations of the Electricity Supply Authority, the Fire Insurance Company insuring the building, Electricity Rules and other local Regulations and the enclosed specifications.

4.0 PRICES

The prices to be quoted by the Tenderer shall include the supply, installation, testing & commissioning of all the Equipment, Ancillary material, associated Civil and Service Works, and other items, what-soever required for carrying out the job, to fulfill the intent and the purpose as laid down in the Specifications and /or the Drawings. The tendered price shall be deemed to include all nuts, bolts, shims, clamps, supports, etc., as required for proper fixing and/or grouting of Equipments, ancillary items, etc. whether specifically mentioned or not. The Contractor shall also include, in his prices, all taxes, duties, other levies, (viz. excise duty, customs duty, sales tax, works contract tax, octroi etc.) which are legally leviable on the Air Conditioning plant and installation entailing the Contractor to any extra claims from the department. The Contractor's rates shall remain firm and fixed during the currency of the Contract. However, the price shall be subject to adjustment, in case of variation in the rate of excise or customs duty due to an act of legislature, within the originally agreed period for the completion of work.

5.0 SHOP DRAWINGS

5.1 Before proceeding with the work, the Contractor shall submit for approval, general layout and assembly drawings and such additional assembly and sub-assembly detailed drawings as necessary to demonstrate fully that all parts of the apparatus to be furnished will conform to Specifications. These Drawings will include plant room layouts, required to complete the project as per specifications and as required by the Engineer-in-Charge/ Consultant. These drawings will contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, as also the details of all related items of work by other Contractors. Each item of equipment proposed shall be a standard catalogue product of an established manufacturer as per specifications.

5.2 When the Engineer-in-Charge/Consultant makes any amendments in the above drawings, the Contractor shall supply fresh sets of drawings with the amendments duly incorporated, along with the drawings on which corrections were indicated.

5.3 The Contractor shall furnish for checking and scrutiny advance sets of prints of the layout, assembly and erection drawings. No modifications shall be made in the drawings after they have been approved by the Engineer-in-Charge/consultant without his prior consent. All drawings necessary for assembly, erection, maintenance, repair and operation of the equipment shall be furnished. Different parts shall be suitably numbered for identification and ordering of spare parts.

5.4 No material or equipment may be delivered or installed at the job site until the Contractor has in his possession, the approved Shop Drawings for that particular material or equipment.

5.5 The Shop Drawings shall be submitted for approval sufficiently in advance of the planned delivery and installation of any materials, to allow the Engineer-in-Charge ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce Shop Drawings at the right time, in accordance with the approved program.

5.6 After approval of the drawings, the Contractor shall furnish a set of tracings of the approved Drawings.

5.7 Approval of Drawings by the Engineer-in-Charge shall not relieve the Contractor of any part of his obligation to meet all the requirements of the Contract or of the correctness of his drawings. The Contractor shall be responsible for any pay for all alterations of the works due to discrepancies or omission in the drawings or other particulars supplied by him, whether such drawings have been approved by the Engineer-in- Charge or not.

5.8 The drawings prepared, and the allocated position for equipment's represents a feasible scheme. The layout in the equipment room may be re-arranged only in the allocated space, subject to the approval of the Engineer-in-Charge/Consultant.

5.9 Where the work of the Contractor has to be installed/executed in close proximity to, or will interfere with the work of other trades, the Contractor executed shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Engineer-in-Charge, the Contractor shall prepare composite working drawings and sections at a suitable scale, clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make all the necessary changes without extra cost to the purchaser.

5.10 On completion of work contractor shall provide soft and two sets of hard copies of as- built drawings

6.0 VIBRATION ISOLATION AND NOISE LEVEL

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. The provision shall be made for vibration isolation of minimum 90% efficiency. Abnormal vibration and noise level conditions shall be corrected by the Contractor at his own expense.

7.0 TECHNICAL DATA

The Tenderers must submit the technical data along with catalogue, literature, and manufacturer's manual for all items as listed in Tender (Technical Specifications) in the indicated format, and submit along with their Tenders. Failure to furnish Technical Data with Tenders may result in summary rejection of Tenders.

8.0 GUARANTEE

8.1 The contractor shall guarantee that all the material, machinery and components supplied, fabricated, designed and installed by him shall be free from defects due to fault design material and/or workmanship, that the plant shall perform satisfactorily specifically the successful performance of the system in monsoon and summer and the efficiency of the system and all the components shall not be less than the values laid down in the specifications and the capacities shall be within +/- 3% of the specified values, in case of deviation greater than +/- 3%, the contractor shall replace the necessary components at no extra cost or alternately the employer shall be entitled to deduct a proportionate amount from payments due to the contractor.

8.2 The period of the guarantee shall be (12) twelve months from the date of first running tests. During which period any or all components found to be defective shall be replaced or repaired free of charge and any shortcomings found in the system as specified shall be removed at no extra cost. The contractor shall provide the necessary personnel and tools for fulfilling the above guarantee.

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

9.0 MAINTENANCE & TRAINING

9.1 The maintenance for a period of 12 months from handing over of the plant shall be included under the warranty.

9.2 The Contractor shall associate, during the erection and during the Defects Liability Period with the purchaser staff/department`s staff to familiarize them with the operation and maintenance of the plant.

9.3 If required by the Engineer-in-Charge the Contractor shall agree to train members of the purchaser maintenance staff either at his or the sub- Contractor's work or at such other place or places as may be considered suitable by the Engineer-in-Charge.

10. Maintenance Manual on Completion of Work

Contractor shall provide 2 sets of hard bound operation and maintenance manual duly approved by engineering in charge/consultant. Each set shall also contain as built drawings.

11. Spares

Contractor shall provide a list of recommended spare parts for operation and maintenance of equipments for a period of 3 years.

WORKS & SERVICES TO BE EXECUTED BY OTHER AGENCIES

The following associated works and services are excluded from Scope of this contract and shall be executed by other agencies in accordance with Contractors approved shop drawings.

a) Provision of 415 volt, 3 phase power at main panel and all indoor unit. 220 volt 1 phase supply /Exhaust Fans.

b) False ceiling work

1. CODES & STANDARDS.

1.1 All air conditioning equipments for the project shall meet energy efficiency criterion employing environment friendly HFC requirements based on latest state of art technology.

1.2 ASHRAE Standards and hand books.

1.3 National building codes of India.

1.3 Indoor air quality as per ASHRAE 62.1-2007.

1.4 Motors, cabling, wiring and accessories as per BIS Codes/ I.E. Rules/National Building Code.

Appendix-1

2. BASIS OF DESIGN.

2.1 LOCATON OF SITE DELHI

2.2 AMBIENTDESIGN CONDITIOINS

Outdoor ambient conditions as detailed below are based on weather data Compiled and published by ISHRAE corresponding to 0.4% annual frequency Of occurrence.

SUMMER

DRY BULB Temperature 41.5 deg. C (107.5°F)

Mean Coincidental WET BULB Temperature 23.6 deg. C (75°F)

MONSOON

WET BULB Temperature 28.05°C (83°F)

Mean Coincidental DRY BULB Temperature 33°C (92° F)

WINTER

DRY BULB Temperature 6.0deg.C (42.8deg. F)

Mean Coincidental WET BULB Temperature 5.2deg.C (41.4deg.F)

2.3 **INDOOR AIR QUALITY**

One stage filtration of normal cleanable filters upto 10 micron particle size

2.4 **FRESH AIR**

Fresh air quantities for Air conditioning areas are as in accordance with ASHRAE Indoor air quality standard

LIGHTING LOAD As per NBC

EQUIPMENT LOAD As per NBC

2.5INSIDE CONDITION

Roof Insulation

ROOM Temperature 24deg.C (75deg.F)±1.1deg.c(2 deg.F)

Relative Humidity 50% - 60% (Not more than 60%)

3.1PROPOSED SYSTEM

VRV System of Air conditioning is proposed in view of variation in occupancy and time duration for optimum use of energy requirement. The system has an added advantage of Heating in Winter in addition to cooling in Summers at a very negligible cost as the equipment has built-in feature .

SERVER room are provided withadditional Split unit as independent STANDBY.

4.0 The area wise cooling loads and proposed cooling units are as follows

Cooling Load Summary

S.NO.	Description	FLOOR	Area Sq. Ft.	Dehumidified CFM	REQUIERD TR	TR
1	WAITING AREA	FF	333	953	2.58	2.58
2	BST & HLST STAFF	FF	437	1093	2.93	2.93
3	AUDITOR +STAFF	FF	318	883	2.95	2.95
4	NPA-1-2-3	FF	281	796	2.48	2.48
5	EXPENSION AREA	FF	1012	2530	5.06	5.06
6	MAINTANANCE	FF	143	502	1.26	1.26
7	CONFERENCE ROOM	FF	416	1113	3.65	3.65
8	PROPOSED STRONG ROOM	FF	1090	2725	6.73	6.73
	FIRST FLOOR TOTAL		**4030**	**10594**	**28**	**28**

5.0 COOLING LOADS

5.1 CONSIDERING UTILITY/DIVERSITY FACTORS OF

a) FIRST FLOOR the cooling load 20TR

20 TR

5.2 CAPACITY OF PLANT

To meet theabove coolingloads a total of 24 HP outdoor units are proposed.

6.0 EQUIPMENT LAYOUT

The outdoor units shall be located at Terrace and Indoor units are located in individual area.

The indoor and outdoor units are connected by suitable copper pipes and control wiring. Thestarting and stopping of units shall be by remote controllers. The condensate drains shall be terminated at nearest building drain points.

6.1 POWER REQUIREMENT

Electrical Power for OUTDOOR units shall be 28 KW of 415V/3/50Hz and INDOOR units shall operate on 230V/1/50Hz from power points in rooms. The total power requirement shall be 41KW including power for INDOOR units

7.0 VENTILATION

The following shall be provided with mechanical ventilation

a) Toilets 12 Air changes/hour for each toilet.

Technical Specification

PART-II AIRCONDITIONING SYSTEM

1.0 SYSTEM DESCRIPTION

1.1 All area

VRV system provides for air-conditioning for all area with multi indoor units with single outdoor unit. Each indoor unit connected to dedicated outdoor units

1.2 Outdoor unit

Outdoor units for all area are located on terrace/stilt level.

1.3 The Refrigerant Piping

Insulated refrigerant piping interconnecting outdoor and indoor units shall be routed as shown in lay-out drawing.

1.4 Drain Piping

Insulated drain piping shall be terminated at nearest drain point or nearby shaft through pipe

VARIABLE REGRIGERANT FLOW SYSTEM

1. SYSTEM

The Variable Refrigerant Flow (VRF /VRV R 410a refrigerant) System should be air cooled, spilt type air conditioning systems consisting of modular condensing units connected to multiple indoor units, each having the capability of individual set point control. Each modular condensing unit should incorporate at least one inverter control scroll/Rotary compressors to obtain 10% to 100% step less capacity control for enhanced Power saving. The indoor units should be provided with Cordless Remote Control as a standard accessory.

The VRF/VRV units shall be capable of operating within a wide range of ambient temperatures. The Condensing units should be capable of provide cooling within an ambient range of -5 Deg. C to 45 Deg. C DB and heating in the range -10 Deg. C to 15 Deg. C DB.

The refrigerant piping shall be extendable minimum 150 m with 50 m level without any oil trap. Ambient conditions.

2. OUTDOOR UNIT

2.1 The outdoor unit shall be a factory assembled unit housed in a sturdy weather proof casing constructed form rust-proofed mild steel panels coated with a baked enamel finish. The ODU must deliver 100% cooling capacity at 49Deg C ambient Temperature.

The outdoor unit shall have multiple scroll / Rotary compressors and be able to operate even in case of breakdown of one of compressors.

The noise level shall not be more than 68 dB(A)at normal operation measured horizontally 1m away and 1.5m above ground.

The outdoor unit shall be modular in design and shall be allowed for side by side installation.

2.2. Compressor

The compressor shall be of inverter type highly efficient hermetic Vapor Injection Scroll/rotary capable of capacity modulation by time averaging method & Vapor injection Technology. Each ODU should have minimum 1 no. variable compressor upto 12 HP capacity.

2.3 Heat Exchanger

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminium fins to form a cross fin coil. The aluminium fins shall be covered by anti-corrosion resin film. The System must have sub-cooling heat exchanger further to Condenser to increase refrigerating effect in Indoor units.

2.4 Fan Motor Speed Control

The condensing unit fan motors to have at least two speed operations to maintain constant head pressure control in all ambient temperatures and modes of operation.

2.5. Refrigerant Circuit

The refrigerant circuit shall include an accumulator, liquid and gas shut off valves and a solenoid valves or pulse width modulation valve.

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

2.6 Safety Devices

The following safety devices shall be part of the outdoor unit;

High Pressure Switch, Low Pressure Switch, Fan Motor Safety Thermostat, Over Current Relay, Fusible Plugs, Fuses.

2.7 Oil Recovery System

Each unit shall be equipped, with an oil separator to ensure stable operation with long refrigerant piping.

3. INDOOR UNIT

3.1 Indoor unit shall be mix-match of duct type . It shall have electronic control valve to control refrigerant flow rate in response to load variations of the room. The fan shall be of the dual suction multi blade type and statically and dynamically balanced to ensure low noise and vibration free operation.

3.2 The address of the indoor unit shall be set automatically in case of individual and group control. In case of centralized control, liquid crystal remote controller shall set it.

3.3 Electronic Expansion Valve

Each indoor unit shall be fitted with an electronic expansion valve to control the refrigerant flow in response to the load variations in the room. The electronic expansion valve is to be controlled via a computerized control sensing the return air temperature, refrigerant inlet and outlet temperatures. During the cooling operation the electronic expansion valve shall control the refrigerant superheat degree at the evaporator.

3.4 Indoor Unit Fans

Shall be direct driven of the DIDW multi-blade type, statically and dynamically balanced to ensure low noise and vibration free operation. The noise level shall not exceed 45dbA.

3.5 Cooling Coils

Shall be direct expansion, constructed from copper tubes expanded into aluminium fins to form a rigid mechanical bond.

4. CABLING BEWTEEN INDOOR AND OUTDOOR UNITS

The cable between indoor and outdoor units shall run in GI conduit.

5. REFRIGERANT PIPEWORK:

5.1 Scope of Refrigerant Piping work shall include Supply, installation, testing and commissioning of all interconnecting pipe-work between the condensing unit & indoor units. Refrigerant quality seamless copper tubes with brazed connections and the appropriate Distribution joints and headers shall be used. The piping should be routed at site in such a manner, that brazed joints in the Refrigeration Piping are kept to a minimum.

5.2 Joint Orientation:

Proprietary Distribution refrigeration pipe joints and headers shall be installed in an appropriate orientation to enable correct distribution of refrigerant. The Distribution joints shall be factory insulated with pre-formed sections of expanded Polystyrene / equivalent.

5.3 Cleanliness of Piping:

All pipe-work must be kept clean and free from contamination to prevent breakdown of the system. All pipe ends shall be kept sealed until immediately prior to making a joint.

5.4 Pressure Testing:

After complete installation of refrigerant piping, it shall be pre-pressure tested and repaired if necessary and further pressure tested to 3,800 Pa, to hold for a minimum 24 hours with dry nitrogen prior to insulating the joints. After satisfactory testing, the refrigerant pipe shall be evacuated and dehydrated to (- 755 MM HG) and held for one to four hours depending on the pipe length.

5.5 Refrigerant Charge

Refrigerant charge must be calculated based on the actual length of the refrigerant pipe work. The refrigerant charging process must be carried out with an appropriate charging station and under supervision of Consultancy.

5.6 Piping Insulation

All suction & liquid lines of the Refrigerant pipe work shall be insulated with cross linked polyethylene pipe sections as specified to avoid condensation. The exposed piping insulation shall be painted with U/V paint

5.7 Fixing Pipe Work & Electrical Conduit:

The insulated refrigerant piping and electrical conduit shall run on GI tray properly supported by GI rods. The exposed tray on terrace shall be covered by open able GI covers.

5.8 The OD & wall thickness of copper refrigerant piping shall be as follows:

Size	Thickness	Specification
6.4mm (1/4 in)	22 G	C1220T-O (ANNEALED)
9.5mm (3/8 in)	22 G	C1220T-O (ANNEALED)
12.7mm (1/2 in)	22 G	C1220T-O (ANNEALED)
15.9mm (5/8 in)	22 G	C1220T-O (ANNEALED)
19.1mm (3/4 in)	20 G	C1220T-1/2 H (HALF-HARD)

22.2mm (7/8 in)	20 G	C1220T-1/2 H (HALF-HARD)
28.6mm (1 1/8 in)	18 G	C1220T-1/2 H (HALF-HARD)
34.9mm (1 1/4 in)	18 G	C1220T-1/2 H (HALF-HARD)

6.0 DRAIN PIPING

6.1 The indoor units shall have uPVC drain pipe suitable for 10 kg/cm2.

6.2 The pipes shall be laid in proper slope for efficient drainage of condensate water.

6.3Drain Pipe Insulation

Drain pipes carrying condensate water shall be insulated with 6 mm cross linkedpolyethylene as specified to avoid any leakage condensation.

The joints shall be properly sealed with synthetic glue to ensure proper bonding of the ends.

7.0 TESTING

The units shall be tested for capacity and COP as per ARI conditions at manufactures premises before delivery, Owners / their representative reserve the right to witness the tests.

8.0 TESTING OF AIR-CONDITIONING SYSTEM

8.1 Routine and types tests for the various items of equipment shall be performed at the contractor's works and test certificates furnished. Functional tests shall be conducted at site.

8.2 The performance tests to determine whether or not the full intent of the specification is meant shall be conducted by the contractor. After notification to the employers that the installation has been completed and the plant has run continuously for a period of at least one weeks, the contractor shall conduct under the direction of the consultants and in the presence of the employer's representatives tests such tests as specified to establish the capacity of various equipment supplied and installed by the contractor.

8.3 The contractor shall operate, test and adjust the air conditioning appliances including adjustment of regulators, dampers, etc,.

8.4 All test equipment, labour, operating personnel, oil and refrigerant required for these tests shall be furnished by the contractor to enable the plant to be put in continuous running test for a period of two days after all other tests and adjustments have been made.

The performance tests shall be conducted during peak summer and peak monsoon.

8.5 PROCEDURE

8.5.1 Design Conditions:

The inside and outside conditions will be recorded for 24 hours duration on hourly basis. The outside and inside dry bulb and wet bulb temperatures shall be recoded by means of a sling spectrometer with mercury thermometers. The relative humidity shall be computed from the psychometric chart. The inside dry bulb temperature and relative humidity shall fall within the specified limits.

8.6 FUNCTIONAL TESTS

8.6.1 Electrical Equipment:

a) All the cables shall be tested for continuity and absence of cross phasing. Insulation resistance between the phase conductors and the earth shall be measured shall with the help of a 500-V megger.

b) Motors:

- Starter operation shall be checked for single phasing by removing one of the phases.
- Overload protection shall be checked by altering the starter thermal overload setting.

TECHNICAL DATA

1 Variable Refrigerant Volume Air Cooled Units

1.1 Outdoor Units

a Make and Model

b. Type (Cooling or heat pump)

c Dimension of unit (Overall)

d. Actual capacity (TR) at specified conditions

e. Permissible length of refrigerant piping (m)

f. Type of compressor

g.No. of compressor (each unit)

h. No. of compressor

i. Electrical characteristics

j. Power consumption at ARI conditions for each capacity

100% , 75%, 50% , 25%

1.2 Indoor Units

a. Manufacturer

b. Type

c Nominal capacity (TR)

d Airflow Min/Max (CFM)

e. Sound level (Hi/Lo)

f. Overall dimensions (L x W x H)

g. Unit weight (Kg)

h. Remote controller for each indoor unit (Yes/No)

PART III –AIR DISTRIBUTION SYSTEM

1.0 SCOPE

This chapter covers the general requirements for sheet metal ductwork for air distribution with associated items such as air outlets and inlets, fresh air intake and dampers.

1.2 MATERIAL

1.2.1 RECTANGULAR DUCTS

1. All ducts shall be fabricated from Galvanized Sheet Steel (GSS) conforming to IS: 277 with coating of minimum 120 grams per square meter (GSM) of Zinc.
2. The thickness of sheets for fabrication of rectangular ductwork shall be as under. The thickness required corresponding to the longest side of the rectangular section shall be applicable for all the four sides of the ductwork.

Longest side (mm)	Minimum sheet thickness	
	For GSS	For Aluminum
750 mm and below	0.63	0.80
751 mm to 1500 mm	0.80	1.00
1501 mm to 2250 mm	1.00	1.50
2251 mm &above	1.25	1.80

1)All sheet metal connections, partitions and plenums required for flow of air through the filters, fans etc. shall be at least 1.25 mm thick galvanized steel sheets, in case of G.I. sheet ducting or 1.8 mm thick aluminum sheet,

2.0 DOCUMENTATION& MEASUREMENT OF DUCTING

All ducts fabricated and installed should be accompanied and supported by following documentation:

1) Measurement sheet covering each fabricated duct showing dimensions and external surface area along with summary of external surface area of duct gauge-wise. Duct vanes ,grids, flanges shall be measured as ducts fabricated
2) All duct pieces to have a part number, which should correspond to the serial number, assigned to it in the measurement sheet. The above system will ensure speedy and proper site measurement, verification and approvals.

TESTING

After duct installation, total duct work (Air-conditioning and Mechanical Ventilation Ducts) should be tested for leakage. The procedure for leak testing should be followed as per SMACNA – "HVAC Air Duct Leakage Test Manual" (First Edition – 1985)

DUCTWORK LEAKAGE TESTS:

1) This section of the specification describes the ductwork leakage testing procedure.
2) All ductwork shall be pressure tested for leakage, by smoke test. The contractor shall provide the necessary test equipment and skilled labour to carry out the tests satisfactorily.
3) Testes shall be witnessed and certified by the Client / Consultant representative. Prior to witness of final tests, the contractor shall carry out preliminary tests to ensure the test results are within specified limits.
4) All duct work shall be tested for leakage without duct insulation or duct enclosure at the joints.

3.0 ASSOCIATED ITEMS

3.1Ducting Supports:

a) All ductwork shall be independently supported from building construction. All horizontal ducts shall be rigidly and securely supported, in an approved manner, with hangers formed of galvanized steel wire ropes and galvanized steel angle/channel or a pair of brackets, connected by galvanized steel wire hangers under ducts, rigid supports may be provided at certain interval if need be. The spacing between supports should be not greater than 2.4 meter. All vertical ductwork shall be supported by structural members on each floor slab. Duct supports may be through galvanized steel insert plates or Toggle end wire fixing left in slab at the time of slab casting. Galvanized steel cleat with a hole for passing the wire rope hanger shall be welded to the plates. Trapeze hanger formed of galvanized steel wire rope using shall be hung through these cleats. Wherever use of metal insert plates is not feasible, duct support shall be through dash/anchor fastener driven into the concrete slab by electrically operated gun. Wire rope supports shall hang through the cleats or wire rope threaded studs can be screwed into the anchor fasteners. In case of PEB structure Loop and Catenary system can be used based on the site conditions as per approved suspension system drawings.

3.2 All horizontal ducts shall be adequately secured and supported. In an approved manner, with trapeze Hangers formed of galvanized steel wire rope in a cradle support method (refer to typical drawings) under ducts at no greater than 3000mmcentre, for 3001mm-above appropriate size angle along with neoprene pad in between the duct & MS angle should be used with prior approval. All vertical duct work shall be supported by structural members on each floor slab. Duct support

shall be through dash / anchor fastener driven into the concrete slab by electrically operated gun. Hanger wires shall then hang around the ducting. Rigid supports shall be used in conjunction with wire rope hangers to assist with alignment of services where recommended for by the manufacturer. Rigid support must also be used in conjunction with wire rope hangers with duct work at each change of direction or connection or as per approved drawings. Support ducting in accordance with Schedule I at the end of this Section. Any other solution can be used based on manufacturer's recommendation on site conditions after prior approval. In cases of Spiral ducting the wire can be wrapped directly around the ducting without the need for a spiral ducting clamp for sizes above 1100 a cradle support should be provided, refer to manufacturer's recommendations.

3.3 Ducting over furred ceiling shall be supported from the slab above or from beams after obtaining approval of Construction manager/consultant. In no case shall any duct be supported from false ceiling Hangers or be permitted to rest on false ceiling. All metal work in dead or furred down spaces shall be erected in time to occasion no delay to other Contractor's work in the building. All supports of pipe shall be taken from structural slab/wall by means of fastener.

3.4 Catenary Supports: Refer to manufacturer's recommendations on Catenary supports with C-clip, special care should be taken with tensioning of the wire and angles at which the installation of services are made.

3.5 Stainless Steel Supports should be available for food, chemical and High Corrosion areas near coastlines.
Refer to manufacturers catalogue and installation guide for further technical information. Comply with manufacturer's load ratings and recommended installation procedures.

Schedule I: Duct Hanger Schedule

For ducts with external SP upto 250 Pa		
Maximum Duct Size (mm)	**Gauge**	**Hanger No.**
1 - 750	26	1 or 2
751-1000	26	2
1001-1200	24	2 or 3
1201 - 1500	24	3
1501 - 1800	22	3 or 4
1801-2100	20	3 or 4
2101-2700	18	4

For ducts with external SP upto 500 Pa		
Maximum Duct Size (mm)	**Gauge**	**Hanger No.**
1–600 mm	26	1 or 2
601-750 mm	26	2
751-1000 mm	24	2 or 3
1001-1200 mm	22	3 or 4
1201-1300 mm	20	3 or 4
1301-1500 mm	18	4
1501-1800 mm	18	4
1801-2100 mm	18	4
2101-2250 mm	18	4 or 5
2251-2400 mm	18	4 or 5
2401-2700 mm	18	4 or 5

Notes: All supports are considered at 2400 mm interval in above table and may vary as per the design but should not be greater than 2400mm.

3.6 Desertification fans, Air Conditioning Units, Plenum Boxes, Radiant Panels, Heaters, Fan Coil Units, Diffusers, Cassette units and Chilled Beams.

3.7 All units shall be adequately secured and supported in an approved manner using wire hanger suspension Y fit solution as per manufacturers' recommendation with prior approval.

3.8Rigid Supports:

Rigid supports if required in conjunction with wire hangers shall be of steel, adjustable for height and Zinc chromate primer coated and finish coated black. Where supports and clamps are of dis-similar materials, a gasket shall be provided in between. If the MS angle at the bottom if required as per design should be as per following table:

Longer size of Duct	**Type of Joints**
Up to 750	25x25x3 mm L angle with M8 nuts & bolts
751-1000	25x25x3 mm L angle with M8 nuts & bolts

1001-1500	40x40x5 mm L angle with M8 nuts & bolts
1501-2250	50x50x5 mm L angle with M10 nuts & bolts
2251 & above	50x50x6 mm L angle with M10 nuts & bolts

All the supporting system should be supplied from same manufacturer.

4.0 CONSTRUCTION

4.1 DUCTS

1. Ducts shall be fabricated at site or factory fabricated and shall be generally as per IS: 655 "Specifications for metal air ducts", unless otherwise deviated in these General Specifications.
2. The interior surfaces of the ducting shall be smooth.
3. All the ducts upto 600mm longest side shall be cross broken between flanges by a single continuous breaking. Ducts of size 600mm and above shall be cross broken by single continuous breaking between flanges and bracings. Alternatively, beading at 300mm centers for ducts upto 600mm longest side, and 100mm centers for ducts above 600mm size shall be provided for stiffening.
4. As far as possible, long radius elbows and gradual changes in shape shall be used to maintain uniform velocity accompanied by decreased turbulence, lower resistance and minimum noise. The ratio of the size of the duct to the radius of the elbow shall be normally not less than 1:1.5.
5. Flanged joints shall be used at intervals not exceeding 2500mm. Flanges shall be welded at corners first and then riveted to the duct.
6. Stiffening angles shall be fixed to the sides of the ducts by riveting at 1.2.5 meters from joints for ducts of size 600mm to 1500mm, and 0.6mm from joints for ducts of size larger than 1500mm. Bracings for ducts larger than 1500mm can alternatively be by/diagonal angles.
7. Plenums for filters shall be complete with suitable access door of size 450mm x450mm.

4.2 AIR OUTLET AND INLETS (SUPPLY AND RETURN)

1. All air outlets and intakes shall be made of extruded aluminum sections &shall present a neat appearance and shall be rigid with mechanical joints.
2. Square and rectangular wall outlets shall have a flanged frame with the outside edges returned or curved 5 to 7 mm and fitted with a suitable flexible gasket between the concealed face of the flanges and the finished wall face. The core of supply air register shall have adjustable front louvers parallel to the longer side to give upto 22.5 degrees vertical deflection and adjustable back louvers parallel to the shorter side to achieve a horizontal spread air pattern to at least 45 degrees. Return air grilles shall have only front louvers. The outer framework of the grilles shall be made of not less than 1.6 mm thick aluminum sheet. The louvers shall be of aero foil design

of extruded aluminum section with minimum thickness of 0.8mm at front and shall be made of 0.8mm thick aluminum sheet. Louvers may be spaced 18 mm apart.

3. Square and rectangular ceiling outlets/intakes shall have a flange flush with the ceiling into which it is fitted or shall be of anti-smudge type. The outlets shall comprise an outer shell with duct collar and removable diffusing assembly. These shall be suitable for discharge in one or more directions as required. The outer shell shall not be less than 1.6 mm thick extruded section aluminum sheet. The diffuser assembly shall not be less than 0.80 mm thick extruded aluminum section.
4. Linear diffusers shall have a flanged frame with the outside edges returned 3.5 mm and shall have one to four slots as required. The air quantity through each slot shall be adjustable. The metal sheet used for the construction of these shall be minimum 1.6 mm thick extruded aluminum sheet.
5. Grilles and diffusers constructed of extruded aluminum sections shall have grille bars set straight, or deflected as required. These shall be assembled by mechanical interlocking of components to prevent distortion. These grilles and diffusers shall have a rear set of adjustable blades, perpendicular to the face blades for deflection purposes.
6. All supply air outlets shall be fitted with a volume control device, made of extruded aluminum gate section. The blades of the device shall be mill finish/ block shade pivoted on nylon brushes to avoid rusting & rattling noise, which shall be located immediately behind the outlet and shall be fully adjustable from within the occupied space without removing any access panel. The volume control device for circular cutlets shall be opposed blade radial/shutter type dampers, or two or more butterfly dampers in conjunction with equalizing grid. Opposed blade dampers shall be used for square and rectangular ceiling/ wall outlets and intakes.
7. All the products supplied by contractor should supplement 'in performance by selection curves of product ratings from the manufacturer.
8. Laminar supply air diffusers shall be made of 2mm thick powder coated aluminum sheet duly insulated with 5mm thick dosed cell polyethylene foam insulation having factory laminated aluminum foil and joints covered with self-adhesive aluminum tape and having holes 2/3 mm dia including frame work.

4.3 FRESH AIR INTAKES

1. Fresh air intake grills shall be made of extruded aluminum sections.
2. A flanged frame using RS sections shall be provided on front face to conceal the gap between the louvers and the adjoining wall face. Corners of frame shall be welded. The frame shall be made structurally rigid.

3. Additional intermediate equally spaced supports and stiffeners shall be provided to prevent sagging/vibrating of the louvers, at not more than 750mm centers where the louver's length is longer than 750rnm.
4. A bird wire screen made of 12 mm mesh in 1.6 mm steel wire held in angle or channel frame shall be fixed to the rear face of the louver frame by screens.

4.4 FLEXIBLE CONNECTION (METAL DUCT CONNECTION TO SUPPLY/ EXHAUST DUCT)

Where sheet metal duct connects to the intake or discharge of fan units, a flexible of fire retarding double layer heavy duty canvas of at least 100mm width shall be provided. The material shall be attached to angle frames by means of steel and over the end of the flexible connection. The material shall be secured between the band and the angle frame by bolting. Sleeve shall be made smooth and the connecting ductwork rigidly held by independent supports on both ends. The flexible connection shall be suitable for fan intake and outlet pressures. This shall be part of the equipment supplier.

5 INSTALLATION OF METALLIC DUCT

5.1 DUCTING

1. The fabrication and installation shall be in a workman like manner. Duct work shall be rigid and straight without kinks.
2. All joints shall be airtight.
3. Ducts shall be supported independently from the building structure and adequately, to keep the ducts true to shape. The support spacing shall be not more than 2m. Where ducts cannot be suspended from ceiling, wall brackets or other suitable arrangements, as approved by the Engineer-in-charge shall be adopted. Neoprene or other vibration isolation packing of minimum 6mm thickness shall be provided between the ducts and the angle iron supports/brackets. Vertical duct work shall be suitably supported at each floor by steel structural members.
4. Where metal ducts or sleeves terminate in woodwork, tight joints shall be made by means of closely fitting heavy flanged collars. Where ducts pass through brick or masonry openings, wooden frame work shall be provided within the openings and the crossing ducts shall be provided with heavy flanged collars on either side of the wooden frame work, so that duct crossing is made leak-proof.
5. Duct connections to the air-handling unit shall be made by inserting a double canvas sleeve 100 mm long. The sleeve shall be securely bonded and bolted to the duct and unit casing.
6. Dampers shall be provided in branch duct connections for proper volume control and balancing the air quantities in the system, whether indicated in the drawings or not. Suitable links, levers

and quadrants shall be provided for proper operation, control and setting of the dampers. Every damper shall have an indicating device clearly showing the position of the dampers at all times.

5.2 AIR OUTLETS AND INLETS

1. The locations of the air outlets and intakes shall be shown in the tender drawings and necessary openings and the wooden framework for fixing the grilles shall be provided by the air conditioning contractor. The location of these outlets/ inlets is subject to change and the approval of the Engineer-in-Charge shall be obtained before finally fixing the grilles/diffusers in position.
2. In installing fresh air intakes, no fixing device shall be visible from the face of the frame. Where louvers are to be fixed in masonry or concrete, fixing shall be with either expanding plugs or raw plugs. Where the louvers are to be fixed in steel or wood, non-ferrous screws or bolts shall be used.
3. Supply air outlets and return air intakes shall be anodized/ powder coated aluminum to the desired color to match the surroundings wall/ceiling. The fresh air intakes shall be anodized/ powder coated aluminum as approved by the Engineer-in-Charge. The paint color shall be approved by the Engineer-in-Charge.
4. All damages to the finish of the structure during the installation work shall be made good by the air-conditioning contractor before handing over the installation to the Department.

5.3 BALANCING

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.

5.4 MEASUREMENT

a. Duct measurements (for insulated ducts) shall be taken before application of insulation.
b. Duct work shall be measured section wise on the basis of external surface area by multiplying the axial length from flange face to flange face for each section by the corresponding duct perimeter in the centre of that section length.
c. Uniformly tapering straight sections shall also be measured as in (ii) above. However, for special pieces like tees, bends etc. area computations for surface areas shall be done as per the shape of such pieces.
d. The quoted unit rate for external surfaces of ducts shall include all wastage allowances, flanges, gaskets for joints, vibration isolators, bracings, hangers and supports, inspection chambers/access panels, splitter dampers with quadrants and levers for position indication, turning

vanes, straightening vanes, and all other accessories required to complete the duct installation as per the specifications. These accessories shall not be separately measured.

e. Grilles and diffusers (except linear diffusers) shall be measured by the cross sectional areas, perpendicular to the airflow, and excluding the flanges. Volume control dampers, where provided shall not be separately accounted for.

f. Linear diffusers shall be measured by linear measurements only, and not by cross sectional areas, and shall exclude flanges for mounting of the linear diffusers. The supply air plenum for linear diffusers shall be measured as described above for ducting.

g. Fire dampers shall be measured by their cross sectional area perpendicular to the direction of the airflow. Quoted rates shall include the necessary collars and flanges for mounting, inspection pieces with access door, fusible link/solenoid with wiring, but excluding the fire detectors, etc.

PART-IV-INSULATION

1. SCOPE:

Supply and fix thermal insulation for piping, ducting and equipment's as per the specification described in this section.

2. **MATERIALS OF INSULATION:**

Thermal insulation material for Duct/Pipe insulation shall be closed cell cross linked polyethylene foam. Thermal conductivity of the insulation material shall not exceed 0.032 W/moK at an average temperature of 25oC. Density of the material shall be 25-30 Kg/m3. The product shall have temperature range of –40 oC to 105oC. The insulation material shall be fire rated for Class 1 as per BS 476 Part 6: 1989 for fire propagation test and as per BS 476 Part 7, 1987 for surface spread of flame test. Water vapour permeability as per DIN 52615 shall not exceed 0.15ng/Pa.Sec.m. Thermal conductivity of the material shall not be affected by ageing, as per DIN 52616. The material must be tested for ageing effect in an acredited laboratory for a minimum period of five years to satisfy the ageing criteria. The smoke density of the material as per AS-1530.3 shall not exceed 1. There shall be no toxicity in the emitted smoke, both under flaming and non-flaming conditions, as per AITM 3.000 (1993).

3. PIPING INSULATION:

3.1 The thickness of piping insulation for various pipe sizes shall be as given below:

For refrigerant pipes of dia. upto 19 mm, 13mm thick XLPE Insulation
For refrigerant pipes of dia. 22 mm - 38 mm , 19mm thick XLPE Insulation

For Drain pipes of dia. 20 mm- 50 mm , 6mm thick XLPE Insulation

PART V- ELECTRICAL WORK

1.1 This chapter covers the requirements for the electrical works associated with ventilation& Air-conditioning applications, namely, switch boards, power cabling, control wiring, earthing, P.F capacitors and remote control-cum-indicating panels. Electric motors are not covered here, as these are covered as part of the respective equipment specifications.

1.2 GENERAL

i) Unless otherwise specified in the tender specifications, all equipment's and materials for electrical works shall be suitable for continuous operations on 415V/240V ± 10% (3phase/ single phase), 50 Hz. AC system.

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

iii) All parts of electrical works shall be carried out as per appropriate CPWD General specifications for Electrical works.

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

1.3 SWITCH BOARDS

The main switch board 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 approved by the Engineer-in-charge, but they shall be cubical design, unless otherwise specified and open able from front.

1. The capacity of switch gear, starters etc. shall be suitable for the requirements of loads feeder /controlled. ACB shall be used for incomer at the panel of suitable rating.

2. Switch boards controlling motors shall house starters for motors, unless otherwise specified. Independent single phasing preventers for each such starter shall be provided. The starter and SPP shall be located adjacent to the controlling switch gear.

3. One volt meter with selector switch, a set of indicating lamps and fuses for voltmeter 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.

4. 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.

5. Switchboards shall be fabricated as per specifications indicated in sub-Para above.

6. The layout of bus bars and cable alleys shall be designed for convenient connections and inter-connections with various switchgears. 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.

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

8. Where terminations are done on the bus bars by drilling holes therein, extra cross section shall be provided for the bus bars. Alternatively, terminations may be made by clamping.

9. 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 within the switchboard.

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

11. Metallic danger board conforming to relevant IS shall be fixed on each electrical switchboard.

1.4 POWER CABLING

1. Unless otherwise specified, the power cables shall be XLPE insulated, PVC outer sheathed aluminum conductor, armored cables rated for 1100 V grade. The power cables shall be of 2 core for single phase, 4core for sizes upto and including 25 sqmm, 31/2 core for sizes higher than 25sq.mm for 3phase. Where high voltage equipments are to be fed, the cables shall be rated for continuous operation at the voltages to suit the same.

2. 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.

3. 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 trays shall be fabricated from slotted angle/solid angles to make ladder type cable tray, designed with adequate dimensions for proper heat dissipation and also access to the cables. Alternatively, cable trays may be of steel sheet with adequate structural strength and rigidity, with necessary ventilation holes therein. In both the cases, necessary supports and suspenders shall be provided by the sub-Contractor as required.

1.5 CONTROL WIRING

a. Control wiring between indoor and outdoor unit shall be done using ISI marked PVC insulated and PVC sheathed, 1.5 sq.mm copper conductor, 250 V grade, cables drawn in ISI marked steel or PVC conduits. Alternatively, armored multi-core copper conductor cables may also be used for the purpose. The control cables interconnecting between indoor and outdoor unit shall be of multi-core armored type only, The number and size of the control cables shall be such as to suit the control system design adopted by the Contractor.

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

c. 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) 1994 shall not be exceeded.

d. 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.

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

2.0MINIATURE CIRCUIT BREAKER (MCB)

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with

The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

LV CABLES

1.0 General

Technical specifications in this section cover supplying and laying of:

11 LV cables

2.0 CODES& STANDARDS:

All equipment's, components, materials and entire work of cabling system shall be carried out in conformity with Bureau of Indian Standards and Codes of Practice as amended up to date and as below:

PVC insulated heavy duty cables	IS 1554
Cross link polyethylene insulated PVC (sheathed XLPE cables)	IS 7098
Conductors for insulated electrical cables	IS 8130
Recommended current rating	IS 3961
Recommended short circuit rating of high voltage PVC cables	IS 5891

In addition, relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended up to date shall also apply.

3.0 Cables

3.1 Medium Voltage Cables: Up to 25 sq.mm size, Medium voltage cables shall be aluminium conductor XLPE insulated, PVC sheathed armoured conforming to IS 7098-part-1 and the cable below 25 sqmm size shall be copper conductor PVC insulated, PVC sheathed confirming to IS-1554-part-1.

All medium voltage Cables shall be rated for a 1100 Volts.The cable shall be stranded aluminium /Copper conductor in case of above 10 sq.mm whereas solid conductor in case of 10 sq.mm. and below.

Current ratings shall be based on the following conditions.

Maximum conductor temperature 70. 0 deg C

Ambient air temperature 45.0 deg C

Ground temperature 30.0 deg C

Depth of laying 750 mm

Short circuit rating of cables shall be as specified in IS 1554 Part-I.

Cables have been selected considering conditions of maximum connected loads, ambient temperature, laying method, grouping of cables and allowable voltage drop. However, the contractor shall recheck the sizes before cables are fixed and connected to service.

LIST OF ACCEPTABLE MAKES OF EQUIPMENTS / MATERIALS

S.No.	Description	Makes/Manufacturer
1.	VRF/VRV AC System	Toshiba/ Mitsubhishi/ Hitachi/ Daikin/Voltas/Carrier/O-general/Bluestar
2.	Split/Cassette AC System	Toshiba/ Mitsubhishi/ Hitachi/ Daikin/Voltas/Carrier/O-general/Bluestar
3.	G.I. Sheets	Sail/ Tata/Jindal
4.	Welding Rods	Advani/L&T
5.	Duct Support	Hilti/ walraven/gripple
6.	Anchor/Fastener	Hilti/Fisher
7.	Grills/Diffusers/ Louvers	Conaire/Caryaire/Systemair/Mapro
8.	insulation/Acoustic Lining	Supreme / paramount /Trocellene
9.	Copper refrigerant pipe	Rajco/Mandev/Mahflow
10.	UPVC drain piping	Supreme/Astrals/Finolex
11.	propeller type exhaust fan	Kruger/ havells
12.	MCB	Schneider (Multi-9)/ Legrand/ Siemens/havells
13.	Selector Switch	Kacee/L&T/BCH/Areva
14.	LT Cables / Control Cables	Bonton/ Finolex/polycab
15.	PVC Conduits	Precision/BEC/AKG

PART-VI : PREAMBLE

1. The quantities given in the bill of quantities are approximate and are liable to vary due to exigencies of work. Such variations in quantities shall not, however, vitiate the contract in any way, whatsoever. The contractor will be paid for the actual measured quantities of work executed by him at the contract rates for each item of work.

2. All the items of work shall be executed strictly in accordance with technical specifications, equipment schedule, drawings and bill of quantities read in conjunction with codes/standards specified and intent of the specifications. Equipment construction specifications given in the NIT shall be treated as guide-lines only. The equipment offered shall be of standard design and of normal manufacturing range. It shall be obligatory on the part of the tenderer to furnish all technical data relevant to the tender along with his offer. In case contractor fails to furnish relevant technical data of equipments or alternative specifications then NIT specifications shall be applicable.

3. The rate for each item of work specified in the bill of quantities shall unless expressly stated otherwise, include the following (but not limited to the list given below):

   a) All materials, equipment, accessories, supporting structure components, labour, tools, tackles, plants, incidentals, etc. required for the full and entire execution and completion of the work including testing and commissioning.

   b) Wastage on materials and labour.

   c) Loading, unloading, transportation, handling/double handling hoisting to all levels, set-ting out of work, fixing in position, safe custody, security, disposal of debris and all other la-bour necessary for full and complete execution of the work as per specifications.

   d) Liabilities, risk and obligations arising out of conditions of contract.

   e) All taxes, entry tax, toll tax, works contract tax, excise duty, customs duty, octroi, in-surance, packing and forwarding, insurance at site (till handing over), labour insurance or any other levies etc.

   f) All the requirements of specifications, equipment schedule and drawings whether such requirements are mentioned in the item or not. Specifications, equipment schedule and drawings shall be read as part of bill of quantities.

   g) Performance test at site after commissioning of the system.

4. The bill of quantities finished hereinafter shall be fully priced and the extensions and the totals duly checked. Tender with lump sum pricing will be rejected.

5. Unless otherwise stated, the measurements shall be carried out strictly in accordance with mode of measurements laid down in tender specification.
6. The term equipment or equal shall mean the equivalent as approved in writing by the consultant. The provision equivalent shall be operative only if, the specified make of material or equipment is not available in the market or production of such material is discontinued by the manufacturer.
7. The prices shall be firm and shall not be subject to any variation due to increase in labour wages, cost of materials, exchange rate variations, variation in custom duties, excise duty, local levies, freight, etc. or any other variation due to any reason whatsoever, whether during the stipulated period of contract or during the extend period of completion if any.
8. The drawings indicating the nature of work have been issued along with the tender. Successful tenderer shall prepare his shop drawings/detailed execution drawings/layouts etc. and submit the same to the Engineer in charge for their approval within 15 days from the date of award of work.
9. The approval of execution drawings/shop drawings/layout drawings shall not in any way absolve the contractor of his obligation to fulfill the intent of the specifications.
10. It shall be contractor's responsibility to provide adequate security and safeguard to the materials supplied at site and the materials/equipment installed at site till the job is completed and handed over to the employers.
11. The drawings furnished by the consultants generally depict the nature of work to be carried and do not guarantee full accuracy of heights, dimensions and measurements of spaces plenums, etc. it shall be the contractors responsibility to check the dimensions, heights, etc. at site and report to the consultants the factual position, so that corrective measures can be incorporated at appropriate stages to-bring out the final product as envisaged by theconsultants.
12. All material including nut bolts screw washer shall be of highest of quality available in India.

SAFETY CODE

- First aid appliances including adequate supply of sterlised dressing and cotton wool shall be kept in a readily accessible place.
- An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.
- Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from the ground.
- No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30 cm (Clear) and the distance between two adjacent rungs shall not be more than 30 cm. When a ladder is used an extra mazdoor shall be engaged for holding ladder.
- Every opening in the floor of a building or in a working platform be provided with suitable means to prevent to fall of persons or materials by providing suitable fencing or railing whose minimum height shall be one meter.

- No floor, roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.
- Workers employed on mixing and handling material such as asphalt, cement mortar or concrete and lime mortar shall be provided with protective footwear and rubber hand-gloves.
- Those engaged in welding works shall be provided with welder's protective eye-shields and gloves.
- I) No paint containing leads or lead products shall be used except in the form of paste or readymade paint.
  ii) The workers should supply suitable facemasks for use when the paint is applied in the form of spray or surface having lead paint dry rubbed and scrapped.
- Overalls shall be supplied by the contractor to the painters and adequate facilities shall be provided to enable the working painters to wash during the periods of cessation of work.
- Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be in perfect condition.
- The ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from defects.

PROFORMA FOR RUNNING ACCOUNT BILLS

C E R T I F I C A T E

The measurements on the basis of which the above entries for the Running Bill_____ were made have been taken jointly on _____ and are recorded at pages _____of Measurement BookNo._____.

Date & Signature of Contractor. | Date & Signature of Consultant's Representative | Date & Signature of Site Engineer (Seal).

The work recorded in the above mentioned measurements has been done at the site satisfactorily as per tender drawings, conditions and specifications.

CONSULTANT

SITE ENGINEER / BANK's ENGINEER

RUNNING A/C BILL

Name of Contractor/Agency: _____
Name of Work: _____
Sr. No. of this Bill: _____
No. and Date of Previous Bill. _____
Reference to Agreement No. _____
Date of Written Order to Commence._____
Date of Completion as per Agreement._____

Sr. No.	Item description	Unit	Rate (Rs.)	As per Tender		Upto Previous R/A Bill		Upto Date (Gross)		Present Bill		Remarks
				Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	
1.	2.	3.	4.	5.		6.		7.		8.		9.

Note: 1. If Part Rate is allowed for any Item, it should be Indicated with reasons for allowing such a Rate.

Net value since Previous Bill.

2. If Adhoc Payment is made, it should be mentioned specifically.

Date & Signature of Contractor.

PERFORMA FOR APPLICATION BY CONTRACTOR FOR EXTENSION OF TIME

- ame of the Contractor
- ame of the Work as given in the Agreement
- greement W O
- ender Amount
- ate of Commencement of Work
- eriod allowed for Completion as per Agreement
- ate of Completion as per Agreement
- eriod for which Extension of Time has been given

	Date	
	Month	**Year**
st Extension vide Bank's Letter No		
nd Extension vide Bank's Letter No		
rd Extension vide Bank's Letter No		

- easons for which extensions have been previously given (Copies of the previous applications should be attached)
- eriod for which extension is applied for and the reasons thereof including hindrances, time for extra work assigned, if any etc.

Signature of Contractor & Seal

PERFORMA OF HINDERANCE REGISTER

Name of Work :

Date of State of Work :

Name of Contractor : Period of Completion :

Agreement No : Date of Completion :

Sr No	Nature of Hindrance	Date of occurrence of Hindrance	Date of which Hindrance was removed	Period of Hindrance	Signature SE / PE	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**

SE = Site Engineer
PE = Project Engineer

ACCOUNT OF SECURED ADVANCE, IF ADMISSIBLE ON MATERIALS HELD AT SITE BY THE CONTRACTOR

No.	Item	Quantity	Unit	Amount	Remarks
1	2	3	4	5	6
Total Value of Materials at Site					
Secured Advance @……% of above Value					B
CERTIFIED (I) That the materials mentioned above have actually been brought by the contractor to the site of the work and no advance on any quantity of any of this item is outstanding on their security, (ii) that the materials are of imperishable nature and are all required by the contractor for use in the work in connection with the items for which rates of finished work have been agreed upon.					

Dated

Signature of Site Engineer
Preparing the Bill

Dated Signature of
Bank's Consultants

(Name of the Consultants)

_____

Dated

Signature of Contractor

SCHEDULE OF APPROVED MAKES AC WORKS

AC units:-	Daikin/ O-General/ Mishubishi /HITACHI/ Carrier/Voltas /Bluestar / Toshiba
GSS Sheet	:- ALLATECH /Jindal / Tata / Sail
Factory Made Ducts	:- ALLATECH /Jindal / Tata / Sail
Propeller fans	:-GE Alsthom / Crompton/ Carryaire
Flexible pipe connection	:-Resistoflex / Dunlop
ExtrudedAluminum Grilles /Diffusers	:- Airtech/Air Cooling system/Tristar/carryaire
Firedampers / Volume Control Dampers	:- Airtech/Air Cooling system/Tristar/carryaire
Flexible insulated ducts	:- CARYAIRE / ATCO/ MAPRO
Fibre glass	:- OWENS CORNING/ UP TWIGA
Extruded Polystyrene Board	:- SUPREME
Cross linked polyethylene	:- SUPREME/A-Flex/Aeroflex
Class 'O' Nitrile rubber insulation	:- SUPREME /K-FLEX / SUPERLON / EUROBATEX / ARMACELL/A- Flex
Copper Pipe	:-RAJCO / MANDEV / MAXFLOW / Total Line / Shree Shayam
PVC PIPE	:- SETIA/ FINOLEX/ PRAKASH/ SURYA

Conduit of Electricalwires	:- AKG, SETIA, BEC,Super
Expanded polystyrene	:- Styrene Packing / Indian Packing
Vibration Isolation Spring	:-Dunlop / Resistoflex
Paints	:-ICI / Asian
Dash Fasteners	:-Canon / Fisher / TKS/Hilti
Welding Rods	:-Advani / L&T
ACB, M.C.B. & MCCB	:- L&T / GE / Crompton/C&S
Power/Control Cable	:- CCI/ Havells / Grandlay/ Universal
Centrifugal / AxialFans	:-ABB / Kruger / Comfrei / Nuaire (UK)
Inline Fans	:-Kruger / Nuaire / Ostberg / Systemair/ carryaire

NOTE :

1. **NO DEVIATION FROM THE APPROVED MAKE IS ACCEPTABLE**. However, the Architect/ Consultant/ Bank reserve the right to select any of the approved make of these items, where more than one make is mentioned.
2. For any left-out items, prior approval from consultant / architects / Bank is required.

BILL OF QUANTITY

PREAMBLE:

TO BE READ ALONG WITH DRAWINGS.

1. RATES TO BE QUOTED BOTH IN FIGURES AND WORDS.
2. ALL PAGES TO BE SIGNED AND STAMPED BY THE TENDERER.
3. THE RATE OF THE ITEMS SHALL BE APPLICABLE FOR ANY FLOOR LEVEL/ ANY NUMBER OF FLOORS, OR ANY QUANTITY.
4. THE SPECIFICATION OF THE ITEMS SHALL BE AS PER LATEST INDIAN STANDARD CODES UNLESS OTHERWISE SPECIFIED.
5. ALL MATERIALS SHALL BE AS PER APPROVED LIST AND SHOULD BE OF Ist QUALITY UNLESS OTHERWISE SPECIFIED.
6. THE RATES ARE INCLUSIVE OF ALL DUTIES AND TAXES (EXCEPT GST) OF ALL GOVERNMENT, MUNICIPAL OR ANY OTHER STATUTORY BODY APPLICABLE FROM TIME TO TIME.
7. RATES SHALL BE FOR ITEMS COMPLETE IN ALL RESPECTS AS PER DRAWING, INSTRUCTIONS AND APPROVAL OF THE CONSULTANT/ BANK'S ENGINEER.
8. THE QUANTITIES ARE APPROXIMATE AND TENTATIVE WHICH MAY VARY DURING COURSE OF EXECUTION. THE RATES QUOTED AGAINST PARTICULAR ITEM SHALL NOT BE CHANGED WITH VARIATION IN QUANTITIES.
9. MAKING OF ANY CUTOUT / OPENING FOR ELECTRICAL / AIR – CONDITIONING WIRING / FITTING IN ANY OF THE ITEM OF FALSE CEILING, PARTITIONS, PANELING MASONRY WORK ETC. AND FINISHING EDGES JAMBS / CILLS / SOFFITS OF THE OPENING SHALL NOT BE PAID EXTRA.
10. THE TENDERER SHALL VISIT THE SITE AND SHALL SATISFY HIMSELF AS TO CONDI-

TIONS UNDER WHICH THE WORK IS TO BE PERFORMED. HE SHALL ALSO CHECK, ASCERTAIN THE LOCATIONS OF ANY EXISTING STRUCTURES OR EQUIPMENT OR ANY OTHER SITUATION WHICH MAY AFFECT THE WORK. NO EXTRA CLAIM AS A CONSEQUENCE OF IGNORANCE OR ON GROUND OF INSUFFICIENT DESCRIPTION WILL BE ALLOWED AT A LATER DATE.

11. THE QUOTED PRICE FOR ITEMS SHALL INCLUDE ALL ACCESSORIES, CONSUMMABLES ETC. AS REQUIRED TO MAKE THE ITEM COMPLETE IN ALL RESPECTS, COMPATIBLE WITH OTHER RELATED / ASSOCIATED ITEMS AND FULLY FUNCTIONAL.
12. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY ERROR, DIFFICULTY IN EXECUTION / DAMAGES INCURRED OWING TO DISCREPANCY IN DRAWINGS WHICH HAS BEEN OVERLOOKED BY HIM AND HAS NOT BEEN BROUGHT TO THE NOTICE OF THE CONSULTANT.
13. THERE ARE NUMBER OF ITEMS GIVEN IN THE TENDER WHERE IN BASIC RATES INCLUDING ALL TAXES EXPECTED HAS BEEN MENTIONED IN THE TENDER. THESE ITEMS SHALL BE PURCHASED BY THE CONTRACTOR FROM THE MARKET ONLY AFTER THE APPROVAL OF QUALITY AND RATES BY THE CONSULTANT.
14. ALL HIDDEN SURFACES OF BOARD / PLY / WOOD WORK TO BE PAINTED WITH ANTI BACTERIAL PAINT FROM NAV AIR INTERNATIONAL FR 881 (VIPER) (WHITE COLOUR AS PER MANUFACTURER'S SPECIFICATIONS ON WOOD / BOARD).
15. CONTRACTOR SHALL APPOINT TECHNICALLY QUALIFIED FULL TIME SITE SUPERVISOR TO MONITORING THE DAY TO DAY PROGRESS OF WORK AT SITE ON THEIR OWN COST.

(Refer Annexure /section in e-tender portal for detailed Bill of Quantities)

AGREED AND ACCEPTED ALL THE TERMS & CONDITIONS.

SIGNATURE OF CONTRACTOR

DATE: **SEAL:**