

Regional Office - Mahabubnagar
Door No:8-3-40, 1st floor, GL towers, Near Venkateshwara colony Bus Stop, Mettugadda,
Mahabubnagar - 509001.

Telangana, INDIA

Email: pnd.romahabubnagar@unionbankofindia.bank.in

Tender Ref. No. ROMHB:PND:102:2026-27

Dt.10.07.2026

**SUBJECT: TENDER FOR INTERIOR FURNISHING, INTERNAL ELECTRICAL,
NETWORKING, AIR CONDITIONING WORKS**

AT

**NEW REGIONAL OFFICE - SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block
No.4, Yenugonda Town, Mahabubnagar Dist - 509001, Telangana, INDIA for 1st Floor, 2nd
Floor & 3rd Floor.**

PART-1
PREQUALIFICATION CUM
TECHNICAL BID

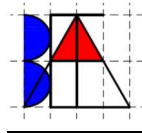
PLACE OF COLLECTING, SUBMISSION OF TENDER AND PRE-BID MEETING

Union Bank of India,
Regional Office - Mahabubnagar
Door No:8-3-40, 1st floor, GL towers, Near Venkateshwara colony Bus Stop, Mettugadda,
Mahabubnagar - 509001.
Telangana, INDIA

Email: pnd.romahabubnagar@unionbankofindia.bank

Date of issue of Tender	: 11.07.2026 to 01.08.2026 During office hours.
Last date for submission of tender	: 01.08.2026 up to 3.00 pm.
Opening of Bid	: 01.08.2026 at 4.00 pm.
Pre bid Meeting	: 27.07.2026 at 4.00 pm.

Consultant:



ARCHITECT

BURMAN ET.AL

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RR District, Hyderabad, Telangana-500005.

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Classification: Public

Classification: Internal

Regional Office - Mahabubnagar

Door No:8-3-40, 1st floor, GL tower, Near Venkateshwara colony Bus Stop, Mettugadda, Mahabubnagar - 509001, Telangana, INDIA.

Email: pnd.romahabubnagar@unionbankofindia.bank

**TENDER FOR
INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND
AIR CONDITIONING WORKS FOR PROPOSED NEW REGIONAL OFFICE -
SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town,
Mahabubnagar Dist – 509001, Telangana for 1st Floor, 2nd Floor & 3rd Floor.**

Union Bank of India invites Tenders in two-bid system i.e. Technical Bid and Commercial/Price Bid from eligible established contractors and vendors having Registered/branch office in Telangana and Andhra Pradesh and having executed at least one project work of similar nature in Hyderabad for carrying out for PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING and AIR CONDITIONING WORKS FOR NEW REGIONAL OFFICE - SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist – 509001, Telangana for 1st Floor, 2nd Floor & 3rd Floor. The estimated cost of work is Rs.88.55Lakhs + GST and the Completion period is 60 days. Tender forms (prequalification bid & Price Bid) can be collected against payment of Rs.1000/- (non-refundable) by way of pay order drawn from Nationalized Bank only in favour of “Union Bank of India” payable at Mahabubnagar during working hours from 11.07.2026 TO 01-08-2026 up to 3.00 pm. The tenders are also available on Bank’s website www.unionbankofindia.co.in. & Government portal www.eprocure.gov.in. Bidder downloading documents from website, must submit pay order for document cost (Rs.1000/-) while submitting the tender in a separate envelope super scribing “tender cost” else tender will not be considered for opening. The last date of submission of tender is 01.08.2026 up to 3.00 PM. to address as

**Union Bank of India
Regional Office - Mahabubnagar
Door No: 8-3-40, 1st floor, GL tower, Near Venkateshwara colony Bus Stop, Mettugadda,
Mahabubnagar - 509001.”**

Applicants registered as MSME / NSIC / Udyog Aadhar/SSI Scheme are exempted from depositing cost of BID document / EMD provided they attach self-attested copy of the relevant certificate. The Bank reserves the right to reject any or all applications without assigning any reasons whatsoever. Please refer banks website and Govt. portal regarding any corrigendum for the subject tender till finalization.

Regional Head

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DISCLAIMER

The information is provided to prospective vendors and Contractors having Registered Office in Telangana and Andhra Pradesh whom intend to participate in bidding process for **PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING and AIR CONDITIONING WORKS FOR NEW REGIONAL OFFICE - SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist – 509001, Telangana for 1st Floor, 2nd Floor & 3rd Floor.** for Union Bank of India for which this tender has been issued, as per the terms and conditions set out in this tender and any other terms and conditions related to such information.

This tender is neither an agreement nor an offer and the purpose of this Tender/ Request for Proposal (RFP) is to provide the Bidder(s) with information to assist the formulation of their proposals. The RFP does not claim to contain all the information each Bidder may require. While Bank has taken due care in the preparation of the information contained herein, it does not claim that the information is exhaustive. Respondents to this tender are required to make their own inquiries/analysis and should check the accuracy, reliability and completeness of the information in this RFP and where necessary obtain independent advises/clarifications. They should not rely solely on the information contained in the blank tender documents / forms. Bank may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information in this RFP. The Bank is not responsible if no due diligence is performed by the Respondents.

The Bank, its employees and advisors make no representation or warranty and shall have no liability to any person, including any applicant or Bidder under any law, statute, rule or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expenses which may arise from or be incurred or suffered on account of anything contained in this tender or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the tender and any assessment, assumption, statement or information contained therein or deemed to form part of this tender or arising in any way for participation in this Bid stage.

Union Bank of India reserves the right to alter, amend, update or supplement the information reflected in this document or to change the process or procedure to be applied. It also reserves the right to decline bids without assigning any reason thereof.

The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery, fees, expenses associated with any demonstrations or presentations which may be required by Bank or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and Bank shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid, regardless of the conduct or outcome of the Bidding process.

NOTICE FOR INVITING TENDER

Dear Sir/Madam

- 1) **SUBJECT: PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING and AIR CONDITIONING WORKS FOR NEW REGIONAL OFFICE - SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist – 509001, Telangana for 1st Floor, 2nd Floor & 3rd Floor**
- 2) Sealed, Item Rate, tenders are invited in the prescribed format from contractors/vendors having registered office in Telangana and Andhra Pradesh for execution **PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND AIR CONDITIONING WORKS FOR NEW REGIONAL OFFICE - SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist – 509001, Telangana for 1st Floor, 2nd Floor & 3rd Floor** as per following details:

Estimated Cost of the Work	: Rs.88.55lacs + GST.
Earnest Money Deposit	: Rs.1.77 lacs (Rupees one lakh and Seventy Seven thousand only by way of pay order drawn From Nationalized Bank only in favor of Union Bank of India payable at Mahabubnagar.
Period of Completion	: 60 days
Validity of Tender	: 4 months/120 days
Date of Issue of Tender	: From 11.07.2026 to 01.08.2026 During office hours
Pre-bid Meeting with Contractor	: 3.00 p.m. on 27.07.2026
Last date of submission of Tender	: up to 3.00 p.m. on 01.08.2026
Date & Time of opening the Technical bid	:4.00 p.m. on 01.08.2026

The tender document can be obtained from the office of the Client: **Union Bank of India Regional Office - Mahabubnagar Door No: 8-3-40, 1st floor, GL tower, Near Venkateshwara colony Bus Stop, Mettugadda, Mahabubnagar - 509001.** payment of Rs.1000/- (non-refundable) by way of pay order drawn from Nationalized Bank only in favor of “Union Bank of India” payable at Mahabubnagar and should be submitted in original, duly stamped, and sealed in the same office. Tender can also be downloaded from Union bank of India’s website and eprocure.gov.in. Applicants registered as MSME/ NSIC / Udyog Aadhar/ SSI Scheme are exempted from depositing

cost of Tender document and EMD provided they attach self-attested copy of the relevant certificate.

- 3) The Item Rates under the contract include for full, final & entire completion of all works in all respects described in the tender document & as shown in drawings forming part of the contract. Contractor must quote Item Rates on estimated cost. Tenders will be opened in the presence of contracting agencies or their authorized representatives.
- 4) The tenders shall be submitted in two envelopes. The envelope No.1 shall be marked as Technical Bid (Page No 01 to 184) and shall contain Technical Bid of the tender, EMD in the form of Demand Draft/ Pay Order drawn from Nationalized Bank, Prequalification application and any other matter.

The envelope No. 2 shall be marked as Price Bid (page No 185 - 203).

All the above 2 envelopes to be put in 3rd envelope super scribing the subject tender before submitting.

- 5) **Envelope No.1.** Will be opened on the due date of opening. **Envelope No. 2** of the contractors will be opened at later date (to be intimated subsequently) and of those whose prequalification application meets with eligibility criteria of the advertisement and the requirement of Tender fees, EMD and the terms/ conditions submitted, acceptance of technical bid, etc.
- 6) Tenders are to be submitted in one sealed Envelope Cover Enclosing Therein the Envelope No.1 and Envelope No.2 duly Super scribed **“Tender for PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND AIR CONDITIONING WORKS FOR NEW REGIONAL OFFICE - SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist – 509001, Telangana for 1st Floor, 2nd Floor & 3rd Floor.**
- 7) **The tenderer must use only the tender forms issued for the purpose to fill in the rates. Intimation of tender quoted by letter, telegram/ telex will not be acceptable.** The tender must be dropped in a tender box kept at given Address. **Delivery of the tender through courier/ post shall be avoided and any disputes arising thereof shall not be entertained.**
- 8) Tenderers are advised not to make any alteration/modification in the tender documents, Item of work or in any respect whatsoever. Violation of this requirement will make the Tender liable for rejection.
- 9) In case of postal delivery, the tenderer has to ensure that tender is reached before the due date and time and dropped in the tender box. The Bank will not be responsible for damage in the transit and delay of receipt of tender, if any or sent by a special messenger. **Tender received late shall be rejected.**
- 10) Every page of the tender documents should be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General and Special Conditions of Contract, Specifications etc. as laid down. Any tender with any of the documents not so signed will be subjected to rejection.
- 11) No consideration will be given to a tender received after the time stipulated above and no extension will be allowed for submission of the tender.

- 12) The Union Bank of India shall not be bound to accept the lowest tender and reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever.
- 13) This notice inviting tenders, the conditions of tender and the duly completed form of tender etc. will form part of the Agreement to be executed by the successful tenderer with the Bank.
- 14) Tender submitted without EMD from Nationalized Bank/Exemption Certificate will be treated as incomplete and the same will be rejected out rightly. The EMD shall be strictly in the form of Pay Order / Demand Draft and the same to be remained valid for period of 60 days beyond the final bid validity period. No Cheques will be accepted on account of EMD. Tenders submitted with the cheque as EMD will be treated as incomplete and will be rejected.
- 15) No tender will be received after the expiry of the time notified for receiving tenders under any circumstances whatsoever.
- 16) The tender rate against each item of work/ price indicated in the schedule of quantities and rates/ prices should be indicated both in words and figures. In case of any discrepancy, the rates indicated in words would prevail.
- 17) Every tender shall be accompanied by earnest money of **Rs.177000/- (Rupees One lakh and seventy-Seven thousand only)** by way of Demand Draft/ Pay Order drawn from Nationalized Bank only favoring UNION BANK OF INDIA, payable at Mahabubnagar. Tender submitted without earnest money shall be summarily rejected.
- 18) Applicants registered as MSME/ NSIC / Udyog Aadhar/ SSI Scheme are exempted from depositing cost of Tender document and EMD provided they attach self-attested copy of the relevant certificate.
- 19) The successful bidder will have to submit performance security deposit for a sum of 5% of the value of the accepted tender in the form of an Account Payee DD, fixed deposit receipt or Performance Bank Guarantee from a commercial bank in an acceptable form safeguarding the interest of the bank in all respect. The Earnest Money shall be returned to successful bidder on submission of performance Bank Guarantee or retained in the case the successful tenderer desires to do so, as part of the performance security deposit for due fulfillment of the Contract. No interest shall be paid on this deposit.
- 20) Failure to enter into the Contract agreement within the stipulated time of 10 days from the date of acceptance of work order or withdrawal from bidding during bid validity period shall entail the forfeiture of the Earnest money Deposit.
- 21) The Earnest money of unsuccessful tenderer will be released after issue of work order, without any interest.
- 22) Security money deposit of the successful contractor who fails to carry out the job after issue of work order by the bank shall be forfeited.
- 23) All tenders in which any of the prescribed conditions are not fulfilled or incomplete in any respect are liable to be rejected.
- 24) This tender notice shall form part of the contract documents.
- 25) Notwithstanding the above condition, bank shall have the right to reject any bid without assigning any reason thereof.

BIO - DATA OF CONTRACTING AGENCY

1. Name of the firm :

Address :

Telephone No :

Office :

Residence :

Mobile :

Fax :

E-Mail :

2a) Whether proprietary/partnership/:
Pvt. Ltd. / Public Ltd. (certificate
of registration / partnership deed
to be enclosed as Annexure-I).

b) Name of the Proprietor,
Partners, Directors

I)

II)

c) Year of establishment :

3. Registration with Tax Authorities :

i) Income-tax (PAN) No. :

ii) GST No. :

iii) EPF Regn. No. :

iv) ESI Regn. No. :

(Copies of certificates of registration with relevant authorities to be enclosed as
Annexure-II-A, II-B, II-C, II-D & II-E)

4. Names of the Bankers with address & telephone numbers:
I)

II)

5. Enclose solvency certificate of the : Enclosed/ Not enclosed
Amount of 30% of estimated cost

Note: The solvency certificate should be addressed to “Whom so ever it may concern” should be specifically for this work and shall be 30% of the estimated cost and Solvency certificate shall be issued only on after 01.05.2026.

6. Furnish copies of audited balance-Sheet and Profit & Loss A/C. for the last 3 years i.e. Assessment years-2023-2024,2024-2025,2025-2026 as Annexure-IV-A, IV-B & IV-C. : Enclosed/ Not enclosed
7. Registration with Govt. / Public Sector / Banks (certificates of Registration to be enclosed as Annexure-V.

Name of the Organization	Year since empaneled

8. Give details if at present involved in litigation in similar type of contracts:

Sr. No.	Name of Project	Name of Employer	Nature of work	Work order dated	Date of completion of work	Value Rs.

9. Details of civil suit, if any, that arose during execution of contract in the past 10 years. :
10. Specify maximum value of single value project executed during the last three years. :
11. Name & relation, if any, with the staff Member of Union Bank of India. :
12. Details of work executed during the last 3 years:

Type of work	Work executed for (name of the Institution / Body)	Nature of work (in brief)	Location	Value Rs.	Duration of work with dt Commence completion		If work left incomplete or terminated (give reasons)

Note: Copies of work orders along with Xerox copies of relevant TDS certificate, satisfactory completion certificate obtained from the client shall be enclosed as Annexure

VI. Please note without the copies of certificates, your application is liable to be rejected.

13. Details of work on hand (photocopies of performance certificate, work orders issued by valued clients, preferably Banks, Govt., and Semi-Govt. Bodies should be enclosed as Annexure VII).

Type of work	Work executed for (name of the Institution / Body)	Nature of work (in brief)	Location	Value Rs.	Duration of work, stipulated time	Present stage of work

14. Details of Pre-Qualifying work (Filling of columns is mandatory and to be supported by copies of work order and completion letters as per the criteria. On Non-filling of columns or not enclosing credentials, the application form submitted will be rejected without assigning any reason thereof.)

Name of the work	Name of the client	Work order reference/ date	Completion letter reference/ date	Value of work completed

15. LIST OF NAME/S OF PROPRIETOR/ PARTNERS & EMPLOYEES

Name	Qualifications	Experience	Particulars of work done	Employed in your firm since	Value of work done

16. Turnover in last 5 years:

Sr. No.	Year	Turnover (Rs.in lacs)	Income-tax paid	VAT paid	Service Tax paid
1	2021-22				
2	2022-23				
3	2023-24				
4	2024-25				
5	2025-26				

Copies of income-tax returns / assessment orders for each year to be enclosed as Annexure VIII-A,B,C,D& E

17. List of equipment / machinery owned:

Sr. No.	Name of equipment	Year of manufacture	Nos. available

18. PRE-QUALIFICATION CRITERIA:

It is mandatory that all the agencies shall have registration for PAN /VAT / TIN / GST/ESI/EPF.

(Estimated Cost: Rs.88.55 lakhs + GST)

Sl. No	Criteria	Documents Required
1	The contractor firm shall have Registered/branch Office in Telangana and Andhra Pradesh	The firm should have registered/ branch office in Telangana and Andhra Pradesh and submit the proof of having office at Hyderabad
2	The Contractor should have minimum of 07 (Seven) years' experience in the field as on 01.07.2025.	Copy of Registration of the Firm or Copy of incorporation. At least one copy of the work order and completion certificate from the clients prior to 01.08.2017.
3	Bidder should have a minimum of Rs.25.99 Lakhs (Excluding GST / Service tax or any other taxes) annual average turnover per year during last three financial years. i.e.2023-24, 2024-25, 2025-26 from the similar business & the firm shall not suffer any financial loss for the last three years	Audited balance sheet and P&L account for years mentioned and certificate from the Chartered Accountant. In addition to that, tenderer should satisfy the following financial conditions:
4	The Tenderer should have executed the following work during the last Seven (7) years ending with 01.07.2025 for at least, One similar Composite (furnishing, electrical and Air conditioning work) costing Rs. 70.84 LAKHS (80% of Tender value) of which 60% shall be of interior works, 40% shall be electrical, LAN works& VRF AC works. 5% variance will be allowed. OR Two similar Composite (furnishing, electrical and VRF Air conditioning work) costing Rs. 44.28 LAKHS (50% of Tender value) of which 60% shall be of interior works, 40% shall be electrical, LAN works & VRF AC works. 5% variance will be allowed. OR. Three similar Composite (furnishing, electrical and VRF Air conditioning work) costing Rs. 35.42 LAKHS (40% of Tender value) of which 60% shall be of interior works, 40% shall be electrical, LAN works	Satisfactory completion certificates of the works clearly indicating the cost & nature of work executed, date of commencement & completion issued by the Clients. The works shall Mandatorily be supported with form 26AS regarding the bills claimed for the Certificate submitted.

	& VRF AC works. 5% variance will be allowed. Out of the above, at least one qualifying work shall be executed at Hyderabad	
5	The contractor must have valid GST registration, PAN number.	Copy of the GST registration certificate and copy of PAN card.
6	The contractor should have Mandatorily the EPF Registration no.	Copy of the EPF registration certificate shall be Submitted.
7	The contractor should have Mandatorily the ESI Registration no.	Copy of the ESI registration certificate shall be Submitted.
8	The bidder should not have been black-listed/ barred by any Public Sector Bank, RBI or IBA or any other Government/PSU agencies during last Seven years.	An undertaking in this regard is to be submitted to Bank by Bidder on Rs.100/- Stamp Paper. Bank has right to verify the same from concerned authorities/agencies.
9	The contractor should submit the Labour License.	Copy of the certificate of Central Labour License shall be Submitted by the successful tenderer.
10	The contractor (Proprietor / Partner/ Director) should have a valid Electrical Licensing Board Class -A license.	Valid license to be submitted. However for carrying out the work Telangana state Electrical Licensing Board Class -A license is mandatory
11	Solvency certificate should be addressed to "Whom so ever it may concern" should be specifically for this work and shall be 30% of the estimated cost not later than three months old	Copy of the Solvency certificate should be submitted.
12	The Contractor should have executed and have experience in doing VRF AC works.	The contractor should submit authorized letter for this work from manufacturer (OEM) for the brand they are using should be submitted. A certificate from the manufacturer shall also be provided, to support and maintain the system for a period of 2 years on behalf of the tenderer/ contractor.

SIMILAR WORKS:

SIMILAR WORK MEANS CARRYING OUT PREMISES INTERIOR, FURNISHING WORKS, INTERNAL ELECTRICAL WORKS & VRF AC WORKS FOR GOVERNMENT, SEMI GOVERNMENT, NATIONALIZED BANKS AND PSU'S ONLY.

NOTE.

- BIDDER MUST COMPLY WITH ALL THE CRITERIA MENTIONED ABOVE. NON- COMPLIANCE OF ANY OF THE CRITERIA WILL ENTAIL REJECTION OF THE BID SUMMARILY. THE BANK RESERVES THE RIGHT TO VERIFY / EVALUATE THE DOCUMENTS / CERTIFICATES SUBMITTED AS EVIDENCE BY THE BIDDER.**

- RELEVANT COMPLETION CERTIFICATES OF HAVING COMPLETED SIMILAR WORKS (WORK ORDERS WILL NOT BE CONSIDERED) ISSUED BY COMPETENT AUTHORITY MUST BE ENCLOSED FAILING WHICH YOUR TENDER WILL BE SUMMARILY REJECTED.
- CERTIFICATES ISSUED BY THE PRIVATE BUILDERS, SUB CONTRACTUAL WORKS ARE NOT ELIGIBLE.
- COMMITTEE OF UNION BANK OF INDIA WILL INSPECT THE SITES OF WORKS / OFFICES OF CLIENTS FOR WHICH RELEVANT CERTIFICATES ARE ENCLOSED IN PRE QUALIFICATION TENDER.
- VIRTUAL COMPLETION CERTIFICATES ARE NOT ELIGIBLE.
- NO JOINT VENTURE PROJECTS ARE PERMITTED / ALLOWED.

19. LIST OF ENCLOSURES:

ANNEXURE NO.	PARTICULARS	TICK IF ENCLOSED
I	Certificate of registration of Company / partnership deed.	
IIA, IIB, IIC, IID, IIE	Certificates of registration with Income Tax, GST, EPF, ESI and VAT / TIN authorities.	
III	Solvency Certificate.	
IVA, IVB, IVC	Audited Balance Sheet & Profit & Loss A/c. Statement for 2022-23, 2023-24 & 2024-25,	
V	Certificates of Registration with Govt. / Public Sector / Banks.	
VI	Copies of work orders along with Xerox copies of relevant TDS certificate, satisfactory completion certificate mentioning value of work.	
VII	Copies of performance certificate, work orders issued by valued clients, preferably Banks, Govt. and Semi-Govt. Bodies. At least One qualifying work mentioned by the Contractor in Bid is to be from Govt./Public Sector/Banks.	
VIIIA, VIIIB, VIIIC, VIID, VIIIE	Copies of income-tax returns/ assessment orders for each year from 2021 to 2025	
IX	Copy of Valid license to be submitted. However for carrying out the work Telangana state Electrical Licensing Board Class-A license is mandatory	

Note: In absence of any of the above enclosures, your application is likely to be rejected.

Contractors who fulfill all the eligibility criteria as above only will be considered as qualified for opening of price bids.

DETAILS OF PREQUALIFYING WORKS - I

(Filling all details is mandatory without which application will be summarily rejected)

1.	NAME OF FIRM & ADDRESS FOR WHOM THE WORK IS EXECUTED	
2.	DETAILS OF WORK DONE BY THE FIRM	1. INTERIOR FURNISHING WORKS -Rs. 2. ELECTRICAL WORKS INCLUDING RELATED JOB= RS. 3. AC WORKS= RS.
3.	PHOTOGRAPHS OF WORK COMPLETED (PLEASE ENCLOSE COPY)	
4.	VALUE OF CONTRACT EXECUTED	
5.	BRIEF DISCRIPTION OF THE WORK	
6.	PERIOD DURING WHICH THE CONTRACT IS EXECUTED	
7.	WORK ORDER REFERENCE (PLEASE ENCLOSE COPY OF THE WORK ORDER)	
8.	COMPLETION CERTIFICATE REFERENCE (PLEASE ENCLOSE COPY OF THE COMPLETION OF WORK)	
9.	DELAY IN EXECUTION OF WORK	
10.	WHETHER TIME SCHEDULE IS ADHERED TO	
11.	ANY OTHER INFORMATION WHICH YOU CONSIDER WILL HELP US IN TAKING OUR DECISION.	

PLACE:

SIGNATURE WITH OFFICE SEAL

DATE:

DETAILS OF PREQUALIFYING WORKS - II

(Filling all details are mandatory without which application will be summarily rejected)

1.	NAME OF FIRM & ADDRESS FOR WHOM THE WORK IS EXECUTED	
2.	DETAILS OF WORK DONE BY THE FIRM	1. INTERIOR FURNISHING WORKS -Rs. 2. ELECTRICAL WORKS INCLUDING RELATED JOB= RS. 3. AC WORKS= RS.
3.	PHOTOGRAPHS OF WORK COMPLETED (PLEASE ENCLOSE COPY)	
4.	VALUE OF CONTRACT EXECUTED	
5.	BRIEF DISCRPTION OF THE WORK	
6.	PERIOD DURING WHICH THE CONTRACT IS EXECUTED	
7.	WORK ORDER REFERENCE (PLEASE ENCLOSE COPY OF THE WORK ORDER)	
8.	COMPLETION CERTIFICATE REFERENCE (PLEASE ENCLOSE COPY OF THE COMPLETION OF WORK)	
9.	DELAY IN EXECUTION OF WORK	
10.	WHETHER TIME SCHEDULE IS ADHERED TO	
11.	ANY OTHER INFORMATION WHICH YOU CONSIDER WILL HELP US IN TAKING OUR DECISION.	

PLACE:
DATE:

SIGNATURE WITH OFFICE SEAL

FORMAT OF CONFIDENTIAL REPORT

(To be submitted by the Client of applicant on their letter head in sealed envelope to the Bank - Mandatory requirement)

To:

REGIONAL HEAD

Union Bank of India,

Regional Office - Mahabubnagar

Door No:8-3-40,1st floor, GL tower,

Near Venkateshwara colony Bus Stop, Mettugadda,

Mahabubnagar - 509001.

Sir,

Confidential Report on M/s. _____

This is to certify that M/s. _____, having Office at _____ have completed the work of _____. Confidential Report for our project executed is as under:

1.	DETAILS OF PROJECT EXECUTED BY THE FIRM	
2.	APPROXIMATE AREA OF RENOVATION	
3.	DATE OF COMMENCEMENT OF PROJECT	
4.	DATE OF COMPLETION OF PROJECT	
5.	TOTAL VALUE OF PROJECT EXECUTED	
6.	QUALITY OF SERVICE RENDERED	
7.	COMPETENCE TO HANDLE WORKS	
8.	INTEGRITY AND RELIABILITY OF THE FIRM	
9.	DEALING IN EXECUTION OF WORK	
10.	WHETHER TIME SCHEDULE IS ADHERED TO	
11.	WHETHER ANY PENALTY IMPOSED FOR THE DELAY	
12.	GENERAL ATTITUDE OF THE FIRM	
13.	ANY OTHER INFORMATION WHICH YOU CONSIDER WILL HELP US IN TAKING OUR DECISION	

PLACE: SIGNATURE: _____

NAME: _____

DATE: DESIGNATION: _____ OFFICE SEAL

DECLARATION

I / We have read the instructions appended to the Proforma and I / We understand that if any false information is detected at a later date, any future contract made between ourselves and Union Bank of India, on the basis of the information given by me / us can be treated as invalid by the Bank and I / We will be solely responsible for the consequences.

I / We acknowledge that:

It shall be deemed that by submitting the Proposal, I/we have:

- a) made a complete and careful examination of the RFP;
- b) received all relevant information requested from the Authority;
- c) accepted the risk of inadequacy, error or mistake in the information provided in the RFP or furnished by or on behalf of the Authority or relating to any of the matters referred above;
- d) satisfied itself about all matters, things and information, including matters referred above, necessary and required for submitting an informed Application and performance of all of its obligations there under;
- e) acknowledged that it does not have a Conflict of interest: and
- f) Agreed to be bound by the undertaking provided by it under and in terms hereof.

I / We agree that the decision of Union Bank of India in selection of contractors will be final and binding to me / us.

I / We agree that I / we have no objection if enquiries are made about the work listed by me / us in the accompanying sheets.

I / We agree that I / We have not applied in the name of sister concern for the subject empanelment process.

All the information furnished by me hereunder is correct to the best of my knowledge and belief.

Place :

SIGNATURE

Date :

NAME & DESIGNATION

SEAL OF ORGANISATION

INSTRUCTION WITH REGARD TO SUBMISSION OF TENDER

- 1) Rates should be quoted both in figures and words in columns specified. All erasures and alterations made while initials of the tenderer must attest filling the tender. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender invalid and it will be the option of Union Bank of India to accept or reject the tender. No request of any change in rate or conditions after opening of the tender will be entertained.
- 2) In the case of figures, the word Rs. should be written before the figures of rupees and the word 'P' written after the decimal figures e.g. Rs. 3.25 P. In the case of words, the word Rupee should similarly precede and the words "Paise only" should be written at the end, closely following each the Item rate. The word "only" should not be written in the next line unless the rate quoted is in whole Rupees closely followed by the word "only". The amount should invariably be upto two decimal places.
- 3) The different Schedules should be filled as follows:
 - (a) The "Rate" Column wherever applicable to be legibly filled in ink in both figures & words.
 - (b) The "Amount" Column also to be legibly filled in ink in both figures and words.
 - (c) All corrections to be initialed.
 - (d) No over writing is allowed.
 - (e) The figure of Item of rate shall be legibly filled in ink in both figure and words.
- 4) Errors in the bill of quantities shall be dealt with in the following manner.
 - a. In the event of any discrepancy between the rates quoted in words and the rates in figures the former shall prevail.
 - b. In the event of an error occurring in the amount column of the bills of quantities as a result of the wrong extension of the unit rate and the quantity, the unit rate shall be regarded, as firm and extension shall be amended on the basis of the rates.
 - c. All the errors in totaling in the amount column and in carrying forward the totals shall be corrected.
- 5) The tender shall be signed and dated at all places provided therein. Also, all pages, drawings and corrections/ alterations shall be initialed. The tender submitted on behalf of a firm shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract. Otherwise the tender may be rejected by Union Bank of India.
- 6) The time allowed for completion of works is **60 days** from the date of issuance of work order by contractor or handing over the site whichever is later. Time shall be considered the essence of contract.
- 7) It shall be the responsibility of the contractor to arrange for water and electricity required for completing construction. However, contractor will have to make arrangement of pipeline for distributing water.
- 8) Every tender shall be accompanied by earnest money of **Rs 177000/- (Rupees One lakhs and seventy seven thousand only)** by way of Demand Draft/ Pay Order drawn from Nationalized Bank only favoring UNION BANK OF INDIA, payable at Mahabubnagar. Tender submitted without earnest money shall be summarily rejected. Applicants registered as MSME/ NSIC / Udyog Aadhar/ SSI Scheme are exempted from depositing cost of BID document/ EMD provided they attach self-attested copy of the relevant certificate.
- 9) The successful bidder will have to submit initial performance security deposit for a sum of 5% of the value of the accepted tender in the form of an Account Payee DD or Performance Bank Guarantee from a commercial bank in an acceptable form safeguarding the interest of the bank in all respect. The Earnest Money shall be returned to successful bidder on submission of

performance Bank Guarantee or retained in the case the successful tenderer desires to do so, as part of the performance security deposit for due fulfillment of the Contract. No interest shall be paid on this deposit.

- 10) Failure to enter into the Contract agreement within the stipulated time of 10 days from the date of acceptance of work order or withdrawal from bidding during bid validity period shall entail the forfeiture of the Earnest money Deposit.
- 11) The Earnest money of unsuccessful tenderer will be released after issue of work order, without any interest.
- 12) The tenderer shall submit his tender after carefully examining the whole of the tender document and the terms and conditions of contract, the drawings and specifications, the schedule of quantities etc., and also after examining the site and conditions prevailing in and around site.
- 13) The Bank does not bind himself to accept the lowest or any tender and reserve to them the right of accepting the whole or any part of the tender and tenderer is bound to perform the same at the rates quoted. The Bank will not be bound to accept the lowest tender and reserves the right to accept or reject any or all the tender without assigning any reasons whatsoever. The work may also be divided among the contracting agencies depending on the exigencies of the Bank.
- 14) Bank shall not be responsible for any expenses incurred by bidders in connection with the preparation and delivery of their bids, including expenses incurred during bidding.
- 15) Bids from consortium shall not be accepted. Telex / Telegraphic / Fax / Email bids shall not be accepted. Late/ Delay / post tenders shall be rejected, and representative of such bidder shall not be allowed to attend the bid opening.
- 16) The Bank is not concerned with any rise or fall in the prices of materials and labor. The rates quoted shall include all costs, allowances, taxes including sales tax on works contract or any other charges including any enhanced labor rates etc. which may become effective for any reason including those due to acts of Government/ Statutory Bodies enacted from time to time by the State and or the Central Government. Under no circumstances, shall the Bank be held responsible for compensation or loss to the contractor due to any increase in the cost of labor or materials etc.
- 17) Contractor to coordinate and assist the Architect/Interior Designer in obtaining all statutory approvals and any other State and Central rules in force. Any expenses incurred in obtaining such approvals are deemed included in the rates quoted by the Contractors.
- 18) Tenders shall remain valid for a period of 120 days from the date of opening of the tender which period may be extended by mutual agreement and the tenderer shall not cancel or withdraw the tender during the initial validity period of 120 days.
- 19) The successful tenderer shall be bound to implement the Contract and mobilize and sign specified agreements within 10 days from the date of acceptance of work order.
- 20) Tenderer must include in their rates all taxes excluding GST. Due to change in taxes structure by orders from Central Govt./ State Govt. after opening of tenders shall be reimbursed to the contractor as per actual and upon verifying the proof of having made the payment.
- 21) This contract shall be an Item Rate contract. The Contractor shall be paid for actual quantity of work done, as measured at site including any deviation plus or minus. The rate of any non-schedule items of work shall be decided as mentioned in the conditions of contract.

- 22) The tender drawings exhibited/enclosed are preliminary drawings intended for the guidance of the Contractor only. They may be subject to revision and alteration without vitiating any of the terms of the contract and the Contractor shall be bound to execute the works as shown on the final drawings without claiming any extra payment.
- 23) No correspondence will be entertained in respect of this tender other than any clarifications strictly pertaining to this tender.
- 24) The tender price quoted by a tenderer shall be kept strictly confidential and shall not be divulged to any other party even approximately before the time limit for delivery of tender. The only exception be for obtaining an insurance quotation, you may give your insurance company or agent any essential information they ask for, so long as it is done in strict confidence. No information about other's tender price should be obtained and no arrangement with anyone else should be made whether or not he submits the tender.
- 25) For electrical, sanitary, water supply and drainage work, tenderer must possess respective valid licenses from the competent authority of the area where the site is located.
- 26) Contractor should sign at the end of every page prior to submitting the tender. Conditional tenders will be summarily rejected.
- 27) COMPLETION PERIOD OF THE PROJECT WILL BE **60 days** from the date of issuance of work order by contractor or handing over the site whichever is later.
- 28) The contractor shall be responsible for obtaining all the necessary statutory permissions for the same.
- 29) COMMERCIAL EVALUATION: Only the technically qualified bidders who are successful will be asked to participate in commercial bid/price Bid opening. The indicative commercial bids of all the bidders' found ineligible as per the requirements of this RFP will be unopened or returned to them unopened against acknowledgement.
- 30) After opening of Commercial Bid, the lowest amount quoted by the bidder will be termed as L1 Bidder. The evaluation of the Commercial Bids will also be done by the Project Architect and tender evaluation committee.
- 31) If any cartel formation is found during any stages of the tender process, the bank has every right to cancel all the offers of shortlisted vendors and will be debarred / expelled from applying from the tenders for Union Bank for 3 years. The Bank's decision is final and binding.

THE REGIONAL HEAD

**Union Bank of India,
Regional Office - Mahabubnagar
Door No:8-3-40,1st floor, GL tower,
Near Venkateshwara colony Bus Stop, Mettugadda,
Mahabubnagar - 509001.**

TENDER FORM

To,
THE REGIONAL HEAD
Union Bank of India,
Regional Office - Mahabubnagar
Door No:8-3-40, 1st floor, GL tower,
Near Venkateshwara colony Bus Stop, Mettugadda,
Mahabubnagar - 509001.

TENDER FOR PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND AIR
CONDITIONING WORKS FOR **PROPOSED NEW REGIONAL OFFICE - SV SQUARE**, Plot
No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar
Dist – 509001, Telangana for 1st Floor, 2nd Floor & 3rd Floor.

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Sir,

1. We have read and examined the following documents as received by us:
 - a) Notice Inviting Tender
 - b) Instructions to Tenderer
 - c) Conditions of Contract.
 - d) Supplementary Conditions.
 - e) Specifications
 - f) Drawings
 - g) Schedule of Quantities.
 - h) Additional condition of contract
2. We are well aware and familiar with CPWD/ PWD, Schedule of Rates 2023 and their specifications, CPWD/ PWD Specification, BIS publication and National Building code which shall apply to this contract to supplement any missing details in this contract in order of preference. Further to the above, we have visited and examined the site of the proposed works and have acquired the requisite information relating thereto as affecting the tender invited by Bank.
3. We agree that any other terms or conditions of contract or any general reservation which may be printed on any correspondence emanating from us in connection with this tender or with any contract resulting from this tender shall not be applicable to this tender or to the contract.
4. We have obeyed the rules about confidentiality of tenders and will continue to do so as long as they apply.
5. We are enclosing along with our tender an earnest money of Rs 1,77,000/- (Rupees One lakh seventy seven thousand only) drawn from Nationalized Bank favoring Union Bank of India, payable at Mahabubnagar (pay Order No..... dated drawn on.....). We hereby agree that this sum shall be forfeited, in the event of our tender being accepted and if we fail to execute the contract when called upon to do so.

6. Subject to and in accordance with paragraphs 3 & 4 above and the terms and conditions contained or referred to in the documents listed in paragraph 1, we agree and offer to execute all the Works referred to in the said documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered to be valued as per the conditions of contract.
7. We undertake to complete and deliver the whole of the works within a period i.e., **2 Months / 60 days** from date of issuing work order as specified in the contract and further confirm that the time allowed for completion is adequate. Time allowed for completion of entire job or part job assigned shall be reckoned from the tenth day of the date of acceptance of work order. We shall be under the obligation to pay the sum as stated in the contract for every day that the works shall remain incomplete, damages as compensation subject to the conditions of contract relating to extension of time.
8. We hereby agree that unless & until a formal agreement is prepared & executed in accordance with the Articles of agreement, this tender together with your acceptance thereof, shall constitute a binding contract between us.
9. EMD Submitted by us shall be treated as Initial Security Deposit. EMD submitted shall be by way of DD/PO drawn from Nationalized Bank in favor of UNION BANK OF INDIA, payable at Mahabubnagar.
10. We agree to pay Performance Guarantee of 5% of the contract amount by way of DD/BG in favour of UNION BANK OF INDIA, payable at Mahabubnagar. This amount shall be released after the virtual completion of work.
11. Validity of the tender is 120 days from the date of opening of tender or it may be beyond 120 days if mutually accepted.
12. The Bank is at liberty to accept or reject any tender, without assigning any reasons whatsoever.
13. The work may be split up in the first instance as per exigencies of the Bank. It may be split up in more parts or parts combined if so desired by the Bank without assigning any reasons whatsoever. We will not have any claim either for loss of profit or revision in rates.
14. Adherence to the pert chart will be ensured by us as the project is to be executed in a very strict time frame.
15. We are aware that the quantities of work indicated in the bill of quantities are approximate, may vary to any extent, even it may be omitted. We will not have any claim of any kind against the Bank.

Signed in the capacity of duly authorized
to sign tenders for and on behalf of

Address

.....

.....

.....

Telephone No.....

Telex No.

Fax No.

Date:

SUPPLEMENTARY CONDITION

On the acceptance of his tender, the contractor will be required to execute an Indemnity Bond with-in 10 days of issue of work order in favor of the Bank against third party claims, civil or criminal complaints, site mishaps and other accidents or disputes and, against any damages, loss or expenses caused to bank and bank's any of articles, fixtures, fittings, infrastructure, due to or resulting from any negligence, misconduct or breach of duty on the part of the contractor, his subcontractors/assignees or his employees and agents, representatives etc., as per the appropriate Indemnity Bond attached.

It will also be covered by labor laws of the Govt. of India.

Any other conditions suggested by the Bank may be added subsequently.

The EMD/SD may be forfeited:

If the Bidder withdraws his Bid during the period of Bid validity specified in this RFP.

or

If the Bidder makes any statement or submit information which turns out to be false / incorrect at any time prior/post of issuing Purchase order.

or

If the Bidder fails to furnish security Deposits or is there any benefit of doubt of formation of cartel by bidders.

or

If the bidder backs out or do not accept the work order after being declared L-1 bidder.

or

In case of a successful Bidder, if the Bidder fails to sign/execute the contract in accordance with this RFP.

or

If a bidder refuses to accept the corrections of errors calculated in accordance with the provisions of the bidding documents, its bid shall be rejected and its EMD shall be forfeited.

INDEMNITY BOND
(On Non-Judicial Stamp Paper of Rs. 100/-)

KNOW all men by these presents that I/We _____ do hereby execute Indemnity Bond in favour of the Union Bank of India on this _____ day of _____ 2026.

WHEREAS Union Bank of India, (address of the office) _____, have appointed _____ as the Contractors for their Proposed Union Bank of India Project at _____.

THIS DEED WITNESS AS FOLLOWS:

I/We _____, duly authorised by Resolution dated.....(in case of a Company) hereby do Indemnify and save harmless Union Bank of India, _____ against

1. Any third party claims, civil or criminal complaints/liabilities, site mishaps and other accidents or disputes and/or damages occurring or arising out of any mishaps at the site due to faulty work, negligence, faulty construction and/or for violating any law, rules and regulations in force, for the time being while executing/executed works by me/us.
2. Any damages to any of articles, fixtures, fittings, infrastructure of bank, loss or expenses to Bank due to or resulting from any negligence or breach of duty on the part of me/us or my sub contractor's if any, servants or agents.
3. The Contractor shall at all times indemnify and keep indemnified the Bank against all losses, claims, damages or compensation including under the provisions of the payment of the Wages Act 1936, Minimum Wages Act 1948, Bank's Liability Act 1938, Workman's Compensation Act 1923, the Maternity Benefit Act 1961, the Bombay Shops and Establishments Act 1947, Industrial Disputes Act 1947, and Contract Labour (Regulation and Abolition) Act 1970 and Employees State Insurance Act 1948, Motor Vehicles Act 1988 or any modifications thereof or under any other law relating thereto and rules made there under from time to time or as a consequence of any accident or injury to any workman or other person in or about the work whether in the employment of the Bank or Contractor or not, and also against all costs, charges and expenses of any suit, action or proceedings whatsoever out of such accident or injury or combination of any such claims arising out of and in the course of the execution of the contract.
4. Any claim by an employee of mine/ours or of sub-contractors if any, under the Employee's Compensation Act and Owners Liability Act, 1939 or any other law, rules and regulations in force for the time being and any Acts replacing and/or amending the same or any of the same as may be in force at the time and under any law in respect of injuries to persons or property arising out of and in the course of the execution of the contract work and/or arising out of and in the course of employment of any workman/employee.

Any act or omission of mine/ours of sub-contractor's if any, our/their servants or agents which may involve any loss, damage, liability, civil or criminal action.

IN WITNESS WHEREOF THE _____ has set his/their hand on this day of _____ 2026.

SIGNED AND DELIVERED BY THE _____ NAME AND ADDRESS

AFORESAID _____ (Contractor)

IN THE PRESENCE OF WITNESSES:

- 1.
- 2.

PERFORMANCE BANK GUARANTEE FORMAT

(To be prepared on Stamp paper issued in the name of Bank)

This BANK GUARANTEE No. _____ made this day of _____ between _____ a bank incorporated and having its registered office at _____ (hereinafter called Bank) which expression shall unless repugnant to the context or contrary to the meaning thereof include its successors and assigns on the one part and **UNION BANK OF INDIA** a body corporate constituted under the Banking Companies (Transfer of Undertakings) Act, 1970 and having its **Regional Office - Mahabubnagar Door No: 8-3-40, 1st floor, GL tower, Near Venkateshwara colony Bus Stop, Mettugadda, Mahabubnagar - 509001** to the context or contrary to the meaning thereof include its successors and assigns on the other part. WHEREAS in pursuance to the agreement No. _____ dated _____ (hereinafter called CONTRACT) entered into between Union Bank of India (hereinafter called OWNER and _____ a Company incorporated in _____ (hereinafter called CONTRACTOR) which expression shall unless repugnant to the context or contrary to the meaning thereof include its successors and assigns, for supply of _____ as envisaged in the Contract, Contractor has to submit a Performance Bank Guarantee for Rs. _____ (Rupees _____ only). CONTRACTOR accordingly agrees to furnish the Performance Bank Guarantee as herein after contained towards fulfillment of all of its obligations under the contract. Now this Deed witness as follows:

1. In pursuance of the Contract, the Bank hereby guarantees as a direct responsibility to OWNER that the BANK is holding the amount of Rs. _____ (Rupees _____ only) at Owner's disposal and hereby promises and shall be bound to pay to OWNER, forthwith at Owner's written notice stating that the contractor has failed to fulfill its obligations under the contract for reasons for which contractor is liable and without any protest or demur and without recourse to contractor and without asking for any reasons as to whether the amount if lawfully asked for by Owner or not, the entire amount or the portion thereof as mentioned by Owner in the notice. The decision of the Owner as to whether the terms and conditions of this Performance Bank Guarantee have been observed or not shall be final and binding on the BANK. In any case, however the Bank's responsibility under this Performance Bank Guarantee is limited to Rs. _____ (Rupees _____ only).
2. This Performance Bank Guarantee shall be valid for an initial period of _____ months from the date of this Bank Guarantee No. _____ dated _____ given by the Bank to Owner become effective. Upon issuance of Commissioning/ Erection/Completion certificate according to terms of contract on expiry of _____ months after the issuance of the above-mentioned certificate 69 of commissioning / erection / completion certificate, the Performance Bank Guarantee shall become null and void.
3. This Performance Bank Guarantee shall be in addition to and shall not affect or be affected by any other security now or hereafter held by Owner on account of money hereby intended to secure and Owner at its discretion and without any further consent from the Bank, and without affecting its rights against the Bank, may compound with, give time or other indulgence to or make any other arrangement with Contractor and nothing done or omitted to be done by Owner in pursuance of any authority or permission contained in this guarantee, shall effect discharge of the liability of the Bank.

4. UNLESS PREVIOUSLY CANCELLED BY THE OWNER, this Performance Bank Guarantee will remain in force initially up to _____ months from the effective date of Bank Guarantee No. _____ dated _____ given by the Bank to the Owner and subject to provisions of paragraph 2 above will stand automatically cancelled on the expiry of the said period. Unless demand or claim under this Bank Guarantee is made on Bank in writing within three months from the date of expiry of this Bank Guarantee, all the rights of Owner against the Bank shall be forfeited, and Bank shall be relieved and discharged from all the liabilities hereunder.
5. We are liable to pay the guarantee amount or any part thereof under this bank guarantee only and only if you serve upon a written claim or demand on or before (Date of expiry of guarantee plus one-year claim period shall be stipulated).

Any notice by way of request, demand or otherwise hereunder may be sent by post to the Bank, addressed as aforesaid, and if sent by post, it shall be deemed to have been given at the time when it would be delivered in due course of post, and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate, signed by an officer of the owners, to the effect that the envelope was so posted, shall be conclusive.

6. The Performance Bank Guarantee is to be returned to the Bank after its expiry in terms of Paragraph 4 above.
7. The Bank declares that it has the power to issue this guarantee and the undersigned have full power to do so. Dated _____ this _____ day of _____ 26 (Indicate the name of the Bank with stamp)

ARTICLES OF AGREEMENT

(Draft will be modified by Bank's Law Officer as per requirement)

ARTICLES OF AGREEMENT made at _____ this _____ day of _____ Two Thousand and twenty-Six.

BETWEEN

UNION BANK OF INDIA, a body corporate constituted under the Banking Companies (Acquisition and Transfer of Undertakings) Act, 1970 , **having its Regional Office - Mahabubnagar Door No: 8-3-40,1st floor, GL tower, Near Venkateshwara colony Bus Stop, Mettugadda, Mahabubnagar - 509001** represented by hereinafter called "the Bank/owner/employer" (which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and assigns) of the **ONE PART**

AND

MESSRS _____, having its registered office at _____, hereinafter called the "Contractor" (which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) of the **OTHER PART**.

WHEREAS

- i. The Bank is desirous of _____ (Works) on its _____ at _____.
- ii. The Bank has already appointed and retained M/s _____, having its Office at _____ and Registered Office at _____ as Architect / Consultant for the Works or the Project.
- iii. The Bank has caused the drawings and bills of quantities showing and describing the Works to be done to be prepared by or under the direction of the Consultants/ Architect;
- iv. The Bank had invited tenders for _____ work in accordance with the general conditions of contract, special conditions of contract, technical specifications, bills of quantities and working drawings, as prepared by the Interior Consultants/ Architect and furnished to the Contractor.
- v. Having examined the general conditions of contract, special conditions of contract, technical specifications, bills of quantities and working drawings as prepared by the Consultants/ Architect, the Contractor offered to execute, complete and maintain the whole of the Works relating to the Project in conformity with the said general conditions of contract, special conditions of contract, technical specifications, bills of quantities and working drawings and in accordance with instructions issued by the Consultants / Architect and the Contractor submitted its tender for the contract sum of Rs. _____ towards the said work.
- vi. The tender submitted by the Contractor was, after negotiations, modified/alterd upon the Contractor agreeing to revise the rates of certain items and further offering a rebate for execution and completion of the Project thereby reducing the tender amount to Rs. _____ as confirmed by its letters dated _____.
- vii. Towards the implementation of the Project, the Contractor has supplied the Bank with a fully priced copy of the said bills of quantities (which copy is hereinafter referred to as "the Contract Bills") and the drawings numbered as mentioned in the Annexure 11 of the Tender document inclusive (hereinafter referred to as "the Contract Drawings") and the Contract Bills and the contract Drawings have been signed by or on behalf of the parties hereto.

- viii. The Contractor has already agreed with the Bank to implement and execute the Project in full on the basis of the contract documents as hereinafter defined on the terms and conditions therein contained.
- ix. The parties are now executing this Agreement setting out the basic terms of the agreement between them for smooth implementation and execution of the Project without any unnecessary difference or dispute.

NOW IT IS HEREBY AGREED as follows:

1. The Contract Document is comprising of
 - i. Tender document including technical bid (Part.-I) and price-bid (Part.-II).
 - ii. Notice Inviting Tender issued vide letter _____
 - iii. Subsequent letters issued by the Bank vide _____
 - iv. Clarifications submitted by the contractor vide letter dt. _____.
 - v. Minutes of Meeting held on _____
 - vi. Rebate/ Discount offered by the contractor vide letter _____
 - vii. Work Order issued by the Bank vide letter _____
 - viii. Acceptance letter _____ from the contractor
 - ix. Drawings numbering as mentioned in the Annexure 11 of the Tender document enclosed along with the tender document.
- 1.1 Unless the context otherwise requires the contract documents above mentioned shall be harmoniously construed and in the chronological order.
- 1.2 Unless otherwise expressly provided under these presents, contract documents (iii) to (ix) above shall be construed as modifying only those general and special terms and conditions in tender document in so far and to the extent referable to the clauses in the said tender document.
- 1.3 Unless otherwise stated expressly hereunder, all the general and special terms and conditions shall apply and binding on the contractor.
2. The Contract Document is complimentary. What is called for in any one shall be as binding as called for by all. The aforesaid shall form integral part of contract and in the event of any inconsistency between any provisions herein the provisions of the Contract Documents shall prevail. When any of the General and Special Conditions are at variance, the condition stipulated in the Special Conditions of Contract shall supersede relevant provisions in General Conditions. For all matters not specifically provided for herein the provisions of General and Special Conditions in the Tender Documents shall apply and the rights and liabilities of the parties shall be decided accordingly. The decision of the Bank in this regard shall be final and binding.
3. All time limits stated in the Contract Document are of the essence of the contract where the work has to be completed within 60 days failing which liquidated damages will be recovered @ 1% of contract amount for per week of delay subject to maximum recovery of 10 % of the contract amount
4. For the consideration hereinafter mentioned, the Contractor shall carry out and complete the Works in conformity with the contract documents and in accordance with the instructions issued by the consultant from time to time including all modifications extra and additional works and obligations to be carried out either on the Site or at any factory or work shop or any other place for subsequent incorporation as required for the due performance of the contract.
5. The general character and the scope of the Works is illustrated and defined by the specifications and the bills of quantities herewith attached and by the signed drawings. The

scope includes furnishing all materials, labor, tools, equipment, transportation and management necessary for and incidental to the construction and completion of the Works. If the Contractor shall find any discrepancy in or divergence between the contract drawings and/or the contract bills he shall immediately give to the Consultant a written notice specifying the discrepancy or divergence and the Consultant shall issue instructions in regard thereto which shall be complied with by the Contractor.

6. INTENT

The intention of agreement is to secure the performance of the Contractor's obligations to the satisfaction of the Bank/ Architect/ Consultant. All labor, material, equipment, constructional plant and transportation necessary for the proper execution of the Project is to be provided by the Contractor and should only be of the approved manufacturer/agencies respective kinds as described in the Contract Documents which is to be subjected from time to time to such tests as the Engineer/ Consultant's representative may direct. In case the required material/services of approved manufacturers/agencies are not available or are not upto the mark the Contractor shall procure material/ services from such other manufacturer/agencies as may be approved by the Consultant / Bank and the Contractor shall submit rate analysis for such material.

7. EXTENT

The Contractor shall carry out and complete the Works in every respect in accordance with this contract and with the directions of and to the reasonable satisfaction of the Consultant. The Consultant may in their absolute discretion and from time to time issue further drawings, details and/or written instructions and written explanations whole of which are collectively referred to as Consultants' instructions. All such drawings and instructions shall be consistent with the Contract Document true developments thereof as reasonably inferable there from.

8. TYPE OF CONTRACT

The Contract is Item Rate contract. The Contractor shall be paid for the actual quantity of Work done, as measured at Site, at the Item quoted by him in the Contract Bills. The contractors have

- 8.1 Been informed that the schedule of approximate quantities is liable to alteration by omission, deduction, substitution or additions at the discretion of the Consultant/Bank without affecting the terms of the contract and no compensation to Contractor.
- 8.2 Fully and correctly understood the meaning of all the tender documents, the General Conditions of Contract, Special Condition of Contract, Technical Specifications, Bill of Quantities and working drawings or part thereof.

9. CONTRACTORS COVENANTS

- 9.1 The Tender form conditions, priced schedule of quantities, contract drawings and General and Special Conditions of Contract, specifications, Drawings, priced Bill of Quantities, Schedule of Rates and Prices, if any, Tender, pre-contract correspondence, Letter of Intent/Acceptance, Work order, shall be read and construed as forming part of this agreement and the Contractor shall abide by and submit themselves to all the conditions and stipulations contained therein; which are not specifically incorporated herein;
- 9.2 The Contractor shall obtain necessary permissions/ certificates/ order from the Competent Authority in respect of workmen employed by them for the Project and shall keep the Bank safe, harmless and reimburse all amounts/expenses incurred or suffered by the Bank in connection with any such claim;
- 9.3 The Contractors shall not make any claim as regards want of information of any particular point or any change in the rate or conditions save and except as provided herein;
- 9.4 The Contractors shall have a duly authorized agent at the place of Work to accept services of notice and to agree to extras, omissions, additions and substituted items of Works and rates from the commencement of the Work until it is virtually completed.

- 9.5 In the event of any discrepancy between the details and/or description given in the Bill of Quantities, the Drawings and the Technical Specifications, such item shall be deemed to have been priced in accordance with the details and/or description confirming to the most superior provisions contained in any of the following :-
- a) Bill of Quantities
 - b) Drawings
 - c) Technical Specifications
- 9.6 It shall be understood that the details and/or description not specifically mentioned in the Bill of Quantities and/or the drawing shall be the same as those mentioned in the Technical Specification. Any further interpretation of above Clause shall be at the discretion of the Consultants, whose decision shall be final and binding on the parties to the contract.
- 9.7 The Contractors shall not make any claim for increase in the contract consideration on the basis of incorrectness and insufficiency of the information available at the time of submitting the Tender and/ or incorrectness and insufficiency of the rates and prices stated in the price bill of quantity and schedule of rates and prices or otherwise alleging insufficiency of the tender amount to cover their obligation under the contract or matters concerning the execution of the Project.
- 9.8 The Contractor shall be fully responsible for the adequacy, stability and safety of all site operations and methods of construction, provided that the Contractor shall not be responsible, except as may be expressly provided in the Contract, for the design or specification of the Permanent Works, or for the design or specification of any Temporary Works prepared by the Consultant.
- 9.9 The Contractor shall promptly inform the Consultant of any error, omission, fault and other defects in design, drawing or specifications for the Works, which are discovered while reviewing the Contract Documents or in the process of execution of the Works.
- 9.10 The Contractor shall arrange for the permits and licenses for release of materials, which are under Government control subject to the Bank giving all the necessary assistance and upon being advised by the Consultant signing any forms or applications that may be necessary.
- 9.11 The Contractor shall comply with the provisions of legislation prevailing during the currency of contract.
10. The Contractor shall keep the Bank saved harmless and indemnified against claims if any of the workmen and all costs and expenses as may be incurred by the Bank in connection with any claim that may be made by any workmen.
- 11. GENERAL CONDITIONS**
- 11.1 The schedule of Quantities given in the Contract Bill is provisional and is meant to indicate the intent of the Work and to provide a uniform basis for tendering. The Bank reserves the right to increase or decrease any of the quantities or to totally omit any item of Work and the Contractor shall not claim any extras or damages on these grounds.
- 11.2 Any error in description or in quantity or omission of items from the Contract Bill shall not vitiate this Contract but shall be treated as a variation.
- 11.3 The rates quoted by the Contractor in the priced bill of quantities (Contract Bills) shall be treated as firm and the contract sum shall be deemed to have been calculated with reference to the cost of execution of Works as set out in Contract Documents and shall not be adjusted or altered for any reason.
12. Notwithstanding anything contained elsewhere in any of the clauses of the tender, the prices/rates quoted for each item/Work in the Bills of Quantities shall be deemed to be inclusive of all direct and indirect costs, and taxes, etc. on any of inputs, royalty on quarried items etc. that may be involved in completing the item/Work as required in the fulfillment of all obligations under the contract and to the satisfaction of the Engineer. Additional Taxes/

Levies by Central/ State Government legislations after opening of tender shall be reimbursed to the contractors as per actual.

13. All the interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for Work actually done and completed, and shall not preclude the repairing of bad, unsound, and imperfect or unskilled Work to be removed and taken away and reconstructed, or re-erected or be considered as an admission of the due performance of the contract, or any part thereof in any respect or the accruing of any claim, nor shall, it conclude, determine or affect in anyway the power of the Bank under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for completion of the Work or of the date of certificate of completion furnished by the Consultant and payment shall be made within eight (8) weeks from the date of receipt of final Certificate from the Consultant.

14. **INSURANCE**

Without limiting the obligations and responsibilities under Contract Clause for Care of Work the Contractor shall effect third party insurance with an insurer and in terms approved by the Bank in the joint names of the Bank and the Contractor-

- a. Against all loss or damage from whatever cause arising, other than the excepted risks stated in contract clause of the General Conditions for which the Contractor is to be held responsible under the terms of the Contract so as to cover the Bank and the Contractor during the period beginning with commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works.
- b. Against any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purposes of completing the outstanding Work during the Defects Liability period pursuant to the Undertaking given at the time of applying for the issue of Certificate of Completion.
- c. Against any loss or damage occasioned by the Contractor in the course of any operations carried out by him for rectifying any defect in perfection or fault appearing during the progress of the Work or during the Defects Liability Period.
- d. Against any loss or damage occasioned by the Contractor in the course of any operations carried out by him for searching the cause of any defect, imperfection or fault appearing during the progress of the Works or during the Defects Liability Period.
- e. Against any liability for or in respect of any damages or compensation payable at law in respect of or in consequence of any accident or injury to any workmen or other person in the employment of the sub-Contractor provided the sub-contractors shall not have insured against such contingency. (Insurance against accident etc. to workman)
- f. Unless otherwise instructed the Contractor shall insure the Works and keep them insured until the virtual completion of the contract against loss or damage by fire and/or earthquake, flood.
- g. The Contractor shall maintain Contractors' all risks insurance policy covering loss, damage, theft, burglary etc. of all materials and equipment's, temporary Works and the Work shall be insured for a total sum equal to the value of all such items plus 10% of such value.

Provided always that all the insurance under the contract documents shall be arranged by the Contractor from a first class insurance company having a branch near the site who can deal with all matters pertaining to the subject, the insurance must be placed with a company approved by the Bank, in the joint names of the Bank and the Contractor for such amount and for any further sum if called to do so by the Bank, the premium of such further sum being allowed to the Contractor as an authorized extra.

15. The Contractor shall deposit the policy and receipt for premiums paid with the Bank within 21 (twenty-one) days from the date of issue of Work order unless otherwise instructed. In

default of the Contractor insuring as provided above, the Bank on his behalf may so insure and may deduct the premiums paid from any money due, or which may become due to the Contractor. The Contractor shall as soon as the claim under the policy is settled or the Work reinstated by the Insurance Company should they elect to do so, proceed with due diligence with the completion of the Works in the same manner as though the insured risk/contingency has not occurred and in all respects under the conditions of the contract. The Contractor in case of rebinding or reinstatement after the occurrence of the insured risk/contingency shall be entitled to such extension of time for completion as the Bank may deem fit.

- 15.1 Such insurance shall continue during the whole of the time of continuance of Work and/or during such time that any persons are employed by him on the Works and shall when required produce before the Bank or the consultant, such policy of insurance and the receipt for payment of the earlier premium and the current premium.
- 15.2 The insurance shall be effective in such manner that the Bank is indemnified under the policy. In the event of the sub-contractor having affected an insurance against accident etc. to the workmen the Contractor shall require such sub-contractor to produce to the Bank/ consultant when required, such policy of insurance and the receipt for the payment of the current premium, then in that event insurance under clause (vii) hereof by the Contractor shall not be necessary.
16. The Contractor shall provide for adequate cover to the Bank as per the provisions of Workmen Compensation Act.
17. The Contractor shall make available the insurance cover note before the commencement of the Work and shall notify any change in the nature or extent of the Work and also make available additional insurance of Works if required in special circumstances.

18. **DEFECTS LIABILITY**

- 18.1 Any defects, shrinkages or other faults which shall appear within the Defects Liability Period of 12 months from the date of handing over the works and which are due to materials or workmanship not in accordance with this contract or on account of failure on the part of the Contractor to comply with any of his obligations expressed or implied shall be specified by the consultant in a schedule of defects which he shall deliver to the Contractor not later than 14 days after the expiration of the Defects Liability Period, and within a reasonable time after receipt of such schedule the defects, shrinkages and other faults therein specified shall be made good by the Contractor and (unless the consultant shall otherwise instruct, in which case the contract sum shall be adjusted accordingly) entirely at his own cost.
- 18.2 The Contractor shall make good at his own costs and to the satisfaction of the consultant, all defects, shrinkages or small faults arising in the opinion of the consultant/ engineer from Work or materials not being in accordance with the drawings or specifications or schedule of quantities or the instructions of the Engineer/ consultant which may appear within the **“Defects Liability Period of 12 months from the date of handing over completed site”** referred to in the Appendix to General Conditions. All defects, shrinkages or small faults arising from any other cause not attributable to the Contractor shall be rectified by the Contractor as an additional work.
- 18.3 In the event of failure of the Contractor to carry out any such work to the satisfaction of the Engineer/ consultant, the Bank shall be entitled to carry out the same at the Contractor's costs and all expenses consequential and incidental thereto shall be deducted by the Bank from any monies due or to become due to the Contractor.
- 18.4 When in the opinion of the Engineer/consultant any defects, shrinkages or other faults which he may have required to be made good under sub-clause (1) and (2) of this condition shall have been made good he shall issue a certificate to that effect, and completion of making good defects shall be deemed for all the purposes of this contract to have taken place on the day named in such certificate.

19. **SPECIAL RISK**

The Contractor shall not be liable for or in respect of any consequences arising out of any special risks as enumerated in relevant clause of the General Conditions. The responsibilities, rights and liabilities of the parties in such case shall be determined with respect to Clause 65 of the General Conditions.

20. STATUTORY OBLIGATIONS, NOTICES, FEES AND CHARGES

The Contractor shall comply with and give all notices required by any Act of Parliament, any instrument rule or order made under any Act of Parliament, or any regulation or byelaw of any local authority or of any statutory undertaker which has any jurisdiction with regard to the Works or with whose systems the same or will be connected. The Contractor before making any variation from the contract drawings or the contract bills necessitated by such compliance shall give to the Engineer / consultant a written notice specifying and giving the reason for such variation and the Engineer / consultant may issue instructions in regard thereto. If within 7 days of having given the said written notice the Contractor does not receive any instructions in regard to the matters therein specified, he shall proceed with the Work confirming to the Act of Parliament, instrument, rule, order, regulation or byelaw in question and any variation thereby necessitated shall be deemed to be a variation required by the Engineer / consultant.

There shall be no employer -Employee relationship whatsoever between the bank and the successful bidder/his sub-contractors/ agents/ labourers/ employees/ staff/ representatives. The bidder shall be liable for compliance of all labor laws applicable in connection with the contract and shall be responsible for payment of wages/arrears of wages under the applicable laws.

21. MATERIALS, WORKMANSHIP, SAMPLES, TESTING OF MATERIALS

- 21.1 All the Works specified and provided for in the specifications or which may be required to be done in order to perform and complete any part thereof shall be executed in the best and most workmanlike manner with materials of the best and approved quality of the respective kinds in accordance with the particulars contained in and implied by the specifications and as represented by the drawings or according to such other additional particulars, and instructions as may from time to time be given by the consultant /Engineer during the execution of the Work, and to his entire satisfaction.
- 21.2 If required by the consultant /Engineer the Contractor shall have to carry out tests on materials and workmanship in approved materials testing laboratories or as prescribed by the consultant /Engineer at his own cost to prove that the materials etc., under test conform to the relevant I.S. Standards or as specified in the specifications. The necessary charges for transporting, testing etc., shall have to be borne by the Contractor. No extra payment on this account should in any case be entertained.
- 21.3 In case contractor is delaying or refusing or avoiding testing of material, the consultant/engineer shall arrange for carrying out testing of material and the necessary expenditure in carrying out the testing, transportation and incidental expenses shall be recovered from the contractor.
22. All the materials (except where otherwise described) stores and equipment required for the full performance of the Work under the contract must be provided through normal channels and must include charge for import duties, sales tax, octroi and other charges and must be the best of their kind available and the Contractor/s must be entirely responsible for the proper and efficient carrying out of the Work. The Work must be done in the best workmanlike manner. Samples of all materials to be used must be submitted to the Consultant/Engineer when so directed by the Consultant / Engineer and written approval from Consultant / Engineer must be obtained prior to placement of order.
23. During the inclement weather the Contractor shall suspend concreting and plastering for such time as the Consultant /Engineer may direct and shall protect from injury all Work when in course of execution. Any damage (during constructions) to any part of the Work for any reason due to rain, storm or neglect of Contractor shall be rectified by the Contractor in an approved

manner at no extra cost.

24. If the Work be suspended by reason of rain, strike, lock-outs or any other cause, the Contractor shall take all precautions necessary for the protection of Work and at his own expenses shall make good any damage arising from any of these causes.
25. The Contractor shall cover up and protect from damage from any cause, all new work and supply all temporary doors, protection to windows, and any other requisite protection for the execution of the Work whether by himself or special tradesmen or sub-contractor and any damage caused must be made good by the Contractor at his own expenses.

26. SUBSTITUTION

Should the Contractor desire to substitute any materials and workmanship, he/they must obtain the approval of the Bank / Consultant in writing for any such substitution well in advance. Materials designated in this specification indefinitely by such term as "Equal" or "Other approved" etc. specific approval of the Bank/Consultant has to be obtained in writing. The term equivalent means, if material specified is not available, then after satisfying to the fact, the consultant / engineer may give other material to be used which will be subject to adjustment in purchase prices.

27. INSPECTION OF WORKS

- 27.1 All materials and workmanship shall be subject to inspection, examination and test at any and all times during manufacture and/or construction. The Consultant may issue instructions requiring the Contractor to open up for inspection any Work covered up or to arrange for or carry out any test at any and all times.

The Consultant / Engineer shall have the right to reject the defective material and workmanship or require its correction.

- 27.2 The test of any materials or goods (whether or not already incorporated in the Works) or of any executed Work, and the cost of such opening up or testing (together with the cost of making good in consequence thereof) shall be added to the contract sum unless provided for in the contract bills or unless the inspection or test shows that the Work, materials or goods are not in accordance with this contract.
- 27.3 The Consultant / Engineer may issue instructions in regard to the removal from the site of any Work, materials or goods, which are not in accordance with this contract.
- 27.4 The Engineer may (but not reasonably or vexatious) issue instructions requiring the dismissal from the Works of any person employed thereon.
- 27.5 On the failure of the Contractor to comply with any of the Engineer's instructions the Engineer may proceed to replace or correct such material/workmanship entirely at the cost of the Contractor.

28. REMOVAL OF IMPROPER WORK

The Bank shall during the progress of the Work have power to order in writing from time to time the removal from the Work within such reasonable time or times as may be specified in the order of any materials which in the opinion of the Consultant/ Engineer are not in accordance with specification or instructions, the substitution or proper re-execution of any Work executed with materials or workmanships not in accordance with the drawings and specifications or instructions. In case the Contractor refuses to comply with the order the Bank shall have the power to employ and pay other agencies to carry out the Work and all expenses consequent thereon or incidental thereto as certified by the Consultant/ Engineer shall be borne by the Contractor or may be deducted from any money due to or that may become due to the Contractor. No certificate which may be given by the Engineer shall relieve the Contractor from his liability in respect of unsound Work or bad materials.

29. PROTECTIVE MEASURES

- 29.1 The Contractor from the time of being placed in possession of the site must make suitable arrangements for watching, lighting and protecting the work, the site and surrounding property by day, by night, on Sundays and other holidays.
- 29.2 Contractor shall indemnify the Bank against any possible damage to the building, roads, or members of the public in course of execution of the work.
- 29.3 The contractor shall provide necessary temporary enclosures etc. for the protection of the work and materials and for altering and adopting the same as may be required and removing on completion of the works and making good all works disturbed.
- 30. NOTICE AND PATENTS OF APPROPRIATE AUTHORITY AND OWNERS.**
- 30.1 The Contractor shall conform to the provisions of any Acts of the Legislature relating to the Work, and to the Regulations and Bye-laws of authorities, and/or any water, lighting and other companies, and/or authorities with whose systems the structures were proposed to have connection and shall before making any variations from the drawings or specification that maybe associated to so conform, give the Consultant/ Engineer written notices, specifying the variations proposed to be made and the reasons for have making them and apply for instruction thereon. The Consultant / Engineer on receipt of such intimation shall give a decision within a reasonable time.
- 30.2 The Contractor/s shall arrange to give all notices required for by the said Acts, Regulations or Bye-laws to be given to any authority, and to pay to such authority or to any public officer all fees that may be properly chargeable in respect of the Work and lodge the receipts due with the Bank.
- 31. ASSIGNMENT AND SUB-LETTING**
- 31.1 The whole of the Works included in the contract shall be executed by the Contractor and the Contractor shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein nor, shall take a new partner, without written consent of the Bank and no subletting shall relieve the Contractor from the full and entire responsibility of the contract or from active superintendence of the Work during their progress.
- 31.2 The Contractor shall not assign the Contract or any benefit or interest therein or there under, otherwise than by a charge in favour of the Contractor's Bankers of any monies due or to become due under this Contract, without the prior written consent of the Bank.
- 31.3 The Contractor shall not sub-let the whole of the Works except where otherwise provided by the contract, the Contractor shall not sublet any part of the Works without the prior written consent of the Engineer, which shall not be unreasonably withheld, and such consent, if given shall not relive the Contractor from any liability or obligation under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen. Provided always that the provision of labor on a piecework basis shall not be deemed to be a subletting under this clause. The Contractor shall co-ordinate and shall be responsible for all aspects of his sub-contractor(s) without being relieved of any of his obligation under the contract.
- 31.4 If, the contracting agencies are violating the tender terms and sub-let the work without Bank's consent and the same is brought to the notice of the Bank, the Bank will be entitled to recover 10% of such work as penalty besides initiating measures as provided in contract.
32. If, at any time during the execution of the Works, the Consultant/ Engineer shall require the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be ordered in writing and shall be deemed to be an addition ordered under the provisions of the General Conditions unless a provisional sum in respect of such anticipated Work shall have been included in the Bill of Quantities.
33. The Contractor shall in connection with the Works provide and maintain at his own costs all lights, guards, fencing and watching when and where necessary or required by the Consultant

/ Engineer or the Bank, or by any duly constituted authority, for the execution and for the protection of the Works, and/or for the safety and convenience of the public / others.

34. The Contractor shall, in accordance with the requirements of the Consultant/ Engineer, afford all responsible opportunities for carrying out their Work to any other Contractors employed by the Bank and their workmen and to the workmen of the Bank and of any other duly constituted authorities who may be employed in the execution on or near the Site of any Work not included in the contract or of any contract with the Bank may enter into in connection with or ancillary to the Works. The Contractor will not be paid any compensation on this account.
35. Shall keep the Site reasonably free from unnecessary store of constructional plant and machinery, wreckage and rubbish during progress of Works and on completion leave the whole site clean and in a workmanlike condition to the satisfaction of the Consultant / Engineer.

36. **Default of Contractor**

36.1 If the Contractor

- i. being a company presents a petition for winding up and/or goes into liquidation (other than voluntary liquidation for the purposes of amalgamation or reconstruction) or
- ii. shall make an assignment or a composition for the benefit of the greater part, in number of amount of his creditors or shall enter into a Deed or arrangement with his creditors, or
- iii. if a Receiver of the Contractor's firm appointed by the court shall be unable, within fourteen days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Bank that he is able to carry out and fulfill the contract, and if so required by the Bank to give reasonable security therefore, or
- iv. if the Contractor shall suffer execution to be issued, or
- v. shall suffer any payment under this contract to be attached by or on behalf of and of the creditors of the Contractor, or
- vi. shall assign, charge or encumber this contract or any payments due or which may become due to the Contractor without the consent in writing of the Bank first obtained, there under, or
- vii. shall agree to carry out the contract under a committee of inspections of his creditors, or
- viii. shall have an execution levied on his goods, or
- ix. shall use improper materials or workmanship in carrying on the Works, or
- x. shall in the opinion of the Bank not exercise such due diligence and make such due progress as would enable the Work to be completed within due time agreed upon, and
- xi. the Consultant/ Engineer certifies in writing that the Contractor has failed to commence the Works or failed to proceed with the Works after the suspension order when so called upon by the Consultant/ Engineer, or
- xii. shall abandon the contract,
- xiii. without reasonable excuse has failed to commence the Works or have suspended the progress of Works for 28 days after receiving from the Consultant/ Engineer written notice to proceed on
- xiv. has failed to remove materials from the site or to pull down or replace for 28 days after receiving from the Consultant/ Engineer written notice that the said materials or Work has been condemned and rejected by the Consultant/ Engineer under these conditions or
- xv. despite previous writings by the Consultant/ Engineer in writing has failed to execute

Works in accordance with the contract, or is persistently or flagrantly neglecting to carry out his obligations under the contract or as to the detriment of good workmanship or in defiance of the Consultant / Engineer's instructions to the contrary, sublet any part of the contract then and in any of the said cases the Bank may notwithstanding previous waiver

- a) determine the contract by after giving 14 days' notice in writing to the effect as hereinafter mentioned, but without thereby affecting the powers of the Bank or the obligations and liabilities of the Contractor the whole of which shall continue in force as fully as if the contract, had not been so determined and as if the Works subsequently executed had been executed by or on behalf of the Contractor (without thereby creating any trust in favour of the Contractor)
 - b) further the Bank or his agent, or servants, may enter upon the Site and take possession of the Work and all Constructional Plant, amenities, unused materials, tools, scaffolding, sheds, machinery, steam and other power, utensils and materials lying upon premises or the adjoining lands or roads reserved for the execution of the Works and
 - sell the same as his own property or
 - may employ the same by means of his own servants and workmen in carrying on and completing the Works or
 - by employing any other Contractors or other persons or person to complete the Works, and the Contractor shall not in any way interrupt or do any act, matter of thing to prevent or hinder such other Contractors or other persons or person employed from completing and finishing or using the materials and plants for the Works when the Works shall be completed, or as soon thereafter as conveniently may be, the Bank shall give notice in writing to the Contractor to remove his surplus materials and plants and should the Contractor fail to do so within a period of 14 days after receipt by him the Bank may sell the same by Public Auction and shall give credit to the Contractor for the amount so realized.
- 36.2 Any expenses or losses incurred by the Bank in getting the Works carried out by other Contractors shall be adjusted against the amount payable to the Contractor by way of selling his tools and plants or due on account of Work carried out by the Contractor prior to engaging other Contractors or against the Security Deposit.
- 36.3 Upon such entry and expulsion by the Bank the Consultant/ Engineer may adopt an appropriate mode at his discretion and certify the amounts, if any, that had at the time of such entry and expulsion reasonably been earned in respect of the work actually done by him and the value of any unused or partially used materials, any Constructional Plant and any amenities brought into existence exclusively for execution of the Works.
- 36.4 If the Bank shall enter and expel [the Contractor] under this Clause, he shall not be liable to pay to the Contractor any money on account of the Contract, until the expiration of the Defects Liability Period and thereafter until the costs of execution, damages for delay in completion, if any, and all other expenses incurred by the Bank have been ascertained and the amount thereof certified by the Consultant / Engineer. The Contractor shall then be entitled to receive only such sum or sums, if any, as the Consultant / Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount shall exceed the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Bank the amount of such excess and it shall be deemed a "debt due" by the contractor to the Bank and shall be recoverable accordingly.

37 NOTICES

- 37.1 All certificates, notices or written orders to be given by the Bank or by the Consultant/ Engineer to the Contractor under the terms of the Contract shall be served by sending by registered post or by Courier or delivering the same to the Contractor's principal place of

business, or such other address as the Contractor shall nominate for this purpose.

- 37.2 All notices to be given to the Bank or to the Consultant/ Engineer under the terms of the Contract shall be served by sending by registered post or by Courier or delivering the same to the respective addresses nominated for that purpose in Part II of these conditions.
- 37.3 Either party may change a nominated address to another address in the country where the Works are being executed by prior written notice to the other party and the Consultant / Engineer may do so by prior written notice to both parties.
- 39 The work should be executed is time bound and Bank has the right to exit/cancel /terminate the contract with immediate effect and engage another contractor, in case the bidder defaults or commit breach of any Tender terms. In such an event, bank shall recover from the bidder the cost, expenses for loss, damage caused due to the bidder, by various means not limited to forfeiture of security deposit and unpaid bills.

40 ARBITRATION

- 40.1 Wherever, in any of the documents forming part of the Contract, the Bank's Dy. General Manager, Regional office Mahabubnagar , has been vested with the final powers, his decision, opinion, certificate or any other discretion shall be final conclusive and binding on the parties and shall be without appeal. All other matters shall be subject to the right of arbitration.
- 40.2 All disputes or differences of any kind whatsoever save and except matters referred to in clause 1) arising out of or in connection with the Contract, whether during the progress of Work or after Completion and shall after written notice by either party to the contract to the other of them and to the Bank hereinafter mentioned be referred for adjudication to two Arbitrator, one each to be nominated by the Contractor and the Bank, who shall thereafter appoint an Umpire. The provisions of Indian Arbitration and Conciliation Act 1996 shall apply for the purposes.
- 40.3 The Work under the Contract shall, however, continue during the arbitration proceedings and no payment due or payable to the Contractor shall be withheld on account of such proceedings.
- 40.4 The Arbitrator shall be deemed to have entered on the reference on the date he issued notice to both the parties fixing the date of the first hearing.
- 40.5 The Arbitrator may from time to time, with the consent of the parties, enlarge the time for making and publishing the award.
- 40.6 The Arbitrator shall give a separate award in respect of each dispute or difference referred to him. The Arbitrator shall decide each dispute in accordance with the terms of the contract and give a reasoned award. The venue of arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion.
- 40.7 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 who may direct to and by whom and in what manner, such costs or any part thereof shall be paid and may fix or settle and amount of costs to be so paid.
- 40.8 The award of the Arbitrator shall be final and binding on both the parties.
- 40.9 Subject to aforesaid the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules made there under, and for the time being in force, shall apply to the arbitration proceeding under this clause.
- 40.10 The Bank and the Contractor hereby also agree that arbitration under clause shall be a condition precedent to any right to action under the contract with regard to the matters hereby expressly agreed to be so referred to arbitration.

IN WITNESS WHEREOF the Bank and the Contractor have set their

Respective hands to these presents through their authorized representatives the day, month and year first herein above written.

Signed by the said

In the presence of

Bank

Witness

Name:

Address

Signed by the said

In the presence of

Contractor

Witness

Name:

Address

DOCUMENTS ATTACHED TO THE AGREEMENT FORMING PART & PARCEL OF THE AGREEMENT

- Tender document & tender drawings.
- NIT vide
- Addendum issued vide
- Contractor's letter dated
- Work order vide.

GENERAL INSTRUCTIONS TO CONTRACTORS AND SPECIAL CONDITIONS

- 1) Canvassing in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.
- 2) The Tender Form must be filled in English and all entries must be made by the hand and written in ink. If any of the documents is missing, or unsigned, the Tender may be considered invalid by the Bank in its discretion.
- 3) Performance Security deposit to be kept @ 5 % of the contract value. This deposit is kept with the bank. The Performance Security Deposit may be refunded within 60 days after completion of contract in all respect.
- 4) Retention Money @8% of tender/ contract value shall be deducted from the running bills. This amount is kept with the bank and 50% retention amount plus Performance Security/ EMD are refunded to the contractor on issue of Virtual completion Certificate by Architect/ Bank. The remaining 50% retention amount may be refunded to the contractor without any interest in 14 days after the defect liability period i.e after one year of work completion, provided the contractor has satisfactorily carried out all the works and rectified all the defects in accordance with the conditions of contract. The Bid Security or Bank Guarantee/security deposit may be forfeited by the Bank for any default/failure to implement any of the terms by the successful bidder.
- 5) The contractor shall not assign the contract. He shall not sub-let any portion of the contract except with the written consent of the Bank. In case of breach of these conditions, the Bank may serve a notice in writing on the contractor rescinding the contract whereupon the Security Deposit shall stand forfeited to the Bank, without prejudice to his other remedies against the contractor. Central Govt./ State Govt. organization will not be allowed to sublet the work on back to back basis.
- 6) The contractor shall carry out of all the work strictly in accordance with Drawings, details and instructions of the Architect, Consultant and the Bank. If in the opinion of the Architect, consultant or the Employer, changes have to be made in the design and with the prior approval in writing of the Employer, they desire the contractor to carry out the same, the contractors shall carry out the same without any extra charge. The Bank's decision in such cases shall be final and shall not be open to arbitration.
- 7) A Schedule of probable quantities in respect of each work and specifications accompany these special conditions. The Schedule of probable quantities is liable to alteration by omission, deductions or additions at the discretion of the Architect/ Bank. No claim will be entertained from the contractor on account of loss of profit over revising the tender rates.
- 8) The Tenderer must obtain for himself on his own responsibility and at his own expenses all the information which may be necessary for the purpose of filling of Tender and for entering into a contract and must examine the drawings and must inspect the site of the work and acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto no compensation will be paid on account of not getting proper information. Furnishing works shall be done in a phased manner as it is a functioning office and complete site cannot be handed over in a single go.
- 9) The rates quoted in the Tender shall be inclusive of all charges for clearing of site before commencement as well as after completion, as occasion shall require or when ordered so to do, and fully reinstate and make good all matters and things disturbed during the execution of the work and to the satisfaction of the Bank / Consultant.

- 10) -Time allowed for carrying out the work as mentioned in the Memorandum shall be strictly observed by the contractor and it shall be reckoned from the date of issuance of work order or the date of handing over the site to the contractor whichever is later. The work shall throughout the stipulated period of the contract be proceeded with all due diligence and if the contractor fails to complete the work within the specified period i.e. 60 days, he shall be liable to pay compensation as defined in the conditions of contract.
- 11) The contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the case of delays may be, including delays arising out of modifications to the work entrusted to him or in any sub-contract connected therewith or delays in awarding contracts for other trades.
- 12) The successful Tenderer is bound to carry out any items of work necessary for the completion of the job even though such items are not included in the quantities and rates. Schedule of instructions in respect of such additional items and their quantities will be issued in writing by the Architect/ consultant with the prior consent in writing of the Bank.
- 13) The successful Tenderer must co-operate with the other contractors appointed by the Employer, if any so that the work shall proceed smoothly with the least possible delay and to the satisfaction of the Architects/ Consultant.
- 14) The contractor must bear in mind that all the work shall be carried out strictly in accordance with the specifications made by the Architect/ Consultant and also in compliance of the requirements of the Authorities concerned and no deviation on any account will be permitted.
- 15) The contractor will have to obtain completion / clearance certificate in respect of services such as water supply, sewerage, etc. The contractor will also obtain permanent water connection for the entire project. The Bank will pay necessary fee to be made to Govt. authorities.
- 16) The Contractor shall strictly comply with provision of safety code annexed hereto.
- 17) The contractor shall indemnify Union Bank of India, against any claim or legal action arising out of the said Act due to the failure of non-compliance of the provisions of the said Act and the penalty or any other amount levied by the authorities, shall be recoverable from the payments due to the contractors.
- 18) The Contractor shall comply with the provision of the Apprentices Act, 1961, and the Rules and Orders issued there under from time to time. Failure to do so will be in a breach of the contract and the Architect / consultant and the Bank may in their discretion cancel the contract. The contractor shall also be liable for any pecuniary or other liabilities arising on account of any violation by him of the provisions of the Act.
- 19) The Security Deposit of the successful Tender will be forfeited if he fails to comply with any of the conditions of the contract.
- 20) The contractor shall be responsible for the observance of all Central Rules and Regulation framed by the Central Government under the Contract Labour (Regulation and Abolition) Act, 1970. The Bank shall be entitled to deduct all damages, which it might suffer on account of non-observance of these rules by the Contractor, from the amount payable to the Contractor.
- 21) Contractors are not allowed to remove materials brought at Site against which advances have been paid. Wastages/excess material & machinery/tools shall be removed from the site on regular basis without causing any disturbance to the office area.

- 22) The Contractor is to provide at all times during the progress of the works and the maintenance period / defect liability period proper means of access, with ladders, gangways, etc., and the necessary attendance to move and adopt as directed for the inspection or measurement of the works by the Consultant or their representatives.
- 23) Materials shall be of approved quality and the best of their kind available and shall generally conform to I.S. Specifications. The Contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead or requirement for use in the work. The work involved calls for approved standard of workmanship combined with speed and to the entire satisfaction of the Architect/consultant. All the material shall be approved by the Consultant / Bank before use. Contractor to arrange samples well in time.
- 24) The Contractors shall after completion of the work clear the Site of all debris and left-over materials at his own expenses to the entire satisfaction of the Bank / Consultant and Municipal or other public authorities.
- 25) The contractor herewith agrees that in respect of inspection of works by the Chief Technical Examiner of the works, a wing of Central Vigilance Commission and the bills of the contractor including all supporting vouchers, abstract etc. to be made after payment of the bills and if as a result of such audit and technical examination any sum is found to have been over paid in respect of any work done by the contractor under the contract of any work claimed by him to have been done by him under the contract and found not to have been executed or any work is found not to have been executed in accordance with the contract, the contractor shall be liable to refund the amount of over payment made already and it shall be lawful for the Bank to recover the same from him in any manner the Bank deems fit either from any payments due and / or becoming due to the contractor or from the security deposit or through any further bills and / or final bill or in any other manner whatsoever not excluding through recourse to legal action. The certification of bills / measurements by consultant / Architect and Engineer will be scrutinized by the Bank's Central Office / Audit / Vigilance and any deficiency will be corrected accordingly. Contractor cannot insist for payment just because it is signed by consultant / architect / engineer. The contractor herewith agrees to co-operate with the Bank / Consultant while such examinations of works and redo the things without any extra cost to the Bank. It is essential and agreed condition of the contract that any such action taken by the Bank shall deemed to be the fully legal and valid and binding on the contractor.
- 26) Contractors are requested to note that no extra item or deviated item of work to be executed without taking prior permission, the Bank shall not be held responsible for the payment of such works executed. Contractors will have to submit all the particulars including purchase bills/price list for the materials along with the rate analysis for verification of Item Rates.
- 27) If it is observed the existing bank properties are damaged then the contractors will have to make good the same at their own cost.
- 28) If contractors fail to pay the taxes/royalties to the Authorities concerned, the Bank reserve their rights to recover the said amount from the amount payable to the contractor and pay the same to the Authorities concerned.
- 29) Work is to be executed & measurements are to be paid as per the detail specification & description of item given in the Standard Specification Book except for the items which are specifically mentioned in the tender for which the details of item and mode of measurements to be followed as indicated separately in the conditions of contractors.
- 30) If there are any contracting clauses mentioned in the tender, the interpretation of the same will be done by the Architect / consultant. However, the decision of the Bank will be final and binding.

- 31) After awarding the work, contractor shall get registered with the office of the Labour commissioner and inform Bank accordingly. Contractors shall follow all rules and regulations stipulated by the Labour Commissioner strictly.
- 32) Contractors shall quote consistent rates for the items of similar nature or analogous in specifications for the sections in schedule of quantities. If it is observed that the rates quoted for similar nature of items or analogous in specification under different sections, are inconsistent, then the Bank reserves his right to consider the lowest of rates for all such items and work out the final amount for payment, unless the competent authority finds that there is justifications for such inconsistent rates.
- 33) The contractor shall give a list of his relatives working with the Bank along with their designations and addresses.
- 34) No employee of the Bank is allowed to work as a contractor for a period of two years of his retirement from Bank service, without the previous permission of the Bank. The contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of the Bank as aforesaid before submission of the tender or engagement in the contractor's service.

CONDITIONS HEREINBEFORE REFERRED TO

1. Definition of terms/ interpretation:

In construction these conditions, the specification schedule of quantities and contract agreement, the following words shall have the meanings herein assigned to them expect where the subject or context otherwise requires.

- (a) "Employer/ owner / Bank" shall mean" Union Bank of India, Government of India undertaking" having its **Regional Office - Mahabubnagar Door No: 8-3-40,1st floor, GL tower, Near Venkateshwara colony Bus Stop, Mettugadda, Mahabubnagar - 509001** and any of its employees representatives authorized on their behalf.
- (b) "Architect / consultant" - shall mean "**M/s BURMAN.ET.AL DESIGNERS ,planners Valuers, having their Registered office at 1-79/1, Kothapet, Near Balapur, Balapur Mandal, RR District, Hyderabad, Telengana-500005. Mob: 8125196178, 8328251857, 9811210589, 8800147589.E-mail: burmanetal2008@gmail.com ,burmanetalhyd@gmail.com.**" or in the event of his or their easing to be Architect/ Consultant for the purpose of this contract such other person as the Bank shall nominate for the Purpose.
- (c) "Contractors" (in case of partnership) shall mean.....andtrading as partners in the name and style ofand shall include partners for the time being of the said firm and the legal representatives of a deceased partner.
- "Contractors" (in case of individuals) shall mean.....andtrading in the name and style ofand shall include his / their heirs, legal representative assigns or successors.
- "Contractors" (in case of company) shall mean.....a company incorporated under19.....and having its registered office atand shall include its successors and assigns.
- (d) "Site" shall mean "Work Place located at Proposed New Regional Office- SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist - 509001, Telangana, INDIA for 1st Floor,2nd Floor & 3rd Floor. includes any building and erections thereon and any other land (inclusively), as aforesaid, allotted by the Bank for the contractor's use.
- (e) Site Engineer / Engineer: The Engineer appointed by the Bank/ Architect/ Consultant for the management of the project.
- (f) "The works" shall mean the work or works to be executed or done under this contract.
- (g) "This Contract" shall mean Articles of Agreement, the special conditions, the general conditions of contract, the appendix, the schedule of quantities and specifications, attached hereto and duly signed.
- (h) "Notice in writing" or written notice shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received), by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post, it would have been delivered.
- (i) "Act of Insolvency" shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act, or the Provincial Insolvency Act or any amending such original.
- (j) "The Schedule of Quantities" shall mean the schedule of quantities as specified and forming part of this contract.
- (k) "Priced Scheduled of Quantities" shall mean the schedule of quantities duly priced with the accepted quoted rates of the contractor.
- (l) "Net Prices" If in arriving at the contract amount, the contractor shall have added to or deducted from the total of the items in the Tender any sum either as a Item or otherwise,

then the net price of any item in the Tender shall be the sum arrived at by adding to or deducting from the actual figure appearing in the Tender as the price of that item a similar Item or proportion of the sum so added or deducted of the sum so added or deducted by the contractor the amount of any Prime Cost items and provisional sums of money shall be deducted from the total amount of the Tender. The expression “net rates” or “net prices” when used with reference to the contract or accounts shall be held to mean rates or prices so arrived at.

2. SCOPE OF WORK:

The work consists of **PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND AIR CONDITIONING WORKS FOR NEW REGIONAL OFFICE - SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist - 509001, Telangana, INDIA for 1st Floor,2nd Floor & 3rd Floor..or** any other work, etc. as required on site. It includes furnishing all materials, labor, tools and equipment and management necessary for and incidental to the completion of the work. It includes liasoning with Statutory bodies for execution of work & disposal of waste / Mosquito/ noise control, as per the local statutory rules & also all documentation & registration with all statutory bodies, central/ state such as Insurances, Labour commissioner, etc. All work, during its progress and upon completion shall conform to the lines, elevations and grades as shown on the drawings furnished by the employer/ architects. Should any detail essential for efficient completion of the work be omitted from the drawings and specifications it shall be the responsibility of the contractor to inform the Bank/ Consultant and to furnish and install such detail with Bank/ Consultant’s concurrence, so that upon completion of the proposed work the same will be acceptable and ready for use.

The term the ‘Architects/Consultants’ in the said conditions shall mean the said **M/s BURMAN.ET.AL**, having their Registered office at **1-79/1, Kothapet, Near Balapur, Balapur Mandal, RR District, Hyderabad, Telengana-500005**. or in the event of the said Architect /Consultants ceasing to be the Architect /Consultants for the purpose of this contract for whatever reason, such other person or persons as shall be nominated for that purpose by the Owner/Employer, provided always that no person subsequently appointed to be the Architect /Consultants under this contract shall be entitled to disregard or over rule any decision or direction or approval given or expressed in writing by the Outgoing Architect /Consultants for the time being if the same had been done under instruction from the Bank/ Employer.

3. CONTRACTOR’S RESPONSIBILITY

The Contractor shall carry out and complete the said work in every respect in accordance with this contract and with the directions of and to the satisfaction of Consultant/Bank. The Consultant may in his absolute discretion and in consultation with the Bank (with prior approval from the Bank) and from time to time issue drawings and/or written instruction, details directions and explanations which are hereafter collectively referred to as “Consultant/Bank’s Instruction”.

In regard to:-

- a. The variations or modifications of the design, quality or quantity of works or the additions or omission or substitution of any work.
- b. Any discrepancy in the drawings or between the schedule of quantities and/or drawings and or drawings and or specification.
- c. The removal from the site of any defective materials brought thereon by the contractor and the substitution of any other materials thereof.
- d. The removal and/or re-execution of any works executed by the contractor.
- e. The dismissal from the works of any person employed thereupon.
- f. The opening up for inspections of any work covered up.

- g. The amending and making good of any defects under clauses 19 hereof and those arising during the maintenance/ defect liability period.

The contractor shall forthwith comply with and duly execute any work comprised in such Consultant/Bank instructions, provided always that the verbal instructions, directions, and explanations given to the contractor or his representative upon the works by the Consultant/Bank shall, if involving a variation, be confirmed in writing by the contractor within seven days, and if not dissented from in writing within a further seven days by the Consultant, such shall be deemed to be Consultant /Bank instructions within the scope of the Contract.

4. VISIT TO SITE

The contractor shall visit the site and make himself thoroughly acquainted with the local site condition, nature and requirements of the works, facilities of transport condition, effective labor and materials, access and storage for materials and removal of rubbish. The tenderer shall provide in their tender for cost of carriage, freight and other charges as also for any special difficulties and including police restriction for transport, etc. for proper execution of work as indicated in the drawings. The successful tenderer will not be entitled to any claim of compensation for difficulties faced or losses incurred on account of any site condition which existed before the commencement of the work or which in the opinion of the Bank or Consultant might be deemed to have reasonably been inferred to be so existing before commencement of work.

5. AGREEMENT

The successful contractor is required to sign agreement as may be drawn up to suit local conditions and shall pay for all stamps and legal expenses, incidental thereto.

6. PERMITS AND LICENSES

Permits and licenses for release of materials which are under Government control will be arranged by the contractor. The Bank will render necessary assistance, sign any forms or applications that may be necessary.

The contractor shall at his own cost arrange for storage shed adequate for taking delivery and storing of the quantity of controlled materials released by the authorities or supplied by the Bank. The costs of storing, transporting, etc. of all materials including those under Government control are to be included by the tenderer in his quoted rates.

The Bank / Consultant shall be indemnified against all Government or legal actions for theft or misuse of any controlled materials in the custody of the contractor.

7. GOVERNMENT AND LOCAL RULES

The contractor shall conform to the provisions of all local Bye-laws and Acts relating to the work and to the Regulations etc. of the Government and Local Authorities and of any company with whose system the structure is proposed to be connected. The contractor shall give all notices required by said Act, Rules, Regulations and Bye-laws, etc. and pay all fees payable to such authority / authorities for execution of the work involved. The cost, if any, shall be deemed to have been included in his quoted rates, taking into account all liabilities for license, fees for footpath encroachment and restorations etc. and shall indemnify the Bank against such liabilities and shall defend all actions arising from such claims or liabilities. The contractor shall comply with provision all labour legislation and keep the employer saved harmless and indemnify against claims if any from the statutory authorities, workman and all cost & expenses as may be incurred by the employer in connection with any claims.

8. QUANTITY OF WORK TO BE EXECUTED

The quantities shown in the schedule of quantities are intended to cover the entire new structure indicated in the drawings, but the Bank reserves the right to execute only a part or the whole or any excess thereof without assigning any reason therefore. The quantity may

vary to any extent and even the same will be omitted. No separate payment/ compensation/ revision in the rates will be entertained.

9. VARIATIONS TO BE APPROVED BY THE BANK/ CONSULTANT

Notwithstanding anything herein contained, the Consultant or his representative shall not, without prior concurrence in writing of the Bank, issue any instructions, verbal or in writing, the Consultant can get the work done upto an amount of Rs.10,000.00 (Rupees Ten thousand only) and all instruction issued to the contractor should forthwith be brought to the notice of the Bank. The contractor shall submit through the Consultant, a statement of variations giving rise quantity and rates duly supported by analysis of rates, vouchers, etc. The rates on scrutiny and final acceptance by the Bank shall form a supplementary tender. The Bank shall not be liable for payment of such variations until these statements are sanctioned by the Bank.

10. DRAWINGS AND SCHEDULE OF QUANTITIES AND AGREEMENT

The contractor on the signing hereof shall be furnished by the Consultant free of cost one copy of each of the said drawings and of the specifications and one copy of all further Drawings issued during the progress of the works. Any further copies of such drawings required by the contractor shall be paid by him. The contractor shall keep one copy of all drawings on the works and the Consultant/ Bank or their representatives shall at all reasonable times have access to the same.

11. CONTRACTOR TO PROVIDE EVERYTHING NECESSARY

The contractor shall provide everything necessary for the proper execution of the works according to the intent and meaning of the Drawings, Schedule of quantities and Specification taken together whether the same may or may not be particularly shown or described therein provided that the same can be reasonably be inferred there from, and if the contractor finds any discrepancies therein, he shall immediately and in writings, refer the same to the Bank/ Consultant whose decision shall be final and binding. The contractor shall provide himself for ground and fresh water for carrying out of the works at his own cost. The Bank shall on account be responsible for the expenses incurred by the contractor for hired ground or fresh water obtained from elsewhere.

- 11.1 The rates quoted against individual items will be inclusive of everything necessary to complete the said items work within the contemplation of the contract, and beyond the unit price no extra payment will be allowed for incidental or contingent work, labor and /or materials inclusive of all taxes and duties whatsoever except for specific items, if any, stipulated in the tender documents.
- 11.2 The contractor shall supply, fix and maintain at his own cost, for the execution of any work, all tools, tackles, machineries & equipment and for the proper execution & protection of the said work but also for the protection of the of the Bank's property & personnel.

12. AUTHORITIES NOTICES AND PATENTS

The contractor shall confirm to the provisions of any Act of the legislature relating to the works, and to regulations and bye-laws of any authority, and or any water electric supply and other companies and/or authorities with and whose the systems the structures is proposed to be connected, and shall, before making any variations from the drawing or specifications that may be associated to so confirming, give to the Architect written notice, specifying the variations proposed to be made and the reason for making it and apply for instructions thereon. In case the contractor shall not within ten days receive such instructions he shall proceed with the work confirming to the provisions, regulations, or byelaws in questions, and variations so necessitated shall be dealt with under clause 13 hereof.

The contractor shall bring to the attention of the Consultant/ Bank all notices required by the said Acts, regulations or bye-law to be given to any authority and pay to such authority,

or to any public office, all fees that may be properly chargeable in respect of the said work, and lodge the receipt with the Consultant/ Bank.

The contractor shall indemnify the Bank against all claims in respect of patent rights, royalties, and damages to buildings, roads or members of public in course of execution of work and shall defend all actions arising from such claims and shall keep the Bank saved harmless and indemnified in all respects from such actions, costs and expenses.

13. CLEARING SITE AND SETTING OUT WORKS

The site shall be cleared of all obstructions, and material rubbish of all kind. The contractor shall set out the works and shall be responsible for the true and perfect setting out of the work and for the correctness of the positions, dimensions, levels and the alignment of all the parts thereof. If at any time any error in this respect shall appear during the progress of any part of work or within the period of one year from the completion of the works, the contractor shall at his own expenses rectify such error to the satisfaction of the Consultant / Bank.

14. CONTRACTOR IMMEDIATELY TO REMOVE ALL OFFENSIVE MATTERS

All the rates quoted are inclusive of removal of rubbish / debris collected during the progress of work, rejected material and clearance of site before and after the work is completed. Not more than one truckload shall be stored that to for not more than 3 days. The contractor shall arrange to remove the same immediately. If the contractor is failing to remove the same and the expenses shall be recovered from the contractor and he will not dispute for the expenses so incurred.

15. MATERIALS, WORKMANSHIP, SAMPLES, TESTING OF MATERIALS:

All the works specified and provided for in the specifications or which may be required to be done in order to perform and complete any part thereof shall be executed in the best and most workman like manner with materials of the best and approved quality of the respective kinds in accordance with the particulars contained in and implied by the specifications and represented by the drawings or according to such other additional particulars and instructions as may from time to time be given by the Bank/Consultant during the execution of the work, and to his entire satisfaction.

The contractor shall have to carry out test on materials and workmanship in approved materials testing laboratories or as prescribed by the Bank/ Consultant at own cost to prove the materials quality and test sample, confirm to the relevant I.S. Standard or as specified in the specifications. The necessary charges for transporting testing etc. shall have to borne by the contractors. No extra payment on this account should in any case be entertained.

All the materials (except where otherwise described) store and equipment required for the full performance of the work under the contract must be provided through normal channels and must include charges for import duties, sales tax, octroi and other charges and must be the best of their kind available and the contractors/must be entirely responsible for the proper and efficient carrying out the work. The work must be done in the best workman like manner. Samples of all materials to be used must be submitted to the Bank/ Consultant when so directed by the Engineer/ Consultant and written approval from Bank/ Consultant must be obtained prior to placement of order.

16. INCLEMENT WEATHER:

Should the work be suspended by reason of rain, strike, lockouts or any other cause, the contractor shall take all precautions necessary for the protection of work and at his own expenses shall make good any damage arising from any of these causes. The contractor shall cover up and protect from damage, from any cause, all new work and supply all temporary doors, protection to window, and any other requisite protection for the execution of the work whether by himself or special tradesmen or sub-contractor and any damage caused must be made good by the contractor at his own expenses.

17. MATERIALS AND WORKMANSHIP TO CONFORM TO DESCRIPTIONS:

All materials and workmanship shall so far as procurable be of the respective kinds described in the schedule of quantities and/ or specifications and in accordance with the Consultant's instructions, and the contractor shall upon the request of the Consultant furnish him with all invoices, accounts, receipts and other vouchers to prove that the materials comply therewith. The contractor shall at his own cost arrange for and/ or carry out any test of any materials which the architects may require from Government approved laboratories.

18. CONTRACTOR'S SUPERINTENDENCE & REPRESENTATIVE ON THE WORKS:

The contractor shall give all the necessary personal superintendence during the execution of the works, and as long thereafter as the Bank/ Consultant may consider necessary until the expiration of the defect's liability period stated in the Appendix hereto. The contractor shall also during the execution of works maintain an experienced qualified supervisor as required who shall be in constantly attendance at work while the men are at work. Any directions, explanations, instructions, or notices given by the Bank/ Consultant to such representative shall be held to be given to the contractor. For non-compliance, an amount of Rs.25,000/- pm shall be deducted from the contractor for the period required if supervisor is not provided. However, deduction of payment shall not exonerate contractor for his responsibility for executing quality work.

19. DEPLOYMENT OF LABOURS:

No labour below the age of eighteen years shall be employed on the work. Any labour supplied by the contractor to be engaged on the work on day-work basis either wholly or partly under the direct order or control of the Bank or his representative shall be deemed to be a person employed by the contractor.

20. FACILITIES TO BE PROVIDED TO WORKERS:

The contractor shall comply at his own cost with the order of requirement of any Health Officer of the State or any local authority or of the Bank regarding the maintenance of proper environmental sanitation of the area where the contractor's labourers are housed or accommodated, for the prevention of small pox, cholera, plague, typhoid, malaria and other contagious diseases. The contractor shall provide, maintain and keep in good sanitary condition adequate sanitary accommodation and provide facilities for pure drinking water at all times for the use of men engaged on the works and shall remove and clear away the same on completion of the works. Adequate precautions shall be taken by the contractor to prevent nuisance of any kind on the works or the lands adjoining the same.

The contractor shall arrange to provide first-aid treatment to the labourers engaged on the works. He shall within 24 hours of the occurrence of any accident at or about the site or in connection with execution of the works, report such accident to the Bank and also the competent authority where such report is required by law.

21. DISMISSAL OF WORKMEN:

The contractor shall at the request of the Bank/ Consultant immediately dismiss from the works, any person employed thereon by him who may in the opinion of the Bank/ Consultant incompetent or misconduct himself and such person shall not be engaged again. Such discharges shall not be the basis of any claim for compensation or damages against the Bank or any of their officer or employee.

22. ACCESS TO WORK:

The Bank/ Consultant and their responsible representative shall at all reasonable times have free access to the works and/ or to the workshops, factories or other places where materials are being prepared or constructed for the work and also to any place where the materials are lying or from where they are being obtained the contractor shall give every facility to

the Bank, the Consultant and their representative necessary for inspection and examination and test of the materials and the workmanship. No persons not authorized by the Bank or the Consultant except the representatives of Public Authorities shall be allowed on the works at any time.

23. ASSIGNMENT/ SUB-LETTING:

The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign, or under-let the contract or any part share thereof or any interest therein without the prior written consent of the Bank and no undertaking shall relieve the contractor of the full and entire responsibility of the contract or from active superintendence of works during their progress. Central Govt./ State Govt. companies shall not be allowed to sublet the work on back to back basis/ labor basis without approval from the Bank. In case, in case contractor sub-let the work, the Bank will be entitled to deduct 10% of cost of work executed besides initiating other measures provided in the contract.

24. VARIATIONS:

No alterations, omissions or variations shall vitiate this contract, but in case the Architect thinks proper at any time during the progress of the works to make any alterations in, or additions to or omissions from, the work or any alteration in the kind or quality of materials to be used therein and shall give notice thereof in writing under his hand to the contractor, the contractor shall alter, 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 deviations from any of the provisions of the contract, stipulation specifications or contract drawings without the previous consent in writing of the consultant /Architect / Bank and the values of such extras, alterations, additions or omissions shall in all cases be determined by the Consultant with the prior approval in writing of the Bank in accordance with the provision of the Clause hereof, and the same shall be added to, or deducted from the contract amount, as the case may be accordingly.

25. SCHEDULE OF QUANTITIES:

The Schedule of quantities, unless otherwise stated shall be deemed to have been prepared in accordance with the standard method of quantity measurement.

Any error in description or in quantity or in omission of items from the Schedule of quantities shall not vitiate this contract but shall be rectified and the value thereof shall be added to or deducted, from the contract amount (as the case may be), provided that no rectification of errors, if any, shall be allowed in the contractor's Schedule of rates.

The contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of this tender for the works and the prices stated in the Schedule of quantities and or the schedule of rates and prices which rates and prices shall cover all his obligations under the contract and all matters and things necessary for the proper completion of works.

The quantities of work may vary to any extent or may be omitted; the contractor cannot claim loss of profit/ overhead on this account.

26. MEASUREMENT OF WORKS:

- 26.1 The Consultant may from time to time intimate to the contractor and the Bank that he requires works to be measured, and the contractor shall forthwith attend or send a qualified agent to assist the Consultant in taking such measurements and calculations and to furnish all the particulars or to give all assistance required by any of them.
- 26.2 The Engineer will take measurement of the work jointly with the contractor and enter the same in measurement books. Based on these measurements the contractor will raise the bill as per the prescribed format. Consultant to verify the bill/ measurement and issue

certificate stating that the work completed is as per the specifications and the measurement claimed for the works are actually executed at site. This certificate shall be issued within 14 days after bill submission by the Contractor. The Bank will release bill amount within 21 days. If for some reason checking of the bill/ measurement is not completed, 75% of the bill amount at least shall be released within 21 days and the balance within 30 days.

- 26.3 Should the contractor not attend or neglect or omit to send such agent then the measurement taken by the Architect or a person approved by him shall be final and binding on the contractors.
- 26.4 The contractor or his also supply without charge the requisite number of persons with means and materials necessary for the purpose of measurements or examinations at any time and from time to time of the work or counting weighting of the materials, etc.
- 26.5 All authorized extra works, omissions and all variations made without the Consultant's knowledge, if subsequently sanctioned by him in writing (with the prior approval in writing of the Bank) shall be included in such measurement.
- 26.6 Measurements shall be recorded as per IS 1200 mode measurement and in metric system. Measurement shall be recorded in 100 pages bounded measurement book to be supplied by Union Bank of India. The M.B. shall be kept in the custody of the consultant / Bank.

27. PROCEDURE FOR MEASUREMENT AND BILLING OF WORK IN PROGRESS:

- 27.1 The Contractors will have to keep the materials at Site under their safe custody and at their risk and cost. The Bank is not responsible for damages and losses of such materials brought at site.

27.2 Running Account Payments to be regarded as Advances:

All running account payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and accepted and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the contract, or any part thereof, in this respect, or the accruing of any claim, nor shall it conclude, determine or effect in any way the powers of the Bank/ consultant under these conditions or any of them as to the powers of the Bank/ consultant under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise, or in any other way vary/affect the contract. The final bill shall be submitted by the contractor within one month of the date fixed for completion of the work; otherwise the Consultant/ Engineer-in-charge's certificate of the measurement and of the total amount payable for the work accordingly shall be final and binding on all parties. Interim Bill value to be minimum of **Rs:30.00 Lacs**.

27.COMPLETION CERTIFICATE:

28.1 APPLICATION FOR COMPLETION CERTIFICATE

The Consultant /Engineer-In-Charge shall normally issue to the contractor the completion certificate within one month after receiving, an application thereof from the contractor and after verifying from the completion documents and satisfying himself that the work has been completed in accordance with and as set out in the construction and erection drawing and contract documents.

The contractor, after obtaining the completion certificate, is eligible to present the final bill for the work executed by him under the terms of contract.

28.2 Completion Certificate

Within one month of the completion of the work in all respects, the Contractor shall be furnished with a certificate by the Consultant/ Engineer-In-Charge of such completion but

no certificate shall be given nor shall the work be deemed to have been completed until all scaffolding, surplus materials and rubbish is cleared of the site completely. The work will not be considered as complete and taken over by the Bank, until all the temporary works, labor etc, are removed and the works site cleared to the satisfaction of the Consultant/ Engineer.

If the Contractor shall fail to comply with the requirements of this clause on or before the date fixed for the completion of the work, the Consultant/ Engineer-In-Charge may at the expenses of the contractor remove such scaffolding, surplus materials and rubbish and dispose off the same as he thinks fit and clean up the site and the contractor shall forthwith pay the employer for all expenses so incurred and shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except of any sum actually realized by the sale thereof.

28.3 CERTIFICATE (to be issued by the consultant/ engineer)

It is certified that various items of works claimed in the RA Bill by Contractor has been completed to the extent claimed and at appropriate rates and that the items are in accordance with and fully confirming to the standard and/or prescribed specifications and drawings. Quality and rates verified. The material supplied and work done conform tender specifications. We further certify that we have checked the measurement to the extent of 100 per cent of each item claimed in this bill. As net amount of Rs..... (Rupees) is recommended to be paid to the contractor making the total upto date payment of Rs.....

(Rs.)

Quality and rates verified. The material supplied and work done confirm with the tender specifications.

DATE :

SITE ENGINEER / CONSULTANT

The above certification shall be endorsed in the relevant Measurement Books also by the Consultant.

28.4 FORMAT FOR RUNNING BILL

ON LETTER HEAD OF CONTRACTOR

Running Bill No.

Tender Amount Rs.

Value of work done Rs.

Less rebate (-) Rs.

Net Value of work done Rs.

Extra variation items after settlement @100% Rs.

Extra variation items without settlement @75% Rs.

Total

Total payable Rs.

Deductions

1. Recovery of advance if any Rs.

2. Income-tax Rs.

3. Any other Rs.

4. Total bill paid till last bill Rs.

Total deductions Rs. Rs.

Net payable Rs.

Amount certified for payment Rs.

Note : This page shall be signed and stamped by the Site Engineer, Contractor and Project Architect.

28.5 FORMAT FOR RUNNING BILL (To be submitted by the contractor)

I	Name of the Contractor / Agency	:	
II	Name of the Work	:	
III	Sr.No. of the Bill	:	
IV	Sr.No. of the Previous Bill	:	
V	Reference to Agreement No.	:	
VI	Date of written order to commence	:	
VII	Date of Completion as per	:	
VIII	Date of Measurements	:	
XI	Present status of work	:	

Sno.	Items Description	Unit	Rate	Qty. as per measurement	Tender Amount Rs.
1	2	3	4	5	6

Up to previous RA Bill		Up to date gross		Present bill		remark
Qty	Amt.	Qty.	Amt.	Qty.	Amt.	
7	8	9	10	11	12	13

Note :

- If part rate is allowed for any item, it should be indicated with reasons for the allowing such a rate.
 - If adhoc payment is made, it should be mentioned specially.
- 29.** Any representative of the Architect/ Consultant, or the Bank shall have power to give notice to the contractor or to his representative, of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the Architect is obtained. The work will be from time to time be examined by the Architect/ the Bank's Engineer or the Architect's representative, but such examination shall not in any way exonerate the contractor from the obligations to remedy any defects which may be found to exist at any stage of the works or after the same is complete. Subject to the limitations of this clause, the contractor shall take instructions only from the Architect/ Bank.

30. DUTIES OF CONTRACTOR

- To make a thorough study of contract documents, Architectural/Structural drawings and other details so as to bring out ambiguities/discrepancies between them and to obtain clarification from the Competent Authority well in time to avoid delays.

- ii. To render a certificate to the Competent Authority to the effect that he has studied the contract documents, drawings and specifications.
- iii. To take charge of objects of value and antiquity found on site or in excavations, immediately, after their discovery, to hold them in safe custody and to hand them over to the Competent Authority of the Bank for further action.
- iv. To ensure that the quality of materials and workmanship as laid down in the contract is maintained and the accuracy of dimension shown on drawings is attained in the construction/ work.
- v. To watch the validity of the building permission issued by the Local Authority and to ensure that the revalidation, if necessary, is obtained well in time.
- vi. To arrange periodical reconciliation of materials and work.
- vii. To maintain the undernoted records at the site of work, in addition to normal routine requirements of an office:
 - a. Daily Progress Record
 - b. Work Site Order Book.
 - c. Instruction by Bank's Officers.
 - d. Test Registers of other materials/fittings, fixtures, equipment's as stipulated in the tender.
 - e. Register of Drawings and Working Details.
 - f. Log Book of Defects.
 - g. The Site Engineer should maintain in a Hindrance Register giving details of commencement and removal of each hindrance.
 - h. Dismantled Materials Account Register.
 - i. Supply and consumption register of scarce/costly materials like laminates, special paints etc.
 - j. Record of materials used/received: Day to day record of materials used/received shall be entered in the register and signed by contractor's representative at site.
- viii. To record measurements of completed work jointly and to process them in running account bills.
- ix. To submit to the Competent Authority the Progress Report fortnightly.
- x. To watch that the concerned contract does not lapse for want of extension of time. Therefore, to keep it alive and in operation from point of consideration that "Time is the essence of contract".
- xi. To ensure that progress on every contract is in accordance with the appropriate stage of its Time and Progress Chart.
- xii. To submit the final summary of costs for the project to the Competent Authority.
- xiii. To submit the Competent Authority authentic information on and the under noted records pertaining to the completed work in order to enable the Competent Authority to finalize them in the due course:
 - a) Record i.e. as completed drawings.
 - b) Record of Standard Measurements for periodical services.
 - c) Inventory of fittings and fixtures.

To hand over to the Competent Authority a “first draft” of “A Note of Comprehensive Information to the User” containing detailed instructions on how to use and maintain the completed building to the best advantage of the Bank.

31. PRICES FOR EXTRAS ETC. ASCERTAINMENT OF NON-TENDER ITEMS

The contractor may, when authorized, and shall, when directed in writing by the Architect/ Consultant with the approval of the Bank, add to, omit from, or vary the works shown upon the drawings, or described in the specification or included in the schedule of quantities, but contractor shall make no addition, omission or variation without such authorization or direction. A verbal authority or direction by the Architect / Consultant shall, if confirmed by them in written seven days, be deemed to have been given in writing. 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 original tender shall determine the valuations of the extra work where such extra work is of similar character and executed under similar conditions as the work priced therein.
(ii) Rates for all items, wherever possible, should be derived out of the rates given in the priced schedule of quantities.
- (b) The net prices of the original tender shall determine the value of the items omitted, provided if omissions vary the conditions under which any remaining items of works are carried out, the prices for the same shall be valued under sub-clause C hereof.
- (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 of works are carried out or if the amount of the whole of the contract works or to any part thereof shall be such that in the opinion of the Architect the net rate or price contained in the priced schedule of quantities or tender or for any item of the works involves loss or expense beyond that reasonably contemplated by the contractor or is by reason unreasonable or inapplicable, the Architect shall fix such other rate or price as in the circumstances he shall feel reasonable and proper, with the prior approval in writing of the employer.
- (d) Where extra work cannot be properly measured or valued the contractor shall be allowed days work prices as the priced schedule of quantities 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 Architect, the workman's name) and materials employed to be delivered for verification to the Architect, or his representative at to the Architect or his representative at or before the end of the week following that in which the work has been executed.

Actual cost of materials	 Rs.
Add for Labour charges	 Rs.
Add for Taxes, Transportation, If any.	 Rs.
Add for Wastage of Materials (Upper Limit 5% wherever applicable)	 Rs.
Add for water and electricity Charges if any required, upper limit 2% of basic cost of materials.	Rs.
Add for 15% towards contractor's overheads and profit.	Rs.
Final rate arrived.	Rs.

32. UNFIXED MATERIALS WHEN TAKEN INTO ACCOUNT TO BE THE PROPERTY OF THE BANK

Where in any certificate (of which the contractor has received payment), the Architect has included the value of any unfixed materials intended for and/or placed on adjacent to the works, such materials shall become the property of the Bank and they shall not be removed except for use upon the works, without the written authority of the Architect/Bank. The contractor shall be liable for any loss of or damages to such materials.

33. REMOVAL OF IMPROPER WORKS

The Architect/Bank shall, during the progress of the works, have power to order in writing from time to time the removal from the work within such reasonable time or times as may be specified in order, of any materials which in the opinion of the Architect/Bank are not in accordance with the specifications or the instructions, the substitution of proper materials, the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the drawings and specification instruction and the contractor shall forthwith carry out such order at his own cost. In case of default on the part of the contractor to carry such order, the Bank shall have the power to employ and pay other persons to carry out the same and all expenses consequent thereon, or incidental thereto, shall be deducted by the Bank from any money due or that may become due, to the contractor.

No certificate, which may have been issued by the Architect, shall relive the contractor from his liability in respect of unsound work of bad materials.

34. DEFECTS AFTER COMPLETION

The contractor shall make good at his own cost and to the satisfactions of the Bank all defects, shrinkage, settlements or other faults, which may appear within 12 months after completion of the work. In default the Bank may employ and pay other persons to amend and make good such damages, losses and expenses consequent thereon or incidental there to shall be made good and borne by the contractor and such damages, loss and expenses shall be recoverable from him by the Bank or may be deducted by the Bank, in lieu of such amending and making good by the contractor, deduct from any amount due to the contractor, a sum equivalent to the cost of amending such work and in the event of the amount retained being insufficient, recover that from the contractor from the amount retained as Security money together with any expenses the Bank may have incurred in connection therewith.

35. CONCEALED WORK:

The contractor shall give due notice to the Bank/ architects whenever any work is to be buried in the earth, concrete or in the bodies of walls or furniture wood, otherwise becoming inaccessible later on, in order that the work may be inspected and correct dimensions taken before such burial, in default whereof the same shall, at the opinion of the Bank/ architect be either opened up for measurement at the contractor's expense or no payment may be made for such materials. Should any dispute or differences arise after the execution of any work as to measurements etc., or other matters which cannot be conveniently tested or checked, the notes of the employer/ architects shall be accepted as correct and binding on the contractor.

36. CERTIFICATE OF VIRTUAL COMPLETION & DEFECTS LIABILITY PERIOD

The work shall not be considered as completed until the Architect has certified in writing that they have been virtually completed. The defects Liability Period shall commence from the date indicated in the virtual completion certificate issued by the Architect.

37. OTHER PERSONS ENGAGED BY THE BANK

The Bank reserves the right to execute any part of the work included in this contract by other agency or persons and contractor shall allow all reasonable facilities and use of his scaffolding for the execution of such work. The main contractor shall extend all co-operations in this regard.

38. INSURANCE

a. IN RESPECT OF DAMAGE TO PERSONS AND PROPERTY

- (i) The contractor shall be responsible for all injury to the work or to persons, animals or things, and for all damages to the structural and / or decorative part of the property which may arise from the operation or neglect of himself or of any nominated sub-contractor or any of his / sub-contractor's employee, whether such damage/ injury arises from carelessness, accident or any other cause whatsoever in any way connected in the carrying out of this contract. This clause shall be held to include inter alias, any damage to buildings, whether immediately adjacent or otherwise, and any damage to the roads, streets, foot-paths, bridge or ways as well as damage caused to the building and work forming the subject of this contract by rain, wind or other inclement of the weather. The contractor shall indemnify the Bank and hold it harmless in respect of all and any expense arising from such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury and damage under any Act of any Legislature or otherwise and also in respect of any award of compensation or damage consequent upon such claims.
- (ii) The contractor shall reinstate all damage of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property or third parties.
- (iii) The contractor shall indemnify the Bank against all claims which may be made against the Bank by any member of the Public or third party in respect of anything which may arise in respect of the works or in consequence thereof and shall at his own expense arrange to effect and maintain, until the virtual completion of the contract, with an approved office, a Policy of Insurance in the name of the Bank and the contractor against such risks and deposit such policies with the Bank from time to time during the currency of this contract. The contractor will also similarly indemnify the Bank of all claims which may be made upon the Bank whether under the Workmen's Compensation Act or any other statute in force during the currency of this contract or at common law in respect of any employee of the contractor or any sub-contractor and shall at his own expense effect and maintain, until the virtual completion of the contract, with an approved office, a Policy of Insurance in the joint name of the Bank and the Contractor against such risks and deposit such policy or policies with the Bank from time to time during the currency of the contract.
- (iv) The contractor shall be responsible for any liability which may be excluded from the Insurance Policies above referred to and also for all other damages to any person animal or property arising out of incidental or defective carry in out of this contract. He shall also indemnify the Bank in respect of any cost, charges or expenses arising out of claims or proceeding and also in respect of any award of composition and damages arising there from.
- (v) The Bank shall be entitled to deduct the amount of any damage, compensation, cost, charges and expenses arising from or accruing from, or in respect of, any such claims or damage from any or all sums due or to become due to the contractor without prejudice to the Bank's other rights in respect thereof.

b. FIRE INSURANCE

- (i) The Contractor shall, within fourteen days from the date of commencement of works, insure the works at his cost and keep them insured until the virtual completion of the contract, against loss or damage by fire and/ or earthquake, flood with an office to be approved by the Architect in the joint name of the Bank and the Contractor (the name of the former being placed first in the policy), for the contract amount only. The Contractor shall deposit the policy and receipts for the premium with the owner within 21 days from the date of issue of work order, unless otherwise instructed by commencement of the works, unless otherwise instructed by the Architect. In default of the Contractor insuring as provided above, the Bank or the Architect on his behalf, may so insure the works and may deduct the premium paid from any money due or which may become due to the

Contractor without prejudice to the other rights of the Bank in respect of such default. In case it becomes necessary to suspend the works, the Contractor shall as soon as the claim under the policy is settled, or work reinstated by the Insurance office should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the incident had not occurred and in all respects under the same conditions of the Contract. The contractor in case of rebuilding or reinstatement after fire, shall be entitled to such extension of time for completion as the Bank/ Architect deemed fit.

- (ii) The amount so due as aforesaid shall be the total value of the works duly executed and of the contract materials and goods delivered upon the site for use in works upto and including a date not more than seven days prior to the date of the said Certificate less the amount to be retained by the Employer (as hereinafter provided) and less any installments previously paid under this clause. Provided that such Certificate shall only include the value of the said materials and goods as and from time to time as they are reasonably, properly and not prematurely brought upon the site and then only if properly stored and/or protected against weather.
- d) The Contractors will have to take out following Insurance Policies:
 - 1) Contractors All Risks Insurance Policy to cover-
 - Earthquake- Fire & Shock
 - Landslide/Rockslide/Subsidence.
 - Flood/Inundations.
 - Storm/Tempest/Hurricanes/Typhoon /Cyclone Collapse.
 - Theft/Burglary.
 - Damage to material brought at Site and to be subsequently used in the work.
 - 2) Third party Insurance Policy
 - a. For accidental loss or damage caused to the property of other persons.
 - b. For fatal or non-fatal injury to any person other than insured own employees or work men of employees of the owner of the works any other construction work thereon, or member of the Insured's family or of any of the aforesaid; directly consequent upon of solely due to the construction of any property described in the Schedule.
 - 3) Workmen's Compensation Insurance.

39. ACCOUNTS RECEIPTS & VOUCHERS:

The contractor shall, upon the request of the employer furnish them with all the invoices, accounts, receipts and other vouchers that they may require in connection with the works under this contract. If the contractor shall use materials less than what he is required under the contract, the value of the difference in the quantity of the material he was required to use and that he actually used shall be deducted from his dues. The decision of the Bank shall be final and binding on the contractor as to the amount of materials the contractor is required to use for any work under this contract.

40. LIQUIDATED DAMAGES/ DAMAGES FOR NON-COMPLETION

If the Contractor fails to complete the works by the date stated in the Appendix or within any extended time and the Architect certifies in writing that in his opinion, the same ought reasonably to have been completed, the Contractor shall pay the Bank liquidated damages @ 1% of the contract amount per week of delay subject to maximum deduction of 10 % of the contract amount.

41. TOOLS, STORAGE OF MATERIALS, PROTECTIVE WORKS AND SITE OFFICE REQUIREMENTS

- i) The contractor shall provide, fix up and maintain in an approved position proper office accommodation for the contractor's representative and staff which offices shall be open at all reasonable hours to receive instruction notices or communications and clear away on completion of the works and make good all work disturbed.
- ii) All drawings maintained on the site are to be carefully mounted on Boards of appropriate size and covered with a coat of approved varnish. They are to be protected from ravages of termites, ants and other insects.
- lii) The contractor shall provide at his own cost all artificial light required for the work and to enable other contractors and sub-contractors to complete the work within the specified time.
- iv) The washrooms assigned for use of contractor workers and field staff shall be kept in a clean and sanitary condition to the satisfaction of the Public Health Authorities. Any damages shall be made good at contractors cost and handed over back after work completion.
- vi) Every precaution shall be taken by the contractor to prevent the breeding of mosquitoes on the works during the construction and all receptacles, cisterns, water tanks, etc., used for the storage of water must be suitably protected against breeding of mosquitoes. The contractor shall indemnify the Employer against any breach of rules in respect of anti-malarial measures.
- vii) The contractor shall not fix or place any placards or advertisement of any description or permit the same to be fixed or placed in or upon any boarding, gantry, building structure other than those approved by the Bank.

42. PROTECTIVE MEASURES

The contractor from the time of being placed in possession of the site must make suitable arrangements for watching, lighting and protecting the work, the site and surrounding property by day, by night, on Sundays and other holidays.

Contractor shall indemnify the Bank against any possible damage to the building, roads or members of the public in course of execution of the work.

The contractor shall provide necessary temporary enclosures, gates, entrances, etc. for the protection of the work and materials and for altering and adoption the same as may be required and removing on completion of the works and making good all works disturbed.

Storage of materials: The contractor shall provide and maintain proper sheds for the proper storage and adequate protection of the materials etc. and other work that may be executed on the site including the tools and materials of sub-contractors and remove same on completion.

Tools: Theodolite levels, prismatic compass, chain, steel and metallic taps and all other surveying instruments found necessary on the works shall be provided by the contractor for the due performance of this contract as instructed by the site engineer. All measuring tapes shall be of steel and suitable scaffolding and ladders that may be required for safely taking measurement shall be supplied by the contractor.

The mistries and the supervisors on the works shall carry with them always a one meter or two meter steel tape, a measuring tape of 30 meters, a spirit level, a plum bob and a square and shall check the work to see that the work is being done according to the drawing and specifications. The Site Engineer will use any or all measuring instruments or tools belonging to the contractors as he chooses for checking the works executed or being executed on the contract.

The contractor should cover in his rates for making provisions for all reasonable facilities for the use of his scaffolding, tools and plant etc. by sub-contractors for their work.

43. DATE OF COMMENCEMENT & COMPLETION

The Contractor shall be allowed admittance to the Site on the “Date of Commencement” stated in the Appendix hereto, or such later date as may be specified by the Architect / Consultant and he shall there upon and forthwith begin the works and shall regularly proceed with and complete the same (except the painting or other decorative works the Architect / Consultant may desire to delay) on or before the “Date of Completion” stated in the Appendix subject nevertheless to the provision for extension of time hereinafter contained. As the work is to be carried out in a running office, the contractor should take care so as not to disturb the day to day functioning of the office & should properly cordon off the section where the work is being carried out from the working section.

44. TIME OF COMPLETION, EXTENSION OF TIME & PROGRESS CHART

- (i) Time of completion: The entire work is to be completed in all respects within the stipulated period i.e. 60 days from the date of issuance of work order or handing over the site whichever is later. The work shall be deemed to be commenced within 10 days from the date of acceptance of work order or date of handing over of site, whichever is later. Time is the essence of the contract and shall be strictly observed by the contractor. The work shall not be considered as complete until the Bank / Architects have certified in writing that this has been completed and the Defects Liability Period shall commence from the date of such certificate.
- (ii) Extension of time: If in the opinion of the Architect / Consultant the work has been delayed
 - (a) By force majeure; or
 - (b) By reason of any exceptionally inclement weather or
 - (c) By reason of proceedings taken or threatened by or dispute with adjoining or neighboring Owners or public authorities arising otherwise than through the Contractor's own default or
 - (d) By the works or delay or the other Contractors or tradesmen engaged or nominated by the Bank or the Architect and not referred to in the Schedule of Quantities and/or specification or
 - (e) By reasons of the Architect's instructions as per clause 2 hereof or
 - (f) By reason of any combination of workmen or strike or lock-out affecting any of the building trades or
 - (g) in consequence of the Contractor not having received in due time necessary instructions from the Architect for which he shall specifically apply in writing or
 - (h) From other cause which the Bank may consider as beyond the control of the Contractor or
- (iii) In the event, the value of work exceeds the value of the Priced Schedule of Quantities owing to variation, the architect may with the previous approval in writing of the Bank make a fair and reasonable extension of time for the completion of the Contract works. In case of such strike or lockout, the Contractor shall as soon as give written notice thereof to the Architect / Consultant, but the Contractor nevertheless constantly use his endeavor to prevent delay and shall do all that may be reasonably required to the satisfaction of the Architect/Bank to proceed with the work and on his doing so that it will be ground of consideration by the Bank for an extension of time as above provided. The decision of the Bank as to the period to be allowed for an extension of time for completion hereunder (which decision shall be final and binding on the contractor) shall be promulgated at the conclusion of such strike or lock-out and the Bank shall then, in the event of an extension being granted, determine and declare the final completion date. The provision in clause with respect to payment of liquidated damages shall, in such case, be read and construed as if the extended date fixed by the Bank were substituted for and the damage shall be deducted accordingly.
- (iv) **PROGRESS OF WORK:** During the period of work, the contractor shall maintain proportionate progress on the basis of a Programme Chart submitted by the contractor immediately before commencement of work and agreed to by the Bank / Architects. Contractor should also

include planning for procurement of scarce material well in advance and reflect the same in the Programme Chart so that there is no delay in completion of the project.

45. FAILURE BY CONTRACTOR TO COMPLY WITH ARCHITECT/CONSULTANT'S INSTRUCTION.

If the Contractor after receipt of written notice from the Architect / Consultant requiring compliance within ten days fails to comply with such further drawings and/or Architect's instructions, the Bank may employ and pay other persons to execute any such work whatsoever the may be necessary to give effect thereto, and all costs incurred in connection therewith shall be recoverable from the Contractor by the Bank on the Certificate of the Architect / Consultant as a debt or may be deducted by him from any moneys due to the Contractor.

46. Idle labor:

Whatever the reasons may be no claim for idle labor, additional establishment cost of hire and labor charges of tools and plants would be entertained under any circumstances.

47. Suspension:

If the contractor except on account of any legal restraint upon the Bank preventing the continuance of the work or in the opinion of the employer shall neglect or fail to proceed with due diligence in the performance of his part of the contract or if he shall more than once make default, the Bank shall have the power to give notice in writing to the contractor requiring the work to be proceeded within a reasonable manner and with reasonable dispatch, such notice purport to be a notice under this clause.

After such notice shall have been given the contractor shall not be at liberty to remove from the site of the works or from any ground contiguous thereto any plant or materials to subsist from the date of such notice being given until the notice shall have been complied with. If the contractor fails to start the work within seven days after such notice has been given to proceed with the works as therein prescribed, the employer may proceed as provided in clause Termination of Contract by employer.

48. TERMINATION OF CONTRACT BY THE BANK

If the Contractor being an individual or a Firm, commits any "act of insolvency" or shall be adjudged an Insolvent or being an Incorporate company, shall have an order for supervision of the court and the official Assignee or the Liquidator in such acts of insolvency and winding up, as the case may be, shall be unable within seven days after notice to him requiring him to do so, to show the reasonable satisfaction of the Architect that he 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 or other process of court attaching property to be issued to the Contractor.

OR shall suffer any payment under this Contract to be attached by or on behalf of any of the creditors of the Contractors.

OR shall assign or sublet this Contract without the consent in writing of the Bank first obtained.

OR shall charge or encumber this Contract or any payment due or which may become due to the Contractor hereunder.

OR if the architect / consultant shall certify in writing to the Bank that the contractor:

- i. Has abandoned the Contract, or

- ii. Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for fourteen days after receiving from the Architect notice to proceed, or
- iii. Has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or
- iv. Has failed to remove materials from the Site or to pull down and replace work within seven days after receiving from the architect written notice that the said materials or work were condemned and rejected by the Architect under these conditions or,
- v. Has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this Contract to be observed and performed by the contractor to observe or perform the same.

Then and in any of the said cases the Bank may, notwithstanding any previous waiver, after giving seven days' notice in writing to the Contractor, determine the Contract but without thereby affecting the powers of the Architect/Bank or obligations and liabilities of the Contractor, the whole of which shall continue in force as fully as if the contract has not been so determined, and as if the work subsequently executed had been executed by or on behalf of the Contractor, And further, the Bank by his agent or servants may enter upon and take possession of the work and all plant, tools, scaffoldings, shed, machinery, steam and other power utensils and materials lying upon the premises or on the adjoining land or roads and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by the employing any other contractor or person or persons to complete the works and the contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other contractor or other person or persons employed for completing or finishing or using the materials and plant for the work. When the work shall be completed or as soon as thereafter as convenient the Architect shall give a notice to the Contractor to remove his surplus materials and plant, and should the Contractor fail to do so within the period of fourteen days after receipt thereof by him, the Bank may sell the same by public auction, and give credit to the Contractor for the net amount realized. The architect shall thereafter ascertain and certify in writing under his hand what (if anything) shall be due or payable to, or by the employer, for the value of the said plant and materials so taken possession of by the Bank and the expense or loss which the Bank shall have been put to in procuring the works to be completed and the amount, if any, owing to the Contractor and the amount, which shall thereupon be paid by the Bank to the Contractor or by the Contractor to the Bank, as the case may be and the certificate of the architect shall be final and conclusive between the parties.

49. Certificates & payments:

The Contractor shall be paid by the Bank from time to time by installments under Interim certificates to be issued the Architect / Consultant to the Contractor on account of the works executed when in the opinion of the Architect, work to the approximate value named in the appendix as value of work for Interim Certificates (or less at the reasonable discretion of the Architect / Consultant has been executed in Accordance with this contract. The Architect / Consultant may in his discretion include the Interim Certificate, such amount, as he may consider proper on accounts of the works which have been virtually completed and the Architect/ Consultant shall have certified in writing that they have been completed, the contractor shall be paid by the Bank in accordance with the certificate to be issued by the Architect / Consultant the sum of money named in the Appendix "Installment after virtual completion" being a part of the said Total Retention Money. And the contractor shall be entitled to the payment of the Final Balance in accordance with the Final Certificate to be issued in writing by the Architect at the expiration of the period referred to as "The Defects Liability Period" in the appendix hereto from the date of virtual completion, or as soon after the expiration of such period as the works shall be finally completed and all defects made good according to the true intent and meaning and hereof whichever shall last happen, provided always that the issue of the Architect / Consultant of any certificate during the

progress of the works or at or after the completion shall not relieve the contractor from his liability under clause 2 and 20 nor relieve the Contractor from his liability in case of fraud, dishonesty or fraudulent concealment relating to the works or materials or to any matter dealt with in the certificate, and in case of all the defects and insufficiencies in the works or materials which is a reasonable examination would not have disclosed. No certificate of the Architect shall of itself be conclusive evidence that any works or materials to which it relates are in accordance with the contract, neither will the contractors have a claim for any amounts which the Architect / Consultant might have certified in any interim bill and paid by the Bank and which might subsequently be discovered as not payable and in this respect the Bank's decision shall be final and binding.

The Architect/ Consultant shall have power to withhold any Certificate if the works or any parts thereof are not being carried out to his satisfaction.

The Architect/ Consultant may by any certificate make any correction in any previous certificate, which shall have been issued by him.

No certificate of payment shall be issued by architect if the contractor fails to insure the works and keep them insured till the issue of Virtual completion certificate.

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

50. EXCEPTED MATTERS / MATTERS TO BE FINALLY DECIDED BY THE BANK:

The decisions, opinion, direction, certificate with respect to all or any of the matters under this tender shall be final and conclusive and binding on the contractor and shall be without appeal. Any other decision, opinion, direction, certificate or valuation of the architect or any refusal of the architect to give any of the same, shall be subject to the right of arbitration and review. The Architect/ Consultant to give recommendations/ opinion in respect of interpreting the various clauses. However, the decision from the competent authority of the Bank shall be final and binding.

51. SETTLEMENT OF DISPUTES BY ARBITRATION

Wherever, in any of the documents forming part of the Contract, the Bank has been vested with the final powers, his decision, opinion, certificate or any other discretion shall be final conclusive and binding on the contractor and shall be without appeal. All other matters shall be subject to the right of arbitration.

All disputes or differences of any kind whatsoever save and except matters referred to in clause 1) arising out of or in connection with the Contract, whether during the progress of Work or after Completion and shall after written notice by either party to the contract to the other of them and to the Bank hereinafter mentioned be referred for adjudication to two Arbitrator, one each to be nominated by the Contractor and the Bank, who shall thereafter appoint an Umpire. The provisions of Indian Arbitration and Conciliation Act 1996 shall apply for the purposes.

The Work under the Contract shall, however, continue during the arbitration proceedings and no payment due or payable to the Contractor shall be withheld on account of such proceedings.

The Arbitrator shall be deemed to have entered on the reference on the date he issued notice to both the parties fixing the date of the first hearing.

The Arbitrator may from time to time, with the consent of the parties, enlarge the time for making and publishing the award.

The Arbitrator shall give a separate award in respect of each dispute or difference referred to him. The Arbitrator shall decide each dispute in accordance with the terms of the contract and give a reasoned award. The venue of 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 who may direct to and by whom and in what manner, such costs or any part thereof shall be paid and may fix or settle and amount of costs to be so paid.

The award of the Arbitrator shall be final and binding on both the parties.

Subject to aforesaid the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules made there under, and for the time being in force, shall apply to the arbitration proceeding under this clause.

The Bank and the Contractor hereby also agree that arbitration under clause shall be a condition precedent to any right to action under the contract with regard to the matters hereby expressly agreed to be so referred to arbitration.

The Bank and the contractor hereby also agree that arbitration under clause shall be a condition precedent to any right to action under the contract with regard to the matters hereby expressly agreed to be so referred to arbitration.

Jurisdiction: All matters arising out of or in any way connected with this contract shall be deemed to have arisen in Mahabubnagar and only the courts in Mahabubnagar shall have jurisdiction to determine the same.

52. RIGHT OF TECHNICAL SCRUTINY OF FINAL BILL

The Bank shall have right to cause a technical examination of the works and the final bill of the works and the final bill of the contractor including all supporting vouchers, abstracts, etc., to be made at the time of payment of the final bill. If as a result of this examination or otherwise any sum is found to have been overpaid or over certified, it shall be lawful for the Bank to recover the sum. The Bank reserves the right to alter/ reduce amount certified by Consultant / Engineer, if noticed that certification is not proper.

The subject work will be scrutinized by the Chief Technical Examiner's Office, a technical wing of Central Vigilance Commission and other Vigilance and Audit Authorities of the Bank. Decision of this Authority shall be binding on the contractor. Any discrepancy noted defected shall be rectified by the contractor free of cost or appropriate amount will be recovered from the contractor's payment.

53. BANK ENTITLED TO RECOVER COMPENSATION PAID TO WORKMEN:

The Bank is obliged, by the virtue of the provisions of the workmen's compensation Act, 1923, or any statutory modification or re-enactment thereof to pay compensation to a workman employed by the contractor in execution of the works, the Bank shall be entitled to recover from the contractor the amount of compensation so paid, and without prejudice to the rights of the Bank under said Act. The Bank shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due to the contractor under this contract or otherwise. The Bank shall not be bound to contest any claim made against it under the said Act, except on written request of the contractor and upon his giving to the Bank full security to the satisfaction of the Bank for all costs for which the Bank might become liable in consequence of contesting such claim.

54. ABANDONMENT OF WORKS:

If at any time after the acceptance of the Tender, the Employer shall for any reasons whatsoever not require the whole or any part of the works to be carried out, the Architect/ Bank shall give notice in writing to the contractor who 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 whole works but which did not derive in consequence of the foreclosure of the whole or part of the work.

55. RETURN OF SURPLUS MATERIALS:

Notwithstanding anything to the contrary contained in any or all the clauses of this contract, where any material for the execution of the contract is procured with the assistance of the Bank by purchase made under orders or permits or licenses issued by the Government, the contractor shall hold the said materials economically and solely for the purpose of the contract and not dispose of them without the prior written permission of the Bank, if required by the Bank, at the price to be determined by the Architect having due regard to the condition of the materials, the price to be determined not to exceed the purchase price thereof inclusive of Sales Tax, Octroi Duty and other such levies paid by the contractor in respect thereof. In event of the breach of the aforesaid condition, the contractor shall, in addition to being liable to action for contravention of the terms of license or permit and /or criminal breach of trust, be liable to Bank for all such moneys, advantage or profits resulting or which in the usual course would have resulted to him by reason of such breach.

56. RIGHT OF BANK TO TERMINATE CONTRACT IN THE EVENT OF DEATH OF CONTRACTOR IF INDIVIDUAL.

Without prejudice to any of the rights or remedies under this contract, if the contractor, being an individual dies, the Bank shall have the option of terminating the contract without incurring any liability for such termination.

57. RATES QUOTED:

The rates quoted in the tender shall be for finished items of works. The rates quoted shall include all the charges required for labours, materials, transportation and equipment's, cleaning of sites during execution of works and to do all the things necessary to provide complete finished items consistent with the specifications attached to tender documents. Rates quoted shall include all charges, duties, royalties etc excluding GST. No extra claim in any cases shall be entertained. The rates shall be firm and shall not be subjected to variations in the cost of materials/due to labour conditions or any conditions whatsoever.

58. Workers shall not be allowed in the building during progress of work. Material shall not be carried by "lifts" in the building.

59. The contractor shall within 7 days of receipt of work order, submit architect/employer a detailed work program to complete the work within the scheduled time.

APPENDIX / MEMORANDUM TO CONDITIONS OF CONTRACT

Estimated cost	Rs.88.55lakhs + GST
EMD	EMD shall be Rs.1,77,000/-payable in form of Demand Draft/Pay Order drawn from Nationalized Bank favoring Union Bank of India payable at Mahabubnagar.

Performance security deposit	The amount of performance security shall be 5% of the accepted value of the tender including EMD.
Time for completion of work	As per time schedule given in tender document i.e. 60 days from the date of issuance of work order (or) date of handing over the site, whichever is late.
Retention Money	8% of tender/contract value to be deducted from the running bills
Defect Liability Period	Twelve months from the virtual completion.
Period of Final Measurement	1 month.
Liquidated damages	Shall be 1% of contact amount per week of delay subject to ceiling of 10% of the accepted contract amount.
Value of works for Interim Certificates	Value not less than Rs.60.00 lacs (Rs. Sixty Lacs only) or as decided by the Bank.
Period for honouring interim certificate.	75% of the bill amount shall be honoured within 14 days after getting certificate from project architect and submitting to the Bank. Balance 25% bill amount payable within 30 days after checking by the Bank.
Return of Security Deposit	Within 60 Days after completion of contract
Return of Retention Money	50% of the retention amount to be refunded upon issuing of virtual completion certificate by the architect/ bank. The remaining 50% retention amount to be refunded after completion of defect liability period of Twelve months.
Recovery towards taxes.	As per rules applicable from time to time.
Escalation/PVA on labour/material	NIL
Mobilization advance	NIL

ADDITIONAL CONDITIONS

- Tenderer to inspect Site:** The tenderer shall visit and examine the site conditions for proposed renovation. No extra changes made in consequence of any misunderstanding or incorrect information on any of these points or on grounds of insufficient description will be allowed. All expenses incurred by the contractor in connection with obtaining information for submitting this tender including his visits to the site or efforts in compiling the tender shall be borne by the Tenderer and no claim for reimbursement thereof shall be entertained.
- Attendance upon all Trades:** The general tenderer shall be required to attend on all the Tradesman or Sub-contractor/ contractors appointed by the Bank for Interior and Electrical

Security Equipment, Hardware, Telephone and other special contractors. The rates quoted shall be inclusive of attendance and also allow the contractors and retain until such times the relevant Sub-contract works are completed.

3. All the materials (except where otherwise described) stores and equipment required for the full performance of the Work under the contract must be provided through normal channels and must include charge for import duties, sales tax, octroi and other charges and must be the best of their kind available and the Contractor/s must be entirely responsible for the proper and efficient carrying out of the Work. The Work must be done in the best workmanlike manner. Samples of all materials to be used must be submitted to the Consultant/Engineer when so directed by the Consultant / Engineer and written approval from Consultant / Engineer must be obtained prior to placement of order.
4. **Stacking of material:** The contractor is not to stack any of his material recklessly so as to endanger the safety of the building and cause any nuisance to the occupants and the public.
5. **Extra charges:** It must be clearly understood that all the conditions of contracts are intended to be strictly enforced and that no extra charges in respect of extra work will be allowed unless they are clearly outside the spirit and meaning of the condition and unless such work shall have been ordered in writing.
6. **Protection of material and work:** The contractor shall be responsible for storing and watching his own material and protecting the work at his own cost. The contractor and his worker will be allowed to use lift. However, no paint drums or heavy bag of cement / paint will be allowed to be taken into the lift. Any damage / spoiling of lift / floor / dado caused during such act will have to be made good by the contractor at his own expenditure.
7. **Cost of transporting:** The tenderer shall allow in his cost for all transporting, unloading stacking and storing or supplies of goods and materials for this work on the site and in the places approved from time to time by the Architects. The tenderer shall allow in his price for transport of all materials controlled or otherwise to the site.
8. **Materials, Workmanship & Samples:** Materials shall be of approved quality and the best of their kind available and shall generally conform to I.S. Specifications, The Contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead of requirement for use in the work. The work-involved calls for high standard of workmanship combined with speed and to the entire satisfaction of the Architects.
9. **Rates for Non-Tender Items:** Rates of items not included in Schedule of Quantities shall be settled by the Architects as mentioned in the variation clause of the Contract Conditions.
10. **Rate to include:** The rates quoted shall be for all heights and depths and for finished work.

The contractor shall ascertain from other contractors as directed by the Architects all particulars relating to their work with regard to the order of its execution and the position in which cases, holes and similar items will be required, before the work is taken in hand as no claims for extras will be allowed for cutting away work already executed in consequence of any neglect by the contractors to ascertain these particulars beforehand.

Before ordering materials, the contractors shall get the samples approved from the Architects well in time.
11. **Testing of work and material:** The contractors will have to carry out testing of the material at regular interval to proof quality, soundness and efficiency of the material. Expenditure required for testing and transportations shall be borne by the tenderer.
 - Cost of testing and transport will be borne by contractor/s.
 - Any other materials will be tested by contractors at his own cost as per the instruction of Architect and Bank from time to time.

- Contractor may have to test materials with any frequency or as instructed by Bank/Architects without any cost.

If after any such test the work or portion of works is found in the opinion of the Architect to be defective or unsound, the contractor shall pull down and re-do the same at his own cost. Defective materials shall immediately be removed from the site.

12. **Foremen and Tradesmen:** All tradesmen shall be experienced men properly equipped with suitable tools for carrying out the work of carpentry and joinery and other specialist trades in a first class manner and where the Architects deemed necessary, the contractor shall provide any such tools, special or ordinary which are considered necessary for carrying out the work in a proper manner.

All such tradesmen shall work under an experienced and properly trained foremen, who shall be capable of reading and understanding all drawings, pertaining to this work and the contractor shall also comply with other conditions set out in Clause 9 of the conditions of the contract.

13. **Work Programmed/ weekly progress report:** The contractor shall prepare and submit to architects for approval, a bar chart showing the programme of works of various items, fitted within the period stipulated for completion, within 15 days of the communication of the acceptance of the tender. The contractor shall also furnish necessary particulars to the site engineer for compiling weekly progress reports in the form furnished by the architects.

14. **Photographs:** The contractor shall at his own expense supply copies of large photographs not less than 25cm x 20cm (10"x8") of the works taken from two approved portions of each building, during the progress of the work, or at every important stage.

15. **Clearing of Site:** The contractor shall after completion of the work clear the site of all the debris and left-over materials at his own expense to the entire satisfaction of the Architects and Municipal or other public authorities.

The whole of the work shall be thoroughly inspected by the contractor and all deficiencies and defects put right. On completion of such inspection, the contractor shall inform the Architects in writing that he has finished the work and it is ready for the Architects inspection.

16. **Vouchers:** The contractor shall furnish the Architects with vouchers on request, to prove that the materials are as specified and to indicate the rates at which the materials are purchased in orders to work out the rate analysis of the non-tender items which he may be called upon to carry thereafter.

21. **TYPE OF CONTRACT:** The Contractor shall be paid for the actual quantity of Work done, as measured at Site, at the Item quoted by him in the Contract Bills.

22. **Schedule of Quantities:** The schedule of Quantities given in the Contract Bill is provisional and is meant to indicate the intent of the Work and to provide a uniform basis for tendering. The Bank reserves the right to increase or decrease any of the quantities or to totally omit any item of Work and the Contractor shall not claim any extras or damages on these grounds.

23. **Contract Sum (Consideration):** The rates and Items quoted by the Contractor in the priced bill of quantities (Contract Bills) shall be treated as firm and the contract sum shall be deemed to have been calculated with reference to the cost of execution of Works as set out in price bid of Contract Documents and shall not be adjusted or altered for any reason.

24. **Idle Labour/ Machinery:** Whatever the reason may be, **no claim** for idle labor, additional establishment cost of hire and labor charges of tools & plants would be entertained under any circumstances, even if the work is delayed / abandoned for any reason.

25. **Provisional Completion of works:**

The Works shall be deemed to have been provisionally accepted after fulfillment of all the following by the Contractor:

- (a) Submitting As-Built drawings (Contractor shall mark all the services on drawings issued by the Engineer), Catalogues, Brochures, Data Sheets, manuals as directed by the Engineer.
- (b) Obtaining certificate of Completion from the Consultant.
- (d) Handing over of the Works to the Bank as directed by the Consultant.

26. **Non-compliance of instructions:** If within seven days after receipt of a written notice from the Consultant, requiring compliance with an instruction the Contractor does not comply therewith, then the Bank may employ and pay other persons to execute any Work whatsoever which may be necessary to give effect to such instructions and all cost incurred with such employment shall be recoverable from the Contractor by the Bank as a debt or may be deducted by him from any monies due or to become due to the Contractor under this Contract.

Upon receipt of what purports to be instruction issued to him by the Consultant the Contractor may request the Consultant to specify in writing the provision of these conditions which empowers the issue of the said instructions. The Consultant shall forthwith comply with any such request, and if the Contractor shall thereafter comply with the said instruction, then the issue of the same shall be deemed for all purposes of this Contract to have been empowered by the provision of these Conditions specified by the Consultant in answer to the Contractor's request.

27. **Certification of Bills in absence of 'Claimant's Engineer:** If the Contractor fails to attend or neglects or omits to send his agent at the time of taking measurement or for examining the records or drawings then the measurements so taken by the Consultant, the records and drawings as prepared by the Engineer shall be taken to be correct, final and conclusive.

28. **Interim payment as adhoc against final bill:** All the interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for Work actually done and completed, and shall not preclude the requiring of bad, unsound, and imperfect or unskilled Work to be removed and taken away and reconstructed, or re-erected or be considered as an admission of the due performance of the contract, or any part thereof in any respect or the accruing of any claim, nor shall, it conclude, determine or affect in anyway the power of the Bank under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for completion of the Work or of the date of certificate of completion furnished by the Engineer and payment shall be made within six (6) weeks from the date of receipt of final Certificate from the Consultant.

29. **Cessation of Bank's liability:** The Bank shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or the execution of the Works, unless the Contractor shall have made a claim in writing before the giving of Certificate of Final Completion.

30. **In respect of building cleaning:** On completion the Contractor shall clean all windows and doors including the cleaning and oiling if necessary, of all hardware, inside and outside, all floors, staircases, and every part of the building. He will leave the entire building neat and clean and ready for immediate occupation and to the satisfaction of the Bank.

31. **In respect of extension and claims of contractor:** The Contractor, in his application for grant of time shall clearly bring out the financial effect of extension of time requested by him. In case no financial effect is stated in the request for grant of extension of time, the same shall be taken as zero and it shall be presumed that the Contractor has mitigated whole of the losses due to the delays of all kinds.

32. **In respect of contractor cannot claim extra cost:** Provided that the Contractor shall not been titled to recover any such extra cost unless he gives written notice to the Consultant of his intention to claim within twenty-eight days of the Consultant's order. The Consultant

shall in consultation with the Bank settle and determine such extra payment and/or extension of time to be made to the Contractor in respect of such claim as shall, in the opinion of the Consultant, be fair and reasonable, and provided the Contractor has taken all steps to mitigate the losses.

33. In respect of no compensation to contractor for increasing work progress:

If for any reason, the contractor is not provided with an extension of time, if the rate of progress of the works or any section is at any time, in the opinion of the Consultant, too slow to ensure completion by the prescribed time or extended time for completion. The Consultant shall so notify the contractor in writing and the contractor shall thereupon take such steps as are necessary and the Consultant may approve to expedite progress so as to complete the works or such sections by the prescribed time or extended time. The contractor shall **not be entitled** to any additional payment for taking such steps.

34. In respect of no additional cost for scheduling and programming:

The contractor shall mobilize or remobilize or adjust his resources according to the priorities set by the Employer **at no extra cost** to the Employer.

35. The Contractor shall employ technically qualified and competent supervisors for the work, who shall be available (by turn) throughout the working hours to receive and to comply with the instruction of employer/ consultant - One Site engineer with minimum experience of 5 years and onesupervisors with minimum experience of 3 years - Civil engineering/ diploma.

36. As building is functional office, material shall not be placed in lobby areas etc. Work shall be done with minimum inconvenience to the staff and customers.

PROFORMA FOR APPLICATION FOR EXTENSION OF TIME PERIOD

1.	Name of Contractor				:	
2.	Name of the work as given in the Agreement				:	
3.	Agreement No.				:	
4.	Estimated tender amount				:	
5.	Date of Commencement of work as per Agreement				:	
6.	Period allowed for completion of work as per Agreement.				:	
7.	Date of Completion stipulated in Agreement.				:	
8.	Period for which extension of time has been give previously				:	
a)	1st extension vide Architect's /Bank's letter				:	
	No.	Dated	Month	Days		
b)	2 nd extension vide Architect's /Bank's letter				:	
	No.	Dated	Month	Days		

c)	3 rd extension vide Architect's /Bank's letter			:	
	No.	Dated	Month	Days	
d)	4 th extension vide Architect's /Bank's letter			:	
	No.	Dated	Month	Days	
	Total extension previously given			:	
9.	Reason's for which extensions have been previously given (Copies of the previous applications should be attached)			:	
10.	Period for which extension is applied for			:	
11.	Hindrances on account of which extension is applied for with dates on which hindrances occurred and the period for which these are likely to last.			:	
a)	Serial No.				
b)	Nature of Hindrance				
c)	Date of occurrence				
d)	Period for which it is likely to last.				
e)	Period for which extension required for this particular hindrance				
f)	Over lapping period if any, with reference to item (e) above				
g)	Net extension applied for				
h)	Remarks, if any				
12.	Extension of time required for extra work			:	
13.	Details of extra work and the amount involved			:	
a)	Total value of extra work				
b)	Proportionate period of extension of time on estimated amount put to tender.				
14.	Total extension of time required for 11 & 12			:	

Submitted to the Architect/Bank

Date:

Signature of Contractor

PARTICULAR SPECIFICATIONS PART-I

SECTION I: DEMOLITION, DISMANTLING AND MODIFICATIONS DURING CONSTRUCTION OF BUILDING INTERIORS

GENERAL

SCOPE OF WORK

Work included:

This section covers the requirements of works involving demolition and/or dismantling parts of building interiors not involving the structure or any part of the building that contributes to the integrity and stability of the building

This section includes preliminary works in preparation for demolition such as obtaining permits; disconnection and/or controlled operation of building services; precautionary measures for the safety of the building, its occupants and workers.

This section includes demolition of non-load-bearing masonry and concrete walls; ally types of partitions and wall cladding; doors and windows; suspended ceiling; wall and floor finishes.

This section includes the dismantling of built-in cabinets, counters, Kitchen Platform, furniture and fixtures.

This section includes disconnection, dismantling and controlled operation of electrical systems, water supply, drainage and sanitary systems, HVAC systems and all other building services by skilled operatives competent in their respective fields.

This section includes the salvaging, retrieval and safe storage of all material as required by the contract and the transport and disposal of all unwanted material and debris.

Work excluded:

This section does not include structural demolition or modifications.

RELATED WORK SPECIFIED ELSEWHERE

Temporary works

Electrical

Water supply & drainage

SUBMITTALS

The contractor shall submit the following to the architect for review and approval well before the commencement of work.

Required approvals from all concerned authorities

Proposed demolition and dismantling plan and day-to-day progress schedule showing clearly the sequence of operations for disconnection of building services, controlled operation of services to retain and safety precautions. This shall be accompanied by description of procedures proposed to be followed.

Equipment proposed to be used for demolition and dismantling.

Proposals for temporary works to partition and protect adjacent or nearby areas in use, including dust control and clean up procedures.

Proposal for temporary storage of salvaged material and for debris to be transformed off site.

CONTROL OF PROCEDURES AND SAFETY

The contractor shall devise and be responsible for all procedures to ensure the safety of the building, the workers and the other occupants during the demolition and dismantling work. The work shall at all times be under the direct supervision of experienced foremen under the overall supervision of the contractor's site engineer.

HANDLING, STORAGE, TRANSPORTATION AND DISPOSAL

Handle and store materials retrieved from the demolition and dismantling in accordance with IS:7969. Whenever there is a conflict in the requirements of IS:7969 and the provisions herein, the more stringent of the specifications shall apply.

Store debris and salvaged material separately in designated places approved by the submittals procedure described above. All salvaged material shall be classified and stored separately by categories agreed upon prior to commencement of demolition.

Do not pile up material in a manner that will cause the structure to be over loaded. Stack material so that the stacks are stable and do not cause obstruction to movement.

Do not allow debris to accumulate beyond the capacity of the approved area for temporary storage. Do not dump debris in public rights-of-way, in private property without owners consent, in municipal garbage receptacles etc. The contractor shall dispose of debris only at dumping grounds approved by the local authority in manner not objectionable to the authority.

Transport debris to the approved dumping grounds at times permissible by law and acceptable by local practice. Take precautions to avoid spillage of debris from the transport vehicle en-route.

MATERIALS AND PRODUCTS

SCAFFOLDS AND LADDERS

Scaffolds and ladders used in the demolition and dismantling shall be in accordance with IS:3696 Part 1 and Part 2.

The scaffolding shall be designed and erected by the contractor in accordance with the requirements of the work, by experienced workers. All scaffolding material shall be in good serviceable condition and assembled to be stable in the conditions of the work being performed.

MECHANICAL EQUIPMENT

Do not use mechanical equipment without the prior approval of the architect.

Do not use gas cutting and electric welding or cutting without the prior approval of the architect. Take special precautions to prevent fire if permission is granted for gas and electrical cutting and welding.

EXECUTION

GENERAL

Survey and mark out clearly the portions that are to be demolished or dismantled. Proceed with demolition and dismantling strictly in conformance with the plans, sequence, schedules and procedures proposed by the contractor and approved by the architect.

Proceed with work only in the presence and under control of skilled supervisors.

Do not proceed with work if latent conditions contrary to expectations or assumptions are encountered as work proceeds. Do not proceed with work if any part of the building assumed to be non-structural and non-load-bearing is discovered or suspected to be structural and contributing to the stability of the building. Report to the architect and obtain approval to proceed further.

Maintain in a journal with serially numbered pages, inventories of all salvaged items as the work proceeds.

ELECTRICAL

Dismantling of electrical installation shall be carried out under the supervision of a licensed electrical contractor, employing competent certified electricians.

Carefully survey the entire existing system and coordinate dismantling work with related temporary permanent works, if any. Modify the existing system, if required before commencing dismantling work to ensure that the functioning of systems outside the demolition areas is not affected.

Shut off and isolate electric supply to the demolition and dismantling area. Take precautions to ensure that the disconnected circuits may not be accidentally re-energized.

Disconnect supply cables and isolate all distribution boards within the work areas. Disconnect and remove the distribution boards. Provide temporary service connections to the work areas from a temporary DB fed by an exclusive cable tapped from a board outside the work area with an isolation switch close to the temporary DB. Do not provide temporary services through any existing circuits in the areas to be demolished.

If DB and circuits located within the demolition areas cannot be disconnected or diverted, they shall be clearly marked out and identified with cautionary signs to distinguish them from others that are to be dismantled.

Have a skilled electrician on standby.

Fixtures and fittings shall be removed only by skilled technicians to salvage them with minimum damage.

Complete dismantling of electrical installation before commencing demolition of walls and partitions, flooring, ceiling etc.

LIST OF INDIAN STANDARDS FOR CIVIL FURNISHING WORKS

IS 4081: Safety code for blasting and related drilling operation

IS 6313: Code of practice for anti termite measures in building

Part 1: Constructional measures.

Part 2 Code of practice for ant termite measures in buildings: Pre constructional chemical treatment measures.

CONCRETE

IS 456: Code of practice for plain and reinforced concrete.

MASONRY WORK -BRICK WORK

IS 1077: Specification for common burnt clay building bricks.

IS 2212: Code of practice for brick work

IS 2250: Code of practice for preparation and use of masonry mortars.

PLASTERING AND POINTING

IS 412: Specification for expanded metal steel sheets for general purposes

IS 1635: Code of practice for application of cement and cement-lime plaster finishes

IS 2402: Code of practice for external rendered finishes.

IS 1542 Specification for sand for plaster (Class A grading)

FLOORING

IS 1443: Code of practice for laying and finishing of cement concrete flooring tiles.

IS 4457: Specification for ceramic unglazed vitreous acid resisting tiles.

DOORS AND WINDOWS

IS 287: Recommendation for maximum permissible moisture content for timber used for different purposes in different zones

IS 848: Specification for synthetic resin adhesive for plywood (Phonetic and amino plastic)

IS 1141: Code of Practice for seasoning of timber

IS 2202: Specification for wooden flush door shutters (solid core type)

Part I: Plywood face panels

Part II: Particle board panels and hard board faced panels

GLAZING

IS 1081; Code of practice for fixing and glazing of metal, (steel and aluminium) doors, windows and ventilators.

IS 2553: Specification for safety glass

IS 2835: Specification for flat transparent sheet glass

IS 3548: Code of practice for glazing in building

PAINTING AND POLISHING

IS 1477: Code of Practice for painting of ferrous metals in building

Part I: Pre-treatment

Part II: Painting

IS 2338: Code of Practice for finishing of wood and wood based materials

Part I: Operation and workmanship

Part II: Schedule

IS 2395: Code of Practice for painting, concrete, masonry and plaster surfaces

IS 3537: Specification for ready mixed paint, finishing interior, for general purposes to IS colors

IS 5410: Specification for cement paints colour, as required

IS 6278: Code of Practice for white washing and colour washing

TECHNICAL SPECIFICATIONS OF INTERIOR AND ELECTRICAL

SECTION – I – JOINERY

General:The type of shutters for doors, windows, ventilators etc. viz. paneled glazed and flush shall be as indicated and detailed in the drawing.

Flush Door shutters: Door shutters shall be 35 mm thick flush door shutters/solid core type non decorative factory made confirming to IS- 2202 and ISI marked with block board core (confirming to the requirements as per IS-1659 1969) with internal hard wood clippings and both faces commercial ply veneered. Adhesive used shall be phenyl form aldehyde synthetic resin conforming to BWR types specified in IS-848-1974.

Contractor shall obtain the approval for the name of the manufacturer of the flush door shutters from the Site Engineer/Architect before placing the supply order. While asking for the approval, copy of the "Bureau of Indian Standard" letter under which manufacturer has been authorized to mark the product with ISI marking should be attached. Site Engineer and Architect before giving the approval shall ensure that the validity date of license has not expired.

Testing of Flush Door Shutters: On receipt of the shutters at site the Site Engineer or the Architect shall be entitled to get the samples of door shutters tested in any approved laboratory. From each lot of approximately 100 shutters, one shutter shall be selected at random by the Site Engineer/Architect. The cost of replacement of the door shutters selected as samples, their transportation to the laboratory and cost of testing by the laboratory shall be borne by the contractor.

Glazed & Gauzed Door Shutters: Shutters shall be 35mm thick. These shall consist of first class i.e. champ, hillock, mango wood styles, top, bottom and lock rails as per details shown on drawings. Timber to be used for these shutters shall be of good quality, seasoned of material growth and conforming to IS-4021-1963. Seasoning and ASCU treatment shall be done as per IS-402-1962. Styles and rails of shutters shall be in one piece only. Styles and rails shall be jointed to each other by tonen or mortice at right angles. Mountings and glazing bars shall have joints and shall be shrub tanned to the maximum depth, which the size of member would permit.

The glass panes shall be free from flaws, specks or bubbles and shall have square corners and straight edges. The glass panes shall be so cut that it fits slightly loose in the frames. The glass pane shall be fixed to the shutter with first class hardwood beading of size as indicated properly screwed to the shutter with steel nails and necessary adhesive as per details as shown on drawings.

NOTE: On all toilet door shutters, aluminum sheet 18 gauge bent to U shape shall be provided at the bottom of the flush shutters. This sheet shall be upto 30cm height on the inner face of the shutters and upto 20cm height on the outer face of the shutters. This shall be fixed with 12mm steel Nails.

Door and windows shutters shall be provided as per details shown on the drawings.

The bottom of door shutters shall be 5mm above the finished floor level.

The glass panes shall be free from flaws, specks or bubbles and shall have square corners and straight edges. The glass panes shall be so cut that it fits slightly loose in the frames. The glass pane shall be fixed to the shutter with first class hardwood beading of size as indicated properly screwed to the shutter with steel nails and necessary adhesive as per details as shown on drawings.

Section -II - Aluminium Doors, Windows & Ventilators.

The Aluminium extruded sections shall conform to Designation 63400 given in IS 737-1986 and shall be of manufacturers such as JINDAL or Hindalco or INDAL or equivalent manufacturers to be approved by the Architect/ Site Engineer.

The Aluminium Doors, Windows, Ventilators and Glazing sections shall be anodized (anodic coating shall conform to IS 1868) as per colour approved by the Architect and Site Engineer.

The fabrication shall be carried out having mechanical joints, accurately machined and fitted to form hair-line joints, with the vertical and horizontal sections at the corners to meet in 45 degrees mitered. The jointing shall be either with accessories such as cleats and cleating screws or by crimping with Hydraulics Press on to heavy duty extruded Aluminium cleats. The relevant arrangement shall be got approved by the Architects.

The Glazing shall be fabricated and anchored to withstand wind pressures as per the Indian Standards.

Before proceeding with any manufacture, Shop Drawings for each typical elevation shall be submitted for the approval of the Architect and no work shall be performed until the approval of the shop Drawings is obtained.

All Glazing shall be airtight and watertight, using appropriate extruded EPDM gaskets/as manufactured by Anand LescuyerPvt.Ltd., or equivalent; and sealant which shall be of high quality and performance requirements.

Each Glazing shall be tailor-made as per openings at Site.No cutting and making good of exposed grit wash plaster surfaces shall be permitted.

All the Aluminium sections shall be wrapped with self-adhesive non-staining thick layer of PVC tapes as Manufactured by M/s. Bhor Industries or equivalent as approved by the Architects and shall be duly packed for avoiding scratches or blemishes to the powder coated surface of the sections till the installation is completed.

The frames shall be fixed to concrete/masonry /brick work with dash fasteners and the method of fixing shall be got approved by the Architects before installation. The drilling of holes for inserting the dash fasteners shall be carried out with drilling machines and the frame shall be fixed in plumb, line and level at jambs, sills and heads.

The perimeter gap between the outer frame and the masonry shall be sealed with poly sulphide sealant as per the make approved by the Architect.

Glazing: The glass panes shall be free from flaws, specks or bubbles and shall have square corners and straight edges. The glass panes shall be so cut that it fits slightly loose in the frames. The glass pane shall be fixed to the shutter with Aluminum beading and E. P.D.M gasket properly shaped as per the drawing. The glass panes shall be of make as specified.

SECTION III- BUILDERS HARDWARE

Manger shall be provided to all doors/windows/ventilator/shutters with necessary matching screws of suitable size.

Fittings and fixtures to all doors window and ventilators etc. shall be Aluminumanodized Matt finish ISI marked of make as specified.These shall be ISI marked where manufacturer contractor shall obtain the approval of the name of the manufacturer and brand of fittings from page of Director/Architect before placing the supply order. While asking for the approved copy of bureau of Indian Standard letter under which the manufacturer has been issued the license and authorized to make the items of builder hardware with ISI marking should be attached and one sample of each fillings of the particular brand duly ISI marked shall be given by contractor.

Butt hinges for doors shall be ISI marked cold rolled mild steel heavy quality of size as specified with mild steel pin and shall be oxidized finish. These shall be welded to pressed steel frames as specified.

Handles for window shutters shall be 75mm long & door shutters shall be 125 mm D-Type Aluminumanodized.

Link chain and sliding channel shall be sturdy of CP brass and shall be provided to main entrance door of all units as specified.

Magic eye for entrance door shall be wide-angle best quality. This shall be fixed at 1400mm height from finished floor level.

One sample piece of each fitting shall be produced for approval of Site Engineer /Architect. The bulk supply order shall be placed by the contractor only after approval is accorded by Site Engineer/Architect.

Schedule of Hardware: Schedule of Hardwares/fittings to door, window and ventilator shutters shall be as per drawing.

Mortice Latch (Vertical Type): Mortice latch (Vertical type) shall conform to IS 5930-1970. Specification for mortice latch (Vertical type). These latches shall be capable of being operated inside and outside and shall be provided with a pair of Aluminium anodized lever handle fitted on the handle plate in order to close the door. The latches shall be of brass alloy. Faceplate shall be provided in front of the ease plate, size of latch shall be 65mm.

Mortice Locks: These shall conform to IS 2209-1976. Specification for Mortice locks (Vertical Type). These shall have body, body covers, cast plate, faceplate, skirting plate lever, follower of cast brass and locking bolt and latch bolt extruded brass. Lever spring and latch spring shall be of phosphor bronze. The locks shall be supplied with 2 Nos. stainless steel keys. Locks shall be 6 lever. The lock shall be easy working with lever and shall be capable of being opened with from both inside and outside and shall be provided with a pair of Aluminium anodized lever handles on the handle plate in order to close the door from both side.

Hydraulic Door Closer (Floor Type): The Contractor shall provide double acting Hydraulic Door Closer model No.F-32, Cat No.1204 with SS Plate, Capacity to carry door weight upto 380Kg of EVERITE brand or Cat No.OFS 9621 of OPEL brand. These shall be of approved brand and manufacturer as above (Confirming to IS-6315) for Aluminium door including cost of cutting floor as required, embedding in floors and cover plate etc.

NOTE:

It shall insure that all builder's hardware are from one manufacturers only for the entire work, However, if due to any reason contractor progress to provide part quantity from other manufacturer approved in Para 2 above, then he may be permitted but he will have to obtain specific approval of Project Engineer/Architect for this change in brand. This will be subject to that all items and fixtures in any particular blocks shall be always of one manufacturer only. In no circumstances items of two manufacturers shall be used in all of the particular blocks.

Project Engineer before giving the approval of the name of the manufacturer and brand shall ensure that the validity date of license for making the fittings, as ISI marked has not expired.

Those fittings which are not manufactured, as ISI marked shall also be of the one brand of which the ISI marked fittings are approved by Project Manager.

SECTION IV: GYPSUM BOARD PARTITIONS AND CEILING

GENERAL

It is intended that these specifications cover principal requirement of new gypsum board partition and ceiling construction.

To prevent weakening due to calcimine, gypsum wallboard should not be exposed to temperature over 125F (52 C) for extended periods of time.

The Contractor shall furnish all materials, labour and scaffolding required to complete satisfactorily of all gypsum board partitions and ceiling work shown on the Drawings and / or specified.

MATERIALS

All materials shall be of an approval manufactures (India gypsum or equivalent) and shall comprise of the following:

G.I Framing for suspended ceiling

G.I Framing for partition and wall cladding.

G.I. corner beads and edge trims.

Dry-wall screw.

Regular gypsum wall board shall be ½” thick. Long edges shall be square. Joint treatment materials shall be.

Joint Tape

Joint compound to be ready-Mixed

Fast hardening joint compound.

Topping compound to be ready-mixed.

Adhesive materials shall be joint compound for board application and wallboard /panel adhesive for board for framing application as recommended by manufacturer.

INSTALLATION

Preparation of work:

Commerce gypsum board and ceiling only after all work are complete.

Examine and inspect materials to which gypsum board is to be applied. Remedy all defects prior to installation of drywall. Any defects in the finished installation due to misaligned framing or the work performed under that section of the specification and such defects shall be remedied under that section of the specification.

Installation of wallboard:

Gypsum wallboard shall be applied to wall. Board of maximum practical length shall be used so that an absolute minimum number of end joints occur. Board edges shall be brought into contact with each other but shall be forced into place.

Wallboard joints at opening shall be located so that no end joint will align with edges of opening unless control joints will be installed at these points. End joints shall be staggered, and joint on opposite sides of a partition shall not occur on the same stud.

Gypsum wallboard shall be held in firm contact with framing member while fasteners are being driven. Fastening shall proceed from center portion of the wallboard toward the edges and ends. Fasteners shall be set with the heads slightly below the surface of

the wallboard in a dimple formed by the hammer or power screwdriver. Care shall be taken to avoid breaching the face paper of the wallboard. Improperly driver nails or screws shall be removed.

SECTION V: ARCHITECTURAL WOODWORK

SCOPE OF WORK

Work included

This section covers the furnishing of all materials, equipment, accessories and labour for architectural woodwork, including but not limited to:

- Wall paneling
- Staircases
- Railings and balustrade
- Wood flooring and decks
- Built-in-cabinetry, including plastic emulsion
- Miscellaneous finished woodwork
- Rough carpentry and framing associated with the above
- Preservative treatment of wood
- Metal fasteners, accessories and adhesives

Work not included

The following work is not included in this section and is covered elsewhere:

- Structural woodwork
- Wood doors
- Wood windows

RELATED WORK SPECIFIED ELSEWHERE

- Structural woodwork
- Wood doors and windows
- Painting and finish coatings

QUALITY CONTROL

The contractor shall be responsible for the quality of all work and material used in the work and shall implement a programme for inspection and testing to monitor the quality of work.

Wood shall be of the best select grade free of defects in accordance with IS:1629

COORDINATION WITH OTHER TRADES AND CONDITIONS

The contractor shall schedule and coordinate the structural woodwork with other trades and contractors whose work may be affected by the Architectural woodwork.

MATERIALS AND PRODUCTS

WOOD

Generally wood for all architectural wood work shall be teak, except for parquet flooring for which the wood shall be Laurel.

The moisture content of wood shall be in conformance to IS:287 and shall generally be between 12% to 14%.

All wood shall be heartwood from mature trees, of the best grade, with minimum sapwood, free of defects, selected for goods finished appearance.

All grades of wood with the following defects shall be prohibited for use:

Timber with loose grain, splits, compression wood in coniferous timber, heartwood-rot and sap rot and wraps.

Worm holes and pitch knots

Wood, that has been badly stored and damaged.

LAMINATES

Plastic laminates shall be from an approved manufacturer, shall conform to IS: 2046 and shall be of new stock & 1.0-1.5mm in thickness.

PLYWOOD

Plywood shall be of new stock from an approval manufacturer, complying IS:710 BWR (and preservative treated respectively)

Plywood having the following defects shall be prohibited for use:

Damaged surfaces

Loose joints between ply

Badly stored

FASTENER AND ACCESSORIES

Screws shall be of Mild steel, complying to IS:451

Mild steel wire nails shall be in compliance with IS:723

Copper wire nails shall be in compliance with IS:725

ADHESIVES

Adhesive shall be synthetic resin adhesives complying with IS: 851, Fast setting glues such as Rubber solutions/ "Zat Pat" shall not be used.

IRON MONGERY

Flanges, bolts, hasps, screws and other hardware shall be brass of the best quality approved by the architect.

Locks and architectural finish hardware such as handle and knobs will be selected by the owner against the allowance made in the contract documents.

The contractor shall order, take delivery and arrange for the transportation of the hardware from the supplier nominated by the owner. The costs for ordering, transportation etc. upto delivery at site will be adjusted the allowance.

EXECUTION

GENERAL

The preservative treatment of wood shall be performed after conversion of lumber to the required sizes in construction so as to keep subsequent working on them to a minimum.

Brush supply two heavy coats of the same wood preservative chemical to any surfaces which were exposed by cutting, sawing, drilling etc.

Set out all architectural woodwork accurately in accordance with the contract drawings or approved shop drawings, true to line, angles, slopes and panes.

All members shall be in continuous lengths between supports without any immediate joints or splices unless otherwise shown on the drawings.

All sizes shown on the drawings are the finished dimensions and shall be within the tolerances given below:

For measurement upto and including 100mm in width or thickness $\pm 0.5\text{mm}$.

For measurement above 100mm in width and thickness $\pm 0.1\text{mm}$

All bearing surfaces shall be constructed to achieve full contact between surfaces over the entire bearing area.

All joints shall be worked to achieve accurate and tight fit with full contact between surfaces.

As far as possible grain and of wood shall be matched for adjacent pieces.

PANELING

Install the wall paneling in accordance with the design and details shown on the drawings.

Check alignment, plumb, plane and dimensions of the backing which is to receive paneling. Make necessary corrections prior to commencing paneling.

Layout paneling in accordance with actual dimensions obtained at site location. Adjust detailed dimensions to obtain the intent of the design.

Install sub-frames and grounds and secure them firmly to the backing, true to line, plumb, alignment and plane to avoid adjustment while installing paneling.

The panel frames shall be true to dimensions, sections, profiles, mouldings etc. as shown on the drawings. Members shall be in one piece between joints.

Panels shall be of the thickness and profiles shown in the drawings. When a large panel is required to be built up from two or more pieces, the joints shall be tongue and grooved flush joints, glued and drawn tight by means of vices, clamps or other means to obtain permanently indiscernible joints. The colour and grain of the wood shall be matched to conceal the joints.

The frames and panels shall be planed and sanded smooth to remove all tool marks before assembly.

The panel frames shall be joined by 'all wood' joints without metal fasteners by means of the most appropriate glued mortise-and-tenoned joints and wood pins. Mortises and tenons shall be tooled to obtain intimate contact between their surfaces and shall be fully glued with glue.

Joints shall be tightened with vice, clamps, draw straps or other means to obtain tight, indiscernible joints. The grain of wood pins shall match the surface grain of the frames.

Mouldings shall be mitered at 45 degrees to obtain a perfect match of lines, edges and profiles between abutting pieces.

After assembly the joints shall be tooled and sanded to remove minor unevenness at joints.

Planted mouldings and architects shall be fixed by means of headless-nails, neatly punched below the surface of wood.

Tolerances:

Plane surfaces when tested with a straight edge placed anywhere, in any direction shall not show a gap of more than 1mm between the surface and the edge in any 2 meter length, provided that there is no noticeable abrupt differences in smaller areas.

Straight lines and edges when tested with a 2 meter long straight edge shall not show a variation of more than 2mm, provided that there are no noticeable abrupt differences.

WOOD VENEERS AND PLYWOOD

Wood veneered plywood shall be 4mm. thick of an approved manufacture. Veneered plywood shall be selected from the best quality new stock for grain and colour appearance.

Plywood shall comply with IS: 5509 and IS: 5539.

ADHESIVES AND FASTENERS

Adhesives shall be synthetic resin adhesive complying with IS: 851

Screw shall be of brass.

Copper wire nails shall be in compliance with IS:725

TREATMENT AGAINST DECAY AND INSECT ATTACK

Treatment against and insect attack shall be by means of an approved proprietary product, proven to have outstanding durability under any conditions of exposure, to provide long-lasting protection against decay producing fungi and insects.

The material used for treatment shall be clean, oil-free. Odorless and harmless to people, planes and animals, evens when exposed to fire.

The material shall be spray or brush applied for deep-penetration, fiber- fixed to prevent leaching. The treated wood shall be capable of being subsequently painted or stained without being discolored.

No coal -tar based products shall be used for preservative treatment.

The material used for preservative treatment shall be compatible with the material used for fire retardant treatment.

HARDWARE

All hardware for wood doors and wood windows will be selected by the owner.

The Contractor shall order, take delivery and arrange for the transportation of the hardware from the supplier nominated by the owner. The costs for ordering, transportation etcup to delivery at site will be adjusted against the Allowance.

GLASS

Glass All shall be float glass of glazing quality conforming to BS:952 part 1 or other acceptable standard.

Wired glass: All wired glass shall be polished both sides with square pattern stainless steel wire mesh complying to BS:925, part 1 or other acceptable standard

Insulating glass insulating glass units shall consist of one exterior pane of tinted glass and one pane of clear glass, separated by a 15mm. Thick spacer filled with moisture absorbing desiccant. Each unit shall be hermetically sealed with primary butyl rubber sealant completely covering the unit's edge.

Glass and sizes and thickness shall be as shown on the contract Drawings.

All glass shall bear the label of its manufacturer and the standard to which it is manufactured.

Glazing gaskets : All glazing gaskets shall be 'U' shaped of flexible vinyl or synthetic rubber (Neoprene) to fit the glass thickness.

Setting blocks: All setting blocks shall be of synthetic rubber to provide the necessary edge clearance from frames for the glass.

Glazing components: These shall be clear silicone sealant.

WEATHER STRIPS

The weather strip to seal the perimeter gaps between sashes and frames shall be flexible vinyl or synthetic rubber suitable for heavy-duty application.

Sealant caulk for sealing joints between frames and structural opening shall be a one - part polysulphide sealant suitable for application by a caulking gun.

MODE OF MEASUREMENTS FOR INTERIOR FURNISHING WORKS:

DOORS, WINDOWS AND GRILLS.

Clear area over one face inclusive of frame shall be measured. Hold fasts and portion embedded in masonry or flooring shall not be measured.

PARTITIONS IN WOOD WORK

The partition height shall be measured up to bottom of false ceiling and framing members / ply going above shall not be measured

DECORATIVE PANELLING OVERWALL OR OVER PARTITIONS

The actual area of cladding shall be measured in square meter.

CARPETS

The actual area covered by the carpet shall be measured. No extra shall be allowed for wastage. No deduction shall be made for columns up to 0.5 sq. meter.

ALUMINIUM SLIDING WINDOWS

The measurement of aluminum sliding windows shall be taken only after the frame going with shutter is fixed in its final finished position in line level and plumb. Width and height shall be measured net between the out to out portion of the aluminum window frames.

FALSE CEILING

For false ceiling work, the measurement shall be for the actual area covered. No deductions shall be made for the cutouts, for light fittings, speakers, AC grills and column up to 0.5 sq. meters.

WOODWORK

For conversion of centimeters to meter the resultant figure shall be taken upto two digits after decimal point. Third digit shall not be taken into account.

TECHNICAL SPECIFICATIONS ELECTRICAL, FIRE FIGHTING, SECURITY SYSTEM & NETWORKING

The Electrical installation work shall confirm to the following I.S. Standards (latest additions), Local Supply Authorities Rules and Regulations, Indian Electricity Act & rules, National Building code and Fire Safety Norms. All equipment including cables, wires & components thereof should be manufactured & installed as per standards specified by Bureau of Indian Standards (BIS) Where such standards do not exist, then the covered items should be approved from Architects/ Consultants /Clients prior to purchase & delivery to site.

IS: 732 Code of Practice for Electrical wiring installation (System Voltage not exceeding 650V)

IS: 1646 Code of Practice for fire safety of buildings (General Electrical Installation)

IS: 9537 PART-II 1981 Rigid steel conduits for electrical wiring.

IS: 2667 Fittings for rigid steel conduits for electrical fittings.

IS: 2509 rigid non-metallic conduits for electrical installations.

IS: 1293 Pin Plugs and Sockets.

IS: 694 PVC insulated cables with copper conductors for voltages up to 1100 Volts

IS: 9532 Specification for conduits for Electrical Installation

IS: 3854 5A & 15A Switches.

IS: 3043 Earthing.

Indian Electricity Act, 1956 and Rules and Fire Insurance Regulations.

IS: 2026 Specification for power transformer----- Not applicable.

IS: 2099 Specification for high voltage porcelain bushings. ----- Not applicable

IS: 355 Specification for insulating oil. ----- Not applicable

IS: 3639 Specification for fittings and accessories for power transformer. ----- Not applicable

IS: 2274 Electrical wiring installations (System voltage exceeding 650 volt)

IS :7752 Guide for improvement of power factor consumer's installations

IS: 5216 Guide for safety procedures & practices in electrical work

IS: 3072 Installation & maintenance of Switch gear

IS: 2551 Guide for danger notice plates

IS: 8923 warning symbols for dangerous voltages

IS :13947 Specification for low-voltage switchgear & Control gear

IS :1777 Industrial luminaries with metal reflectors

IS :1913 General & safety requirement of luminaries

IS :116 Circuit Breakers for AC system

IS :3427 Metal enclosed switchgear & Control gear

IS: 3837 Accessories for rigid steel conduits.

IS: 4047 Heavy duty Air break switches & composite switch fuse units for voltage exceeding 100 volts.

IS :4237 General requirements for switchgears not exceeding 1000 Volts

IS :4615 Switch socket outlets

IS:159: Busbars & busbars connections

IS: 415 marking & arrangement for switchgear board's main connections & auxiliary wiring.

IS: 415 Tungsten filament lamp

IS: 722 Three phase watt hour meter with MDI
 IS: 1248 Directing acting electrical indicating instruments
 IS: 1293 three pin plugs & sockets outlets.
 IS :1947 Floods lights
 IS: 2147 Degree of protection provided for enclosure for switchgear
 IS: 2418 Tubular fluorescent lamps for general lighting services
 IS: 2509 PVC electrical Conduits
 IS: 2075 Current Transformer
 IS: 2834 LT Capacitors
 IS: 3106 Code of practice for installation & maintenance of switchgear.
 IS: 2607 Air break isolators for voltage not exceeding 1000 Volts
 IS: 1753 aluminium Conductors for insulated conductor
 IS: 3961 Recommended current ratings for cables
 IS: 3480 Flexible steel conduits for electrical wiring
 IS: 1646 Code of fire safety of building (General Electrical installation)
 IS: 1913 General & safety requirements for electric lighting fitting.
 IS: 1239 Mild steel tubular & other wrought steel pipe fitting
 IS: 6381 Specifications for construction & testing of electrical apparatus.
 IS: 1818 Isolator & Earthing switches
 IS: 3106 Code of practice for selection
 IS: HRC Cartridge fuse unit up to 650 Volts
 IS: 10332 Part I to Part V Specification of Luminaries

SPECIFICATIONS FORELECTRICAL WORKS

SPECIAL CONDITIONS OF CONTRACT

1. COMPLETENESS OF TENDER:-

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various components of the work shall be deemed to have been included in the tender, whether such items are specifically mentioned in the tender documents or not.

2. RATES: -

The rates tendered shall be for complete items of work inclusive of Cost of material, erection, connection, testing, labour, supervision, tool & plants, storage, contingencies, breakage, wastage, execution at any level & height, all taxes (including works contract tax, if any), duties, and levies etc. and all charges for items contingent to the work, such as, packing, forwarding, insurance, freight and delivery at site for the materials to be supplied by the contractor.

3. WORKS TO BE DONE BY THE CONTRACTOR:-

The scope of internal and external electrification under this contract shall include the design, engineering, manufacture, assembly, testing, delivery, erection and commissioning of electrical system including supply of all material, labour, T&P etc for followings -

Main Switches, Main L T Panels, meter board and external cable connection.

11 KV HT Panel.

11 KV / 0.433 KV Transformers.

D. G. Sets with fuel tank, piping, fuel pump, exhaust piping with lagging and supports, cooling system complete.

Sub and branch distribution boards, MCB's and RCCB's etc.

Mains and Sub mains between various panels, meter boards and distribution boards.

Point wiring with Conduits for all type of wiring including circuits, sub mains, light, fans, power and AC etc.

Switches and socket outlets for light, fans, plug, power, Tel, TV, computer network etc with suitable MS/GI boxes with accessories complete.

Earthing and Lightning Protection with earth leads/strips.

Conduits and wiring for Telephone, EPABX, TV system, PA system, Music system and Computer networking, fire alarm, broad band etc.

Cables and other allied works.

Provision of emergency electrical supply and distribution for complete light, fans and other specified points are also included in the scope of work. For the purpose of emergency distribution separate DB's shall be installed for Light/fans and fax machines & staircase lighting at every place, so that these can be separated.

Lighting Fixtures fans and exhaust fans. (If these are supplied by the client, then the contractor will erect the fixture as required without any extra payment beyond the contract)

External lighting including underground cables and connection with the external cables and earthing.

Feeder pillars with circuit breakers.

Underground cables.

All the above work shall be complete in all respects up to the satisfaction of architect, consultant, Client and Engineer in charge as per the details mentioned in BOQ and drawings supplied time to time.

Unless and otherwise mentioned in the tender documents the following scope of works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost:

Furnishing of all labour, skilled and unskilled, supervisory and administrative personnel, erection tools and tackles, testing equipment, implements, supplies, consumables like welding rods and gas, oil and grease, cleaning fluids, insulating tape, anticorrosive

paints, jute cotton waste etc., and hardware for timely and efficient execution of the erection work.

Transport vehicles necessary for efficient transportation of equipment from Owner's stores to site of erection and excess materials back to owner's stores.

Complete assembly, erection and connection, testing and commissioning, putting into successful and satisfactory commercial operations of above equipment.

The items of work to be performed on all equipment and materials shall include but not limited to the following:

Receiving, unloading and transportation at site. (To Owner or Contractor's stores and from their upto actual place of erection).

Opening, inspecting and reporting all damages and short supply items.

Arranging to repair and/or re-order all damaged and short supply items.

Storing at site with suitable allweather protection.

Assemblies, erection and complete Installation.

Necessary coordination between work done by other Contractors.

Final check-up, testing and commissioning in presence of Owner's representative.

Obtaining Owner's written acceptance of satisfactory performance.

4. INFORMATIONS REQUIRED FROM CONTRACTOR

Typical GA drawing of all equipment to be supplied and disposition of various fittings and loading.

All Annexure of this specification duly filled in and signed by the contractor.

Catalogue of all equipment and components explaining construction features.

Transportation/shipping dimensions and weights, space required for handling parts for maintenance.

Type test certificates for all equipment on similar type of equipment.

Final Single line diagram complete with cable sizes etc.

Bill of Materials, Control & schematic line diagram for meter & relay panel, terminal connection/Master Terminal box diagram, wiring diagram with physical location of components for all equipment.

Detailed cabling layout showing cable trench / tray layout, earthing layout.

Detailed lighting layout showing position of fixtures / type of fixtures, circuiting and route of wires / cables / fixing details, DB details.

Protections relay settings.

Cable schedule & interconnection chart.

Foundation details and plan, loading details for all equipment.

Test certificates.

Instruction manuals of all major equipment.

Test Procedures at sites.

Test reports of all tests carried out at site.

'AS BUILT' drawings (2 sets of soft copies on CD and six sets of hard copies duly wound).

All layout drawings shall be made in scale of 1:50 or 1:100 unless until agreed by the Owner/ Consultant.

5. PRICES

The price quoted for supply items shall include all packing, crating, excise duty, sale tax / Works Contract tax, insurance, freight, loading/ unloading, handling & all other charges.

The price quoted for erection & commissioning shall include cost of all consumables, taxes & duties. (if any). No additional taxes/duties shall be payable by Owner.

Prices quoted shall be firm and no variation shall be allowed during contract period.

Contractor shall furnish prices separately for spare parts for two (2) year's troublefree operation of the equipment and shall furnish the list of the same.

6. ELECTRIC POWER SUPPLY AND WATER SUPPLY :-

Unless and otherwise specified, power supply and water supply as may be required shall be arranged by the contractor for installation and testing of the equipment's at the site of work.

7. PROVISIONS AGAINST ACCIDENTS AND SAFETY MEASURES

All safety rules and codes as applicable to work including rules applicable as per factory inspector shall be followed during execution of above work.

All safety appliances and protective devices including hand gloves, aprons, helmets, shields, goggles, safety belts etc. shall be provided by Contractor for his personnel.

The Contractor shall arrange to provide guards and prominent display caution notices if access to any equipment/ area is considered unsafe and hazardous.

8. SPECIFICATIONS

In the absence of specifications for any work or materials, relevant Indian Standard Specifications shall be applicable. If such codes for a particular subject have not been framed, the decision of the Employer/ Consultant will be final and binding.

9. VARIATION IN QUANTITY

The Owner shall have right to delete or increase/ decrease quantity specified in this specification as specified in preamble to Bill Of Materials.

Quantities indicated in Bill of Materials are based on engineering status of the project as on date. It is necessary that proper engineering is carried out by the contractor before procurement of material.

For procurement of any material & sequential delivery at site from point of view of erection etc. Contractor shall take prior approval from the employer.

All left over material for which payment has been made by the employer, has to be taken back by the contractor. The employer shall make necessary deduction from the bills of contractor.

10. SITE VISIT

It is recommended that contractor shall visit site before submission of his offer. Time and date shall be fixed with employer.

11. TOOLS FOR HANDLING AND ERECTION :-

All tools and tackles required for handling of equipment and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

12. CO-ORDINATION WITH OTHER AGENCY: -

The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in his work. Recessed conduit and other works, which directly affect the progress of building work, should be given priority.

13.CARE OF BUILDINGS :-

Care shall be taken by the contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of his work from the site, from time to time as designed by the Engineer-in-charge.

14.STRUCTURAL ALTERATIONS TO BUILDINGS:-

- i. No structural member in the building shall be damaged/altered, without prior approval from the competent authority through the Engineer-in-charge.
- ii. Structural provisions like openings, cutouts if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the contractor at his cost.
- iii. All such openings in floors provided by the department shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.

All chase required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

15.WORK IN OCCUPIED BUILDINGS: -

When work is executed in occupied buildings, there should be minimum of inconvenience to the occupants. The work shall be programmed in consultation with the Engineer-in-charge and the occupying department. If so required, the work may have to be done even before and after working hours.

The contractor shall be responsible to abide by the regulations or restrictions set in regard to entry into, and movement within the premises.

The contractor shall not tamper with any of the existing installations including their switching operations or connections there to without specific approval from the Engineer-in-charge.

16. STATUTORY REGULATION AND APPROVALS :-

All electrical works shall be carried out only by those Contractors who are licensed by the concerned local authorities to execute this type of work. Only **“A” Class government approved electrical contractor shall execute the job.**

It shall be the responsibility of the Contractor to comply with the regulations laid down by the Indian Electricity Rules and local authorities. The Contractor shall also be responsible for obtaining all the statutory approvals/certificates for the work from the concerned Departments and these certificates shall be handed over to the Architects/Clients at the completion. All coordination with the local electric supply authorities, submitted of application, getting the desired load sanctioned shall be in the

scope of contractor. The fees required to obtain the desired load sanctioned and other legal and miscellaneous charges by local electric supply authority / undertaking shall be given by the client but all follow-ups etc. shall be the contractor's responsibility.

On completion of the work, the contractor shall obtain the certificates of final inspection and approval by the local electric supply authority and deliver these certificates to the Owner/Architects in original. The contractor shall bear all expenses and fees required to obtain these certificates without which the work shall not be taken over and shall not be considered complete.

17. STANDARDS AND CODE OF PRACTICE:-

The work shall be carried out as per the enclosed Specifications of work and the construction drawings to be issued from time to time. These specifications shall be read in conjunction with National Building Code, National Electrical Code 1985, Relevant Codes of Practices and Standards as issued by ISI and Indian Electricity Rules, CPWD specifications for electrical works (all with the latest amendments). The installation shall confirm in all respects to Indian Standard code of Practices. Following BIS codes shall be referred -

National Electrical Code

IS: 694 - 1977: PVC insulated cables for working voltage up to and including 1100 volts

IS: 732 -1989: Electrical wiring installation

IS: 1225 -1938: Installation and Maintenance of power Cables up to and including 33 KV Rating

IS: 1554: PVC insulated heavy-duty electrical cables.

IS: 1860: Installation operation and maintenance of passenger and goods elevator.

IS: 2309 -1989: Protection of building and allied structures against lightning.

IS: 3043 -1987: Earthing

IS: 3646 (Part-1) -1992: Interior Illumination

IS: 3661 (Part-2) -1967: Current rating for cable

IS: 3661 (Part-5) -1968: Current rating for cable

IS: 5216 (Part-1) -1982: Recommendations on safety procedures and practices in electrical work.

IS: 7098 (1 & 2): XLPE insulated cables

IS: 10028 (Part-1) -1985: selection, Installation and Maintenance of Transformers

IS: 10118 (Part-1) -1982: Selection, Installation and Maintenance of switchgear and Control gear.

18. MATERIAL SAMPLES AND SHOP DRAWINGS:-

It shall also be the responsibility of the Contractor to submit without any extra charge the samples of the materials/equipment as and when asked by the Architect/Consultant. If the Contractor wishes to use an alternative make due to non-availability of the approved one, he should take the prior approval of the Architect/Consultant. Under such situations the Contractor shall show such promptness as not to hamper the progress of the work.

The Contractor shall submit for Architect/Consultant's approval the shop drawings at approved scale indicating the custombuilt equipment, L.T. Panels, run of cables and conduits he proposes to install.

19. ELECTRICAL DRAWINGS: -

- i) The electrical drawings issued from time to time to the contractor are diagrammatic but shall be following as closely as actual construction and work will permit. The Contractor at his own expenses shall make any deviation from the drawings required to conform to the building construction. The architectural drawings shall take precedence over the electrical drawings as far as the civil and other trades works are concerned.
- ii) If there is any discrepancy due to in-complete description, ambiguity or omission in the drawings and other documents relating to this Contract found by the Contractor either before starting the work or during execution or after completion, the same shall be immediately brought to the attention of the Architect/Consultant and his decision would be final and binding on the Contractor.

20. TESTING AND COMMISSIONING: -

The Contractor shall be responsible for testing and commissioning the entire electrical installation described in these specifications and relevant IS specifications and will demonstrate the operation of the systems to the entire satisfaction of the Architect/Consultant and to the Client approval.

21. GUARANTEE

At the close of work and before issue of final certificate of virtual completion by Owner / Consultant, the contractor shall furnish a written guarantee indemnifying the owner against defective materials and workmanship for a period of one year after commissioning. The contractor shall hold himself fully responsible for reinstallation or replacement of defective material free of cost to the owner.

22.COMPLETION DRAWINGS

The contractor shall submit, after the completion of the work, one set of originals and two sets of prints of the As-Fitted drawings/Completion drawings, giving the following information:

- a. Run and size of conduits, inspection, junction and pull boxes.
- b. Size of conductor in each circuit.
- c. Location and ratings of sockets and switches controlling the light/fan and power outlets.
- d. Location and details of distribution boards, mains, switches, switchgears and other particulars.
- e. A complete wiring diagram as installed and schematic drawings showing all connections in the complete electrical system.
- f. Location of telephone outlets, junction boxes and sizes of various conduits.
- g. Location of all earthing stations, route and size of all earthing conductors etc.

Layout and particulars of all cables.

Location of all equipments with dimensions and connections.

23. INSPECTION

All equipment & material covered under this specification is liable for inspection by the Owner/ his representative. The vendor shall inform two weeks in advance for inspection to be carried out at the manufacturer's works. The contractor shall furnish data Sheets & other details. Additional information, if desired by the bidder can also be furnished separately.

TECHNICAL SPECIFICATIONS

CHAPTER 1

INTERNAL ELECTRIFICATION

SCOPE:

This specification is intended to cover the requirements of supply, installation, testing and commissioning of electrical wiring installation and other accessories required for its satisfactory operation. This covers the essential requirements or precautions regarding wiring installations for ensuring satisfactory and reliable service.

STANDARDS:

The Electrical wiring installations and other accessories shall comply with latest IS:732-1989 and National Electrical code - 1985.

CONSTRUCTION:

Wall mounted switch boards shall be installed such that the bottom is at a minimum height of 1.35 m above finished floor level wherever applicable, as indicated in the drawing. Equipment which is on the front of a switch board shall be so arranged that inadvertent personnel contact with live parts is unlikely during the manipulation of switches, changing of fuses or similar operation. In every case in which switches and fuses are fitted on the same pole, these fuses, shall be so arranged that the fuses are not live when their respective switches are in 'OFF' position. No fuses other than fuses in instrument circuit shall be fixed on the back or behind a switch board panel or frame.

CAPACITY OF CIRCUIT:

Lighting Circuits shall not have more than a total of ten points of fans, 5A socket outlets and light points and its total load shall not exceed 800 watts. Lights, fans, and 5A socket outlets can be wired on a single common circuit. If fan circuit is drawn separately, circuit

shall not be used more than eight points and load shall not exceed more than 800 watts. In the circuit, the neutral and earth wires can be looped up to 10 points. From distribution boards Neutral & Earth wires shall be run for every circuit. The power circuits shall not have more than two outlets per circuit if load to be fed by each outlet is less than 1KW, and if load is more than 2KW, each outlet shall be connected to a separate circuit.

(a) Switches: All switches shall be placed in the live conductor of the circuit and no single pole switch or fuse shall be inserted in the earth or earthed neutral conductor of the circuits. Single pole switches (other than for multiple control) carrying not more than 15 amperes may be of the piano flush type and the switch shall be 'ON' When the knob is down.

(b) Lamp holders: Lamp holders for use on brackets and the like shall have not less than 1.3 cm nipple and all those for use with flexible pendant shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where centre contact Edison screw lamp holders are used, the outer or screw contact shall be connected to the 'middle wire' or the neutral or to the earthed conductor of the circuit.

c) Lamps: All incandescent lamps, unless otherwise specified shall be hung at a height of not less than 2.5 m above the finished floor level.

(d) Ceiling rose: a) A ceiling rose or any other similar attachment shall not be used on circuit, the voltage of which normally exceeds 250 volts. A ceiling rose shall not embody fuse terminals as an integral part of it. Every socket outlet shall be controlled by a switch. The switch controlling the socket shall be on the 'live' side of side line. 5 Amps and 15 Amps socket-outlet shall normally be fixed at any convenient place 60 cm above the floor level or near such level as indicated in drawing. 15 Amps socket outlets in kitchen shall be fixed at convenient place 23cm above the working platform. In a room containing a fixed bath or shower, there shall be no socket outlet and there shall be no provision for connecting a portable appliance.

RECESSED MS CONDUIT WIRING SYSTEM:

(a) Making of chase: The chase in the wall shall neatly be made and shall be of suitable dimension to permit the conduit to be fixed in the manner desired by the Engineer-in-charge. In the case of buildings under construction, chases shall be provided in the wall, ceiling, etc. at the time of their construction and shall be filled up neatly after erection of conduit and brought to the original finish of the wall.

(b) Fixing of conduit in chase: The conduit shall be fixed by means of staples or by means of saddles not more than 600 mm apart. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with a long radius which will permit easy drawing-in of conductors. All the threaded joints of rigid steel conduits shall be treated with approved preservative compound to ensure protection against rust.

(c) Inspection boxes: To permit periodical inspection and to facilitate replacement of wires, suitable inspection boxes shall be provided at convenient locations. They shall be mounted in flush with the wall. The minimum size of inspection boxes shall be 75 x 75 mm. Suitable ventilating holes shall be provided in the inspection box covers.

(d) Types of accessories to be used: All outlets, such as switches and sockets may be either of flush mounting type or of surface mounting type. The switches and other outlets shall be mounted on such boxes. The metal box shall be efficiently earthed with the earth continuity wire run along the conduit. When crossing through expansion joints in buildings, the conduit sections across the joint may be through flexible copper bellows of the same size as PVC conduit. The Number of wires that can be drawn through a conduit shall be strictly as per IS 732 and as mentioned in Drawings.

MS CONDUITS:

MS conduit shall be black enameled and of thickness not less than 16SWG and of size minimum 19 mm dia. The Conduit shall conform to IS 9537/ Part II.

(a) Bunching of cables: Separate conduits shall be used for bunching of conductors of AC supply and DC supply for lighting and small power outlet circuits. All outlets of conduit systems shall be properly drained and ventilated, but in such a manner so as to prevent the entry of insects etc. as far as possible.

(b) Bends in conduit: Wherever necessary, bends or diversions may be achieved by bending the conduits or by employing normal bends, inspection bends, inspection boxes,

elbows or similar fittings. In case of plain conduit, heat may be used to soften the conduit for bending and forming joints. Positioning of conduit in close proximity to hot surfaces should be avoided.

TESTING OF WIRING:

The following tests shall be carried out on all types of wiring on completion of the work & before energizing the installation:

Insulation resistance test, (ii) Electrical continuity test, (iii) Earth continuity test, (iv) Earth electrode resistance test, and (v) Switch polarity test.

(i) Insulation Resistance test:

The insulation resistance shall be measured by using 500 v megger between the following points.

Phase and neutral conductor with all fuses in position and all switches in closed condition and main switch in OFF position with lamps and other devices removed.

Between earth and whole system of conductors with all fuses in place, all switches closed and all lamps in position.

Between all conductors connected to one phase of the supply of the above tests shall not be less than 50 divided by the number of points on the circuit. Where a whole installation is being tested, a lower value than that given by the above formula is acceptable subject to a minimum of one megaohm.

The insulation resistance in megaohm as obtained by each of the above tests shall not be less than 50 divided by the number of points on the circuit. Where a whole installation is being tested, a lower value than that given by the above formula is acceptable subject to a minimum of one megaohm.

(ii) Electrical continuity test:

Each and every circuit shall be tested for electrical continuity by using a multimeter.

(iii) Earth continuity test:

The earth continuity conductor including metal conduit shall be tested for electrical continuity and the resistance of the same along with the earthing lead measured from the connection with the earth electrode to any point in the earth continuity conductor in the complete installation shall not exceed one ohm.

(iv) Earth electrode resistance test:

The earth electrode resistance shall be tested as specified in section.

(v) Switch polarity test:

Test shall be made to verify that all switches in every circuit have been fitted in the same conductor throughout and such conductor shall be marked for connection to the phase conductor.

DISTRIBUTION BOARDS:

All the distribution boards shall be with MCBs as described in the respective schedule.

The distribution boards shall be controlled by a switch fuse, miniature circuit breaker or an isolator as described in the respective schedule. Each outgoing circuit shall be provided either with MCB or a fuse on the phase. The neutral shall be connected to a common link and be capable of being disconnected individually for testing purposes.

The distribution boards shall be located as indicated in the respective electrical working drawings and as directed by Engineer - in - charge. The distribution boards shall be fixed on wall in the niche provided and marked with the details of circuits, source of supply, size of incoming wires etc.,

All marking shall be clear and legible.

The total load of the consuming devices shall be evenly distributed between the number of ways of distribution board.

The consuming devices circuit shall be connected to distribution board in proper sequence, so as to avoid unnecessary crossing of wires.

Cables shall be connected to a terminal only by crimped lugs.

Cables shall be rigidly fixed in such a manner that a clearance of at least 2.5cm is maintained between conductors of opposite polarity or phase and between the conductors and any material other than insulating material.

The incoming and outgoing cables shall be neatly bunched.

MOUNTING HEIGHTS :

The Mounting heights of various fixtures shall be as specified in the Drawings.

CHAPTER 2

POWER CONTROL CENTRES

1.0 SCOPE:

This specification is to cover the requirement of design, supply, installation, testing and commissioning of LT power control centers / main switch boards with all components, Instruments, fittings and accessories for efficient operation without any trouble.

2.0 STANDARDS:

The PCC specified herein, unless otherwise stated shall conform to the relevant and latest revisions of Indian standards and Indian Electricity Rules.

3.0 DESIGN AND CONSTRUCTION:

3.1 Design requirements: The power control centres shall be suitable for operation on 440 volt, 3 phase, 4 wire 50 Hz system to withstand a short circuit level of 50 KA RMS symmetrical.

The PCC shall be designed for operation in high ambient temperature up to 45 degrees centigrade and high humidity up to 95% and tropical atmospheric conditions. Means shall be provided to facilitate ease of inspection, Maintenance and Servicing.

3.2 CONSTRUCTIONAL REQUIREMENTS: The power control centre shall be of

- i) Metal clad, cubicle, indoor, free standing type suitable for mounting on built up trenches with U Channels of adequate size.
- ii) Made up of the requisite vertical sections, which when coupled together shall form continuous dead front switch board.
- iii) Dust and damp protected, the degree of protection shall be better than IP - 54 as specified in IS-2147.
- iv) Readily extendable on both sides by the addition of vertical sections after removal of the end covers.
- v) Single front construction with the circuit breaker feeder and switch fuse feeders suitable for operation from the front of the panel.

The PCC shall have the feeder ratings as per the schematic diagrams enclosed with the schedule and constructed only of materials capable of withstanding the mechanical, electrical and thermal stresses as well as the effects of humidity, which are likely to be encountered in normal service.

3.3 VERTICAL SECTIONS: Each vertical section shall comprise a front framed structure rolled folded sheet steel channel section of minimum 2 mm thickness rigidly bolted together. This structure shall house the components contributing the major weight of the equipment such as circuit breaker, switch fuse units, main horizontal bus bars, vertical risers and other front mounted accessories. The structure shall be mounted on a rigid base frame of folded sheet steel of minimum of 2.5 mm thickness and 100mm height. The design shall ensure structural stability during Transit and also during Operation after Commissioning. Suitable cable chamber housing the cable end connections and power / control cable terminations shall be provided. The design shall ensure generous availability of space for ease of installation and maintenance of cabling and adequate safety for working in one vertical section without coming into accidental contact with live parts in the adjacent section.

A cover plate at the top of the vertical section shall be provided with necessary ventilating arrangements. Any aperture for ventilation shall be covered with a perforated sheet having less than 1 mm diameter perforations to prevent entry of vermin.

3.4 SHEET STEEL CUBICLE :

3.4.1 The sheet steel cubicle shall be designed in fully segregated multitier formation. Each cubicle shall have hinged front access door with easy operating fasteners. All the doors and covers shall be heavily gasketed to make the compartment dust tight. Each cubicle shall have a covering at the bottom to make a dust and vermin proof construction. Door hinges shall be of concealed type.

The cubicle shall be of minimum 2 mm thick sheet steel. Sheet steel shrouds and partitions shall be of minimum 1.6mm thickness. All sheet steel work forming the exterior of switch boards shall be smoothly finished, leveled and free from flaws. The corners shall be rounded. The minimum Thickness of Gland plates shall be 3mm.

3.4.2 The apparatus and circuits in the power control centers shall be so arranged as to facilitate their operation and maintenance at the same time to ensure the necessary degree of safety.

Apparatus forming part of the control centers shall have the following minimum clearance.

- i) between phases - 25 mm,
- ii) between phase and neutral - 25 mm,
- iii) between phases and earth - 25 mm,
- iv) Between neutral and earth - 19 mm,

When, for any reason, the above clearances are not available suitable insulation shall be provided. Clearance shall be maintained during normal service conditions. Creepage distances shall comply with those specified in relevant standards.

3.4.3 All insulating materials used in the construction of the equipment shall be non hygroscopic duly treated to withstand the effect of high humidity, high temperature and tropical ambient service conditions.

3.4.4 Functional units such as circuit breakers and fuse switches shall be arranged in multitier formation, except that not more than One air circuit breaker housed in a single vertical section.

3.4.5 Metallic/insulated barriers shall be provided within vertical sections and between adjacent sections to ensure prevention of accidental contact with :

- i) Main bus bars and vertical risers during operation, inspection or maintenance of functional units and front connected accessories.
- ii) Cable terminations of one functional unit, when working on those of adjacent unit/units.

3.4.6. All doors / covers providing access to live power equipment / circuits shall be provided with tool operated fastners to prevent unauthorized access.

3.4.7 Provisions shall be made for permanently earthing the frames and other metal parts of the switchgear by two independent connections.

3.5 METAL TREATMENT AND FINISH:

All steel works used in the construction of the switch boards shall have undergone a suitable rigorous metal treatment process so as to remove oxide scales and rust formation and to facilitate a durable coating of the paint on the metal surfaces and also to prevent the spreading of rust, in the event of the paint film being mechanically damaged.

Two coats of Anti Corrosive primer followed by a finishing coat of Epoxy spray power coating of the shade 631 of IS: 5 (i.e. Siemens grey) shall be given. The total thickness of paint shall not be less than 25 micron.

3.6 BUS BARS:

3.6.1 The busbars shall be housed in non-segregated sheet steel compartments in the cubicle at convenient locations with provision for access to the buses from the front of the panel. The bus bar shall be suitably braced with DMC/SMC supports to provide a through fault withstand capacity of 50 KA RMS symmetrical for one second and a peak short circuit withstand capacity 150 KA minimum. The neutral as well as the earth bus shall be capable of withstanding the above fault level.

3.6.3 Large clearance and creeping distance shall be provided on the bus bar system to minimize the possibility of a fault.

3.6.4 High tension bolts, nuts and spring washers shall be provided at all bus bar joints.

3.6.5 The continuous rating of the bus bar shall be 125% of the rated current. Maximum temperature of the bus and the connections shall not exceed 85 degrees centigrade. The busbars shall be of liberal design for the required current rating i.e. 0.8Amp/sq.mm. The main phase busbars shall have continuous current rating throughout the length of each power control centre and the neutral busbars shall have continuous rating of at least 50% of phase busbars.

3.6.6 Connections from the main busbars to functional circuits shall be arranged and supported so as to withstand without any damage or deformation, the thermal and dynamic stresses due to short circuit currents.

All bus bars and tapings shall be provided with color coded sleeves for phase identification.

All joints/tapping points of the buses shall be suitably shrouded to prevent accidental contact.

4.0 CIRCUIT BREAKERS :

4.1 General :

4.1.1 Circuit breakers shall be of triple pole / four pole, air break, horizontal draw out /Fixed type, as given in the schedule of work and comply with the requirements of relevant IS with latest amendments and shall have the following :

- i) A short circuit breaking capacity of not less than 50 KA RMS at 415 volts, 50 Hz AC.
- ii) A short circuit making capacity of 105 KA.
- iii) A short time withstand capacity of 150 KA for one second.
- iv) Electrical overload performance at 6 times the rated current, 100% of the rated voltage as recovery voltage at 0.5 power factor.
- v) Dielectric test of 2.5 KV applied for one minute on main circuits.

4.1.2 The circuit breakers shall be fitted with detachable arc chutes on each pole designed to permit rapid dispersion, cooling and extinction of the arc. Interphase barriers shall be provided to prevent flash over between phases.

4.1.3 Arcing contacts shall be of hard wearing material copper tungsten or silver tungsten and shall be easily replaceable. Main contacts shall be of silver plated copper of high pressure type and generous cross section.

4.2 Operating Mechanism :

The operating mechanism shall be of robust design, with minimum number of linkages to ensure maximum reliability. Manually operated circuit breakers shall be provided with spring operated closing mechanism which are independent of speed of manual operation. Electrically shall be independent of the motor which shall be used slowly for charging the closing spring.

The operating mechanism shall be such that the breaker is at all times free to open immediately when the trip coil is energized.

Mechanical operation indicators shall be provided to show open and close positions of the breaker. Electrically operated breakers shall be additionally provided with mechanical indications to show charged and discharged conditions of the charging spring. Means shall be provided for slow closing and opening of the breaker for maintenance purposes, and for manual changing and closing of electrically operated breakers during emergencies,

4.3 Protection :

Provisions shall be available for fitting a minimum of five trip devices - three over current, as shunt trip and an under voltage release or two over current and earth fault release, a shunt trip and one under voltage release. The breakers shall be of the shunt or series trip type as specified in the schedule.

4.4 Housing of Circuit Breaker :

Circuit breakers shall be individually housed in sheet metal castle provided with hinged doors. The breaker along with its operating mechanism shall be mounted on a robust carriage moving on guide rollers within the castle. Isolating contacts for both power and control circuits shall be of robust design and fully self-aligning. The assembly shall be designed to allow smooth and easy movement of the breakers within its castle.

The breaker shall have three distinct positions within the castle as follows :

- i) 'Service' position : With main and auxiliary contacts connected.
- ii) 'Test' position : with power contacts fully disconnected and control circuit contacts connected.
- iii) 'Isolated' position : with both power and control circuit contacts fully disconnected.

It shall be possible to achieve any of the above positions with the castle doors closed. Mechanical position indicators shall be provided for the three positions of the breakers.

4.5 Interlocking :

4.5.1. The moving portion of the circuit breaker shall be interlocked so that :

- i) It shall not be possible either to isolate it from the connected position, or to plug it in from the Isolated position with the breaker closed.
- ii) The circuit breaker can be closed only when it is in one of the three positions or when it is fully out of the castle.
- iii) It shall not be possible to open the hinged door of the castle unless the breaker is drawn to the isolated position.
- iv) Inadvertent withdrawal of the circuit breaker too far beyond the supporters is prevented by the suitable stops.

4.5.2 Provisions shall be available for the padlocking of the circuit breaker access flame in any of the three positions.

4.5.3 Automatically operated safety shutters shall be provided to screen the fixed isolating contacts when the breaker is drawn out from the castle.

4.5.4 The moving portion of the circuit breaker shall be provided with a heavy duty, self-aligning earth contact, which shall make before and break after the main isolating contacts during insertion into with drawl from the service position of the breaker. Even in the isolated position positive earthing contact should exist.

4.5.5 Auxiliary switches directly operated by the breaker operating mechanism and having 4 'NO' and 4 'NC' contacts, shall be provided on each breaker. The auxiliary switch contacts shall have a minimum rated thermal current of 10 amps.

5.0 SWITCH FUSE UNITS:

5.1 General:

The switch fuse units shall be of the load break, heavy duty, cubicle type conforming to the requirements IS and of AC 23 duty.

The switch fuse units shall be capable of withstanding the thermal and electromagnetic stresses caused by short circuits for the time of operation of the associated fuse links.

The switch fuse units shall be double break and have quick make break mechanism, designed to ensure positive operation.

All switch fuse contacts shall be silver plated at the current transfer surfaces.

The unit shall be provided with a front operating handle. The ON and OFF positions of the switch handle shall be clearly marked.

5.2 Interlocks and Safety:

Interlocks shall be provided so as to prevent opening of the unit door when the switch is in the ON position and also to prevent closing of the switch with the door not properly secured. It should however be possible for a competent person to operate the switch shall be suitable for locking with switch in the OFF position by means of a padlock.

The interior arrangement of the switch fuse unit shall be such that all 'Live' parts are shrouded.

5.3 HRC Fuses :

The switch fuse units shall be fitted with High rupturing capacity cartridge fuse links with ISI marking for a rupturing capacity of not less than 80 KA at 415 volts. The fuse links shall be mounted in a drawout carriage, thus ensuring positive isolation of contacts during fuse replacements.

6.0 CURRENT TRANSFORMERS.

Current transformers shall comply with the requirements of relevant latest amendment IS. They shall have ratios, outputs and accuracy as specified in the schedule.

7.0 INDICATING / INTEGRATING METERS :

All indicating instruments shall be of flush mounted industrial pattern conforming to the relevant latest amended IS. The instrument shall have non reflecting bazels,

clearly, divided and indelibly marked scales, and shall be provided with zero adjusting devices in the front. Integrating instruments shall be of flush mounted switch board pattern complying with the requirements of relevant latest IS.

8.0 RELAYS:Circuit breakers shall be provided with integrally mounted relays as specified in the schedule.

The relay shall have a set of three phase characteristics, which shall be adjustable over a wide range, to provide discrimination between a multiplicity of devices. The relay shall be able to provide over current and earth fault protection. Also UV and Shunt trip Relays are to be provided.

9.0 CONTROL SWITCHES/SELECTOR SWITCHES:Control switches/Selector switches shall be of the heavy duty rotary type, with plates clearly marked to show the operating position. They shall be of semi-flush mounted type with only the front plate and the operating handle projected.

Circuit breakers control switches shall be of the spring return to neutral type.

10.0 INDICATING LAMPS AND PUSH BUTTONS :

Indicating lamps shall be of the LED type of low watt consumption, provided with series resistors where necessary and with translucent lamp covers. Bulbs and lenses shall be easily replaceable from the front.

Push buttons shall be of the momentary contact, push to actuate type fitted with self-reset contacts and provided with plates marked with its junctions.

11.0 CABLE TERMINATIONS :

Cable entries and terminals shall be provided in the switch board to suit the number, type and size of aluminum conductor power cables and copper conductor control cables as indicated in the schematic diagram.

Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chambers shall be provided, with the position of cable glands and terminals such that cables can be easily and safely terminated.

Barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.

Cable riser shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.

Cable sockets shall be of copper and of the crimping type/soldering as required.

12.0 CONTROL WIRING :All control wiring shall be carried out with 1100/650 V grade single core Copper cable conforming to relevant IS having stranded copper conductors of minimum 2.5 sq.mm. section for CT Wiring and 1.5sq.mm for Control/indicating Instruments.

Wiring shall be neatly bunched, adequately supported and properly routed to allow easy access and maintenance.

Wires shall be identified by numbered ferrules at each end. The ferrules shall be of the ring type of non-deteriorating material. They shall be firmly located on each wire so as to prevent free movement.

All control circuit fuses shall be mounted in front of the panel and shall be easily accessible.

13.0 TERMINAL BLOCKS AND LABELS :

Terminal block shall be of 500 volts grade of the stud type. Insulating barriers shall be provided between adjacent terminals.

Terminal block shall have minimum current rating of 10 amps and shall be shrouded. Provisions shall be made for label inscriptions.

Labels shall be made of anodized aluminum, with white engraving on black background. They shall be properly secured with fasteners. Danger plate of size and descriptions as recommended in the relevant IS shall be provided on the PCC.

14.0 TESTS :

- i) The power control centre shall be completely assembled, wired, adjusted and tested for operation under simulated conditions to ensure correctness of wiring and interlocking and proper functioning of all components.
- ii) Each power control centre and components shall be subjected to standard routine tests as per applicable clauses of relevant standards.
- iii) All current carrying parts and wiring of power control centre shall be subjected to power frequency voltage withstand test.

15.0 DRAWINGS: After the award of the contract the contractors shall submit three copies of the following drawings for approval of the Department.

- i) Outline dimensional drawing of the PCC showing the general arrangement indicating the following:
 - a) Bus bar clearances; b) power and control cable entry points; c) Configuration of busbars; d) Details of support insulations and spacings; e) Outgoing power cable termination arrangements.
- ii) Single line diagram of power control centre showing Protection, Metering etc.
- iii) Cubicle wiring diagram.
- iv) List of Firements with Ratings & makes / Models

16.0 INSTALLATION TESTING AND COMMISSIONING :

The power control centre shall be installed over the cable trench/cable pit using suitable size of MS channel including grouting of the channel with necessary bolts and nuts. Proper earthing of PCC shall be done using two independent copper/GI strip of sizes as indicated in the schedule. The channel shall be painted with one coat of red oxide primer and two coats of anticorrosive enamel paint of proper shade as directed by the Engineer-in-charge.

The pre-commissioning tests as required shall be done and the PCC shall be commissioned.

CHAPTER 3 LAYING OF CABLES

1.0 SCOPE :

This specification is intended to cover the requirements of installation and energizing of PVC/XLPE/PILCDSTA power cables including jointing of cables.

2.0 STANDARDS :

The power cable and its fixing accessories shall comply with the latest relevant Indian Standards and National Electrical Code.

3.1 GENERAL :

3.1.1 Before the commencement of cable laying, it shall be ensured by the Engineer-in-Charge that only ISI marked cables are used. It shall be the responsibility of the contractor to check the soundness and correctness of the size of the cable while taking delivery of the cable from stores. Any defect noticed shall be brought to the notice of the issuing authorities immediately. If any defects is noticed after the cable is laid or during the process of laying, it shall be brought to the notice of the Engineer-in-Charge and upon his satisfaction, that the cable is not damaged due to bad handling, it will be the entire responsibility of the contractor to retrieve the cable already laid and return the defective cable to store and take fresh length of the cable from the store and relay the same.

3.1.2 The material such as bricks, sand, cable route markers, RCC slab of best quality as approved by the Engineer-in-Charge only shall be used for cable laying works.

3.1.3 The contractor shall provide all the necessary labour, tools, plants and other requisites at his own cost for carrying out pumping of water and removing of water from trenches, if any, where required.

3.1.4 Installation shall be carried out in a neat, workman like manner by skilled, experienced and competent workman in accordance with standard practices.

3.1.5 While laying the cable care shall be taken to avoid formation of kinks and also damage to the cable. In the case of cable bends, it shall not have bent radius lesser than 20 times the overall diameter of the cable.

3.1.6 A cable loop of about five meters length and as directed by the Engineer-in-Charge shall be provided at the following locations.

a) Near the termination points

b) Near to the straight through joint

3.1.7 The method of cable laying and routing of cables, shall in every case be as directed by the Engineer-in-Charge / consultant.

3.1.8 Whenever cable passes through hume pipes/GI pipes embedded across the wall in a building, both the ends of the pipe shall be suitably sealed.

3.1.9 Identification tags indicating the size of the cable and feeder designation shall be securely attached at both ends of the cable. Such tags shall also be attached to the cable at intervals of 50 Mtrs. The materials of the tag shall be of either 12 SWG GI sheet. In case of plastic, the details have to be engraved and incase of GI sheet, the details should be punched. Cable route markers shall be provided at the intervals of 200 M with a minimum of one number route marker. The details of the route makers shall be as per the drawing. At the locations of straight through joints, necessary joint-markers shall be provided.

3.1.10 When cable runs vertically, it shall be clamped on mild steel flats or angle iron fixed on walls and are spaced at such intervals as to prevent buckling of the cables. All steel work shall be painted with a coat of red oxide and thereafter finished with suitable anticorrosive paints.

3.2 CABLE LAID IN GROUND :

3.2.1. All MV cables (up to 1.1 KV) shall be laid at a minimum depth of 0.75 M & HT cables (1.1 KV to 11 KV) shall be laid at a depth of 1.0 M when laid in ground. When cable pass through roads, nallahs etc. they must be protected by either hume pipe or GI pipe of suitable dimensions.

3.2.2. Excavations of trenches shall be carried out as indicated in the drawing. The width of the trench at the bottom shall be 0.4 M for one cable. In case the total number of cables laid in trenches is more than one, then the width shall be such that the spacing between the cables is maintained as shown in the drawing. Before the cable is laid in the trench the bottom of the trench shall be cleared from stones and other sharp materials and filled with sand layers of 75 mm, as shown in the drawing.

3.2.3. While removing the cable from the drum, it shall be ensured that the cable drum is supported on suitable jacks and the drum is rotated to unwind the cable from the drum. The cable should never be pulled while unwinding from the drum. It shall be ensured that the cables are run over the wooden rollers placed in the trench at intervals not exceeding 2 M.

3.2.4. After placing the cables in the trench shall be filled in layers ensuring that each layer is well rammed by spraying water and consolidated. The extra earth shall be removed from the place of trench and deposited at a place as directed by the Engineer-in-Charge/consultant.

3.2.5. The HT cables shall be provided with RCC slabs (marked HT cable) on top as protection.

3.3 CABLES LAID IN BUILT UP TRENCH :

3.3.1. Before the commencement of cable laying the cable trench shall be drained properly. Cable shall be laid as explained in item 3.2. Cable shall be properly clamped to the cable supports, which are provided in the cable trench. The method of clamping shall suit the size of the cable and the cable supports, which are provided in the cable trench. The method of clamping shall suit the size of the cable and the cable supports, as directed by the Engineer-in-Charge.

Care shall be taken while removing and replacing the trench cover slab. It is the responsibility of the contractor to make good any damaged trench covers.

3.4. CABLE TERMINATIONS AND STRAIGHT THROUGH JOINTS:

3.4.1. All cable jointing materials such as straight through joint boxes, cable compound, cable lugs, insulation tapes etc. shall be of best quality and as approved by the Engineer-in-Charge.

3.4.2. Cable glands for strip / armoured cables shall include a suitable armour clamp for receiving and securely attaching the armouring of the cable in a manner such that no movement of the armour occurs when the assembly is subjected to tension forces.

3.4.3. The cable gland shall not impose on the armouring, a bending radius not less than the diameter of the cable. The clamping ring shall be solid and of adequate strength.

3.4.4. Provision shall be made for attachment of an external earthing bond between the metallic covering of the cable and the metallic structure of the apparatus to which the cable box is attached.

3.5 SEALING BOXES :

3.5.1 A sealing box, irrespective of the class of insulation of the cable for which it is intended, shall be so designed that it may be filled with compound after connecting the cable specially in flame proof/hazardous areas.

3.5.2 All parts and connection for attaching the armouring, wiping or clamping the metallic sheath in a sealing box, shall be easily accessible. This may be achieved by splitting the box or by providing a suitable cover or other such means.

3.5.3 The joints in the box shall prevent leakage of the compound.

3.5.4 Provision shall be made to ensure that the cores of the cable are efficiently sealed to prevent moisture penetrating along the strands or the cable conductors.

3.5.5 The sealing box shall be provided with compound filling orifices with suitable covers or plugs of size that will permit easy pouring of the compound.

3.5.6 In all cases where screwed plugs are used, one or more air vents shall be provided to ensure complete expulsion of air and total filling of the box with compound. 3.5.6 The box shall be of sufficient length to allow for manipulation of the insulated cover without damage to them or to the insulation.

3.5.7. A sealing box intended to be attached directly to the apparatus shall be designed such that the box together with the connected cable may be detached from the apparatus without disturbing the sealing compound.

3.5.8. Cable sealing and dividing boxes intended for use in the flame proof areas shall comply additionally with the relevant requirements of IS:2148-1968.

4.0 TESTING

Once cable is laid, following tests shall be conducted in the presence of Engineer-in-Charge, before energizing the cable:

- i) Insulation resistance test (Sectional and Overall).
- ii) Sheathing continuity test.
- iii) Continuity and conductor resistance test.
- iv) Earth test.
- v) High voltage test.

Tests conducted shall be as per Indian Standards and National Electrical Code.

CHAPTER 4 EARTHING

1.0 SCOPE:

This specification is intended to cover the requirements of supply, installation, testing and commissioning of

a) Pipe earthing, b) Plate earthing, c) Strip earthing

2.0 STANDARDS:

Earthing installations shall conform to the Indian Electricity Rules - 1956, as amended from time to time and IS 3043-1989 "code of practice for earthing", with latest amendments.

3.0 EARTH ELECTRODE ARRANGEMENT:

3.1 Pipe electrode:

3.1.1 Electrode shall be made of CI pipe having a clean surface and not covered with paint, enamel or poorly conducting material. Galvanized pipe shall not be smaller than 100 mm ID. Earthing with pipe electrode shall be done as per the details indicated in IS:3043/87.

3.1.2 Electrodes shall be embedded below permanent moisture level.

3.1.3 The length of pipe electrodes shall not be less than 2.5m. If rock is encountered, pipes shall be driven to a depth of not less than 2.5 m with suitable inclination. Pipe shall be in one piece and deeply driven.

3.1.4 To reduce the depth of burial of an electrode without increasing the resistance, a number of rods or pipes may have to be connected together in parallel. The distance between two electrodes in such a case shall not be less than twice the length of the electrode. The earthing lead shall be connected by means of a through bolt, nuts and washers and cable socket.

3.2 PLATE ELECTRODE :

For plate electrodes, minimum dimensions of the electrode shall be as under.

3.2.1 GI plate electrode: 600 x 600 x 6 mm thick.

3.2.2 Copper plate electrode: 600 x 600 x 3.15 mm thick

3.2.3 The electrode shall be buried in ground, with its faces vertical and top not less than 2.5 M from the surface of the ground.

3.2.4 Earthing using plate electrode shall be done as per details, indicated in drawing.

3.2.5 Plate electrodes shall have a galvanized iron water pipe, buried vertically and adjacent to the electrode. One end of pipe shall be atleast 5 cm above the surface of the ground and need not be more than 10 cm. The internal diameter of the pipe shall be atleast 19 mm. The length of pipe under the earth's surface shall be such that it shall be able to reach the center of the plate. The earthing lead shall be securely bolted the plate with two bolts, nuts, check nuts and washers.

3.3. STRIP OR CONDUCTOR ELECTRODES:

3.3.1. Strip electrode shall not be smaller than 25 x 1.6 mm, if of copper and 25 x 3 mm, if of galvanized iron and steel. If round conductors are used as earth electrodes, their cross sectional area shall not be smaller than 3sq.mm, if of copper and 6 sq.mm. If galvanized iron and steel.

3.3.2. Conductor shall be buried in trenches not less than 0.5 m deep.

4.0 GENERAL:

- i) All materials used for connecting the earth lead with electrode shall be of GI in case of GI pipe and GI plate electrodes, and of tinned brass in case of copper plate electrode. The earthing lead shall be securely connected at the other end to the main board.
- ii) The earthing lead from electrode onwards shall be suitably protected against mechanical injury by routing the earth wire / strip through a suitable size of GI pipe.
- iii) All medium voltage equipments shall be earthed by two separate and distinct connections with the earth. In the case of high and extra high voltages, the neutral points shall be earthed by not less than two separate and distinct connections with the earth, each having its own electrode at the generating station or substation.
- iv) All materials, fittings etc. used in earthing shall conform to Indian standard specifications wherever they exist. In the case of materials for which Indian standard specifications do not exist, such materials shall be approved by the Engineer-in-Charge.
- v) The earth electrode shall be kept free from paint, enamel and grease.
- vi) It shall be ensured that similar materials for respective earth electrodes and earth conductors are used.
- vii) Earth electrode shall not be installed in proximity to a metal fence.
- viii) Copper/GI strip shall be connected to the respective earth electrodes, either by brazing or welding respectively. The Copper/GI strip shall be jointed only either by brazing or by riveting at the end of over lapping portions. The overlap shall not be less than 50 mm.
- ix) Earthing clamps used for supporting earth strips shall be made of such materials so as to avoid bimetallic action between strip and clamps.

5.0 TESTING:

The earth resistance of each electrode shall be measured by using a reliable and calibrated earth megger the value shall be as per IS/IE rules

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

CIRCUIT BREAKERS

A. MINIATURE CIRCUIT BREAKERS (MCB):-

Miniature Circuit Breaker shall comply with IS-8828-1996/ IEC898-1995 amended upto date.

Miniature circuit breakers shall be quick make and break type for 240/415 V AC, 50 Hz application with magnetic thermal release for over current and short circuit protection.

The breaking capacity shall not be less than 10kA at 415V AC.
MCBs shall be DIN mounted.

MCBs shall be current limiting type (class-3).

MCBs shall be C-curve.

MCBs shall have minimum power loss (watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values.

MCBs shall be of self-extinguishing ULV0 grade thermoset plastic material. The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection.

All DP, TP, TPN and 4pole MCBs shall have a common trip bar independent to external operating handle.

Mechanical Life shall be 20000 operations and Service life at rated load for In below 32A shall be 20000 and for In above 32A shall be 10000 operations.

B. Earth Leakage Circuit Breaker / Residual Current Circuit Breaker - Current Operated Type (ELCB / RCCB / RCBO)

System of operation

ELCB/ RCCB/RCBO shall work on the principle of core balance transformer. The incoming shall pass through torroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a pre-determined critical value. ELCB/RCCB/RCBO shall be current operated independent of line voltage. Current sensitivity shall be of 30mA at 240/415V AC or as specified in BOQ / drawings and shall have a minimum of 10000 electrical operations. The RCBO shall also provide overload and short circuit protection in addition to the earth leakage protection.

Mechanical Operation

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing/opening of all three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.

Neutral Advance Feature

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact. First before the phases; and at the time of opening, the neutral shall break last after allowing the phases to open first. This is an important safety feature which is also required by regulations.

Testing Provision

A test device shall be incorporated to check the integrity of earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB/RCCB/RCBO and the operating handle shall move to the "OFF" position.

C. MOULDED CASE CIRCUIT BREAKER (MCCB's)

The rated normal current should be specified at 40°C

1. General

Moulded case circuit breakers shall be incorporated in the switchboard wherever specified. MCCB shall conform to IS: 13947 (Part-2): 1993 or IEC-60947-2 in all respects.

MCCB shall be suitable either for single phase AC 230 Volts or three phase 415 volts $\pm$ 10%. The rated insulation voltage shall be 600 volts. Suitable discrimination shall be provided between upstream and downstream breakers in the range of 10-20 milli seconds. The MCCBs will have earth fault module (if specifically asked) and front operated.

MCCB shall indicate its suitability for isolation and this should appear clearly on the MCCB with the symbol as specified in standard IS: 13947/IEC 60947.

2. Construction.

The MCCB cover and case shall be made of high strength heat-resistant and flame retardant thermosetting insulating material; operating handle shall be quick make/quick break. The operating handle shall have suitable 'Rs.ON', 'Rs.OFF' and 'Rs.TRIPPED' mechanical indicators notable from outside. Three phase MCCBs shall have a common operating handle for simultaneous operation and tripping of all the three phases.

Suitable arc extinguishing device shall be provided for each contact. Tripping unit shall be thermal-magnetic type upto 250A and Microprocessor based above 250A (or as specified specifically in Bill of Quantities and drawings) provided on each pole and connected by a common trip bar such that tripping of any one pole operates all three poles to open simultaneously. Tripping device shall have IDMT characteristics for sustained over load and short circuits.

3. Contact tips shall be made of suitable arc resistant, sintered alloy for long electrical life. Terminals shall be of liberal design with adequate clearances.

4. Accessories

All the accessories shall be mounted from the front and shall be adjustment free. MCCBs shall have the electrical accessories fitted even without removing the circuit breaker from the switchboard so that site changes, if any, can be carried out easily. MCCB shall be provided with the following accessories, if specified in schedule of quantities, such as Under voltage trip, Shunt trip, Alarm switch, auxiliary switches, Rotary and motorized operating mechanism, Plug in and with draw able mechanism etc.

5. Interlocking

Moulded case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switchboard.

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

6. Rupturing capacity

The moulded case circuit breaker shall have a rupturing capacity as mentioned against each in Schedule of Quantity at 415 volts. Wherever required, higher rupturing capacity breakers to meet the system short circuit fault shall be used. In absence of any capacity specifically mentioned in the bill of quantities and drawings, following rupturing capacities shall be used -

100 / 125 Amp : 25 KA
160/200/250 Amp : 35 KA
300/400/630/800 Amp : 50 KA

7. The MCCB shall be current limiting type and comprise of quick make - break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. For thermal magnetic protection the O/L adjustment should be 75%-100% and for microprocessor-based release the adjustment should be 40%- 100% and S/c for 2 to 12 times .All MCCBs rated 200 Amps and above shall have adjustable magnetic short circuit pick-up.

8. Electrical Features

All MCCB's & shall be selected on the basis of rated current. Four poles MCCBs shall be always supplied with neutral protection. The MCCBs having 400A & should have category B as per the IEC standards to ensure the selectivity. Minimum Electrical & Mechanical Endurance of MCCB Shall be as follows

Rating of MCCB	Electrical Endurance	Mechanical Endurance
Upto 160 A	7000 Opns	25000 Opns
Above 160 A	4000 Opns	15000 Opns

9. The trip command shall override all other commands. The manufacturer shall provide both the discrimination tables (with test certificates) and let-through energy curves. Line and Load connections shall be interchangeable.

10. Installation

It should be possible to terminate Aluminium cable of required size for the defined current carrying capacity. The requisite size should be made available by means of extended terminals (as a standard offer) in case the direct terminals are not of adequate size. Adequate phase to phase clearance has to be ensured in case of extended terminations.

The circuit breaker should provide the flexibility of terminating line and load from any direction. Manufacturers should test the circuit breaker for this condition and requisite test certificate should be available.

Phase barrier should be provided as a standard feature.

11. Testing

Original test certificate of the MCCB as per BS 3871 or JS-C-8370 shall be furnished.

Pre-commissioning tests on the switchboard panel incorporating the MCCB shall be done as per standard specifications.

D. AIR CIRCUIT BREAKER

1. General

Air circuit breakers shall be incorporated in power control center and motor control centers wherever specified. ACB shall conform to IEC60947 / IS: 13947 Part-2 1993 in all respects. ACBS shall be suitable for operation on 660 volts, 3 phase, 50/60 Hz, AC supply. The rated insulation voltage shall be equal to or greater than 1000V. The rated impulse withstand voltage shall be equal to 12kV, so that the device can be used for every installation category, in compliance with the international standards CEI IEC 664-1.

2. Type and construction

Air circuit breakers shall be of enclosed pattern, dead front type with trip free operating mechanism. Air Circuit breakers shall be withdrawable type with horizontal draw out carriage. The mechanism shall be mechanical if not specifically mentioned for electrical. The ACBs shall be strong and robust in construction with suitable arrangement for anchoring when in fully engaged or fully drawn out positions. The carriage or cradle on which the breaker is mounted shall be of robust design made of fabricated steel, supported on rollers. Cradle shall also comprise of main and secondary separable contacts and all draw out mechanisms in a completely fig welded assembly short circuit on top. There shall be no dependence upon the panel board frame for any critical alignment. The withdrawal arrangement shall be such as to allow smooth and easy movement.

The draw out operation shall be possible through a closed door. Three positions of the moving part shall be possible:

- 1 - Connected / service position - all auxiliary and main circuits engaged
- 2 - Test position - all auxiliary circuits engaged all main circuits disconnected
- 3 - Isolated position - all circuits disconnected.

All three positions should be indicated discreetly on the cradle. Safety shutter to be provided as standard

All the current carrying parts of the circuit breakers shall be silver-plated. Suitable arcing contacts shall be provided to protect the main contacts. The contacts shall be of spring-loaded design. The sequence of operation of the contacts shall be such that arcing contacts 'make' before and 'break' after the main contacts. Arcing contacts shall be provided with efficient arc chutes on each pole. The arc chutes shall be suitable for ready replacement. Self-aligning isolating contacts with automatic shutters to screen the live parts shall be provided. The design of the breaker shall be such that all the components are easily accessible to inspection, maintenance and replacement. The ACB at its rated current shall be suitable for operation in extremely tropical humid climate at 50°C ambient temp. The manufacturer shall declare ideal de-rating charts.

There should be total segregation between the power circuit and control circuit, thus making double insulation and ensuring fitting of accessories while the circuit breaker is in the ON position. It shall be possible to inspect the arcing chamber and main contacts. The ACB shall have metal load bearing structures. The main contacts shall be separate from the arc-breaking contacts. It shall be possible to check the wear of the main contacts with the ACB in its racked-out position, removing the arcing chambers. No mechanical junctions in the main contact shall be there so that losses are minimal.

3. Operating Mechanism

Air circuit breaker shall be provided with a quick-make, trip-free operating mechanism. The operating mechanism shall be strain-free spring operated. The operating shall be "handle front of the panel" type. The design shall be such that the circuit breaker compartment door need not be opened while moving the breaker from completely connected, through test, in to the disconnected position. The spring shall be charged automatically during the closing operation. Mechanical Indication of the position of the spring charge shall be provided.

4. Interlocking and safety arrangement

Air circuit breakers shall be provided with the following safety and interlocking arrangements:

It shall not be possible for breaker to be withdrawn when in Rs.ON" position.

It shall not be possible for the breaker to be switched on until it is either in fully inserted position or for testing purposes it is in fully isolated position.

The breaker shall be capable of being raked in to Retesting' isolated and maintenance positions and kept locked in any of these positions.

A safety latch to ensure that the movement of the breaker, as it is withdrawn is checked before it is completely out of the cubicle.

If under voltage release is provided, then circuit breaker will close only if it is energized. Under voltage release should have time delay to avoid nuisance tripping for transient voltage failure

The operating mechanism shall provide for raking the breaker in to connect, test and disconnected positions without opening the compartment door.

Mechanical interlocks shall be provided between the operations of different breakers (if specified in Bill of Quantities).

The circuit breaker shall provide as a standard feature, the following mechanical indicator in the front Panel

1. Contact portion indicator (on/off)
2. Stored energy status indicator
3. Trip indicator on fault

5. Rating

The CTs range from 250A to 6300A: all the CTs shall have a structure made of self-extinguishing thermoplastic material. The breaking capacity of the ACB shall be greater than or equivalent to 50kA. The Breaking Capacity of the circuit breaker shall be as indicated in the BOQ with minimum of 50kA for upto 1250A, 65kA for 1600 to 2000A and 80kA for 2500 to 3200A. Icu=Ics for all ACBs. Icw rating at 1 sec/3sec should be declared. The minimum Electrical & Mechanical Life of ACB at 415/440V shall be as follows:

Rating of ACB	Electrical Endurance	Mechanical Endurance
Upto 1600 A	10000 Opns	20000Opns

2000-4000 A
Above 4000 A

5000 Opns
1500 Opns

15000 Opns
10000 Opns

6. Accessories

All the accessories like U/V, shunt opening, shunt closing shall be accessible from the front.

Circuit breakers shall be provided with the following Accessories: -

- i) Under-voltage relay for the incoming ACB.
- ii) Microprocessor based Overload releases with IDMT characteristics.
- iii) Microprocessor based Instantaneous earth fault release.
- iv) Alarm switches (if specifically asked for)
- v) Auxiliary switches

NO and NC auxiliary contacts rated for 10 Amps at 415 V AC and 6 Amp at 48V DC, in addition to ones already in use for the operation of the breaker and will be used in subsequent interlocks to be incorporated in future.

Mechanical indicators

Mechanical indication on the front of the air circuit breaker shall be provided to indicate the following:

main contacts closed "ON"

main contacts open "OFF"

springs charged

springs discharged

circuit breaker in "service" position (drawout only)

circuit breaker in "test" position (drawout only)

circuit breaker in "isolated" position (drawout only)

9. Mounting

Circuit breakers shall be mounted as per the standard specification of power control centers.

10. Testing

Testing of each circuit breaker shall be carried out at the works as per IEC:60947 and the original test certificate shall be furnished in triplicate. The tests shall incorporate atleast the following:

- i) Impulse withstand test

Insulation test

Di-electric rigidity /Insulation test

Mechanical operation checking

Thermal protection with a current of 3rd starting from cold conditions.

11. Protection

The ACB shall be with an integral self-powered microprocessor based current release for Overload, Short-Circuit and Earth Fault protection which works on true rms values for ensuring accurate protection, if specifically asked for. The protection unit should meet

the EMI/EMC requirement as per latest standard. Online Test Fault shall be provided to test healthiness of release and ACB.

12. Setting range of protection release

a) Overload protection shall have adjustable setting from 40% to 100% of the ACBs rated current in steps of 10% and adjustable time setting from 3-18m sec.

b) Short circuit protection shall have adjustable current setting from 100% to 1000% of the overload setting and adjustable time delay setting for fault discrimination from 50-500 m sec.

c) E/F protection if specified will have adjustable current setting from 40% to 100% of ACB rated current and adjustable time setting from 100-800m sec. It shall be possible to change the release setting on load.

PVC CONDUIT WIRING SYSTEM

1. SCOPE:-

This chapter covers the detailed requirements for wiring work in non-metallic conduits. This chapter covers both surface and recessed types of wiring work.

2. APPLICATION:-

1. Recessed conduit work is generally suitable for all applications. conduit work may be adopted in places like workshops etc. and where recessed work may not be possible to be done. The type of work shall be as specified in individual works.

Flexible non-metallic conduits shall be used only at terminations, wherever specified.

3. Special precautions:-

If the pipes are liable to mechanical damages, they should be adequately protected.

ii. Non-metallic conduit shall not be used for the following applications:-

a) In concealed/ inaccessible places of combustible construction where ambient temperature exceeds 60oC.

b) In places where ambient temperature is less than 5oC.

c) For suspension of fluorescent fittings and other fixtures.

d) In areas exposed to sunlight.

3. MATERIAL:-

3.1 CONDUITS:-

All non-metallic conduit pipes and accessories shall be of suitable material complying with IS: 2509-1973 and IS : 3419-1988. for rigid conduits and IS : 9537(V)-2000 for flexible conduits. The interior of the conduits shall be free from obstructions. The rigid conduit pipes shall be ISI marked.

ii. The conduit shall be circular in cross-section. The conduit shall be designated by their nominal outside diameter. The dimensional details of rigid non-metallic conduits are given in Table-3.

iii. No non-metallic conduit less than 20 mm in diameter shall be used.

iv. Wiring CAPACITY:-

The maximum number of PVC insulated aluminum/copper conductor cables of 650/1100 V grade conforming to IS: 694-1990 that can be drawn in one conduit of various sizes is given in Table-4. Conduit sizes shall be selected accordingly.

3.2 Conduit ACCESSORIES:-

i. The conduit wiring system shall be complete in all respect including accessories.

ii. Rigid conduit accessories shall be normally of grip type.

iii. Flexible conduit accessories shall be of threaded type.

iv. Bends, couplers etc. shall be solid type in recessed type of works, and may be solid or inspection type as required, in surface type of works.

v. Saddles for fixing conduits shall be heavy gauge non-metallic type with base.

vi. The minimum width and the thickness of the ordinary clips or girder clips shall be as per Table-5.

vii. For all sizes of conduit, the size of clamping rod shall be 4.5mm (7 SWG) diameter.

4. INSTALLATION:-

1. Common aspects for both recessed and surface conduit works.

i. The erection of conduits of each circuit shall be completed before the cables are drawn in.

ii. Conduit joints:-

All joints shall be sealed/cemented with approved cement. Damaged conduit pipes / fittings shall not be used in the work. Cut ends of conduit pipes shall have no sharp edges or any burrs left to avoid damage to the insulation of conductors while pulling them through such pipes.

The Engineer-in-charge, with a view to ensuring that the above provision has been Carried out, may require that the separate lengths of conduit etc. after they have been prepared, shall be submitted for inspection before being fixed.

iii. Bends in CONDUITS:-

All bends in the system may be formed either by bending the pipes by an approved method of heating, or by inserting suitable accessories such as bends, elbows

or similar fittings, or by fixing non-metallic inspection boxes, whichever is most suitable. Where necessary, solid type fittings shall be used.

Radius of bends in conduit pipes shall not be less than 7.5 cm.

Care shall be taken while bending the pipes to ensure that the conduit pipe is not injured, and that the internal diameter is not effectively reduced.

iv. PAINTING:-

After installation, all accessible surfaces of metallic accessories shall be painted.

5. ADDITIONAL REQUIREMENTS FOR SURFACE CONDUIT WORK:-

Conduit pipe shall be fixed by heavy gauge non-metallic saddles with base, secured to suitable approved plugs with screws in an approved manner, at an interval of not more than 60 cm, on either side of couplers or bends or similar fittings, saddles shall be fixed at a closer distance from the center of such fittings. Slotted PVC saddles may also be used where the PVC pipe can be pushed in through the slots.

Where the conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles or girder clips as required by the Engineer-in-charge. Where it is not possible to use these for fixing, suitable clamps with bolts and nuts shall be used.

6. ADDITIONAL REQUIREMENTS FOR RECESSED CONDUIT WORK:-

i. Making CHASE:-

Chase in the wall shall be neatly made, and of ample dimensions to permit the conduit tube fixed in the manner desired.

In the case of buildings under construction, the conduits shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.

In case of exposed brick/rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

ii. Fixing conduits in CHASE:-

The conduit pipe shall be fixed by means of staples, or by means of non-metallic saddles, placed at not more than 40 cm apart, or shall be fixed by any other approved means of fixing.

At either side of the bends, saddles/staples shall be fixed at a distance of 15 cm from the center of the bends.

iii. Erection in RCC work :-

The conduit pipes shall be laid in position and fixed to the steel reinforcement bars by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly

to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.

Fixing of standard bends or elbows shall be avoided as far as practicable, and all Curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing of conductors.

Location of inspection/junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

iv. Fixing inspection BOXES:-

Suitable inspection boxes to the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary. These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm Depth junction boxes shall be used in roof slabs. Suitable ventilating holes shall be provided in the inspection box covers.

v. Fixing switch boxes and ACCESSORIES:-

Switch boxes shall be mounted flush with the wall. All outlets such as switches, socket outlets etc. shall be flush mounting type, unless otherwise specified in the additional specification.

vi. Fish WIRE:-

To facilitate subsequent drawing of wires in the conduit, GI fish wire of 1.2 mm (18 SWG) shall be provided along with the laying of the recessed conduit.

BUNCHING OF CABLES :-

a) Cable carrying alternating current, installed in metal conduit, shall always be bunched so that the outgoing and return cables are drawn into the same conduit.

b) Where the distribution is for single phase loads only, conductors for these phases shall be drawn in one conduit.

c) In case of three phase loads, separate conduits shall be run from the distribution boards to the load points, or outlets as the case may be.

8. EARTHING REQUIREMENTS:-

A protective (earth) conductor shall be drawn inside the conduit in all distribution circuits to provide for earthing of non-current carrying metallic parts of the installation. These shall be terminated on the earth terminal in the switch boxes, and/or earth terminal blocks at the DB's.

Protective conductors of large size which may not be possible to be carried inside the conduits (as in the case of some sub mains etc.) may be laid external to the conduits and clamped thereto suitably.

Gas or water pipes shall not be used as protective conductors (Earth medium).

TABLE - 3

Dimensional details of rigid non-metallic conduits.
(All dimensions in mm)

S. N o.	Nominal outside diameter (In mm)	Maximum outside diameter (In mm)	Minimum inside diameter (In mm)	Maximum permissible eccentricity (In mm)	Maximum permissible ovality (In mm)
1.	20	20 +0.3	17.2	0.2	0.5
2.	25	25 +0.3	21.6	0.2	0.5
3.	32	32 +0.3	28.2	0.2	0.5
4.	40	40 +0.3	35.8	0.2	0.5
5.	50	50 +0.3	45.0	0.4	0.6

TABLE - 4

Maximum number of PVC insulated 650/ 1100 Volt grade copper conductor cable that can be drawn into rigid pvc conduit

Nominal cross sectional area of conductor in Sqmm.	20 Mm	25 mm	32 Mm	40 mm
1.50	5	10	14	-
2.50	5	8	12	-
4.00	3	8	10	-
6.00	2	5	8	-
10.00	-	3	5	6
16.00	-	-	3	6
25.00	-	-	2	4

Note :-

The above table shows the maximum capacity of conduits for a simultaneous drawing of cables.

TABLE - 5

Ordinary clips or girder clips.

S. N o.	Size of conduit	Width	Thickness
1.	20 mm & 25 mm	19 mm	20 SWG (0.9144 mm)
2.	32 mm & above	25 mm	18 SWG (1.219 mm)

EARTHING

1. SCOPE:-

This chapter covers the essential requirements of earthing system components and their installation. For details not covered in these specifications, IS code of Practice on earthing (IS: 3043-1987) shall be referred to.

2. INSTALLATION:-

1. ELECTRODES:-

Plate electrode shall be buried in ground with its faces vertical, and its top not less than 3 m below the ground level. The installation shall be carried out as per standard drawing.

When more than one electrode is to be installed, a separation of not less than 2 m shall be maintained between two adjacent electrodes.

a) The strip or conductor electrode shall be buried in trench not less than 0.5 m deep.

b) If condition necessitate the use of more than one strip or conductor electrode, they shall be laid as widely distributed as possible, in a single straight trench where feasible, or preferably in a number of trenches radiating from one point.

iv. Earth Electrodes shall be kept clear of the building foundation & in no case shall it be nearer than 2 meters from the outer surface of the wall.

3. WATERING ARRANGEMENT:-

In the case of plate earth electrodes, a watering pipe 20mm dia. medium class pipe shall be provided and attached to the electrodes. A funnel with mesh shall be provided on the top of this pipe for watering the earth.

The watering funnel attachment shall be housed in a masonry enclosure of size not less than 30cm*30cm*30cm.

A cast iron/MS frame with MS cover, 6 mm thick, and having locking arrangement shall be suitably embedded in the masonry enclosure.

4. EARTHING CONDUCTOR (Main earthing lead):-

The earthing conductor shall be securely terminated on to the plate with two bolts, nuts, check nuts and washers.

A double C-clamp arrangement shall be provided for terminating tape type earthing conductor with GI watering pipe coupled to the pipe earth electrode. Galvanised "C" shaped strips, bolts, washers, nuts and check nuts of adequate size shall be used for the purpose.

The earthing conductor from the electrode up to the building shall be protected from mechanical injury by a medium class 15 mm dia GI pipe in the case of wire, and by 40 mm dia, medium class GI pipe in the case of strip. The protection pipe in ground shall be buried at least 30 cm deep (to be increased 60 cm in case of road crossing and

pavements). The portion within the building shall be recessed in walls and floors to adequate depth in due co-ordination with the building work.

The earthing conductor shall be securely connected at the other end to the earth stud/earth bar provided on the switchboard by:

Soldered or preferably crimped lug, bolt, nut and washer in the case of wire, and,

Bolt, nut and washer in case of strip conductor.

Earthing Terminal/ neutral point/ earth bus in case of equipment's/ sub stations.

5. PROTECTIVE (Loop earthing/earth continuity) CONDUCTOR:-

Earth terminal of every switchboard in the distribution system shall be bonded to the earth bar/terminal of the upstream switchboard by protective conductor(s).

Two protective conductors shall be provided for a switchboard carrying a 3phase switch gear thereon.

All the mountings of industrial type switchboards shall be bonded to the earth stud/earth bar using a protective conductor looping from one to another. Loop earthing of individual units will not be however necessary in the case of cubical type switchboards.

The earth connector in every distribution board (DB) shall be securely connected to the earth stud/earth bar of the corresponding switchboard by a protective conductor.

All metallic switch boxes and regulator boxes in a circuit shall be connected to the earth connector in the DB by protective conductor (also called circuit protective or loop earthing conductor), looping from one box to another up to the DB.

The earth pin of socket outlets as well as metallic body of fan regulators shall be connected to the earth stud in switch boxes by protective conductor. Where the switch boxes are non-metallic type, these shall be looped at the socket earth terminals, switch or at an independent screwed connector inside the switch box. Twisted earth connections shall not be accepted in any case.

Double earthing strips in rising mains, bus trunking etc. shall be securely connected to the earth bar/earth stud at the sending end switchboard. In the case of overhead bus bar systems, protective conductors shall be provided in addition to feeder cable armouring connection.

6. EARTH RESISTANCE:-

The earth resistance at each electrode shall be measured. No earth electrode shall have a greater ohmic resistance than 5 ohms as measured by an approved earth testing apparatus. In rocky soil the resistance may be up to 8 ohms.

Where the above stated earth resistance is not achieved, necessary improvement shall be made by additional provisions, such as additional electrode(s), different type of

electrode, or artificial chemical treatment of soil etc., as may be directed by the Engineer-in-charge.

iii. If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, then 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.

7. MARKING: -

- i. Earth bars/terminals at all switchboards shall be marked permanently either as "E".
- ii. Main earthing terminal shall be marked "SAFETY EARTH - DO NOT DISCONNECT".

CABLES

1. GENERAL

All cables shall be supplied, inspected, laid tested and commissioned in accordance with drawings, specifications, relevant Indian standards specifications and cable manufacturer's instructions. The cable shall be delivered at site in original drums with manufacturer's name clearly written on the drum.

The recommendations of the cable manufacturer with regard to jointing and sealing shall be strictly followed.

The laying of cable shall be done as per IS 1255 amended up to date.

Cable Identification

Cable identification shall be provided by embossing on the outer sheath the following:

Manufacturer's name or trade mark

Voltage grade

Year of manufacture

Type of insulation

Printing of cable length on each meter

Core Identification

Respective cores of power/control cables shall be identified with the following pattern :

2 core	:	red (R), black (BK)
3 core	:	5 core red (R), yellow (Y),blue (BL)
4 core	:	red (R),yellow (Y),blue (BL), black (BK)
5 core	:	red (R), yellow (Y),blue (BL), black (BK) & grey (GY)
7&14 cores	:	cores shall be numbered.

Tests

Shop Tests

The cables shall be subject to shop tests in accordance with relevant standards to prove the design and general qualities of the cables as below:

Routine tests on each drum of cables.

Acceptance tests on drums chosen at random for acceptance of the lot.

Type tests on each type of cable, inclusive of measurement of armour D.C. resistance of power cables.

2. MATERIAL

11 kV HT Cables

The 11 KV cable shall be cross linked polyethylene insulated, GI strip armored, PVC inner and outer sheath (to be extruded type) earthed grade cable. The outer sheath shall be resistant to water, fungus, termite & rodent attacks. Colour of outer sheath shall be black. The cable shall be confirming to IS: 7098 (Part - II) with aluminium conductor as per I.S. 8130.

L T Power Cables

The 1.1 KV cables shall be XLPE insulated PVC sheathed aluminium conductor armoured conforming to IS : 7098 (part- 1) amended up to date or PVC insulated, extruded PVC inner sheath, steel strip armored and extruded PVC overall sheath conforming to 15:1554 (PI).as mentioned in the Bill of Quantities and drawings, laid in trenches, ducts and underground as shown on drawing or as per instruction given by engineer-in-charge.

Control Cables

Control cables shall be of stranded annealed copper conductors with cross section area of 1.5/ 2.5 sq.mm, PVC insulated, colour coded or with core identification, extruded inner sheathed, steel wire armoured and over all PVC extruded outer sheath etc. The cable shall conform to 15: 1554 (P-I).

Cable Termination

a) HT Cable Terminations

Cable termination shall be heat shrinkable type/cold shrink type suitable for sizes as specified in BOQ, XLPE insulated 11 kV (E) grade, and aluminum conductor armoured cables. Termination shall confirm to IS 3573 with latest amendment.

b) L T power, control cable termination

L T cable termination shall be provided with compression cable glands of brass suitable for holding the armour of the cable.

Lugs shall be crimping type and shall be of copper suitable for copper conductor cable and of aluminum for aluminum conductor cable.

Termination shall be carried out as per details furnished in this specification.

Compression Glands

Cable glands shall be made of brass casting, machined accurately to the required size with protective coating of nickel.

Cable glands shall be of heavy duty type and shall consist of: gland nipple, neoprene seal for inner sheath, armour clamping cone, gland body, neoprene seal for outer sheath, skid washer, gland body nut.

The Aluminium conductor shall be stranded, grade H4 class 2 as per IS 8130 and copper conductor shall be annealed copper class 2 as per IS 8130.

Technical data sheets for above cables, including all electrical & mechanical parameters shall be furnished with offer.

L. T. PANEL

1. CONSTRUCTION FEATURES

Panels shall be indoor, metal clad, modular construction, fix type (except circuit breaker cubicles) air insulated and floor mounted type.

Unless otherwise mentioned, panels shall be of single front construction and shall be of dead front type.

All panels shall be extensible on both sides.

All panels shall be dust proof and vermin proof.

The panels shall have horizontal Busbar Chamber at top of the panel even for top cable entry.

All panels shall have provision for cable entry from top or from bottom or both as required. The same shall be confirmed to the Vendor during detailed engineering approval of shop drawing of panel manufacturer.

All panels including capacitor panels shall be fully compartmentalized with metal! insulating partitions between individual compartments.

The Horizontal busbar chamber shall be separate & totally enclosed.

Minimum thickness of CRCA MS sheet member shall be 1.6 mm for non load bearing members and 2.0 mm for load bearing members.

All panels shall comprise a continuous line up of dead front, free standing vertical sections. The installation of circuit breakers shall be limited to the bottom two tiers only. In two tiers formation two nos. of upto 1000 Amp. breakers can be provided.

All doors and cutouts shall be provided with neoprene gaskets.

The back doors of the panels shall be double door leaf type where the panels have more than 400 mm width.

Strong concealed type hinges shall support all doors.

All relays, meters, and switches etc. shall be flush mounted type.

All incoming terminals shall be provided with shrouds. Support shrouds shall be transparent and shall be made of SMC/DMC material. However Bakelite/Hylam material is not acceptable and shall not be used anywhere in panels.

The complete structure shall be rigid, self-supporting free from vibration, twists and bends etc.

The panels housing circuit breaker feeders shall be in single front draw out execution.

The incoming & bus coupler circuit breaker feeders shall be in single tier formation while the outgoing circuit breaker feeders may be in double tier formation, unless otherwise specified.

A suitable barrier shall be provided between the circuit breaker and the associated control.

The number of modules shall be so decided that the cable alleys are not over crowded. However the number of module in any panel shall not exceed six. The minimum size of module shall be 300mm and 225mm for starter and switch fuse / MCCBs feeders respectively. The minimum clear width of cable alley shall be 300mm.

In cable alley, outgoing terminals shall be identified with feeder number.

2 BUS AND BUS TAPS

The main buses and connection shall be of high grade of aluminium bus bars conductivity aluminium 1 aluminium alloy (Grade EC-91 E), sized for specified current ratings with max, temp. limited to 85 deg.C (35 deg. above 50 deg. ambient temp.). Vertical bus bars shall be designed depending upon the actual feeder requirement. Bimetallic connector shall be provided for connection between dissimilar metals.

Busbars and connections shall be fully insulated for working voltage with adequate phase 1 ground clearances. Insulating sleeves for Bus bars and shrouds for joint shall be provided. Minimum clearance of 25 mm is required between phases and between phase & earth.

Shrouds for busbars joints tapping points shall be of fiber glass only. Bus insulators shall be flame retardant, track resistant type with high creepage surface and of non-hygroscopic material such as epoxy SMC DMC.

Busbars shall be supported and braced to withstand the stresses due to max. short circuit current and also to take care of any thermal expansion.

The busbar size shall be of similar size as of busduct.

3 CHANGEOVER SWITCHES

Changeovers switches shall be 4 pole, heavy duty, group operated load break fault make type with AC 23A duty.

The switches shall be capable of successfully withstanding the thermal stress for one sec. caused by the short circuit corresponding to the fault level specified.

The switches shall be able to withstand mechanical stresses caused by the peak short circuit currents corresponding fault level specified.

The switches shall be provided with operating handle compartment door and shall be so interlocked that on the hinged compartment door and shall be so interlocked that :

- i) The door can be opened only when the switch is in OFF position.
- ii) It shall not be possible to close the switch when the door is open.
- e) The switch shall be provided with pad-locking arrangement for 250A and above rating.
- f) The switch shall be provided with defeat interlock facilities.

4 FUSES

- a) All fuses shall be HRC cartridge link type.
- b) The fuses shall be provided with visible indication when they have operated.
- c) Rating of the fuses shall be so chosen so as to have co-ordination with switch. Fuses shall preferably mounted directly on plug in type fuse bases & sufficient number of insulated fuse pullers shall be supplied.
- d) Fuses and links functionally associated with the same circuit shall be mounted side by side.

Earthing and neutral links in main supply circuits shall be of silver plated copper & of bolted pattern.

5 CONTACTORS

- a) Contactors shall be of double break, single throw and electromagnetic and non-gravity type.
- b) Contactors shall be suitable for interrupted duty and shall be rated for class AC-3 duty.
- c) Main contacts of contactors shall be silver faced.
- d) Operating coils of contactors shall be suitable for operation on 220/240V AC, 1 phase, 50 Hz supply.
- e) Contactors shall be provided with at least two pairs of 'NO' and 'NC' auxiliary contacts.
- f) Contactors shall not drop out at voltages down to 70% of coil rated voltages and min. pick up voltage shall be 85%.

6 OVERLOAD RELAYS

- a) Overload protection for each motor feeder (wherever required) shall be provided by thermal overload relay on each of the three phases.
- b) The relay shall be duly compensated against fluctuations on ambient temp. and frequency and shall have single phasing preventer feature.
- c) Relay shall be hand reset type from the front of the cubicle door.

Overload relay for fan applications shall be of heavy duty type with provision of bypassing the same during starting of the fan.

7 CAPACITORS

- a) The capacitor shall be of mixed dielectric type rated for 440Volts. Capacitors shall be provided with discharge resistors. The value of discharge resistors should be such that the residual voltage be less than 50V in one minute.

- b) Capacitors shall be suitable for prolonged operation at an rms. voltage between terminals not exceeding 1.10 times the rated voltage, excluding transients.
- c) Capacitors shall be suitable for continuous operation at an rms. line current not exceeding 1.30 times the current which occurs at rated sinusoidal voltage and rated frequency excluding transients.
- d) The maximum continuous reactive output of a capacitor (including any due to flow of harmonic currents) shall not exceed 30% over rated reactive output of a capacitor.
- e) Loss in the capacitors shall be kept as low as possible. (Max 0.5W/ KVAR).
- f) Wherever capacitor consists of several elements inside the units, each element shall be provided with individual fuses, so that the unit need not be discharged or disconnected (although with moderate reduction in output), if one of short circuit to any of the elements.

8 AUTOMATIC POWER FACTOR CONTROL RELAY

- a) Automatic Power factor control relay (APFCR) shall operate its auxiliary relay by sensing the power factor of the plant thru' current and voltage signals.
- b) APFCR shall have no. of steps specified in drawings.
- c) APFCR shall be provided with Built in PF meter (0.5 lag to 0.5 lead), calibrated setting dial.
- d) APFCR shall be suitable for 5A secondary current.
- e) APFCR shall be suitable for flush mounting in capacitor panel/MCCs.
- f) Current rating of its auxiliary relay shall be compatible with switching and continuous energization of main contactor of capacitors. Otherwise, additional relay shall be provided.

9 COOLING

- a) All the Capacitor Panels shall be properly ventilated. If required a small exhaust fan of suitable rating shall be provided on the rear door of the panel, with the opening properly covered with fine wire mesh. The fan shall start/stop automatically along with normal start/stop provision.
- b) Louvers shall be provided on the door on rear side with a fine wire mesh.

10 CURRENT TRANSFORMERS

- a) Current Transformers shall be cast - resin type. All secondary connections shall be brought out to terminal blocks where connection will be made.
- b) Accuracy class of the current transformers shall be:
Class 5P20 for protection.
Class 1.0 for metering.
Class PS for differential Protection & REF.
- c) Current transformer shall be provided with test links and shorting on both secondary leads for setting purpose.
- d) All current transformers shall be earthed by a separate earth link on terminal blocks.
- e) Additional nameplate of CTs/PTs shall be provided (if required) at such a place that it shall be possible to find out details of CTs/PTs after mounting in the panel.

11 VOLTAGE TRANSFORMERS

- a) Voltage transformers shall be cast-resin, fixed type and shall have an accuracy class of 1.0.
- b) Low voltage fuses, sized to prevent overload, shall be installed in all ungrounded secondary leads. Fuses shall be suitably located to permit easy replacement while the board is energized.

12 RELAYS

Relays wherever provided shall be of draw-out design with built-in testing facilities. Small auxiliary relays may be in non-drawout execution-.

13 CONTROL AND SELECTOR SWITCHES

- a) Control and selector switches shall be of rotary type having enclosed contacts, which are accessible by the removal of cover.
- b) Control and selector switches shall be of flush mounted type and on front of panels.
- .
- c) Selector switches shall be of stay-put maintained contact type.
- d) Control switches shall be provided with escutcheon plate clearly marked to show the position.

14 INDICATING METERS AND INSTRUMENTS

Indicating instrument (96 x 96 mm) shall be digital meter, switch board type and accuracy class of 1 (1 % full scale $\pm$ 1 count).

15 INDICATING LAMPS

Indicating lamps shall be of LED type, low watt consumption and provided with appropriate value of resistors. The LEDs shall also have an in-built surge suppressor. Bulbs and lenses shall be interchangeable and easily replaceable from the front of the panel.

16 PUSH BUTTONS

- a) All push buttons shall be of the push to actuate the contact type.
- b) All push buttons shall be oil tight and shall be provided with adequate no. of contacts.

17 POWER AND CONTROL CABLE TERMINATION

Suitable supporting arrangement shall be provided for all power and control cables entering the panel.

Removable undrilled gland plate of 3 mm thick of MS for multicore cables and 4mm thick of Aluminium for single core cables sufficient in size to accommodate all compression type, heavy duty brass glands shall be provided.

Adequate termination arrangement shall be provided for all power cables which shall be aluminium / copper conductor, PVC insulated, sheathed, armored PVC sleeved overall, heavy-duty cables, 1.1 KV grade. Power cables termination shall be by means of crimping type lugs on conductor cables.

The terminal blocks shall be bolted lug type for cables. These shall be protected type and rated for 1100 Volts service. The minimum current rating of terminal block shall be 16 Amp. The construction shall be such that after the connection of cable by means of lugs, necessary clearance and creep age distance are available.

Wherever there is more than one equipment connected on the same feeder, separate terminals shall be provided.

18 INTERNAL WIRING

All internal wiring shall be carried out with stranded copper conductors, PVC insulated, 1100/650 V grade.

Min. size of conductor for power wiring shall be 2.5 sq.mm, 1.5 sq.mm for AC control wiring and 4.0 sq.mm. for DC control wiring. Current transformer secondary wiring shall be with 2.5 sq.mm conductor.

All wiring shall be run on the sides of the panels and shall be neatly bunched and shall not affect access to equipment mounted in the panels.

Wiring shall be terminated on terminal blocks using crimping type lugs and without joints or tees on their runs.

Power wiring shall be done either by phase identifying coloured wires or suitably coloured PVC sleeves shall be provided at each end of wire.

The following wiring codes shall be used.

Instrument Transformer: Red, yellow or blue depending upon phase with which wire is associated.

A-C phase wire : White

A-C Neutral wire : Black

Earth connection : Green

f) PVC identification ferrules, yellow colour with black engraved letter shall be provided at each end of all control wires marked to correspond with equipment designation & termination numbers.

g) Ferrules provided shall be oil tight and numbered from left to right.

19 TERMINAL BLOCKS

a) Terminal blocks for control wiring shall be 650V grade 10 sq.mm size.

b) Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminals blocks shall be segregated.

c) Terminals blocks shall be numbered for identification and provision shall be provided for terminal labels.

d) Terminal blocks requiring duplication shall be provided with solid bonding links.

e) Terminal blocks for current transformer secondary lead wires shall be provided with shorting, disconnecting & earthing facilities.

f) Terminal blocks and control wiring shall be so arranged that only one conductor of external wiring required to be terminated in at each terminal.

20 GROUND BUS

a) A ground bus, rated to carry maximum fault current, shall extend to full length of the panel.

b) The ground bus shall be provided with two-bolt drilling with GJ. bolts and nuts at each end to receive 75X 10 mm G.I. flat.

c) Each stationary unit shall be connected directly to the ground bus. The frame of each circuit breaker and shall be grounded through heavy multiple contacts at all times.

d) Wherever the schematic diagrams indicate a definite ground at the switchgear, a single wire for each circuit thus grounded shall be run independent to the ground bus and connected thereto.

e) C.T. shall be earthed through removable links so that earth of one circuit may be removed without disturbing other.

f) Frames and noncurrent carrying metal parts of all equipment mounted shall be effectively to earth bus.

g) All hinged doors shall be connected to earth bus by flexible tinned bare copper wire.

h) Instrument and relay cabinets shall be connected to earth by 2.5 sq.mm stranded copper insulated wire 1100 V grade.

21 SPACE HEATERS

Each cubicle shall be provided with thermostat controlled space heaters.

22 AC/DC POWER SUPPLY

a) The panels shall be suitable to receive following power supplies.

AC Supply : Single Feeder

DC Supply: Double Feeder

- b) Isolating switch fuse units shall be provided at each switchgear for the incoming supplies, 4-pole, single throw for AC.
- c) Bus-wires of adequate capacity shall be provided to distribute the incoming supplies to different cubicles. Isolating switch-fuse units shall be provided at each cubicle for AC supplies.
- d) AC load shall be so distributed as to present a balance loading on three phase supply system.

23 NAME PLATES

- a) Name plates of anodized aluminium shall be furnished at cubicle and at each instrument, device mounted on and inside the cubicle.
- b) Caution notice on suitable metal plate shall be affixed at the back of each vertical panel.
- c) Name plates for feeders shall be provided on front and back of the panel.

24 TROPICAL PROTECTION

- a) All equipment, accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.
- b) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

25 PAINTING

- a) All surfaces shall be sand blasted, pickled and grounded as required to produce a smooth, clean surface free of scale, grease and rust.
- b) After clearing, the surfaces shall be given a phosphate coating followed by 2 coats of high quality primer and stoved after each coat.
- c) The panels shall be finished with two coats of Siemens Grey (Shade RAL 7032) powder coated / Polyester enameled.

26 TESTS & INSPECTION

- a) The following routine and acceptance tests shall be carried out during final acceptance list.
 - i) Mechanical operation test.
 - ii) Electrical operation test.
 - iii) High voltage test on power circuits.
 - iv) High voltage test on control circuits.
 - v) Millivolt test on the circuit breakers.
 - vi) Millivolt Drop test on Busbar joints
- b) All tests shall be performed in the presence of Owner's representative, if so desired by the owner. The contractor shall give at least 15 days advance notice of the date when tests are to be carried out.
- c) Contractor shall furnish test certificate indicating that equipment has been tested by their quality control department for compliance of technical specification and approved drawings. The same shall be forwarded to owner! Consultants along with inspection call.
- d) These inspections shall however, not absolve the vendor from the responsibility for making good any defect with may be noticed subsequently.

27. The Bank at its discretion may purchase light fixtures and supply it to the contractor for installation. Contractor cannot claim any compensation for supply of fixtures by the Bank.

BATTERY & BATTERY CHARGER

1. BATTERY

General

- a) The battery shall be maintenance free type
- b) The plates shall be designed for maximum durability during all service conditions including high rate of discharge and rapid fluctuation of load.

2. BATTERY CHARGER

General

- a) The charger shall be natural air cooled, solid state type with full wave, fully controlled, bridge configurations.
- b) The charger shall be provided with automatic voltage regulation, current limiting circuitry smoothing filter circuit and soft start feature.
- c) Voltage control shall be step-less, smooth and continuous.
- d) The charger shall be self-protecting against all A-C and D-C transients and steady state abnormal currents and voltages.
- e) Voltage setters shall be provided for setting the output of float boost charge. Setting shall be independent of each other so that setting of one voltage shall not require resetting other.
- f) There shall be separate transformers for float and boost charger.
- g) Charger A-C input and D-C output shall be electrically isolated from each other and also from panel ground.
- h) Isolation shall also be provided between power and control circuits.
- i) Batteries shall also be housed into the Battery Charger cubical.

Construction

- a) The charger shall be freestanding, floor mounted with sheet steel enclosure with all access from the front.
- b) The panel shall conform to the degree of protection IP 42. Minimum thickness of sheet metal used shall be 2 mm.
- c) Access door shall be with concealed hinges and neoprene gaskets. Ventilating louvers shall be covered with fine wire mesh.
- d) All equipment within the panels shall be arranged in modular units and laid out with sufficient space for easy maintenance.
- e) Switches, meters, relays etc. shall be flush mounted on the front of the panels. Nameplates of approved size and type shall be provided for all circuits and devices.

Charger Equipment

- a) All power diodes and control rectifiers shall be silicon type. Rectifier Transformer shall be dry type, double wound, with copper conductor and class B insulation.
- b) Blocking diodes shall be fully rated and redundant so that failure of a single diode shall not incapacitate the system in any way.
- c) Isolating switches shall be heavy duty, load break type, operated by an external handle with provision for padlocking in ON and OFF position.
- d) Changeover switch shall be 3 position, 4 pole, load break type with 2 NO + 2 NC auxiliary contacts.
- e) Contactor shall be air-break type with thermal overload relays having in built single phase preventor.
- f) Fuses shall be HRC type and arranged for easy replacement. Semi conducting device fuses shall be fast-acting.
- g) Indicating lights shall be low-watt filament type with series resistor. Both lamp and lens shall be replaceable from front.
- h) Meters shall be 96 x 96mm switchboard type, 250 deg. scale, antiglare glass, ± 2% accuracy with zero adjuster on the front.

Alarms

- a) One (1) ten-points alarm facia shall be provided on charger panel complete with proper actuating devices, circuitry and legends.
- b) The arrangement shall be such that on occurrence of a fault the corresponding window will light up and stays lighted until the fault is cleared and reset button is pressed.
- c) Each time a window lights up, a master relay will get energized to provide group alarm signals for Owner's remote panel.
- d) Following minimum annunciation shall be provided:
 - i) A. C. Supply failure *
 - ii) D. C. Voltage low *
 - iii) D. C. Voltage high *
 - iv) D. C. System ground *
 - v) Charger overload *
 - vi) SCR fuse blown
 - vii) Filter fuse blown
 - viii) D. C. Output fuse blown
- e) Alarm points marked with an asterisk (*) shall have electrically separate spare set of contacts wire up to the terminal block for Owner's use.
- f) Alarm contacts shall be rated 2A at 24V D. C. And 5A at 240V A.C.

Outgoing Feeders

- a) Each Outgoing feeder shall be provided with double pole switch and with HRC fuses.
- b) Outgoing feeders shall be located in separate module forming part of charger panel with separate cable alley for terminated outgoing cable.

Lamp / Space Heaters l Receptacles

- a) The charger panels shall be provided with:
Internal illumination lamp with door switch.
Space heater with thermostat control.
- b) Lamp, heater circuits shall have individual switch fuse units.

Wiring/ Cabling

- a) The panels shall be completely wired-up. All wiring shall be routed through wiring troughs. Wires shall be ferruled at both ends for identification.
- b) Panels shall have removable gland plates at the bottom for cable entry. All incoming l outgoing cables shall be terminated in suitable terminal blocks.
- c) Control terminal blocks shall be box-clamp type ELMEX 10 Sq. mm or approved equal.

Grounding

- a) The charger panels shall be fully rated ground bus with two ground terminals, one at each end.
- b) Each terminal shall comprise two-bolt drilling with M10 G.I. bolts and nuts to receive Owner's ground connection of 50 x 6 mm G.I. flat.

Tropical Protection

- a) All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.
- b) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

Painting

- a) All surfaces shall be sand blasted, pickled as required to produce a smooth, clean surface free of scale, grease and rust.
- b) After cleaning, the surfaces shall be given a phosphate coating followed by 2 coats of high quality primer and stoved after each coat.

c) The panels shall be finished in powder coated Siemens Grey, RAL7032.

Tests

a) All equipment and components there of shall be subject to shop tests as per relevant IS standards. The tests shall included but not limited to:

b) Tests on battery charger.

Dielectric tests.

Voltage regulation check from 0 to 100% load with $\pm 10\%$ input voltage variation.

Ripple content measurement.

Heat run test on current limiting value.

Test Witness

All tests shall be performed in presence of Owner's representatives, if so desired by the Owner. The contractor shall give at least fifteen (15) days advance notice of the date when tests are to be carried out.

3. REQUIREMENT

Battery

- i) Type : Lead Acid
- ii) Nos. of Cells per Battery : 12
- iii) Battery nominal voltage : 24 V
- iv) Ten hour rating to : 300 AH
1.85 Volt/Cell at 27 deg. C.

Battery Charger

- i) Charger : Float & Boost
- ii) Type : Solid state, rectifier
- iii) Rating : 40A
- iv) A.C. Input Supply : 415V, 3ph, 4 w/230V, 1Ph., 50Hz.,
2 wire.
- v) Ripple content in charger DC output : $\pm 1\%$
- vi) Outgoing feeders - 12 Nos : Each consisting of double pole
MCB of 32A.

INSPECTION SCHEDULE

Witness of routine / Type test (as per relevant standards/ agreed schedule) of various equipments shall be carried out at the works of manufacturer by Owner/ owner's representative. The Contractor shall furnish the following details and freeze this schedule within 2 weeks after placement of LOI in consultation with Owner/ Consultants.

ITEMS	TESTING DATE OF INSPECTION	PLACE	NAME OF MANUFACTURER

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NOTE

It is the obligation on the part of Contractor to inform actual date of inspection 2 weeks in advance.

Contractor's engineer shall be present in all inspection.

In some cases, Owner/ Owner's Representative may give waiver of inspection.

In all cases, test certificate shall be furnished by the contractor and the same shall be approved by owner/ Consultant.

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Bidder's Signature

PUBLIC ADDRESS SYSTEM

SCOPE OF WORK

1.1 The scope of work covers supply, installation, commissioning and testing of the Public Address System relating to the Fire Alarm System meeting the intents of the specifications. The system may have centralized or distributed amplifiers.

The system could be combined with other paging functions or piped music or any other announcements.

AMPLIFIERS

2.1 All amplifiers shall be suitable for Fire Protective Signaling Systems.

2.2 The power amplifiers associated with FACP shall have adequate continuous (RMS) power output to meet with centralized or distributed configuration as the case may. The unit shall be capable of delivering the rated output watts with less than 0.5% harmonic distortion in the design band width. The amplifier shall have a broad band frequency response of 20 Hz to 20 KHz with a signal to noise ration greater than - 90dB. The output voltage and impedance shall meet with the system requirements. Amplifiers shall be

protected against over loads and output shorts and a special thermal overload on the heat sink.

2.3 The distributed audio amplifiers shall be magnetically coupled switch mode type with three input signal sources selectable manually or automatically by the fire alarm system. The amplifier shall incorporate a push to talk switch and paging over ride. Output wattage and volts shall be as shown in the schedule of work or as required to meet the needs of the PA system.

2.4 All amplifiers shall have adequate back up battery support to power the PA System for at least 4 hours. The battery system shall have facility for recharging the battery. Power as well as audio amplifiers shall be mounted in suitable wall mounted/floor standing enclosures shall have lockable and removable doors with vision panel, all suitable for fire alarm systems.

SPEAKERS

Speakers shall be especially designed for broadcasting high quality, integrated emergency fire alarm signals and voice communications and approved by an appropriate authority for use in such situations. Speakers shall be ceiling or wall mounted as shown in the schedule of work and shall be completed with mounting brackets accessories etc.

Speakers shall be of high efficiency yielding maximum output at minimum power across 400 - 4000 Hz frequency range. Speakers shall have a line matching transformer with power - doubling multiple taps and shall yield a sound pressure level of 84 DBA @ 3.0 when on the lowest tap. Speakers shall be mounted in a rugged metal housing with vandal resistant grille.

Speakers external appearance shall be approved by the Architects.

Speakers and strobes shall be capable of being mounted on a 100 x 40 mm junction box. There shall be appropriate terminal strips for incoming and outgoing wires, Pigtail type connections are not acceptable.

4.0 PA SYSTEM WIRING

4.1 PA System wiring shall follow the specifications under "conduit wiring".

Testing and Commissioning

5.1 Entire PA System shall be tested to establish the following.

- i. Functionally of the PA System
- ii. Acceptable audibility of the public address in all spaces and record sound pressure levels of the Public address vis the ambient noise levels.

MODE OF MEASUREMENT

6.1 The mode of measurement shall follow the schedule of work
COMPUTER NETWORKING

SECTION - I INTRODUCTION

1.0 GENERAL REQUIREMENTS:

Computer Net Working System should adhere to relevant and recognized standards.

The Structural Cabling System shall be a hierarchical star topology utilizing CAT 6 copper cable in horizontal sub system and multimode fiber optic cable in the backbone subsystem.

All components within the cabling system shall be from a single manufacture and shall be covered by the manufacturer's system performance warranty. The warranty shall be independent of application and will support all ratified protocols, and the warranty shall be minimum of 25 years.

DATA CABLING - UNSHIELDED TWISTED PAIR

2.1 Unshielded Twisted pair (UTP) CAT 6 cable shall be used for LAN connectivity to the Desktop. To enable increased performance UTP-CAT 6 cabling should support 100/1000 Mbps Ethernet and ATM 155 Mbps as per IEEE 802.3ab connectivity standards.

Unshielded Twisted Pair (UTP) CAT 6 cable and other relevant products shall be in accordance with EIA/TIA 568 standards.

Unshielded Twisted Pair (UTP) CAT 6 cable shall meet developments in applications technology and shall perform for a worst case four-conductor channel to support applications that utilize full-duplex transmission schemes, such as Gigabit Ethernet.

All cables shall be fitted with strain relief boots.

Contractor shall furnish 25 Year warranty certificate to cover Bandwidth of the specified and installed cabling system and installation costs.

Cable shall be manufactured by using 24 AWG solid bare coppers with polyethylene insulation and Flame retardant PVC jacket.

Cable shall be suitable in operating temperature of -20° C to 60° C.

The cable shall be tested up to 350 MHz frequencies.
Delay skew should not be more than 25ns/100m.

2.10 Impedance of the cable shall be 100 Ω +/- 15 Ω .

2.11 Following installation practice shall be followed by the Contractor

While laying the cable.

Do not place cable near equipment that may generate high levels of electromagnetic interface.

Place cabling at a sufficient distance from equipment.

Do not over tighten cable ties, use staples or make sharp bend with cables.
Tie and dress horizontal cables neatly and with a minimum bend radius of 4 times the cable diameter.
Maintain the twist of horizontal and backbone cable pairs up to the point of termination.
Do not leave any wire pairs untwisted.
Do not create multiple appearances of the same cable at several distribution points (called Bridging Taps)
Do not use connecting hardware that is of lower category than the cable being used.
Terminate each horizontal cable on a dedicated telecommunications outlet.
Use connecting hardware that is compatible with the installed cable.

The contractor shall note that the above installation practices are not exclusive. It is the responsibility of the contractor to ensure that the installation is compliant to required specifications. Installation Practices shall also meet all applicable local and national codes, standards and ordinances. Where a conflict exists between these standards, it is the responsibility of the contractor to detail these conflicts to the consultant prior to installation commencing.

CAT 6 RJ 45 MODULAR JACK

3.1 Copper outlets shall be presented into work area as an RJ45 connector. The outlet shall have a shuttered cover to prevent the ingress of dust and other contaminants.

One outlet/Double outlet of required color and type should be provided to each workstation as per the final approval of the consultant.

All outlets shall be modular type and made out of ABS plastic.

The outlet shall be provided with icons or circuit identification and labels for port identification.

All outlets should include cable management facilities as per standards.

The modular outlets shall be factory assembled.

The termination of the installed horizontal cable shall be by insulation displacement connectors.

UTP JACKS

4.1 UTP Jacks shall be suitable for CAT 6 cable, PCB Based and as per TIA/EIA 568 standards.

The durability of Modular jack shall be minimum 750 mating cycles and minimum 200 termination cycles for wire terminals.

Housing of UTP Jack shall be made out of Polyphenylene oxide rated for 94V and wiring block shall be of Poly Carbonate rated for 94 V.

UTP JACK PANELS

5.1 UTP Jack Panels shall be suitable for CAT 6 cable with 24 port, modular type, PCB based, 1 U height and as per the EIA/TIA 568-B2 standards.

UTP Jack panel shall have Icons on each of 24 Ports.

9mm or 12mm labels on each of 24 ports shall be provided as per the final approval of the consultant.

The durability of Modular jack shall be minimum 750 mating cycles and minimum 200 termination cycles for wire terminals.

The UTP Jack Panel shall be made out of Powder Coated Sheet Steel with UTP Jack shall be made out of Polyphenylene oxide rated for 94V and wiring block shall be of Poly Carbonate rated for 94 V.

6.0 WORK AREA CABLING

Work area equipment and cables shall be as per ANSI/TIA/EIA-568-A and ISO/IEC 11801.

Equipment Cords are assumed to have the same performance as patch cords of the same type and category.

To ensure consistency of performance, the same manufacturer as the installed cabling shall provide all the work area cables (patch/mounting cords) throughout this project.

The patch cord shall be manufactured out of 24 AWG 7/32, Stranded copper conductor, with PVC insulation, Flame retardant polyethylene jacket and shall have length as mentioned in schedule of quantities as per the standards of CAT 6.

The patch cord shall be provided with matching colored snag-less, elastomeric polyolefin boot.

Housing of the plug shall be of Clear Polycarbonate and the Load Bar shall be of PBT polyester.

Terminals shall be made out of Phosphor Bronze, 50 micron gold plating over selected area and gold flash over remainder, over 100 micron nickel under plate.

All cables shall be fitted with strain relief boots.

The onsite fabrication of work area cabling shall not be permitted.

7.0 DATA RACKS

7.1 The contractor shall also examine the location of the Data Rack to Ensure the Air Flow around the same and sufficient clearance is available to allow access for inspection and maintenance.

7.2 The specification for patching frames shall match that detailed in UTP cabling.

7.3 The patch panels shall meet or exceed the transmission Performance requirements of ANSI/EIA/TIA 568-A5.

8.0 TERMINATION AND CONNECTORS

8.1 The wiring schedule used at the point of termination should be complete with ANSI/EIA/TIA 568-A.

8.2 All termination shall be made using CAT 6 connectors and Panels.

8.3 When terminating both ends of the connection should be tested, Labeled and documented according to the requirement of the OEM and site practices.

8.4 All termination should be made by an approval installer so as to Meet warranty.

9.0 LABELING AND COLOR CODING CONVENTIONS

9.1 All Cables shall be labeled so as to ultimately and the end user in the maintenance and administration of the installed cabling system.

9.2 Contractors shall make allowance for labeling of all cables at both Ends and for the full labeling of all patch panels and outlets with a unique circuit identifier.

10.0 INSTALLATION ACCEPTANCE TESTING SPECIFICATIONS

10.1 Installed UTP Cabling system shall be tested with TIA/EIA 568 Level IIE/Level III hand held testers. Each installed UTP drop shall be tested as per the latest revisions of TIA/EIA 568 CAT5e specifications.

10.2 The contractor shall after completion of the installation, submit a Detailed documentation of the cable plant. The documentation shall cover minimum following:

As built diagrams of the Network.

Test results for UTP

Consolidated Bill of Materials with manufacturer's part Nos. and quantities used.

Warranty certificate from OEM Supplier.

SECTION - II SUBMISSION

1.0 SUBMISSIONS

Contractor to note that the following Minimum Documents shall be furnished along with the Bid.

UTP CABLING SYSTEM

ETL verification of the Cable as per TIA/EIA 568 B.1 standards.

Performance characteristics for Attenuation, Pair to Pair and PS NEXT, ELFEXT and PSELFEXR, Return Loss, ACR and PS ACR for 4 - Connector Channel.
Certificate of UL listing.

UTP JACKS

Certificate of UL listing.

b. Performance characteristics for Attenuation, NEXT, PS NEXT, FEXT and Return Loss.

UTP JACK PANELS

Certificate of UL listing.

Performance characteristics for Attenuation, NEXT, PS NEXT, FEXT and Return Loss.

Certificate for termination pattern as per TIA/EIA 568 A and B.

After the system is fully supplied, installed, tested, Commissioned, successfully handed over and such certified by the Employer, the contractor should carry out his defects liability responsibilities as specified for a period of one year. During this period the Contractor shall carry out all repairs to the equipment and replace all defective components at his own cost.

3.0 TELEPHONE WIRING

Telephone Wiring should be carried out with 0.5 Sqmm Tinned Copper flexible wire through PVC Cassing/Caping / Conduit. And terminated in the Jack on workstation and on the krones in the Krone Junction Box place at Server Room.

The Krone Junction Box should be joint less type.

12.0 MISCELLANEOUS

Stiles shall be two way waist high units with a heavy duty durable aluminum hub, hydraulically controlled arm rotation with stainless steel arms and permanently lubricated bearings. The unit shall incorporate a card reader,

Guard Tour Unit (GTU) shall be a single key operated unit signaling

Guard attendance
Overdue alarm and
Discreet emergency alarm

Guard attendance shall register time of attendance and the overdue alarm shall signal non-attendance at the predetermined time. The emergency alarm shall be signaled by the discreet operation of the key in the wrong direction. Any other system meeting the intents is acceptable.

Hold-up switch (HUS) shall be a discreetly mounted unit with twin push buttons and a reset key. Pressing of both the buttons simultaneously shall set up alarm and locks-in. The HUS can be reset only by authorized person through a key operated switch.

Metal Detectors (MD) shall be electronic metal detecting devices built into a pass-thru arch (built by others) providing audio-visual signaling.

13.0 INSTALLATION

The installation shall be carried out in a work like manner. Network controllers shall be recessed in walls wherever possible. Readers shall be mounted in co-ordination with the interior designs. Enclosures for all panels, readers shall have IP 54 class of enclosure and any steel structural members used for mounting the peripherals shall be galvanized after fabrication.

Wiring shall be through wires drawn through concealed galvanized conduits. Wiring details shown below and on drawings are suggestive and tenderers may modify to suit their systems.

Key pad to Reader	Multi-core shielded
Reader to R. C.	2 Pair shielded
Door lock & door contact to TC	1 Pair shielded or unshielded
TC to FC	2 pair shielded

14.0 ACCEPTANCE TESTING

The system shall be tested and validated for its function as an integrated security system conforming to the intents of the specifications. The following functional tests shall be carried out in the presence of the engineer-in-charge.

Card Readers	Card acceptance & entry clearance Card rejection
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Measure maximum distance of card reading (Proximity cards)
Tamper switch

Doors - Door contact activation

Door closing forces for delivering & door opening
Time to door shut and to latch
panic/Fire escape hardware operation

Terminal Controller	• Communication Failure mode : Full mode operation Event recoding
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Supervising the monitoring circuits: Power failure mode

	Full mode operation Event recoding
Supervising the monitoring circuits	

Field Controllers Uploading from TC's	Same as for Terminal Controllers
Main Controller (SCC) Uploading from TC's	Same as FC's

Databank and retrieval

All the network components shall be tested 100% and results recorded. Engineer in charge may make random verification of any of the components. All such verification shall be recorded.

DUCTING TECHNICAL SPECIFICATIONS

CHAPTER-1 ELECTRICAL WORK 1.0 SCOPE

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

GENERAL

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

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

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

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

1.2 SWITCH BOARDS / MOTOR CONTROL CENTRE

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

Engineer-in-Charge, but they shall be cubical designed, unless otherwise specified and from open able from front.

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

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

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

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

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

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

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

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

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

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

Provision shall be made for proper termination of cables at the switchboards such that there is no strain either on the cables, or on the terminators. Cables connected to the upper tiers shall be duly clamped with the help of PVC cable ties within the switchboard. Identification labels shall be provided against each switchgear and starter compartment, using plastic engraved labels.

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

1.3 POWER CABLING

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

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

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

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

CONTROL WIRING

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

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

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

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

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

Runs of control wires within the switchboard shall be neatly bunched and suitably supported/clamped. Means shall be provided for easy identification of the control wires. Control wiring shall correspond to the circuitry/sequence of operations and interlocks approved by Engineer-in -Charge.

EARTHING

i) Provision of earth electrodes and the type of earthing shall be as specified in the tender specifications.

ii) The earth work shall be carried out in conformity with CPWD Specifications for Electrical works (Part-I), Internal 2005 / NBC 2005.

iii) Metallic body of all medium voltage equipments and switch boards shall be connected by separate and distinct earth conductors to the earth stations of the installations; looping of such body earth conductors is acceptable from one equipment, or switch board to another.

iv) G.I. plate earthing shall be provided for PTAC plants and reciprocating central AC plants upto 100 TR capacity. Above 100 TR reciprocating units, copper plate earthing shall be provided.

v) The size of earth conductors for body earthing of equipments shall be as under:-

Motor upto and including 10 HP rating 2Nos.3mm dia copper wire / 2 nos.
4mm dia GI wire
12.5 HP to 40 HP 2Nos.4mm dia copper wire / 2 nos. 6mm dia GI wire
50HP to 75 HP 2Nos.6mm dia copper wire / 2 nos. 25x3mm GI strip
Above 75 HP 2Nos.25mm x 3mm copper strip / 2 nos. 25x6mm GI strip
Switch boards with incoming rating upto

100 A 2Nos.3mm dia copper wire / 2 nos.
4mm dia GI wire

125 A to 200 A rating 2Nos.6mm dia copper wire / 2 nos. 25x3mm GI strip
Above 200 A rating 2Nos.25mm x 3mm copper strip / 2 nos. 25x6mm GI strip

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

MOTOR STARTER

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

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

The starter shall be mounted on the main electrical control panel/ unit mounted / self mounted as specified.

Each starter shall be provided with the following protections:-

Thermal overload on all the three phases with adjustable settings,

Under voltage protection, and

Independent single phasing preventor. (current sensing type)

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

1.7 PAINTING

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

CHAPTER- 2.0

INSPECTION, TESTING AND COMMISSIONING

2.0 SCOPE

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

2.1 INITIAL INSPECTION AT MANUFACTURE'S WORKS

Compressor

i) Salient features such as model, No. of cylinders, capacity control, provision of crank case heaters, type of lubrication etc. shall be verified against the requirements visually without opening the compressors.

ii) Manufacturer's internal test certificates shall be scrutinized to check compliance with the requirements as specified in the order.

iii) Rate of leak test shall be checked by developing 7 Kg/sq.cm (gauge) pressure on HP side and 1 Kg/ sq.cm on LP side using dry Nitrogen air or carbon dioxide. The leakage through the valves, shaft seal, cylinder heat gasket etc should not be more than 0.3 Kg/sq.cm per cylinder in 4 minutes time. Alternatively this may be demonstrated through vacuum.

iv) Pneumatic pressure test shall be carried out at 22 Kg/ sq.cm and by submerging the compressor in water for 1 hour & there shall be no leakage.

v) Free running test shall be carried out at the rated speed specified in contract. This test shall be carried out for 30 minutes in open space. During this running test following operations are to be noted:

Manual loading / unloading of capacity control
Lubrication oil pressure
Safety valve operation

Vacuum test for the compressor for 0.5mmHg.

Condensers

i) Salient features like number of tubes, inside diameter of tubes (from which the gauge of the tube can be verified), no. of passes, material of fins, length of condenser, provision of fittings like safety valve, water, gas connection shall be verified during stage inspection. The tube thickness shall be checked.

ii) Manufacturer's internal test certificates shall be furnished and it shall be verified against contract requirements.

Pneumatic pressure test at twice the normal condensing pressure for gas side of condenser shall be carried out.

Air Handling Units:

i) Salient features such as model, size, physical dimensions, and other details of various sections, fan motor details, fan dia, static pressure etc. shall be verified against the contract requirements.

ii) Manufacturer's internal test certificates for the motor and air handling unit shall be furnished and scrutinized as per contract requirements.

iii) Test certificate for static and dynamic balancing of the fan/ blower should be furnished. Fan balancing may be witnessed by Engineer-in-Charge or his authorized representative.

iv) Salient features like, type, material, no. and gauge of fins and tubes and no. of rows of cooling coil shall be furnished and verified with reference to contract requirements during stage inspection.

v) Hydraulic pressure to the extent of 10 Kgf/sq.cm or pneumatic pressure of 21 Kgf/ sq.cm shall be applied to cooling coil and this pressure should be maintained for 1 hour and no drop should be observed indicating any leaks.

2.4 INITIAL INSPECTION AT SITE

Ducting

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

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

Switch Gear, Control Gear, and Measuring Instruments

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

Electric Motors

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

Insulation and acoustic lining

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

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

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

FINAL INSPECTION

i) After completion of the entire installation as per specification in all respects, the AC contractor shall demonstrate trouble free running of the AC equipments and installation for a period of minimum 120 hours of running as detailed under following points:

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

TESING REQUIREMENTS AND PROCEDURES

Balancing of all air systems and all tests as called for in the specification shall be carried out by the HVAC contractor in accordance with the specifications and relevant local codes if any. Performance tests of individual equipment and control shall be carried out as per manufacturer's recommendation.

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

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

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

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

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

Air Systems

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

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

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

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

Balancing Tolerance

System shall be balanced with in the following tolerance:

1.Duct leakage rates (at operating pressures)

Low pressure ducts (0 to 0.5 Kpa)	5% of full flow
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Medium pressure ducts (0.5 to 3 Kpa)	1% of full flow
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High pressure ducts (greater than 3 Kpa)	1% of full flow
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2. Air flow rates

Under 70 L/S	10% of flow
Over /at 70 L/S	5% of flow

3. Water flow rates

Chilled Water	2% of flow
Other	5% of flow

4. Heat flow rates

Heat exchangers	5% of design capacity
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Procedure:

Review all pertinent plants, specifications, shop drawings and other documentation to become fully familiar with the systems and their specified and intended performance. Furnish equipment and instruct sheet metal trade on proper use for conducting duct leakage tests. Conduct first test as a way of instructing the above trades in the presence of the Department's representative.

Test performance and continuously record on a 24 hour basis, temperature and humidity levels where control equipment is provided for that purpose in certain critical areas. Before commissioning of the equipment, the entire electrical installation shall

be tested in accordance with relevant BIS codes and test report shall be furnished by a qualified and authorized person.

Reports

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

i) Safety measures

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

Final documentation

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

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

Upon commissioning and final handover of the installation, the HVAC contractor shall submit (within 4 weeks) to the Engineer-in-Charge/ department 6 (six) portfolios of the following indexed and bound together in hard cover ring binder (300 x 450 mm) in addition to the completion drawings as follows:

Completion Drawings

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

a) Plant installation drawings giving complete details of all the equipments, including their foundations,

c) Pipeing layout drawings including insulation giving sizes and lengths of all the pipes and the sizes and locations of all types of valves, and including isometric drawings for entire piping including pipe connections to the various equipments and insulation details wherever required.

d) Duct layout drawings with their sizes and locations, and sizes and locations of all dampers, grills and diffusers.

e) Line diagram and layout all electrical control panels giving switchgear ratings and their disposition, cable feeder sizes and their layout,

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

- g) Comprehensive operation and maintenance manual
- h) Test certificates, consolidated control diagram and technical literature on all controls.
- i) Equipment warranties from manufacturers
- j) Commissioning and testing reports
- k) Rating charts for all equipment
- l) Log books as per equipment manufacturers standard format
- m) List of recommended spares and consumables
- n) Any special tools required for the operation or the maintenance of the plant shall be supplied free with the plant.

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

Any defective material or equipment supplied by the contractor.

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

Cassette type indoor units.

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

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

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

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

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

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

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

The unit shall be supplied with suitable decorative panel.

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

The unit will be connected in series to a suitable outdoor unit & it must be possible to Operate the unit independently, through corded/ cordless remote specified in the "Bill of quantities". The unit will be further connected to Intelligent Building Management

System (To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

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

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

B. Wall Mounted Units.

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

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

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

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

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

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

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

The unit grille must be washable with soap solution.

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

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

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

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

Operation Manual
Installation Manual
Installation panel
Paper pattern for installation

Insulation tape/ Clamps/ Screws

A - 1: COPPER TUBING.

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

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

A -2 : TUBING DESIGN:

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

3. Contractor should discuss any such mis- matches and any doubts regarding system design with the consultant and get all doubts clarified.
 4. Before commencement of tubing work, proper shop drawings must be generated by the contractor, and same should be got approved from the consultant. The drawings must clearly indicate schematic flow diagrams for various circuits, tube sizes, description and quantities for refrigerant joints, indoor and outdoor unit models and room / block / floor names, tube routes, levels for horizontal tubes, details regarding insulation type and thickness and surface treatment for insulation, typical and critical sections and any other details to explain the entire tubing layout to the installer.
 5. Tube sizing and routing must be carried out taking into consideration various site constraints and system manufacturer's recommendations.
 6. Care should be taken to design tubing as per the manufacturer's recommendation for maximum tubing total length, maximum tubing length after first tapping, vertical height difference between outdoor and indoor units etc. and necessary corrections should be carried out in outdoor unit capacity if required.
- A - 3 : REFRIGERANT TUBING INSTALLATION WORK:**
1. The installer must first study the shop drawings in detail with respect to the site condition and point out any fouling / alternatives to the agency prepare shop drawing and necessary revisions must be carried out in the drawings, to be approved by consultant.
 2. The layout must be marked on the true ceiling and any civil openings required should be marked and got done from concerned agency.
 3. Supports as described in BOQ / specifications should be installed, leaving adjustable free length for supports.
 4. Before installation, the tubes and tubes must not be removed from their original packing. Proper storage of tubing is a must to maintain the temper of the tubes / tubes. Any abrasion on ends / surface, or any in grace of dirt / dust must be avoided. Proper Polyethylene sheets should be used for covering the tubes and tubes, while wooden pellets and soft expanded Polyethylene / rubber sheets should be used as floor supports.
 5. Necessary loops / slopes must be followed as recommended by system manufacturer.
 6. Tubes must be cut to required sizes using cutting tools recommended by system manufacturer.
 7. Using proper quality of brazing set, Oxygen / Acetylene and Copper brazing rods having minimum 2% Silver content.
 8. During brazing, Nitrogen must be filled in the Copper tubing at a mild positive pressure and must be kept bleeding out continuously, to prevent any oxidation of parent material.
 9. After tubing work, each circuit should be pressure tested as per the system manufacturer's recommendation and as per the procedure described in the following paragraphs. A certificate mentioning the test pressure, time of first and final pressure

readings, make, model, serial number, range and least count of the gauge used, along with a copy of valid calibration certificate must be maintained, duly signed by the inspecting technician, and client /PMC representative.

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

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

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

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

A - 4 : RECOMMENDATIONS FOR PRESSURE TESTING:

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

1. Nitrogen is easily available as a commercial gas packed in easy to handle cylinders.
2. Nitrogen, being the most abundant component of the atmosphere, is safe for leaking out without contaminating the atmosphere.

3. Nitrogen is less costly as compared with other gases.
4. Nitrogen is safe for handling and testing.
5. Nitrogen does not readily react with system components Pressure gauge/s used for testing must be calibrated and a calibration certificate with traceability to a Government(National) Physical Laboratory must be documented. The gauge should be capable of measuring pressure at least 10% above the reading to be recorded.

A - 5 : PROCEDURE FOR CARRYING OUT PRESSURE TEST

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

once again from beginning.

A - 6 : DOCUMENTATION RECOMMENDED FOR ENSURING PROPER QUALITY

ASSURANCE:

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

GENERAL:

ACR GRADE COPPER TUBES AND FITTINGS : SIZES AND SPECIFICATIONS

Tube material Specification :

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

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

S. No.	OUTER DIAMETER IN INCH & (MM)	WALL THICKNESS IN GUAGE & (MM)	LENGTH IN FEET & (MTRS.)	TEMPER	WEIGHT PER METER (kg.)	SOCKET AND ELBOW THICKNESS IN SWG & (MM)	RUBBER INSULATION THICKNESS
1.	1/4" (6.4 mm)	21 (0.8 mm)	50' (15.24)	Soft	0.1265	18 (1.2mm)	15mm
2.	3/8" (9.5 mm)	21 (0.8 mm)	50' (15.24)	Soft	0.199	18 (1.2mm)	15mm
3.	1/2" (12.7 mm)	21 (0.8 mm)	50' (15.24)	Soft	0.2714	18 (1.2mm)	15mm
4.	5/8" (15.9 mm)	19 (0.99 mm)	50' (15.24)	Soft	0.4241	18 (1.2mm)	15mm
5.	3/4" (19.1 mm)	19 (0.99 mm)	50' (15.24)	Soft	0.5147	18 (1.2mm)	20mm
6.	1/4" (6.4 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.1265	18 (1.2mm)	15mm
7.	3/8" (9.5 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.199	18 (1.2mm)	15mm
8.	1/2" (12.7 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.2714	18 (1.2mm)	15mm
9.	5/8" (15.9 mm)	19 (0.99 mm)	12' (3.658)	Half Hard	0.4241	18 (1.2mm)	15mm
10.	3/4" (19.1 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.4164	18 (1.2mm)	20mm
11.	7/8" (22.2 mm)	21 (0.8 mm)	12' (3.658)	Half Hard	0.489	18 (1.2mm)	20mm
12.	1.0" (25.4 mm)	20 (0.88 mm)	12' (3.658)	Half Hard	0.6054	18 (1.2mm)	20mm
13.	1 1/8" (28.6 mm)	19 (0.99 mm)	12' (3.658)	Half Hard	0.7865	18 (1.2mm)	20mm
14.	1 1/4" (31.8 mm)	18.5 (1.1 mm)	12' (3.658)	Half Hard	0.843	16 (1.6mm)	20mm
15.	1 3/8" (34.9 mm)	18 (1.21 mm)	12' (3.658)	Half Hard	1.155	16 (1.6mm)	20mm
16.	1 1/2" (38.1 mm)	17.5 (1.3 mm)	12' (3.658)	Half Hard	1.340	16 (1.6mm)	20mm
17.	1 5/8" (41.3 mm)	17 (1.43 mm)	12' (3.658)	Half Hard	1.594	16 (1.6mm)	20mm

Use Soft tube only for Indoor Unit Connection

10. INSULATION TO REFRIGERANT PIPING:

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

11. COMMUNICATION CABLE AND CONTROL CABLING:

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

12. DRAIN PIPING:

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

3.0 FILL THE TECHNICAL DETAILS FOR ALL OUTDOOR AND INDOOR UNITS

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

27	Air Quantity	CFM	
28	Motor Type		

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

FIRE SAFTEY NORMS AND MEASUREMENTS

SCOPE OF WORK

1.0 The scope under this contract shall include all FIRE & SAFTEY works for the proposed works. The work to be carried out under this contract shall cover the supply, erection, testing and commissioning of the FIRE & SAFTEY including performance testing at site. The contractor has to inspect the site physically before bidding for the project and shall be well acquainted with the requirement. If any clarifications and deviations are proposed the same shall be discussed in the pre-bid meeting. It is deemed that the contractor has understood the entire desired requirement and shall hold liable for the project completion, execution and upto the Defect liability period. The contract shall deliver all the material to site, storing, handling at site, erection, testing commissioning and carrying out acceptance test at site of the complete works related FIRE & SAFTEY works for the project and Hand over the project with design details, Actual Bill of materials, technical manuals, equipment schedule, as-built drawings, Guarantee certificates, commissioning reports, escalation chart, vendors contact list, etc., detailed herein under and shown in the drawings and specifications.

1.1 Contractor shall carry out and complete the said work under this contract in every respect in conformity with the current rules and regulations of the local electricity authority, NBC, NFPA-409 and other local rules etc., The contractor shall furnish all the

details of the labourers engaged in the work. and install all materials, appliances, equipment (except those items which will be supplied by the Client to the contractor at site), necessary for the complete provision and testing of the whole FIRE & SAFTEY works as specified herein and shown on the drawings This also includes any materials, appliances, equipment not specifically mentioned herein or noted on the drawings as being furnished or installed but which are necessary and customary to make complete installation.

1.2The work shall include all incidental jobs connected with FIRE & SAFTEY works.

1.3It is not the intent to specify completely herein, all the details of design and construction of the equipment and system. However, the equipment and system shall confirm in all respects, to high standards of engineering, design and workmanship and be capable of performing in continuous operation up to the Contractor's guarantee in a manner acceptable to the Engineer-in-charge who will interpret the meaning of drawings and specifications, and shall have the power to reject any work or materials, which, in his judgement, are not in full accordance therewith. Quantities, sizes and capacities of various equipment mentioned in this specification and enclosed drawings are for contractor's guidance only. Contractor shall carefully check the above-mentioned details while selecting and offering the equipment.

1.4The extent of supply under this contract includes all items shown in the bid drawings, notwithstanding the fact that such items may have been omitted from the specifications, schedules or drawings. but which are required to complete the intent of the contract shall also be deemed to be within the scope for supply of the Contractor.

1.5This specification covers only the broad outline of the FIRE & SAFTEY systems to be provided. It is the contractor's responsibility to check and satisfy himself that the capacities of the equipment wherever indicated in this specification are adequate to meet the stated design goals of the FIRE & SAFTEY system. The design of the system shall follow the various design criteria and guidelines detailed in the specification.

RATES

The rates quoted shall be deemed to allow for all minor extras and constructional details which are not specifically shown on drawings or given in the specifications but are essential in the opinion of the Consultants/Client to the execution of works to conform to good workmanship and sound engineering practice. The Engineer-in-charge reserves the right to make any minor changes during the execution without any extra payment.

The Consultant's decision to clarify any item under minor changes, minor extras and constructional details shall be final, conclusive and binding on the Contractor.

The rates quoted by the Contractor shall be net so as to include all requirements described in the contract agreement and no claim whatsoever due to fluctuations in the price of material and labour will be entertained.

The rates quoted by the Contractor shall include for supplying material and labour necessary for completing the work. The rates shall be complete in all respects including cost of materials, erection, fabrication, labour, supervision, tools and plant, transport, local loading & unloading charges, and materials, contingencies, breakage, wastage, sundries, scaffoldings, etc on the basis of works contract.

In case the rates of identical items under different sub-heads/parts are different, the lowest of these will be taken for the purpose of making the payments.

The rates for different items are for all heights, depths, widths and positions, unless otherwise specified against the item. No claim in respect of any leads/lifts for any item specified in the Bill of Quantities, for which separate items for lead/lift do not exist in that schedule, will be entertained.

The work shall be executed as per the program drawn or approved and it shall be so arranged as to have full co-ordination with any other agency employed at site. No claim for idle labour shall be entertained nor shall any claim on account of delay in the completion of the work be tenable except extension of time secured by the contractor on request approval.

The Contractor shall permit free access and afford normal facilities and usual convenience to other agencies or departmental workmen to carry out connected work or other services under separate arrangements. The Contractor will not be allowed any extra payment on this account.

The contractor shall provide all equipments, instruments, labour and such other assistance required for measurement of the works, materials etc.

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

Liability to Govt. Regulations:

The Contractor shall be responsible and shall abide by all the Government rules and regulations pertaining to erection, testing and commissioning of complete HVAC system at site.

Any compensation towards damage / loss of property / material / equipment or to any person working at site shall be borne by the Contractor as per standard terms of Contract.

No escalation / change of prices would be admissible under any circumstances.

3.0ENGINEERING RESPONSIBILITY OF THE SYSTEM

a) The responsibility of system design, manufacturing, erection, working and safety will solely be responsibility of the Contractor for the parameters as mentioned in the tender documents.

b) The system after commissioning shall be handed over to the Clients and thereafter they will monitor the performance for standard designed parameters for 30 days continuously. In case during this period the performance is not found satisfactory and rectification / replacement, design improvement or any other change as felt necessary, will be made by the Contractor at no extra cost. Though these improvements can only be done after getting the approval from the Clients / Engineer-in-charge.

4.0 Even though the payment shall be effected under different items in the schedule of quantities, the various items in the schedule of quantities shall be deemed to cover all aspects of the work for the completion of the work as per drawings, from excavation to the finishing notwithstanding any space adjustment, possible omission in the description of the item and specifications thereof regarding incidental items of work, without which the whole work cannot be deemed to have been included under the scope of the different items of the schedule of quantities. The Contractor is advised to keep this in mind while quoting rates as no claims in this regard shall be entertained.

5.0 AWARENESS OF SITE CONDITIONS AND CARRYING OUT OF SITE INSPECTION PRIOR TO TENDER SUBMISSION.

5.1 Prior to the preparation and submission of his Tender, the Contractor shall make visits to the site and carry out all the necessary inspections and investigations in order to obtain all information and to make his own assessment of the conditions and constraints at site, including the means of access to it. The Contractor shall make himself aware of all the features of the site and the working conditions and space and shall, in general, be responsible for obtaining all the necessary and requisite information needed for him to prepare and submit his Tender.

5.2 Should the Contractor require any clarifications he shall seek these in writing from the Consultant before submitting his Tender. At no stage will any extra claims be entertained or allowed on any matter or for any reason arising from or as a consequence of the Contractor's failure to comply with all the requirements stipulated in this Clause.

6.0 WORK AND WORKMANSHIP

6.1 To determine the acceptable standard of workmanship, the Consultant may order the Contractor to execute certain portions of works and services under the close supervision of the Consultant. On approval, these items shall be labelled by them as guiding samples so that further works are executed to conform to these samples. Samples of components, fixtures, etc. shall where required, submitted to the consulting Engineer-in-Charge for approval before commencement of the installation work.

PREAMBLE TO SCHEDULE OF QUANTITIES

All items of work mentioned in the Schedule of Quantities shall be read and executed strictly in accordance with the description of the item in the Schedule of quantities, equipment schedule, drawings and standard specifications and in compliance with the appropriate IS (and Conditions of Contract).

the rate for each item of work included in the bill of quantities shall, unless expressly stated, otherwise include cost of :-

a) All materials, fixing materials, accessories, hardware, operation tools, equipment, consumables, civil works- wherever involved = and incidentals required in preparations for the full and entire execution and completion of the work called for in the item and as per specification and drawings in all respects.

b) Wastage on materials and labour.

c) All taxes, duties, octroi, and similar levies including works contract tax, sales tax, transit insurance, packing and forwarding charges, loading, transportation, unloading, handling, hoisting to all levels, setting up and fixing in position, disposal of debris and all labour necessary to complete the work in accordance with contract documents, good engineering practice and recognized principles.

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

e) Liaison service charges.

All requirements of system, whether such of them are mentioned in the item or not, the specifications and drawings are to be read as complementary to and part of the schedule of quantities and any work called for in one shall be taken as required for all.

In the event of conflict between the bill of quantities and other documents, the more stringent shall apply and interpretation of the architect shall be final and binding.

The installation price of switchboards, metering panels, DB's or any other items shall include supply and fixing of supporting steel structures/MS channels, grouting of the same, civil works etc. as required.

No change in unit rate shall be allowed for any change in quantity or for any other reason whatsoever.

Supply of materials shall mean supply of materials at site. The rate for supply shall include all taxes, octroi, insurance, packing and forwarding charges, transportation, unloading at site, shifting and placing the same to the required spot at site, as directed by the architect.

The successful tenderers shall submit the schematic diagrams, fabrication drawings with details of all equipments, wiring diagrams, etc., to the architects for approval, sufficiently prior to supply/commencement of such works. The approval of these drawings will be general and will not absolve the contractor of the responsibility of the correctness of these drawings. At least four copies of the approved drawings shall be supplied to architects for their distribution to various agencies at site at no cost to the owner.

The tenderers must visit the site and see the site conditions such as type of soil, locations etc, and take all factors into consideration while quoting the rates as no extra cost will be allowed on any grounds arising out of or relating to the site conditions, since the contractor will be deemed to have verified in person all site conditions beforehand.

Any error in description or in quantity or omission of items from the contract shall not vitiate this contract but shall be corrected and deemed to be a variation required by the architects / owners.

The Liaison Service charges shall include the following :

- i) Follow up expenses with the Electricity Board, starting from getting approval of the drawing, upto servicing the installation and getting the safety certificate.
- ii) Preparation of detailed drawings required by the Electrical Inspectorate.
- iii) Obtaining approval of drawings and installation, including carrying out modifications insisted by the Statutory Authorities
- iv) Renewal of any temporary power supply connection during construction/ securing additional temporary power.
- v) All incidental charges/expenses associated with the above work.
- vi) Provision of labour in assisting Electricity Board for installing DP structure and accessories.

Official deposits paid to the above agencies will be reimbursed separately at actuals by the owners.

All testing and calibrating charges for the Meters shall be included in the installation price of the Meter Board. High voltage testing by Voltage Boosters, Relay calibration by secondary injection and meter calibration will have to be carried out at site by authorised agencies mentioned in Chapter "ACCEPTED MAKE OF MATERIALS".

The tenderer shall take into account, the expenses of pre-commissioning tests to be conducted as per specification of the complete installation by licensed agencies.

Written approval shall be taken from the Consultant, incase of using the material other than list of approved makes.

Incuse of additional temporary power required to execute the work in time, same shall be organized by the contractor in case of power cut by EB during the execution of work.

The contractor should provide all the required lighting samples to site to make trails and may have to be fixed for approval.

Qualified Supervisor shall be made available at site for the entire length of the project.

The supervisor shall not wait for the Regular meetings, incase of any details /clarifications required, same shall be brought to the notice of Consultants and work should get progressed.

Technical Specification for Fire Protection System

SPECIFICATION FOR FIRE HYDRANT SYSTEM.

Scope of Work.

Following are the different items of work that have to be designed, supplied, erected, tested and commissioned along with getting the entire system approved by the Tariff Advisory Committee, Bangalore region.

Automatic fire hydrant system, consisting of Electrical Jockey pump and diesel main hydrant pumps, electrical main pump, MS Piping with fittings, valves, yard hydrants and hose cabinets & sprinklers.

2.0 Regulations and Standards.

The installation shall conform in all respects, to the following broad list of standards in general and in particulars, the materials used shall bear the prevalent ISI marking.

- a) IS : 901-1975 : Specification for coupling - double male and double female, instantaneous pattern, for fire fighting.
- b) IS : 902-1974 : Specification for suction hose coupling for fighting purpose.
- c) MSS SP 67 : Butterfly valves.
- d) API 609 : Butterfly valves, lug type & wafer type.
- e) IS : 1536-1976 : Centrifugally cast (spun) cast iron pressure pipe for water, gas and sewage.
- f) IS : 1239 : Mild steel tube, tubular and other wrought steel fittings.
- g) IS : 1538-78 : Cast iron fittings for pressure pipes for water, gas and sewage.
- h) IS : 8423-1977 : Controller percolating hose for fire fighting.
- i) IS : 5290-1983 : Landing valves.
- j) IS : 5306 : Code of practice for fire extinguishing installation and equipment on premises.
- k) ADI : 610 : Centrifugal pump for general refinery service.
- l) IS : 1648-1966 : Code of practice for building (general) fire fighting equipment and their maintenance.
- m) IS : 3844-1966 : Code of practice for installation for internal fire hydrants in multistoried buildings.
- n) IS : 2871-1983 : Branch pipe, universal for firefighting purposes.
- o) IS : 384-1969 : First aid hose reel for fire fighting.

- p) IS : 5132-1968 : Hose reel tubing for fire protection system
- q) BS : 5155 : Cast iron and carbon steel butterfly valves

DRAWINGS :

The drawings enclosed herewith are for the general guidance to tenderers. The contractor shall, upon award of the work, furnish detailed drawing necessary to carry out the work at site, within 15 days. These shall be submitted for approval, to the architects / owners and obtaining the approval from the Tariff Advisory Committee.

Drawing information required from successful tenderer within 15 days, after the award of work.

Pump GA and cross sectional drawings.

Performance curve for the pump.

Necessary civil scope drawing for the system.

Bar chart showing engineering, manufacturing and dispatch of each equipment and erection services.

Drawing, literature and technical particulars of all bought out items.

Control logic diagram for the pump to start.

Schedule for valves and piping material.

INSPECTION AND APPROVAL.

The contractor shall arrange all necessary inspection by the local authority/Tariff Advisory Committee. He shall also arrange for all the tests, obtain and deliver to the owner, any approval required as per the local by-laws and Tariff Advisory Committee. It is the sole responsibility of the contractor to prepare and submit the drawings to the Tariff Advisory Committee in getting the complete installation approved by them.

PAINTING.

All piping, equipment, cabinets furnished under this specification, shall be properly painted with two coats of synthetic enamel paint after installation and shall meet the requirements as outlined in the Fire Protection Manual. The cost of the painting is deemed to be included in the respective items.

GUARANTEE.

The contractor shall guarantee the material and workmanship of the entire system, are of first class quality and shall correspond to standard engineering practice. All the equipment/apparatus shall be guaranteed to yield the specified rating and design capacities and speeds. Any defective equipment/material/workmanship found short of

the specified quality, shall be rejected and the contractor shall make good, the rejected items at his own cost. Guarantee certificate of equipment from suppliers/manufacturers shall be handed over to the owner.

DEFECTS & LIABILITY.

All the equipment/material and the system, shall be guaranteed against defective material and workmanship, for a period of 12 months from the date of commissioning and handing over the installation to the owner, along with all relevant documentation. The contractor shall repair/rectify or replace all the defective materials & components, free of cost. In addition, normal maintenance shall be carried out periodically during the defects and liability period, including replacement of spares, as required.

INSTRUCTION MANUAL/COMPLETION DRAWINGS/TRAINING.

The contractor shall furnish a detailed instruction and operation manual in quadruplicate. The contractor shall also furnish detailed completion drawings on tracing sheet, drawn to an approved scale. The drawings shall be inclusive of control schematic, if any. The contractor shall train the Employer's personnel in the operation and maintenance of the system for one month.

TESTING.

The contractor shall arrange to test the entire system as per the procedure enumerated under particular specifications, after the erection is completed. The tests shall be carried out to the satisfaction of the architects/owners. The results of the tests shall be submitted to the owner, in triplicate. If the results of the test are not found to be satisfactory by the architects/engineer in-charge, necessary rectifications shall be done until the test results are found to be satisfactory. The installation shall be deemed to be completed only after the successful completion of the tests.

TECHNICAL DATA.

The tenderers shall furnish data of their equipment, as per the proforma under 'Technical data'. The tenders without technical data are liable to be rejected.

PARTICULAR SPECIFICATIONS.

:

11.2 Piping:

Underground piping shall be of mild steel tube of heavy grade, conforming to IS : 1239. The piping shall be laid not less than 1 m below the ground level, suitable masonry supports, and concrete anchor blocks of suitable design, shall be provided at every change of direction of pipeline, both horizontal and vertical and near every pipe joint, where soil conditions are unsatisfactory. All fittings shall be MS 'C' class, conforming to IS : 1239.

Flanges shall be faced up and shall have jointing of rubber insertion of asbestos compound. The joints shall be capable of withstanding a pressure of 10.5 KSC. All the ground piping shall be supported by angle iron brackets on walls or suspended by hangers from the ceiling or concrete pedestals at some places. Piping over ground shall be painted with two coats of approved enamel over a coat of primer after the installation and testing.

11.3 Anti-Corrosive Treatment for Underground Piping.

MS pipes laid outdoor in trenches/buried in earth, shall be wrapped with fibre glass tissue, giving two coats of anti-corrosive treatment. Pipes passing through masonry walls, foundation and beams, shall be taken through embedded pipe sleeve of the same material. The pipe sleeve size should be atleast 1 ½ times the diameter of the crossing pipeline. The pipeline running below the floor, shall be given an anti-corrosive treatment same as that for underground piping. The wrapping material shall be fiber glass RP tissue, grade RP 40, with density 800 gm/sq.m.

Butterfly valves - Vertical/Horizontal gear type.

Butterfly valves shall conform to the following specifications:

Body : High duty cast iron to IS 210 Gr FG 220 & BS 1452 Gr 220

Seating :Mouledinsitu resilient lining of black nitrile rubber.

Disk : Nylon coated SG iron to IS 1865/SG 400/12 & BS 2729 Gr 420/12.

Shaft : The shafts are made of stainless steel AISI 431.only flaged end valves to be used with flanges drilled to BS 10 Table F.Valves shall be capable of being locked in open position. Hand wheel shall be with vertical gear unit for smooth opening and closing of the valve-key rods with MS coated extended spindles to be provided whenever the valves are not approachable from the ground surface.

Non-Return valves.

Non-return valve shall be of cast iron, with gun metal seat, non-return valves shall be of flanged type. Spring loaded valves shall not be used. The valves shall be suitable for a test pressure of 21 kg/sq.cm.

Hydrant valves (landing valves)

Landing valves shall be gun metal 63mm dia. Oblique female instantaneous pattern with caps and chains. Landing valves shall conform to IS:5290 in all respects. Double headed landing valves shall have separate control valves. Landing valves shall be of gun metal and fitted with instantaneous coupling, conforming to IS : 901. The coupling shall be fitted with an internal plug secured by a chain. Landing valves shall be installed on hydrant risers, at a height of 1 to 1.2 metre form the floor level. The landing valves shall be connected to the wet riser stand pipes, by means of a suitable tee, the cost of which is deemed to be included in the unit rate for piping.

Hose pipes.

All hose pipes shall be of 63m diameter and made of RRL, as per IS:636, Type-I.

Branch Piping and Nozzle.

Branch pipes shall be of gun metal/iron, to fit into the instantaneous coupling. Nozzle shall be of spray or fog type of diameter of not less than 16mm and not more than 25mm. Branch pipe and nozzle, shall be of instantaneous pattern.

Hose Cabinet

Hose cabinet shall be glass (4mm thick) fronted with double hinged door and lock. The cabinet shall be made of 16G MS sheet and spray painted to scarlet red color. The hose cabinet shall be of a suitable size, to accommodate the following:

Landing valves (single headed)

63mm Hose pipe.

Branch pipe and nozzles.

Two keys of break glass recess for keys.

Fire pump :

Pumping sets.

Pumping sets shall be single or multistage horizontal centrifugal multi-outlet pumps, with cast iron body and bronze, dynamically balanced impeller, connecting the shaft, shall be of stainless steel.

Pumps shall be connected to the drive, by means of a flexible coupling.

Pumps shall be provided with approved type of mechanical seals pressure gauge, with isolation cock on the delivery side.

Pump driven by diesel engine.

Diesel engine shall be 4 cylinder type, with individual head assemblies. The engine shall be water cooled and shall include radiator, water pump and connecting piping, strainer, isolating and pressure reducing valves, by-pass line, complete in all respects.

Engine shall be direct injection type, with low noise & exhaust omission levels.

The speed of the engine shall match the pump speed for direct drive.

The engine shall be self starting type and shall be provided with 12V heavy duty batteries, dynamo, starter, cut out, cut-out battery leads, complete in all respects. Two spare batteries shall be provided.

The system shall be provided with an automatic fully connected battery recharged of type and capacity as required by the system.

The engine shall be provided with an oil bath air cleaner.

The engine shall be suitable for running on high speed diesel oil.

The system shall be provided with a control panel with push button starting arrangement and wired to operate the engine on a differential pressure gauge.

The entire system shall be mounted on a common structural base plate with anti-vibration mounting and flexible connections on the suction and delivery piping.

Providing one fully mounted & supported day oil tank of 500 litres capacity (size 1000 X 1000 X 700mm), fabricated out of 5mm thick MS sheet, with inlet, outlet with valves, gauge glass and manhole cover. The cost of the MS frame work for staging, has to be included.

Provide on exhaust pipe of MS, 3mm thick, with suitable muffler to discharge the engine gases to outside open air, as per site conditions, duly painted.

Provide all accessories, fittings and fixtures necessary and required for a complete operating engine set.

Air vessel tank made out of 4mm MS sheet, 300mm dia. X 1000mm long with dished ends, in 5mm thick sheet, with provision necessary for inlet, outlet, duly painted inside with two coats of anti-corrosive paint of approved synthetic enamel.

Jockey Pump.

The pump shall be electrically driven centrifugal pump of capacity 3.8 LPS a 70 mtrs head. The pump shall be automatic in operation & driven by dip proof squirrel cage electric motor.

Testing :

After laying and jointing, the piping shall be pressure tested by hydrostatic method. The piping shall be slowly filled with water, in order to expel all the air. The piping shall then be allowed to stand full of water, for 24 hours. Any leakages at flanges or elsewhere, shall be rectified. The pressure shall then be applied by means of a test pump. The test pressure shall not exceed 10.5 kg/sq.cm under any circumstances whatsoever.

Pressure gauges used for the test, shall be accurate and shall preferably have been calibrated before the test. The open ends of the piping, shall be checked with respect to the contractor's piping and equipment layout. Tests shall be conducted to determine the delivery head, flow end BHP of pumps after installation. All the leaks and defects in joints revealed during the testing, shall be rectified to the satisfaction of the owner/TAC inspector.

The system shall also be tested for its desired performance and function, by opening hydrant valves on each floor separately & four landing valves, simultaneously. The flow of water at the top most hydrant, shall be checked when three landing valves below, are open. The cutting in and cutting out pressure setting of starting device, shall also be checked for its correct operation.

The test results shall be recorded and countersigned by the owner's representatives and submitted in triplicate for approval by the owner.

Fire brigade inlet connection.

Fire brigade inlet connection to the UG tank, shall comprise four instantaneous pattern 63mm dia. Inlets, with caps and chains complete with 4mm thick non-return, housed in a 16G MS cabinet with glass fronted door. The cabinet shall be 1000 x 300 x 400mm size for recess mounting.

16.0 Base plate:

Pumps and motors shall be mounted on a common structural base plate with anti-vibration mounting.

17.0 Yard hydrants.

Yard hydrant shall comprise 80mm dia. MS flanged stand pipe, 63mm dia. Gun metal instantaneous landing valve. The buried protection shall be anti-corrosive treatment as per specification.

B. SPECIFICATION FOR SPRINKLER SYSTEM

The sprinkler shall be of approved make and shall have a 15mm spherical type orifice, with universal type deflector of 74 deg. C rating. The sprinkler pressure should be tested to 30 bars (450 PSI).

SAFETY CODE

1.1 Scaffolds:

- 1.1.1 Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying material as well, suitable footholds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical)
- 1.1.2 Scaffolding or staging more than 4m. above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached bolted, braced and otherwise secured at least 3 feet high above the floor or platform of such scaffoldings or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
- 1.1.3 Working platform, gangways, and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6m above the ground level on the floor level. They shall be closely boarded, should have adequate width and should be suitably fastened, as described in (ii) above.
- 1.1.4 Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 1m. Wherever there are open excavations in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.
- 1.1.5 Safe means of access shall be provided to all working platforms and the working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m. in length while the width between side rail in rung ladder width shall in no case be less than 290mm. for ladder upto and including 3m. in length. For longer ladders this width should be increased at least 20mm. for each additional meter or length.
- 1.1.6 A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer-in-charge obtained prior to construction.
- 1.1.7 All personnel of the Contractor working within the plant site shall be provided with safety helmets. All welders shall wear welding goggles while doing welding work and all metal workers shall be provided with safety gloves. Persons employed on metal cutting and grinding shall wear safety glasses.
- 1.1.8 Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.

1.2 Excavation and Trenching:

- 1.2.1 All trenches, 1.25m or more in depth, shall at all times be supplied with at least one ladder for each 30m in length or fraction thereof. Ladder shall be extended from bottom of the trench to at least 1m. above the surface of the ground. The side of the trench which are 1.5m or more shall be sloped back to give suitable slope or securely held by timber bracing, so as to avoid the dangers of sides to collapse. The excavated material shall not be placed within 1.5m. of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.
- 1.2.2 The Contractor shall take all measures on the site of work to protect the public from accidents and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any such persons or which may with the consent of the Contractor, be paid to compromise any claim by any such person.

1.3 Demolition:

- 1.3.1 Before any demolition work is commenced and also during the process of the work.
- 1.3.1.1 All roads and open areas adjacent to work site shall either be closed or suitably protected;
- 1.3.1.2 No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.
- 1.3.1.3 All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

1.4 Personal Safety Equipment's:

- 1.4.1 All necessary personal safety equipment as considered adequately by the Engineer should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the Contractor should take adequate steps to ensure proper use of equipment by these concerned.
- 1.4.2 Worker employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.
- 1.4.3 Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes shall be provided with protective goggles.
- 1.4.4 Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
- 1.4.5 When workers are employed in sewers and manholes, which are in use, the Contractor shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into the manholes and manhole's so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public.
- 1.4.6 The Contractor shall not employ men below age of 18 years and women on the work of painting with products containing lead in any form. Where ever men above the age

of 18 years are employed on the work of lead painting, the following precautions should be taken.

- 1.4.5.1 No paint containing lead or products shall be used except in the form of paste or readymade paint.
- 1.4.5.2 Overalls shall be supplied by Contractors to the workmen and adequate facilities shall be provided to enable the worker painters to wash during the cessation of work.
- 1.4.6 When the work is done near any place where there is risk of drowning, all necessary equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work

1.5 Hoisting Machines:

- 1.5.1 Use of hoisting machines and tackle including their attachment, anchorage and supports shall conform to the following standards or conditions:
 - 1.5.1.1 These shall be of good mechanical construction, sound material and adequate strength and free from patent defect and shall be kept in good repair and in good working order.
 - 1.5.1.2 Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.
- 1.5.2 Every crane driver or hoisting applications operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding which give signals to operator.
- 1.5.3 In case of every hoisting machine and of every chain, hook, shackle swivel and fully block used in hoisting or as means of suspension for safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load, each safe working load of the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
- 1.5.4 In case of department machines, the safe working load shall be notified by the Engineer-in-Charge. As regards Contractors machines the Contractor shall notify the safe working load to the machine to the Engineer-in-Charge whenever he brings any machinery to site of work and get it verified by the Engineer-in-charge concerned.
- 1.5.5 Motors, gearing transmission, electric wiring and other dangerous parts of hoisting, appliances should be provided with efficient safe guards hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load, adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers employed on electrical installations which are already energized insulating mats, wearing apparel, such as gloves sleeves and boots as may be necessary should be

provided. The workers should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

All scaffolds, ladders and safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use.

- 1.5.6 To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by that Contractor shall be open to inspection by the Labour Officer, Engineer-in-Charge of the department or their representatives.

Notwithstanding the above clauses from 9.5.1 to 9.5.5 there is nothing in these to exempt the Contractor from the operation of any other Act or Rule in force in the Republic of India.

MODEL RULES FOR THE PROTECTION OF HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS EMPLOYED BY CONTRACTORS

10.1 Application:

These rules shall apply to the Contractor for TENDER FOR PROPOSED INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND AIR CONDITIONING WORKS FOR NEW REGIONAL OFFICE- AT SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, MAHABUBNAGAR Dist – 509001, TELANGANA. INDIA for 1st Floor, 2nd Floor & 3rd Floor.

10.1.1 "Work Place" means a place at which, at an average 50 or more workers are employed in connection with construction work.

10.1.2 "Large Work Place" means a place at which, at an average 500 or more workers are employed in connection with construction work.

10.2 First Aid:

10.2.1 At every work place, there shall be maintained in a readily accessible place first aid appliance including an adequate supply of sterilized dressings and sterilized cotton wool. The appliances shall be kept in good order and, in large work place they shall be placed under the charge of a responsible person who shall be readily available during the working hours.

10.2.2 At large work places, where hospital facilities are not available within easy distance of the work. First Aid post shall be established and be run by a trained compounder.

10.2.3 Where large work places are remote from regular hospitals, indoor ward shall be provided with one bed for every 250 employee.

10.2.4 Where large work places are situated in cities, in towns or in their suburbs and no beds are considered necessary owing to the proximity of city or town hospitals, suitable transport shall be provided to facilitate removal of urgent cases to the hospitals. At other work places, some conveyance facilities, such as a car, shall be kept readily available to take injured person or persons suddenly taken seriously ill to the nearest hospital.

10.3 Drinking Water:

10.3.1 In every work place, there shall be provided and maintained at suitable places easily accessible to labour, a sufficient supply of cold water fit for drinking.

10.3.2 Where drinking water is obtained from an intermittent public water supply, each work place be provided with storage where such drinking water shall be stored.

10.3.3 Every water supply storage shall be at a distance of not less than 15m. from any latrine, drain or other source of pollution. Where water has to be drawn from an existing well which is within such proximity of latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for

drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust and water proof.

10.3.4 A reliable pump shall be fitted to each covered well the trap-door shall be kept locked and opened only for cleaning or inspection which shall be done at least once in a month.

10.4 Washing and Bathing place:

10.4.1 Adequate washing and bathing places shall be provided, separately for men and women.

10.4.2 Such places shall be kept in clean and drained condition.

10.5 Scale of Accommodation in Latrines and Urinals:

There shall be provided within the precincts of every work place latrines and urinals in an accessible place, and the accommodation, separately for each for each of them, shall not be less than the following scale:

	No. of Seats
10.5.1 Where the number of persons does not exceeds 50,	2
10.5.2 Where the number of persons exceeds 50 but does not exceed 100	3
10.5.3 For every additional 100	3 per 100

10.6 Latrines and Urinals for Women:

If women are employed separate latrine and urinals, screened from those of men and marked in the vernacular in conspicuous letter. "For Women Only" shall be provided on the scale laid in 6.0. Those for men shall be similarly marked "For Men Only". A poster showing the figure of a man and a woman shall also be exhibited at the entrance of latrines for each sex. There shall be adequate supply of water close to the urinals and latrines laid in 6.0 Those for men shall be similary marked "For Men Only". A poster showing the figure of a man and a woman shall also be exhibited at the entrance of latrines for each sex. There shall be adequate supply of water close to the urinals and latrines.

10.7 Latrines and Urinals:

Except in work places provided with water flushed latrines connected with a water borne sewerage system, all latrines shall be provided with receptacles on dry earth system which shall be cleaned at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. The receptacles shall be tarred inside and outside at least once a year.

10.8 Construction of Latrines:

The inside walls shall be constructed of masonry or some suitable heat-resisting non-absorbent material and shall be cement-washed inside and outside at least once a year. The dates of cement washing shall be noted in a register maintained for the

purpose and kept available for inspection. Latrines will not be of a standard lower than borne-hole system and should have thatched roofs.

10.9 Disposal of Excreta:

Unless otherwise arranged for by the local sanitary authority arrangements for proper disposal of excreta shall be made by septic tank or leach pit duly approved by the Engineer and in conformity with the requirements of local public health authorities.

10.10 Provision of Shelters during rest:

At every work place there shall be provided, free of cost, two suitable sheds one for meals and the other for rest separately for men and women for the use of labour. The height of the shelter shall not be less than 11 feet from the floor-level to the lowest part of the roof. The sheds should be roofed with at least thatch and mud flooring will be provided with a dwarf wall around not less than 750mm. Sheds should be kept clean and the space should be on the basis of at least 0.50 Square meters per head.

10.11 Creches:

10.11.1 At every work place, at which 50 or more women workers are ordinarily employed there shall be provided two huts for the use of children under the age of 6 year belonging to such women. One hut shall be used for infant's games and play and the other as their bed-room. The huts shall not be constructed on a lower standard than the following:

- 10.11.1.1 Thatched roofs:
- 10.11.1.2 Mud floor and walls:
- 10.11.1.3 Planks - spread over the mud floor and covering matting.

The huts shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision of sweepers to keep the place clean. There shall be two ayahs in attendance. Sanitary utensils shall be provided to the satisfaction of the Health Officer of the area concerned. The use of the hut shall be restricted to children their attendants and mothers of the children.

10.11.2 Where the number of women workers is more than 25 but less than 50, the Contractor shall provide at least one hut and one ayah to look after the children of women workers.

10.11.3 The size of creche or creches shall vary according to the number of women workers.

10.11.4 The creches or creche shall be properly maintained and necessary equipment like toys, etc. shall be provided.

10.12 Canteen:

A cooked food canteen on a moderate scale shall be provided for the benefit of workers where ever it is considered expedient.

**LIST OF APPROVED MANUFACTURES / NATURAL SOURCES OF MATERIALS TO BE USED IN THE INTERIOR WORKS SUBJECT TO THE APPROVAL OF SAMPLES BY CONSULTANT
ALL THE MATERIALS USED HAVE TO CONFIRM TO GREEN INTERIOR NORMS OF IGBC**

S.NO	MATERIAL NAME.	BRAND / MANUFACTURER.
1.	PLYWOOD - BWR- CONFIRMING TO IS :710.	GREENPLY /CENTURY PLY /NICON /HUNSUR/BLACKCOAT
2.	LAMINATE - CONFIRMING TO IS: 2046-1995	GREENLAM / CENTURY/ BRAVIA/ARCHID/STYLAM
3.	GLASS	MODIFLOAT / ASAHIFLOAT / SAINT GOBAIN MAKE.
4.	HARDWARE	EFFICIENT GADGETS / EARL BEHARI (EBCO) / HARDWIN / ETALICA.
5.	FLUSH DOOR - CONFIRMING TO IS: 2202 (Part - 1) - 1991	GREENPLY/ NICON / BLACK COAT PREMIA
6.	BEECH WOOD.	AS APPROVED BY THE CONSULTANT.
7.	VENEER. (4MM AND PAPER VENEER) - GROUP MATCHED, STRAIGHT GRAIN.	GREENLAM / CENTURY/ MERINO/ SIGNATURE
8.	BLOCK BOARD.	CENTURY PLY / GREENPLY / SAMRAT PLY
9.	GI SUPPORT SYSTEM FOR FALSE CEILING.	SAINT GOBAIN MAKE/ US BORAL
10.	GI DRY WALL PARTITION SYSTEM	RONDO / BMS OR APPROVED EQUIVALENT.
11.	ROLLER BLINDS	VISTA LEVOLOR, MAC, HUNTER DOUGLAS OR EQUIVALENT.
12.	PLASTER BOARDS	SAINT GOBAIN MAKE / US BORAL
13.	SOFT BOARD	JOLLY BOARD OR APPROVED EQUIVALENT.
14.	SCREWS	GKW/METTLEFOLD OR APPROVED EQUIVALENT.
15.	ADHESIVES	MOVICOL / FEVICOL SH / ARALDITE ORAPPROVED EQUIVALENT.
16.	PAINT	ASIAN/ ICI/ BERGER/NEROLAC OR APPROVED EQUIVALENT.
17.	FLOOR SPRING & PATCH FITTINGS	DORSET / STERLING / OZONE/ DORMA
18.	DOOR CLOSURES	DORSET / STERLING / OZONE/ DORMA/GODREJ
19.	TEXTURED PAINT.	TERRACO / SPECTRUM OR APPROVED EQUIVALENT.
20.	VINYL FLOORING.	ARMSTRONG OR APPROVED EQUIVALENT.
21.	WRITING BOARD.	WHITE MARK OR APPROVED EQUIVALENT.
22.	DRAW/STORAGE/DOOR LOCKS AND HANDLES	KICH/ DORSET / OZONE/ DORMA/ GODREJ
23.	HINGES.	C.I. HINGES OF PALLDIUM / JYOTHI BRAND OR ANY REPUTABLE BRAND.
24.	CEILING TILES.	ARMSTRONG (RH DUNE 99) / AMF / US BORAL(WHITE SAND)
25.	TRULOCK SILHOUETTE GRID PROFILE	KNAUF/ARMSTRONG/ US BORAL
26.	VITRIFIED TILES	JOHNSON, KAJARIA, RAK
27.	CHAIRS	FEATHERLITE, GODREJ, WIPRO, ZODIAC, BOSQ
28.	UPVC WINDOW	NCL, ENCRAFT, FENESTA
29.	CEMENT	JK/ULTRATECH/ACC/AMBUJA/BIRLA OF 43/53 GRADE

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

<u>S.No.</u>	<u>Material Name.</u>	<u>Brand / Manufacturer / Recommended Make.</u>
1.	SWITCHES/SOCKETS/FAN REGULATORS/FRONT.	MK INDIA (MK BLENZ) / LEGRAND (MYRIUS) /HAVELLS CRABTREE (VERONA),INDA ASIAN WEST (NOWA)
2.	TELEPHONE/COMPUTER AND LAN SOCKETS	LEGRAND/HAVELL / AMP/ SYSTIMAX / PANDUIT
3.	CABLES/COPPER CONDUCTOR WIRES	FINOLEX / POLYCAB / HAVELLS
4.	PVC CONDUITS & ACCESSORIES	PRECISION (DT) / SUDHAKAR/ AVON PLAST / ATUL / MECURY / VIP.
5.	MS CONDUITS & ACCESSORIES	GUPTA / BHARAT / BEC.
6.	METAL CLAD SOCKETS	MDS / CLIPSAL / BCH / LEGRAND.
7.	MCBS / RCBO / RCCBS / MCB DISTRIBUTION BOARDS	L&T- HAGER / SCHNEIDER/ BCH / SIEMENS / ABB / LEGRAND.
8.	MCCBS/SWITCHGEAR	L&T- HAGER / SCHNEIDER/ BCH / SIEMENS / ABB / LEGRAND.
9.	UNDER GROUND CABLES	POLYCAB / FINOLEX / HAVELLS
10.	CABLE GLANDS	HMI /COMET /HAVELLS
11.	CAPACITOR BANK	EPCOS /NEPTUNE / SIEMENS.
12.	CABLE LUGS	DOWELL'S / 3D /HAVELLS
13.	MV PANELS (PCCS)	MANUFACTURERS WITH CPRI TEST CERTIFICATE.
14.	ELRS/CBCT	PROKDVS /NAGoba
15.	KRONE BOX	KRONE,
16.	INDICATION LAMPS LED (PROTECTED TYPE)	SCHNEIDER / VAISHNO / BINAY
17.	RESIGN CAST CTS	AE / KAPPA
18.	CAT6 / RG 6 / RG 11	LEGRAND /HAVELL/ AMP/SYSTIMAX/D-LINK
19.	LAN (RJ45) SOCKETS	LEGRAND /HAVELL/ AMP/SYSTIMAX/D-LINK
20.	LIGHT FIXTURES	PHILIPS / WIPRO / HAVELLS /CROMPTON
21.	CEILING FANS & EXHAUST FANS	CROMPTON GREAVES
22.	BBTS BUS BAR TRUNKING SYSTEM	LEGRAND,L&T,C&S,SCHNEIDER

Note: All wires to be uses shall be FRLS

LIST OF APPROVED MAKES FOR MATERIALS FOR DATA WORKS

S.Nos.	Name of the materials	Approved make.
1.	CAT6 E UTP CABLE	LEGRAND/HAVELL/AMP/SYSTIMAX/PANDUIT/D-LINK
2.	PVC CASING/PIPE/FLEXIBLE PIPE	MODI/SUDHAKAR/ VIP/ UNIVERSAL
3.	CAT6 24-PORT JACK PANEL	LEGRAND/HAVELL/AMP/SYSTIMAX/PANDUIT/D-LINK
4.	CAT6 INFORMATION OUT LET, FACEPLATE WITH SMD	LEGRAND/HAVELL/AMP/SYSTIMAX/PANDUIT/D-LINK
5.	CAT6 MOUNTING CORD 3FT (1MTR) FACTORY MADE	LEGRAND/HAVELL/AMP/SYSTIMAX/PANDUIT/D-LINK
6.	CAT6 MOUNTING CORD 7FT (2MTR) FACTORY MADE	LEGRAND/HAVELL/AMP/SYSTIMAX/PANDUIT/D-LINK

<u>S.No.</u>	<u>Material Name.</u>	<u>Brand / Manufacturer / Recommended Make.</u>
1.	VRV/F Out Door Unit	Mitsubishi Heavy, Mitsubishi Electric, Daikin, Hitachi , Bluestar, Carrier
2.	VRV/F- Indoor Units Cassette Type	Mitsubishi Heavy, Mitsubishi Electric, Daikin, Hitachi , Bluestar, Carrier
3	VRV/F-Indoor Units Hi Wall Type	Mitsubishi Heavy, Mitsubishi Electric, Daikin, Hitachi , Bluestar, Carrier
4	Hi-Wall Split AC Units	Mitsubishi Heavy, Mitsubishi Electric, Daikin, Hitachi , Bluestar, Carrier, Voltas
5	Cassette AC Units	Mitsubishi Heavy, Mitsubishi Electric, Daikin, Hitachi , Bluestar, Carrier
6	Refrigerant Joints / Multi kits	Mitsubishi Heavy, Mitsubishi Electric, Daikin, Hitachi , Bluestar, Carrier
7.	Refrigerant Piping	Mandev / Rajko
8.	Drain Piping	Mandev / Rajko/Sudhakar pvc
9.	Nitrille Rubber Insulation	Aerolam / Armacell / Trocellene
10.	Control cum Transmission wiring	Delton/ Finolex/Polycab
11.	Cable Tray	MEK/ Indian/ Patney
12.	Software Integration	Mitsubishi Heavy, Mitsubishi Electric, Daikin, Hitachi , Bluestar, Carrier

NOTE :

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

2. The contractor shall display the samples of all the brands specified out of which one brand will be chosen by Architect / Bank

ALL MAKE SHALL BE CONFIRMING TO BIS ONLY.

Regional Office - Mahabubnagar

Door No: 8-3-40, 1st floor, GL tower, near Venkateshwara colony bus stop, Mettugadda, Mahabubnagar-509001.

Email: pnd.romahabubnagar@unionbankofindia.bank

Tender Ref. No. ROMHB:PND:102:2026-27

Dt.09.07.2026

SUBJECT : INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND AC WORKS AT NEW REGIONAL OFFICE – SV SQUARE, PLOT No.3,15,27, SY.No.287, WARD No. 10, BLOCK NO.4, YENUGONDA TOWN, MAHABUBNAGAR Dist – 509001, TELANGANA, INDIA for 1st Floor, 2nd Floor & 3rd Floor

**TENDER FOR
INTERIOR FURNISHING, INTERNAL ELECTRICAL, NETWORKING AND AC
WORKS**

**PART-2
Price -Bid**

(To be submitted in separate sealed envelope)

The price bid will be opened only of those satisfying the Criteria of Pre-qualification

Date of issue of Tender	: 11.07.2026 to 01.08.2026 During office hours.
Last date for submission of tender	: 01.08.2026 up to 3.00 pm.
Opening of Bid	: 01.08.2026 at 4.00 pm.
Pre bid Meeting	: 27.07.2026 at 4.00 pm.

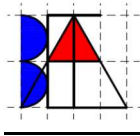
Name of the Contractor:.....

PLACE OF COLLECTING, SUBMISSION OF TENDER AND PRE-BID MEETING

Union Bank of India,
Regional Office - Mahabubnagar
Door No: 8-3-40, 1st floor, GL tower, near Venkateshwara colony bus stop, Mettugadda, Mahabubnagar-509001.

Email: pnd.romahabubnagar@unionbankofindia.bank

Consultant:



ARCHITECT

BURMAN ET.AL

1-79/1, Kothapet, Near Balapur, Balapur Mandal,

RR District, Hyderabad, Telengana-500005.

Mob: 8125196178, 8328251857

9811210589, 8800147589.

E-mail: burmanetal2008@gmail.com

burmanetalhyd@gmail.com.

PROJECT: UNION BANK OF INDIA AT REGIONAL OFFICE- REGIONAL OFFICE –

Door No: 8-3-40, 1st floor, GL tower, near Venkateshwara colony bus stop, Mettugadda,
Mahabubnagar-509001.

Email: pnd.romahabubnagar@unionbankofindia.bank

SUMMARY

ARCHITECT :- DESIGN INTEGRATION.

S.NO.	ITEMS	AMOUNT
1	INTERIOR WORK	
2	ELECTRICAL AND LAN WORK	
3	AC WORK	
	TOTAL AMOUNT	
	DISCOUNT IF ANY	
	GRAND TOTAL	

BOQS FOR INTERIOR WORKS FOR UNION BANK OF INDIA NEW REGIONAL OFFICE AT SV SQUARE,
Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist – 509001,
Telangana, INDIA for 1st Floor,2nd Floor & 3rd Floor

S.No	Description	Unit	Qty	Rate	Amount
	INTERIOR FURNITURE WORK FOR BRANCH				
1.0	GYPSUM BOARD FALSE CEILING - Providing & fixing as per design with suspended false ceiling consisting of 12mm.thk.Gyp. board suspended on G.I. framework to consists of G.I. perimeter channels 0.55 mm thk. x 20mm .x 30mm. along perimeter of false ceiling; screw fixed to wall/partition with nylon sleeves & screws @ 600mm. dc. Suspending GI. Intermediate channels of size 0.9mm thk.x45mmx15mm. from the soffit at max. distance 1220mm. dc with ceiling angle 0.55mm. thk.x2n5mm.x10mm. Fixed to soffit using proprietary supplied GI. Cleats & steel expansion fasteners. Ceiling section 0.55mm thk. xweb size 51.5mm & flanges 26mm. Each & 10.5 mm. lips fixed perpendicular to intermediate channel at 457mm. c/c Gyp board is screw fixed to ceiling section with 25mm. drywall screws at 230mm. c/c. boards to be finished with proprietary supplied jointing tape & jointing compound & sand papered to achieve a smooth finish etc.complete or as directed by the Architec/Bank. Gyp ceiling where necessary as normal specification Rate should include all types of cut-outs, grooves ,moulding & plain troughs for tube lights / Down Lighter as directed by the designer. Note: Where RCC Slab is old and concrete is weal, the GI suspended channel shall be fixed with epoxy chemical and necessary load test to be carrid out before fixing Gypsum board fixing.Rate shall be inclusive of epoxy chemical and fixing of suspenders with chemical no extra will be given for vertical and borders and rate include with luppum ,painting upto 3 coats till smooth finish.	Sft.	2,750.00		
2.0	ARMSTRONG FALSE CEILING - Providing and fixing of Armstrong make Mineral fibre Ceiling Boards in true horizontal level suspended on inter locking Grid system made of Hot Dip Galvanized steel sections powder coated XL -15 mm as per manufacturers specification including making opening for electrical and air conditioning fitting complete as directed. The tiles and grid system FRAMEWORK XL-15 mm Main Runner of 3000mm spaced at 1200mm centre fixed to soffit by approved hangers at 1200mm distance. First and last hanger should not be at a distance more than 450mm from the adjacent wall.XL-15 mm 1200mm cross Tee to be interlocked between Main Runner at 600mm centre to form 1200x600mm module 600mmx600mm module to be formed by fixing XL-15mm 600mm Cross Tee between centre of 1200mm Cross Tees.19X19 mm Wall Angle to be secured to wall at 450mm centers Suspension to be done by using 2mm pre-straightened GI wire using anchor fasteners. Make - Armstrong - ANS Micro & Supra fine XL frame work. Note: Where RCC Slab is old and concrete is weal, the GI suspended channel shall be fixed with epoxy chemical and necessary load test to be carrid out before fixing Gypsum board fixing.Rate shall be inclusive of epoxy chemical and fixing of suspenders with chemical	Sft.	3,500.00		
2A	Supply and Fixing of Decorative Ceiling to be made as per the material selected and Suggested by the like wood ,acleric sheet ,gypsum projections banks deign logo ,theme based design and as per the site situation /discussion given by the Architect /Client As per the Site Conditions on Front Lobby Base (Rate includes with material ,labour ,fixing ,lifting ,transportation and design and cutting charges will not be paid extra)	sft	250.00		
3.0	FULL HT SOLID PARTITION - Full Height Solid Partitions : Providing and Fixing of Full height partitions all made with	Sft.	1,955.00		

	Sall/Kail/Marandi wood frame of 2"x2" section with 2'0"x2'0" c/c vertically and horizontally. Frame to be covered with 8 mm plywood of (Century/Green /nikon) from both sides. 1mm thick laminate/Veneer of (Century/Bravia/Greenply) to be covered from both the sides of the partition. Frame should be properly fixed to the Floor, Vertical members should be firmly to the Slab and side wall available. Laminate should be considered up to two or three colour combination. All as per the design suggested at site and instructions of Architects.(Frame work above false ceiling done for fixidity shall not be measured but contractor may factor it while quoting their rate as measurements up to false ceiling level only be taken). Plywood wherever mentioned Must be BWR GRADE , MARKED ISI.				
4.0	SEMI GLAZED PARTITION WITH DOOR - Full Ht. Partitions : Same as Item no 3 but 8mm toughened Glass with Etching design or One way vision film approved design should be provided with 35mm x 12mm Steam beach Molding duly melamine polished. This glass will be starting from 3'-0" ht from ffl .All as per the design and instructions of Architects. Plywood wherever mentioned BWR GRADE .AS GIVE IN THE ITEM .(AGM CABIN TWO SIDES)	Sft.	1,962.00		
5.0	PARTLY GLAZED LOW HT PARTITION - Low Ht /Half Ht Solid Partitions: Same as Item no 3 but Low ht or Half height as per design. Edges of the partition to be covered with 3"x1.5" Steam beach wood duly male mine polished moulding. All as per the design and instructions of the design in charge.ply wood wherever mentioned BWR GRADE IS 303,(AT WORK STATION AND BETWEEN TABLES)(Between workstations , 2 sides for section heads & DM cubical 2 sides).	Sft	1,550.00		
6.0	TABLE (Size:- 5'-6" OR 4'-6" x 2'-6") ht. 2'-6" :- Providing and fixing tables made out of 19 mm thick commercial ply over hard wood frame work finished with 1.0mm Lam of approved shade. Top having steam beech wood edging of size 2" x 1 3/4". 10mm thick clear float glass with beveled edges shall be provided on the finished to 19mm thk Comm.ply wood of approved make cladded with Lam as per design in all visible areas. All the exposed edges to be covered with wooden steam beech lippings and mouldings duly malamine polish. The drawers to be made out of 19mm thk ply wood with 1.0Lam finish in the front , and bottom to be made out of 6mm plywood and it should play in drawer sliding telescopic channels. The inside of the drawer to be duly paint/LAM & Table back side wil be 1mm laminate. A leg rest to be provided duly polished made out of 3"x2" Wooden Section. A shutter to be made by 19mm ply wood cladded with 1.0mm thick Lam .The necessary locks handles to be provided in each drawers and shutters. 3" x 1/2" wooden skirting to be provided in all visible areas duly polished. The necessary wire managers(SS) to be provided on the tables and provision for lights to be kept if required in the front of the table. All the exposed areas to be polished The work to be completed as per design and approval of the Bank. The table should have key board tray and CPU Trolly to be Modular. <u>All as per the design and instructions Bank .(for DM table)</u>	RFT	77.00		
7.0	UTILITY COUNTER (2'-0" WIDE) :- Providing and fixing of Utility Counter 2'-0" wide top made up of 19mm board pasted on 1.0 thl lam. The Top of table will be finish with 1.0mm thick lam .all hardware fittings fixtures etc. The drawers to be made out of 19mm thk board with 1.0mm thick lam finish in the front ,sides to be made out of 12mm plywood and bottom to be made out of 6mm plywood and it should play in drawer sliding telescopic channels. The inside of the drawer to be duly paint. All exposed edges to have wooden lipping stained to match the desk and melamine finished.Design and detail of the table shall be as per	R.FT.	10.00		

	design. (As per Site, Designing of Table and specification may be Changed). The works to include a keyboard tray and CPU trolley to be modular. <u>All as per the design and instructions Bank/Architect. (S.S. Finish Lock & Handle to be included) for counter no. 17</u>				
8.0	Officer/Clerk counter - Providing & fixing officers counter of 2'-5" height, 4'-6" TO 5' length and 2'-6 " OR 2'-0" width , Counter to be made up of 18mm. thk. Plywood framework and open space for C.P.U. & small drawer above it on other side of Key Board drawer. The counter should have necessary holes of required sizes for wire managers. The counter should have necessary passages & ledges for data cables, electrical cables and telephone lines. The counter should be finished with 1.0mm. Thk. Laminate of approved color & shade from external side and polish from inside. All the exposed edges of plywood including lower edges should have lipping patti. Lipping patti should be finished in polish. The cost should include necessary hardware Moulding .handles & Godrej make drawer locks with common key for cash drawers, footrest etc. complete as per design. for running tables rate includes with glass seperater /partition of 12mm thk floated glass with fixing with studs and other hardware to be made as per the instruction given by the architect.	Rft	280.50		
9.0	RM TABLE (8'-0"x3'-0") :Fabricating manger's Table made out of 18mm BWR Grade ply, having table top 2'-6" height from the ground level & 3'-0" clear top width. it will have a side table of size 1'-6" x 3'-0" Table shall be provided with a sliding keyboard tray 2'-3" wide with slider, 2nos drawers on either sides and cupboard below the drawer locking arrangements, aluminum handles, brass hinges etc all exposed surface shall be laminated with 1.0 mm thk rubber wood laminate. 12mm thk plain glass on table top as per shape with cutting for wire manager. The internal surfaces shall be painted with two coats of enamel paint over a coat of primer. Provision for c.p.u stand 1'-0" x 2'-0" & foot rest of size 75mm x 38mm shall be at bottom .wire manger shall be provided to the counter all exposed edges of the block board shall be provided with teak wood beading and polishing etc, complete. All exposed edges of the block shall be provided with teak wooden beading (3"x1"front side and 1"x 3/4" inner side) and polishing done etc. complete as shown in drawing.	no	1.00		
10.0	CONFERENCE TABLE - CONFERENCE TABLE (Size :- 22'-0" x 7'-0") ht. 2'-6" To be made up of 18mm commercial plywood by making top and bottum with required support on the surface to be laminate/veneer and 6MM Corean top to be fixed on the table .table to be made of design and instruction given by the Architect.	NO's	1.00		
11.0	DINING PLATFORM - Providing & Fixing Dining Platform 2'-0" wide made with 18mm ply finished with 1mm thick laminate on all surfaces including verticals. The platform should be supported on 18mm tk ply verticals placed at 2'0" intervals. All the edges of the plywood are covered with 12mm tk. steam beech beeding duly painted.	R.FT.	40.00		
12.0	Side Units - Providing & fixing side unit made up of 18mm. thk. plywood framework & 6mm. thk. plywood as backing. Side unit should have 2 no. of drawers above & shutters below. Drawers should be made up of 18 thk. Plywood fascia, 12 thk. Plywood sides & 6 thk. Plywood bottom. Drawers should be mounted on heavy duty drawer sliders. Side unit should be finished with 1.0 mm. thk. Laminate of approved shade & colour on external surface & oil paint to non laminated surface. All exposed edges of 18 thk. & 12 thk. Plywood should have lipping patti All lipping patti's should be finished with paint/french polish on it. The cost should include necessary hardware, handles, Godrej make locks with common handles, Godrej make locks with common key for set of	Sft	250.00		

	drawers etc. complete as per design. Drawers to be made of 12 mm thick comm. plywood and finished with laminate on front and enamel painted inside				
13.0	Storage Units				
A	Providing & fixing storage units made up 18 mm. thk. plywood framework, 6 mm. thk. plywood back as required as per design. Good quality blockboard shutters should be fixed on SS heavy hinges Storage units. should be finished with 1.0 mm. thk. laminate from external side & oil paint to non laminate ed surfaces. All exposed edges of plywood should have lipping patti on it. Lipping patti should be finished with French polish on it. The cost should include necessary handles, magnetic catches, Godrej make locks etc. complete as per design. LOW HEIGHT STORAGE	Sft	550.00		
B	Providing & fixing storage units made up 18 mm. thk. plywood framework, 6 mm. thk. plywood back as required as per design. Good quality blockboard shutters should be fixed on SS heavy hinges Storage units. should be finished with 1.0 mm. thk. laminate from external side & oil paint to non laminate ed surfaces. All exposed edges of plywood should have lipping patti on it. Lipping patti should be finished with French polish on it. The cost should include necessary handles, magnetic catches, Godrej make locks etc. complete as per design. FULL HEIGHT STORAGE .	Sft	1,000.00		
14.0	Main Entrance Door with Partition - Providing & fixing main door & partition made up of 12 mm thk. Clear toughened glass shall be fixed in.Ozon / Enox make patch fitting with necessary hardware.With application of sealant from all sides. Edge polish for all exposed sides of glass. Complete as per design Door size 7'0" x 3'0" - Providing & fixing main door made up of 12 mm thk. Clear toughen glass shall be fixed in.Ozon / Enox make patch fitting with necessary hardware like floor spring, 12" S.S. finished decorative handle pair,& locking arrangment. Edge polish for all exposed sides of glass. Complete as per design and rate includes with all the mechanism and floor spring fixing at Entrance.	Sft	210.00		
14A	Supply and Fixing Of glass shelves come with flat polished edges with 3/8 inch or 10mm thick glass. With smooth surface and tough strength with displaying Front Glass . should be Durable enough to lift the weight of Memento and Glass shelf holders to be rust-proof and durable, The qualities to be more reliable and long-lasting , maximum weight capacity is 50 lbs.and Design given by the Architect.	Sft	60.00		
15.0	PILLER /WALL PANELLING - Fabricating and fixing wall/column paneling to consist of 37.5mm x 50mm treated kail/chir hardwood framework at spacing not exceeding 600mm bothways (horizontal and vertical). Paneling framework to be secured to wall surface/column surface.Paneling framework to be clad on one side with 8mm thick commercial ply finished with 1.0mm thk laminate including skirting of 100mm high & 12mm x 12mm groove at skirting level. Plywood wherever mentioned Must be BWR GRADE AND IS 303, MARKED ISI.(THIS ITEM IS AS PER SITE CONDITION AND AS PER THE REQUIRMENT)	Sft	2,600.00		
16.0	SHUTTER BOXING - OUT OF SHUTTER BOX Overhead outside shutter box: p/f sal/maranti wood frame fixing of 12mm plywood with 1mm thk. Laminate finish and openable shutter for out side area	Sft	300.00		
17.0	WOODEN PODIUM - Supply and Fixing of Wooden Movable podium with Size (Feet): 121 X 50 X 45 Cms provision for mic to be provided and it should be made up of standard plywood with surface approved make laminate and Design given by The Architect.	Nos	1.00		

18.0	WOODEN Platform Stgae - Supply and Fixing of Wooden Platform for the conference area height 6 inches with above solid platform.	Nos	1.00		
19.0	Solid Doors : providing and fixing of solid door and Door Frame should of best quality non-teak wood of 4.5"x2.5" section without Glass. Instead of glass, matching laminate on plywood to be used for maintaining uniform appearance. Plywood wherever mentioned Must be BWR GRADE AND IS 303, MARKED ISI. rate includes with laminate panal, nails adhesive , hardware ,labour ,transportation,lifting, etc for pantry ,ups,passage and other rooms	Nos	11.00		
20.0	VERTICAL BLINDS:- Providing and fixing vertical blinds of 100mm lenth of vista Lavour of approved shade and pattern. The rate shall include necessary scoch gurd treatment on both sides. The overlaping should be uniform and adequate.Necessary oparative arrangements,frames to be provided. The work to be completed as per specification and approval of the architect.MAKE(vista) at banking hall and cabins windows.	Sft	250.00		
21.0	SOFT BOARD:- Providing and fixing soft board with necessary framework with 12mm plywood on top 12 jolly board to be fixed finished with fabric @Rs120 , with necessary mouldings duly polished along the periferi.	Sft	210.00		
22.0	TEXTURED PAINT:- Providing , spraying and applying Texture paint as per approved shade as per approval of the architect. Bi colour texture paint will be used. On POP finish wall to give a smooth surface as per approval of the Architect.(optional for pillar)	SFT	150.00		
23.0	WALL DISPLAY BEHIND VISITOR AREA - Structure made by 18mm plywood and gypsum board 6" depth boxing ,finish with 1mm thk. laminate, splot light,flower vase, abstrac paintings as per drawings.	SFT	30.00		
24.0	BACK DROP BEHIND RECEPTION AREA - Structure made by 19mm plywood and gypsum board finish with laminate/veneer, and 10mm frosted glass panelling with splot light,flower vase, abstrac paintings as per drawings.	SFT	60.00		
25.0	WHITE BOARD - P/F in position magnetic white board (make Alkor, Whitemark) to walls complete as per detailed drawings.	SFT	50.00		
26.0	Lacquerd glass - Providing & fixing 6 mm thk Lacquerd glass for projector fixed with S.S stud.	SFT	50.00		
27.0	TOILETS, UPS & RECORDS, etc., (INCLU. CEILING) PAINT - Cleaning the old surface of the wall and then applying & painting walls with OBD White paint matt finish with two coats of approved make shade and colour over a base coat of appropriate paint of approved make (total 3 coats) including cost and conveyance of materials like paint to site including lift and labour charges such as preparing the wall,applying luppum,applying primary coat, curing for primary coat, applying paint with matt finish two coats etc., complete for the finished item of work.	SFT	2,500.00		
28.0	SYNTHETIC ENAMEL PAINT FOR WINDOW GRILL, ROLLING SHUTTER & COLLAPSEABLE GATE - Providing and applying 2 coats synthetic enamel paint on window grill,rolling shutter and collapsible gate.Before putting final paint scrapping, leveling, preparing the surface and 2 coats primer to be done.The wall to be completed as per the direction of architect.	SFT	380.00		
29.0	Round Meeting table - Providing and fixing Round Meeting Table of 4'-0" (1200 mm) diameter and 2'-6" height, made with 18 mm thick commercial plywood/MR grade board finished with 1.0 mm laminate on top surface and approved laminate finish on exposed vertical surfaces. Edges to be finished with matching PVC edge banding. Table to be supported on sturdy wooden/modular metal base frame with necessary bracing, hardware, screws, fittings, and leveling bushes. Complete with polishing/laminate	Nos	2.00		

	finish, transportation, labor, installation, and all incidental works required for a complete finished table as per approved design and site requirements. Size: 4'-0" Dia × 2'-6" H Rate Includes: Plywood/MR board, Laminate finish, PVC edge banding, Base frame/support structure, Hardware and fittings, Transportation, Labor and installation, Complete finishing and site fixing				
30.0	Meeting room center table - Providing, fabricating, supplying and installing Meeting Table of required size as per approved drawing, made with 18mm thick commercial/BWR grade plywood structure finished with 1.0mm laminate on top and exposed surfaces, including edge banding, necessary supports, modesty panel, cable management provisions, hardware, screws, adhesive, polishing of internal surfaces, transportation, loading, unloading, labour, tools and all accessories complete in all respects as directed by the Engineer/Architect. 8' x 3' Meeting Table	Nos	1.00		
31.0	Dining table - Providing, fabricating, supplying and installing Meeting Table of required size as per approved drawing, made with 18mm thick commercial/BWR grade plywood structure finished with 1.0mm laminate on top and exposed surfaces, including edge banding, necessary supports, modesty panel, cable management provisions, hardware, screws, adhesive, polishing of internal surfaces, transportation, loading, unloading, labour, tools and all accessories complete in all respects as directed by the Engineer/Architect. 8' x 3' Meeting Table	Nos	3.00		
	TOTAL AMOUNT				
	DISCOUNT IF ANY				-
	GRAND TOTAL				
BOQS FOR ELECTRICAL WORK FOR UNION BANK OF INDIA REGIONAL OFFICE MAHABUBNAGAR - 3 FLOOR					
S.NO	DESCRIPTION	UNIT	QTY	Rate	Amount
	INTERNAL ELECTRICAL WORKS				
E - 1	<u>Lights Points(Including Circuit Wiring 2x2.5+1.5 Sqmm)</u>				
	Point Wiring for Light/ Fan/ Exhaust fan with 2runs of 650V grade 1.5 Sq.mm FRLS PVC & 1 run of 1.5 Sq.mm PVC insulated Copper wires , run in 25 mm dia heavy gauge PVC conduits concealed in wall / ceiling conforming to IS including all accessories such as junction boxes, conduit bends elbows and ceiling rose, anodised GI Switch box with modular switch and the box covered with front plate.(Point Wiring Include Circuit Wiring From Main Db to SWitch Board with 2x2.5 +1.5 Sqmm Copper fluxible wire etc)				
a	One Light point controlled by one 6A switch.	Nos	100.00		
b	Two Lights point controlled by one 6A switch.	Nos	100.00		
c	Exhaust fan point controlled by one switch.	Nos	10.00		
d	Ups light point (from ups room to AGM and hall)	Nos	30.00		
e	Ceiling fan point controlled by one switch & Electronic Step type Regulator and Concealed MS fan hook box.	Nos	12.00		
f	Supply and fixing of 6A, 3Pin Socket outlet switches of 6A rating boards for Wall Mounting Fans and (Dependant				
i	Dependant fans	Nos	20.00		
ii	Independent Fans	Nos	20.00		
E - 2	Supply and Wiring with the following size 650V grade FR PVC insulated Copper conductor wires in suitable PVC conduit including end terminations with suitable lugs.				
	a)Supply and wiring of UPS Points wiring from UPS Room DB to Individual Work Stations With required all Connections and	Rmt	450.00		

	Suitable PVC Conduites. 2runs of 2.5Sq.mm PVC wires with 1run of 1.5 Sq.mm PVC Conduite for UPS out going Wirings				
	c) 2 runs of 6 Sq.mm PVC wires with 1 run of 4 Sq.mm PVC insulated Copper earth wire in PVC in conduit. For A/C Sockets	Rmt	350.00		
	d) 4 runs of 4 Sq.mm PVC wires with 2 runs of 4Sq.mm PVC insulated Copper earth wire in PVC conduit.	Rmt	250.00		
	e) 2runs of 4.0 Sq.mm PVC wires with 1run of 1.5 Sq.mm PVC wire for Name board from the 10 A DP MCB on the main board	LS	3.00		
E - 3	Light / Fan Fixtures				
	Supplying, installation with hanging support, testing and commissioning of following light fixtures with electronic Ballasts, Tubes, lamps, all fixing materials including connecting wires etc. all complete as per the directions of Engineer-in-charge (All LED Light Fixtures should be covered with minimum 3 Years onsite replacement warranty).on gypsum ceiling no additional rate will be provided for frame or any hardware.				
1.0	Ceiling FIXTURE LED Spot lights	Nos	10.00		
2.0	FULL GLOW 2 X 2 LED 36 W slim Smart Panel of make As specified in tender document or approved by Bank/Architect.	Nos	100.00		
3.0	Supplying, fixing, testing and commissioning of 15 W LED commercial type down lighter of make As specified in tender document or approved by Bank/Architect.	Nos	120.00		
4.0	Supplying, fixing, testing and commissioning of 1X18/40 watts T5 led light fixture Wall/ Ceiling mounted (Philips ,havells)	Nos	55.00		
5.0	Supplying, fixing, testing and commissioning of Led rope light	Rmt	100.00		
E - 4	Ceiling Fans				
	Supply & Fixing of 1200 mm sweep Crompton Make High Speed Ceiling fan with standard down rod, all accessories Electrical connections. Including fixing materials required.	Nos	12.00		
E - 5	Wall Mounted Fans				
	Supply & Fixing of 400 mm sweep Wall mounted fan with metal body with the specifications given by the bank /Architect 3 pin Plug on the lead wire of each fan all accessories Electrical connections. Including fixing materials required.	Nos	40.00		
E - 6	Exhaust Fans				
	Supply,fixing and commissoning of Fresh air exhaust fan of light duty 300mm size (9"), Metallic body plastic blades, wire mesh, etc. including cost and conveyance of all materials, taxes and all labor charges etc., complete for eraction.Make:Crompton/Havells/bajaj.	Nos	10.00		
C.	<u>SUPPLY, INSTALLATION OF MAIN DISTRIBUTION & FINAL DISTRIBUTION BOARD</u>	-	-	-	-
1.0	Design, manufacturing, supply, loading, unloading, shifting to location, inspection, installation, testing and commissioning of Main distribution panels/ sub-distribution panels fabricated out of CRCA sheet steel not less than 14 gauge for load bearing members and 16 gauge for non load bearing member in cubicle formation, compartmentalized, form 3B type construction, free standing floor mounted, dust and vermin proof (indoor application; IP-42) with reinforcement of suitable size angle iron, channel, 'T' sections and/or flats wherever necessary. 3 mm thick cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process before powder coating as per specifications and final approved shade. The operating handle of the highest unit shall be at a height of 1.8 metre maximum and 300 mm minimum. Overall height of the panel shall not exceed 2.3 metre. 2 No. earthing terminals shall be provided for all				

	distribution panels. Panels shall be suitable for 415V, 3 phase, 4 wire, 50 HZ supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel in the form of shop drawings before fabrication.				
1.1	MAIN DISTRIBUTION BOARD:				
A.	INCOMERS - 2NO (1 No. for Mains & 1 No. for DG Power)				
a.	2 No. 150A 4P MCCB 25kA with adjustable thermal & Magnetic trip unit				
b.	2 Set- 0-125 Amps Meter (96 x 96mm) with 3 No. CT's, selector switch-AE make				
c.	2 Set- 0-500 V A.C. 50 Hz. Volt meter (96 x 96mm) with selector switch-AE make				
d.	2 Sets- ON - OFF Indication lights				
e.	2 Sets- R-Y-B (phase indication lights				
f.	1 No. 150Amps 4 pole Change over switch (On-Load type).				
B.	BUS BARS				
a.	1 Set - 300, Aluminium Bus Bars				
	with 160amps change over mandotry				
C.	OUTGOINGS -				
a.	1 No. 63 Amps FP MCB's -10 kA (Raw Power DB)				
b.	1 No. 63 Amps FP MCB's -10 kA (Lighting DB)				
c.	1 No. 63 Amps FP MCB's -10 kA (UPS Incoming)				
d.	10 No. 32 Amps FP MCB's -10 kA (AC Outdoor Units)				
e.	10 No. 16/20/32 Amps DP MCB's (AC Outdoor Units)				
f.	1 No. 63 Amps FP MCB's -10 kA (spare)	Nos	1.00		
b	b)Supply, installation, testing and commissioning of (Double door) with 4Way TPN MCB DB with 63A 4Pole MCB as incomer and 12 nos10A SPMCBs s outgoing. (for LDB) LEGRAND / HAVELS	Nos	4.00		
c	c)Supply, installation, testing and commissioning of 8way SPN MCB DB (Double door) with 32A DP MCB as incomer and 6nos. 6A/10A/16A SPMCBs as outgoing.(UPS DB) LEGRAND / HAVELS	Nos.	4.00		
d	d)Supply and fixing of 32 A, DP MCB-1No. with encloser for UPS Incoming.	Nos	4.00		
	e)Supply and fixing of 63A 4 Pole Change over Switch for LDB/UPS Connections with encloser for UPS Incoming.	Nos	2.00		
E - 7	Raw power Wiring and Sockets; Supply and wiring of Raw Power Points from Main DB to Individual Work Stations With required all Connections with 2runs of 2.5Sq.mm PVC wires with 1run of 1.5 Sq.mm PVC Conduite for UPS out going Wirings and also SAupply and fixing of 1 Nos 6A sockets with 1 Nos 6A switch of modular type with 'front plate and anodised GI box complete 'as required'.for UPS Sockets	Nos	88.00		
E -8	Supply and fixing of lno 16A 3pin 'socketswith 16A switch of modular type with 'front plate and anodised GI box complete 'as required'.(Raw Power)	Nos	12.00		
E -8- a	Supply and fixing of pop up Box is Hydraulic ,open with press button. Connection 2 power,2 Lan,Hdmi,Vga,Audio,Usb with 6 inch female connection cables.	Nos	6.00		
E - 9	UPS Wiring and Switch/Sockets; Supply and wiring of UPS Points from UPS Room DB to Individual Work Stations With required all Connections with 2runs of 2.5Sq.mm PVC wires with 1run of 1.5 Sq.mm PVC Conduite for UPS out going Wirings and also SAupply and fixing of 3 Nos 6A sockets with 2 Nos 6A switch of modular type with 'front plate and anodised GI box complete 'as required'.for UPS Sockets. (UPS -1 conection table / counter no.1,3,5 & 7 and UPS -2 table no. 2,4,6 & 8 etc, and network rack & manager 2 UPS points from UPS-1 & UPS-2. if require seperate	Nos	88.00		

	<u>3 module controlling to be given on top of the table with switch .modular plate,metal box .wiring and labour as per the requirment of bank no extra will be paid for switch controlling</u>				
E -10	Supply installation testing and commissioning of AC Units With 2x4Sqmm+2.5Sqmm Copper Fluxible Wire From Main DB to AC Units including Legrand Make 20A Metal Clad Socket with 25/32A SP MCB set(Like Metal Clad Socket+Wiring From Db to AC Box to Stabilizer to AC Units) for cassette and split which ever at site available as per the ac requirement.	No	20.00		
E -11	Supply and erecting of approved make telephone RJ 11Jack for telephone with 2 pair .5mm Thick Telephone cable including pvc conduite with required all materials (RJ-11 Jack+ 2 pair Cable)	Nos	40.00		
E -12	Supply and Laying of 10 pair .5mm Thick Telephone cable including pvc conduite with required all materials From Outside to Rack locations	Nos	40.00		
E -13	Supply and fixing of 20pair Crone Connector box with 30 Poir connectors and required all connections.	Nos	3.00		
E-14	Supply ,and fixing of Cutt off switch to be provided with db/encloser at entrance with wiring from main board to encloser to be given as per the requirment of the site . Rate includes with mcb /mccb Db /encloser ,with laying of suitable with all connections and piping of 1.5mm thk with labour transportation and other expenses as per the site conditions .	Nos	1.00		
E -14	Earthing				
	Supply, Installation, Testing and Commissioning of Maintenance Free Earthing system made up of copperbonded rod of 10 feet length,23 mm dia. (Minimum copper bonding shall be 0.25mm) along with Rod- toConductor connectors, Earth enhancement material, Pit Cover Pit Cover ,manhole with brick ,cement construction and other accessories as required and as per specification and other applicable codes (include chamber for earthing, Earthing certificate to be submitted along with the bill and photographs at the time of laying).	No	2.00		
	Supply, Installation, Testing and Commissioning of Maintenance Free Earthing system made up of copper bonded rod of 10 feet length, 17.2 mm dia. (Minimum copper bonding shall be 0.25 mm) along with Rod-to- Conductor connectors, Earth enhancement material, Pit Cover ,manhole with brick ,cement construction and other accessories as required and as per specification and other applicable codes (include chamber for earthing, Earthing certificate to be submitted along with the bill and photographs at the time of laying).	No	2.00		
	c) Supply and laying of following size strips including including all necessary inter connections with earth station and equipments.				
	i)providing and laying of 8 SWG Copper wire	Rmt	300.00		
	TOTAL AMOUNT FOR BRANCH ELECTRICAL WORKS Rs :				
L	LAN WORKS				
1.1	Supply and fixing the following sizes of PVC medium grade ISI marked conduits (IS : 9537 Part-III) complete with accessories such as bends, junction boxes, pull boxes etc., in recess or on surface including cutting chases in the walls/floors and making good the same complete as required.				
	25 mm dia 2mm wall thickness	mts	320.00		
1.2	Providing and laying Cat 6 cable for data in existing conduits data (Make: MDS) and providing & terminating with RJ-45 (Krone / DELL make) with face plates in suitable modular / MS box from server / enclosure room to individual work stations.				
a	providing and fixing of RJ-45 for data points dual plate and socket point as one	NO	88.00		

b	providing and fixing of Mounting Cord 7 ft Make D- LINK	NO	172.00		
c	providing and fixing of Mounting Cord 3 ft Make D- LINK	NO	172.00		
d	providing and fixing of Switch 10/100 mpbs 16 port	NO	5.00		
e	providing and fixing of jack panel 16 port	NO	5.00		
f	providing and fixing of rack 12u with all fitting and fixtures	NO	3.00		
	TOTAL RUPEES				
	Music or Voice				
SR NO.	Material Code				
A1	OP_MUSICSYSTEM010 Ceiling Recess Mounted Speaker Ceiling Speaker 10W in white colour finish & sculpted grille.	NOS	10.00		
A2	OP_MUSICSYSTEM015 250W Amplifier 250W Amplifier. 1 outputs of 250W @ 4/8 Ohms (1kHz Power, THD+N <0.5%). With USB option.	NOS	2.00		
A3	OP_MUSICSYSTEM004 Rca to phono ,stereo to rca connectors (Make-Custom)	NOS	2.00		
A4	OT_INSTALLATION001 Fixing,installation,testing & commisioning charges for PA System .	NOS	2.00		
A5	Supply and Fixing of Confrence /Seminar mic Dimensions Width: 185 mm, Length: 180 mm, Height: 67 mm. Frequency response 100 Hz to 14.5 kHz.	NOS	10.00		
	Total amount for Voice				
	TOTAL AMOUNT ELECTRICAL,LAN AND VOICE				
	DISCOUNT IF ANY				
	GRAND TOTAL				
PROJECT: BOQS FOR AIR CONDITIONING WORK FOR UNION BANK OF INDIA NEW REGIONAL OFFICE AT SV SQUARE, Plot No.3,15,27, Sy.No.287, Ward No. 10, Block No.4, Yenugonda Town, Mahabubnagar Dist – 509001, Telangana, INDIA for 1st Floor,2nd Floor & 3rd Floor					
SUB:- AC WIRING					
S.NO	ITEMS	UNIT	QTY	RATE	AMOUNT
1.00	Supply of Inverter Cassette AC cooling only with dual rotor Inverter super 360 degree air flow .Turbo Cooling with smart protection technology , Ultra slim design .100% Copper condenser.Warranty on Compressor will be 5 years . (Make -)				
A	2.0 TR Cassette Airconditioning	Nos	4.00		
2.00	Installation testing comisioning of Hi -Wall Split AC				
A	Cassette Airconditioning	Nos	4.00		
3.00	Supply of Copper Refrigerant piping with insulation for Hi - Wall Split AC and cassette ac				
A	Copper pipe for split and cassette ac	Rmt	40.00		
4.00	Drain Piping Hard PVC insulated drain water piping wrk of size 32/25 mm for Cassette AC complete fiting Etc.				
a	For Split and cassette AC	Rmt	80.00		
5.00	Electric cabling interconnecting IDU & ODU for Split AC				
a	For Split and cassette AC	Rmt	40.00		
6.00	Frame Work				
a	Supply fabrication & installation of MS angle iron stand with safety cage for ODU 2 - Tier type complete with hanger& suporting Arrange- ments as required.	Nos	4.00		
7.00	Civil Work For cutting Chisling Plastering of walls to conseal copper pipe, Drain pipe & Electrical wire with plaster finish.	LS	4.00		

8.00	Dismantling and shifting of existing air conditioning unit including recovery of refrigerant gas, complete cleaning and servicing of indoor and outdoor units, refilling of refrigerant gas as required. Supplying, laying, and fixing of new insulated copper piping with necessary fittings, along with new PVC drain piping of approved quality. Providing and laying of new electrical wiring with suitable insulation, control cabling, and necessary accessories. Reinstallation, testing, and commissioning of the air conditioning unit at the proposed location, ensuring proper functioning and performance as per specifications.	1.00	20.00		
	TOTAL AMOUNT				-
	DISCOUNT IF ANY				
	GRAND TOTAL AFTER DISCOUNT				
	GRAND TOTAL ALL WORKS				
Amount in Rupees:- Rs. _____					
	Sign & Seal of the Contractor : -				
	Name & Address of the contractor : -				
	Date:				

