UNITED INDIA INSURANCE CO. LTD.

Tender document for the work of availing HT Supply at United India Insurance Company Limited, Regional Office, S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017

CONTENTS

UNITED INDIA INSURANCE CO. LTD.
Regional Office: S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017

1. NOTICE INVITING TENDER FOR THE WORK OF AVAILING HT SUPPLY AT UNITED INDIA INSURANCE COMPANY LIMITED, REGIONAL OFFICE, CHANDIGARH – 160 017

Sealed tenders on item rate basis under Two bid system are invited from licensed electrical contractors who qualifies the minimum eligibility criteria for the work of availing HT Supply at United India Insurance Company Limited, Regional Office, S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017.

The tender documents (both Technical and Price Bid) can be down loaded from UIIC's web site www.uiic.co.in from **_26.08.2015 to _15.09.2015.**

The tender shall be of two cover system / two bid system.

Part 1: Technical Bid document containing Technical specifications, minimum qualifications, general conditions of contract etc.

Part 2: Price Bid

The cost of tender document **Rs. 3000/- (Rupees Three Thousand Only)** (non – refundable) shall be enclosed in the form of DD favouring " United India Insurance Co. Ltd " payable at Chandigarh **along with Technical Bid Documents.**

The EMD for Rs 46,500/- in the form of D.D favouring ",United India Insurance Co Ltd.," payable at Chandigarh / Bank guarantee from any scheduled Bank in favor of United India Insurance Co Ltd**.,** shall be enclosed **along with Technical Bid Documents**. Tenders submitted without EMD and Tender Cost will be rejected.

The tenders in DUPLICATE **along with enclosures** should be submitted in two separate sealed covers each with the superscription giving the Name of the work.

The first cover superscribed as **"Technical Bid"** should contain Technical Bid document (**in duplicate**) along with cost of Tender for Rs 3000/- and EMD for Rs.46,500/- in the form of Demand Draft /BG (Part I) .

Also the cover should contain all the technical pamphlets, literatures of the HT / LT switch gear and other features of the same and such other details / data required for the technical evaluation of the entire system offered. (It is essential that any technical information considered useful should be furnished at the first instance itself in this envelope and any additional or supplementary information furnished at a later date shall not be entertained unless it is found necessary and sought by the Employer / Consultant in the form of a written clarification to clear any pertinent doubts).The second Cover superscribed as **"Price Bid"** should contain Price Bid (**in duplicate**). PART-II should be submitted on the same given date and time simultaneously along with Technical Bid. Non submission of the same along with Part I shall automatically render the entire tender being rejected. This envelope should contain duly filled in Bill of quantities (enclosed in the tender document) with values written in words and figures, and as detailed elsewhere in the tender documents.

Both the above sealed covers (First & Second) shall be submitted together in a common sealed cover with the superscription giving the Name of the work.

Salient Features of Contract:

Estimated Cost of Work(approx)	**Rs.46.5 lakhs** (Rupees Forty Six Lakhs and Fifty Thousand only)
Earnest Money Deposit	Rs. 46,500/- (refundable) by crossed demand draft payable at Chandigarh and drawn in favor of United India Insurance Co Ltd. or Bank Guarantee from any scheduled bank in favour of United India Insurance Co Ltd., Chandigarh.
Retention Money Deposit (RMD)	5% of the each Bill Amount

Security Deposit	7% of the total contract price (2% EMD + 5% RMD)
Defects Liability Period	12 Months from the date of virtual completion
Date of Commencement	14 days from the date of issue of Work Order/letter of intent.
Date of Completion	120 days from the date of issue of Work Order/letter of intent.
Liquidated Damages for Delay	**1% of the contract sum per week of delay subject to a ceiling of 10% of the contract sum.**
Frequency of Interim Certificate	Monthly
Minimum Value of work for the issue of Interim Certificates	Rs.15,00,000/-
Period of honouring certificate for interim payment against each running bill by Employer	21 days from the date of receipt of Bill payment recommendations received from the Electrical Consultant.
Period of honouring Final Bill	Six weeks from the date of receipt of Bill payment recommendations from the Electrical consultant.
Dates for down loading the Tender	From _26.08.2015 to __**15.09.2015**_
Last date and Time for Submission of tenders	**Before 2.00 PM on _15.09.2015**
Opening of Technical Bid with EMD	**3.00 PM on 16.09.2015**
Opening of Price Bid	**Will be informed later**

- Validity of offer shall be 90 days from the date of opening of tender (Technical Bid).

❖ For any clarifications, bidder may contact our Architect, M/s Creations, S.C.O- 50, 2nd floor, Swastik vihar, M.D.C, Sector -5, Panchkula on Mail: CREATIONS_30B@REDIFFMAIL.COM on or before _15.09.2015. The rates quoted by the tenderer shall be based only on the specifications and conditions of the tender documents. Any conditional tender will be rejected by UIIC.

❖ The tenderers are advised to inspect the site before quoting for the job. The site will be available for inspection on all working days between 10.00 am & 5.00 pm.

The Tenderer shall ensure that the proposed HT work shall be installed at the existing site conditions. Hence, the tenderers are advised to inspect the site in this regard before quoting for the job.

Note :

1) The tender without complete information and certified photocopies of documents in support of fulfilling the Pre–qualification criteria will not be entertained.

2) If any information furnished by the Tenderer is found to be incorrect at a later stage, the Tenderer shall be liable to be debarred from tendering/taking up the work in UIIC.

3) The UIIC reserves the right to verify the particulars furnished by the Tenderer independently.

4) Short- listing of Tenderers will be finalized after inspection of works and obtaining confidential reports from previous employers for only those firms who fulfill the aforesaid Pre – qualification criteria and that specified in **Technical bid**.

5) The tenderer shall take care to price his tender rationally. Extreme under pricing or overpricing in item-rates total amount will be considered adversely in the assessment of tenders. The tenderer shall on demand submit analysis of rates of some items of work if so required by the Employer i.e. UIIC Ltd., or its consultant.

6) The Employer / UIIC is not bound to accept the lowest tender and reserves the right to accept or reject any or all tenders, either in whole or in part, without assigning any reason for doing so.

7) All the competitive tenders will be received upto the specified date and time. The tenders will be opened in the presence of available tenderers on the date and time

specified. In the event of the specified date being declared as a holiday for any reason, the date and time shall stand postponed to the next working day at the same time.

2. ELIGIBILITY CRITERIA

1. The Tenderers shall be themselves licensed electrical contractors who have executed the work of HV (High Voltage) / MV (Medium Voltage) installations including testing and commissioning at Government /Public Sector Undertakings / PSBs / IT / reputed business organizations.

2. The tenderers shall produce the following documents duly attested along with tender documents.

   Audited financial statement consisting of financial turnover and profit & loss account for the past 5 years. Those tenderers who have achieved annual turnover of atleast Rs 50.00 lakhs each in all the past 3 years(April 2011 to March 2014) are only eligible to tender for the work. The tenderer should not have incurred loss during the last 3 years out of 5 years in the past.

3. The tenderer shall have a minimum of 5 years experience in the execution of both HV and MV electrical works. The tenderer shall produce the details of work done and enclose work orders / agreements and satisfactory work completion certificate in each one of the last 5 years.

4. The tenderer should have a solvency for an amount of Rs 20 lakhs duly certified by any Scheduled bank obtained on or after 01.06.2015 and enclose copy of the same.

5. The tenderer should have its own after-sales service unit at Chandigarh/ Tricity. **The address and full contact details should be given.**

6. The Tenderer should have executed HV and MV installation works in **non – residential** multi-storied building of (a) Three works each costing not less than the amount equal to 40% of the estimated cost i.e Rs 20 lakhs or (b) Two works each costing not less than the amount equal to 50% of the estimated cost i.e Rs 25 lakhs or (c) One work costing not less than the amount equal to 80% of the estimated cost i.e Rs 40 lakhs under single agreement in Punjab / Haryana during the last 3 years ending with 31.03.2015.

7. The tenderer shall produce copies of valid licenses issued by Electricity Department, Chandigarh for the execution of HV and MV installations at Punjab / Haryana.

8. The tenderer should have executed at least two works of HV and MV installations consisting of Compact RMU and compact substation (CSS) consisting of 11 KV switch gear, 400 KVA transformer (minimum capacity), MV Panel etc. The tenderer shall produce in this regard, copies of work orders and completion certificates for the work claimed under eligibility criteria as a proof of having completed the job during the last three years ending on 31.03.2015.

Deputy General Manager
United India Insurance Co Ltd.,
Email: omparkashbibian@uiic.co.in / ravirai@uiic.co.in
SCO 123 – 124, Sector 17 – B, Chandigarh – 160 017
Ph: 0172 – 5039023, 5039032 & 5039025

3. TENDER DECLARATION

I/We have read and examined the notice inviting tender, Schedules, applicable specifications, drawings, Conditions of contract and other documents and rules referred to in the conditions of contract and all other contents in the tender documents for the work.

I/We hereby submit tender for the execution of the work specified for United India Insurance Co Ltd., Chandigarh within the time frame specified in the tender and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in General conditions of contract .

We agree to keep the tender open for 90 days from the due date of opening of Tender (Technical Bid) thereof and not to make any modifications in its terms and conditions.

A sum of Rs 46,500/- is enclosed in the form of demand draft/Bank Guarantee towards EMD.

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

Dated : Signature of the tenderer

Witness Signature

Name :

Postal Address :

Occupation:

DECLARATION

(TO BE GIVEN BY THE TENDERERS WHO HAVE DOWNLOADED THE TENDER DOCUMENT FROM THE WEB)

It is to certify that

1) I / We have submitted the Tender document in the proforma as **down-loaded directly from the web site & there is no change in formatting, number of pages etc.**

2) I / We have submitted Tender document which **are same / identical** as available in the website.

3.) I / We have **not made any modification / corrections / additions etc** in the Tender documents downloaded from web by me / us.

4) I / We have checked that **no page is missing** and all pages as per the index are available & that all pages of Tender document submitted by us are **clear & legible.**

5) I / We have **signed (with stamp) all the pages** of the Tender document before submitting the same.

6) I / We have **sealed** the Tender documents properly before submitting the same.

7) I / We have submitted the cost of Tender document.

8) I /We have read carefully & understood the instructions to all the Tenderers & to the Tenderers who have down-loaded the Tender document from the web.

9) In case at any stage later, it is found that there is difference in our downloaded Tender documents from the original, UIIC United India Insurance Co Ltd., shall have the absolute right to take any action as deemed fit without any prior intimation to me / us.

Dated: Signature(s) of Tenderer(s)

4. SPECIAL CONDITIONS OF CONTRACT

1. **Scope of Work:**

The scope of work for the purpose of this tender constitutes the work of availing HT Supply at United India Insurance Company Limited, Regional Office, S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017. The works should be carried out in accordance with the "Drawings and Schedule of quantities".

2. **Price Basis:**

a. The unit rates mentioned in schedule of rates shall remain firm and shall not be subjected to any escalation throughout the currency of the contract.

b. The quoted rates shall be inclusive of supply of all materials required for completing the item works.

c. Payment shall be made on the actual quantum of work executed, duly certified by Engineer-in-Charge / Consultant.

d. The rates quoted shall be based on laws, levies, taxes and duties applicable on the date of Letter of Award. Any Statutory Variations thereto and / or new levies due to an act or enactment, after the date, shall be to the Employer's account against documentary evidence within the contractual completion date. Any such variation/imposition of new taxes and levies beyond the contractual completion date shall be to the Tenderer's account.

e. The Tenderer shall clearly indicate every element of taxes, duties, levies and cess considered in the quoted price.

f. Tenderer shall satisfy himself on the applicability of various taxes, duties, levies, octroi, including sales tax, works - contract tax, turnover tax, VAT, etc. as applicable for such work and quoted prices shall be inclusive of all such liabilities. Employer / Consultant shall not be liable to any liability of the Tenderer on this account. Tenderer shall periodically produce documentary proof for having fulfilled the above obligations in time, including proof of payment, proof of filing of returns, etc. failing which Employer / Consultant reserve the right to take appropriate action at the cost and consequence of the Tenderer. Service Tax, Education Cess and Secondary & Higher Education Cess, as applicable at the prevailing rates, shall be shown separately in Tenderer's Bills.

g. Income Tax and Works Contract Tax, at applicable rates, shall be deducted from the Tenderer's Bills, and TDS Certificate issued thereof.

3. **Terms of Payment:**

Progress Payment:
70% of value of Contract /Interim bill value on receipt of materials at site and against submission of invoice, duly certified by UIIC / Consultant, subject to deduction of 5% towards retention money,

20% of the contract value upon the completion of erection and Commissioning subject to deduction of 5% towards retention money,

Balance Amount (10%) shall be released on submission of all statutory approvals from relevant statutory Authorities & submission of invoice duly certified by UIIC / Consultant subject to deduction of 5% towards retention money,.

50% of both retention money deducted, as stated above and EMD shall be released on successful completion of work and on receipt of all final technical documents and all relevant statutory approvals against submission of the following:

a) Invoice duly certified by UIIC/Consultant
b) "NO CLAIM" certificate
c) NOC/ Permissions from UT Electricity Department / Electrical Inspectorate Officials or other statutory bodies.

The Employer / Consultant will entertain only one running bill per month and for a minimum gross amount of Rs. 15, 00, 000/- (Rupees Fifteen Lakhs only).

Employer may withhold payment on account of any defect/deficiency in the work already executed and payment released, based on subsequently discovered evidence, failure to make payments to Sub-Tenderers, damage caused by the Tenderer to Employer's property, properties of other agencies within the premises, unfulfilled statutory obligations, etc.

The "Completion Certificate " shall be issued by Electrical Consultant / Engineer- in – Charge only after total job completion and fulfillment of all contractual obligations by the Tenderer.

4. Effective date, Time schedule and Liquidated damages for delay:

a) The date of issue of Work Order/letter of intent shall be deemed as the "Effective Date" of contract.

b) The entire work covered under the contract shall be completed in all respects within 120 days from the Effective Date.

c) Time is the essence of this project and hence completion schedule of 120 days should be strictly adhered to.

5. Measurement:

The Quantities set out in the schedule of items and rates are estimated quantities of work. The final quantities of work executed by the Tenderer in fulfillment of his obligations under the contract shall be jointly measured by the Tenderer and the Employer / Consultants. The Employer / Consultants will be final authority for the measurement relating to bills.

The intending tenderers are also required to make their own assessment of adequacy and correctness of the quantities before submitting their tenders.

6. Responsibility:

Employer / Consultant reserve the right to inspect the electrical installations at the Manufacturer's /Tenderer's Works as per the technical specifications and the equipment shall be dispatched only after receipt of a Release Order issued by the Engineer-in-Charge / Consultant.

However, such inspection/Release order shall not absolve the Tenderer of his responsibility to supply the materials in the required quantities and carry out the work as per technical specifications.

Unless otherwise specified in the contract / Work order / Purchase Order, the completion of work shall not be deemed to have been achieved until all the works required to be carried out under the contract have been completed to the entire satisfaction of the Engineer-in-Charge / Consultant, in all respects and Completion Certificate is issued.

It is the responsibility of the Tenderer to obtain all statutory approval from statutory authority related to scope of work in the tender and hand over the same to the Employer through the Consultant.

7. Progress Report:

The Tenderer shall submit to the Employer / Consultant once in two weeks progress report for the previous period showing up-to-date cumulative progress and progress during the preceding period alone on all progress items of each section or portion of the works in the proforma prescribed by the Employer / Consultant.

8. Tenderer's Engineer:

The Tenderer shall keep qualified and experienced Engineers for full time during execution of work for entire Contract.

9. Equipment:

The Tenderer shall make his own arrangement to procure all constructional plant and equipment for his work. He shall also submit with the tender, the type and number of different equipments with their capacities in good working conditions, which he will use on the site to ensure completion of the work in specified time. All materials, construction plant and equipment etc., once brought by the TENDERER on the site are not to be removed from there without the written approval from the Employer / Consultant.

10. Extra Items:

Extra items, if any, shall be paid on the basis of analysis of rate of cost of materials and labour produced by TENDERER, and the item-rates agreed upon with the Employer / Consultant.

The execution of extra item is compulsory in order to complete the project work. In case the Tenderer fails to execute extra item, Employer / Consultant will have the right to execute these items through other agency / agencies at the risk and cost of the Tenderer.

While arriving at the agreed rate of extra items, the Plant & Machinery / Overheads / profit shall be considered to the tune of 15% of cost of materials and labour.

Employer / Consultant reserves the right to verify the price of material through market survey.

11. Guarantees / Liabilities:

The Installation including all components and accessories shall be guaranteed for a period of 12 months from the date of virtual Completion of the same against defective material , shortfall in performance and faulty workmanship. The Tenderer shall immediately make free replacement of any of the parts or components that might go out of order within this period and UIIC / Consultant's decision in this regard will be final and binding on the Tenderer. Free maintenance shall be provided during the guarantee period.

The contract involves the work of availing HT Supply at United India Insurance Company Limited, Regional Office, S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017. Hence, the guarantee period shall commence on completion of commissioning of HV and MV installations **including production of safety certificate from the Electrical Inspectorate Department.**

The work shall be carried out in a workmanlike manner.

12. Work Front:

Work front for the Tenderer may / may not be guaranteed throughout the pendency of the contract, especially during monsoon. No compensation will be paid for idle labour hours and other incidental charges. Tenderer may suitably arrange requisite labour / manpower / equipment to meet the requirement of lean period, if any.

The Tenderer have to execute the work in such place and condition where other agencies will also be engaged for other works, such as mechanical, electrical, instrumentation work, etc. No claim shall be entertained due to work being executed in the above circumstances. The Tenderer should ensure that there is no interference with the work of other agencies at Site.

13. INCOME TAX CLEARANCE (I.T.C) CERTIFICATE

Attested copy of the latest Income Tax Clearance Certificate in the proforma prescribed by the Government of India should be attached with the bid document. The I.T.C. Certificate should be in the name of the firm/individual who has quoted for the tender. In the absence of the above clearance certificate, Tenderer may not be awarded the work tendered for, in the light of government directives/instructions in this regard.

14. INSURANCE

Tenderer shall obtain and maintain any and all necessary insurance cover for the entire work up to Virtual completion date , that may be required under any law or regulations applicable, including but not limited to the following:

- Tenderer's All Risk Policy, for Tenderer's Scope of Work.
- All materials and Tenderer's own machinery, equipment, tools & tackles, vehicles, etc.
- Third Party liability.
- Workmen Compensation
- ESIC
- Employer's Liability

The quoted price shall be inclusive of all costs for such insurance coverage. In all such policies, Employer shall be made 'Co-insured'. Also other Tenderers, working at the Site, be covered under the policy. The Third party insurance shall be for a sum of Rs 5.00 lakhs per accident.

15. COMPLETION TIME :

Tenderer shall complete the entire work within **120 days** from the date of issue of Work Order/letter of intent or date of which the site is handed over whichever is later. During the above time frame, the tenderer should also obtain required approvals from CEA / Electrical Inspectorate and other statutory authorities.

16. GENERAL

These Special Conditions of Contract (SCC) shall be read in conjunction with the terms and conditions stipulated in the General Conditions of Contract (GCC). However, if there is any contradiction between the terms and conditions mentioned in this SCC and those in the GCC, stipulations of SCC shall prevail to that extent.

5. ARTICLES OF AGREEMENT

THIS AGREEMENT is made on this ..... day of ..... 2015 between UIIC, Regional Office: S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017 (hereinafter referred to as the "Employer") which expression shall include its successors, legal representatives and assigns of the one part.

AND

* Shri _____S/D/o_____ __ resident of _____the sole proprietor of M/s_____ having office at the following address _____

* M/s. _____ the partnership firm having an administrative/principal office at_____ represented by its Managing/duly authorised partner.

* M/s. _____ company/body corporate incorporated under the provisions of the Companies Act 1956 having its registered office at the following address _____, duly represented at _____ duly represented by its constituted and authorised Managing Director, Shri_____

(hereinafter referred to as the "Tenderer") which expression shall include its successors, legal representatives and assigns of the second part.

WHEREAS THE Employer intends to avail HT supply at UIIC, Regional Office: S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017

WHEREAS the Employer has caused drawings and tender documents to be prepared by their Electrical consultant Mr. S Chandrasekaran, Chennai (hereinafter referred to as "Consultant").

AND whereas the Employer has called for tenders for erection of electrical installations as per Employer's NIT dated ----------and whereas the tender dt. ---------- submitted by the Tenderer has been accepted for such sum as may be ascertained to be payable in terms of the Bill of Quantities and which sum is estimated to be Rs. ... . (Rupees ……) hereinafter referred to as the said "Contract Sum".

AND whereas the Tenderer has agreed to execute the work as per drawings, specifications, conditions of contract of the tender and Work Order for the Employer's project of "availing HT Supply at United India Insurance Company Limited, Regional Office, S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017"

AND whereas the parties herein being desirous of reducing the agreed terms into writing as under:

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:-

1) In consideration of the said Contract Sum to be paid at the times and in the manner set forth in the said General Conditions to the Contract, the Tenderer shall carry out and complete all the Civil, electrical Works as per terms and conditions herein contained and according to the general conditions of the contract, notice inviting tender, special conditions of contract, general scope of work, technical specifications, schedule of rates and instructions to be given by Electrical Consultant and to the entire satisfaction of the Employer.

2) Contract Price, Taxes and Payment Terms:

Total contract price is Rs……..... which is inclusive of cost of materials, equipment, installation charges and tools and tackles required for execution of the job. Above price is inclusive of all taxes & duties including excise duty, sales tax, works contract tax, income tax, octroi etc. in respect of this contract. No claim in this respect will be entertained. Sales tax on works contract & Income tax on payments will be deducted and deposited by Employer in accordance with the sales tax law of the state and the provisions of tax deductions at source under Income Tax Act 1961.

However, interim payment will be made as per the site measurements on Item Rate basis and certification of the Consultant :

3) Completion Period:

Time is the essence of the Contract. The work is to be completed in all respects within **120 days** from the date of receipt of the Work Order /letter of intent by the Tenderer. If the Tenderer fails to complete the job within the agreed time period the Tenderer will have to bear liquidated damages as per the relevant clause mentioned in the Tender Documents.

4) Earnest Money:

The Tenderer has deposited Bank Guarantee/Demand Draft for an amount of Rs. 46,500/- (Rupees Forty Six Thousand and Five Hundred only) as earnest money.

5) Inspection of Site:

The Tenderer has inspected the site before submitting his tender and has satisfied himself as to the nature of the work to be executed on the site. Any difficulties which the Tenderer may come across in the course of the work shall in no way entitle the Tenderer to claim or receive extra payment unless the Employer is of

the opinion that such difficulties could not have been foreseen and the Employer consents in writing.

6) Supply of Material and Labour:

The Tenderer shall arrange all labour, materials, equipments, tools, tackles and everything necessary for the completion of the work. The Tenderer will assume all responsibility for the safety, protection and accounting of all material and equipment and the work during construction. All materials used by the Tenderer shall be of the best quality conforming to the required specification mentioned in the tender document and will be subject to the approval of the Electrical Consultant / Employer. All such materials not approved by Electrical Consultant / Employer shall be removed at once by the Tenderer at his own expense. The Tenderer shall also at his own expense arrange for carrying out any test of materials which the Electrical Consultant / Employer may from time to time require or if so desired by the employer.

7) Defective Work / Materials:

If any part of the work done by the Tenderer is found defective in workmanship or if bad or inferior materials have been used the Tenderer shall at his own risk and cost demolish all such defective work and rebuild the same and / or replace the bad or inferior materials used within a time frame mentioned to the satisfaction of the 'Electrical Consultant / Employer'. The decision of the Employer / Electrical Consultant in this regard shall be final and binding on the Tenderer. In case of default of the Tenderer to remove the defective work and rebuild the same or replace bad or inferior materials as directed by the Employer, the Employer shall be entitled to employ anyone else to carry out the same at risk and cost of the Tenderer and recover all expenses incurred in this regard from the Tenderer.

8) Inspection of Work:

During progress of the work the site engineer of the Employer and Electrical consultant/ Employer shall be entitled at all times to have access to and inspect the work. If the work is inspected by the Government/ UIIC's authorized persons, the Tenderer will fully co- operate and extend all help to meet the observations.

9) Supervision:

The Tenderer shall provide one or more competent and technically qualified engineers duly and fully authorized to act on his behalf in all matters relating to the works to be carried out under or any other matter concerning this agreement and who shall at all times be present at the works while any work is in progress as per directions, explanations & instructions of Employer / Electrical Consultant.

10) Compliance with Statutory Regulations & Work Rules:

The Tenderer shall be responsible for complying with the applicable laws / bye laws / Regulations in force from time to time and shall have to bear all statuary liabilities to the workers / personnel engaged for the job. Nothing will be paid extra in this regard. If any amount is paid by the Employer in this regard the same amount shall be deducted from the Tenderer's dues. The Tenderer shall have to arrange insurance cover for the workers / personnel engaged by him for the job.

11) Determination of Contract:

In the event of Tenderer failing to keep / adhere to agreed schedule of work, or in the event of the Tenderer failing to comply with the provisions of this contract by default and / or negligence and / or suspension of work or in the event of Tenderer failing to complete the work within the stipulated period, the Employer may terminate this Agreement forthwith and employ, at the Tenderer's risk and cost, another Tenderer or sufficient number of workmen to complete the work.

12) Force Majeure:

In case any Force Majeure condition herein mentioned occurs and continues for a period exceeding 15 days the parties hereto undertake to sit together and devise ways for expeditious and proper performance of the obligations of the parties under this order.
This clause will be operative only if the work is delayed by

a) Acts of God

b) Earthquake or floods or similar natural calamities.

c) Serious loss or damage by fire or lightning.

13) Arbitration:

"In the event of any dispute or difference relating to interpretation and application of provisions of the contract and all disputes/claims whatsoever which shall either during the continuance of the contract or afterwards either between the parties to the contract or the respective representatives touching the construction/application of any provision/clause mentioned in the contract or any account or liability between the parties to the contract or as to any act or deed or omission of any party to the contract, in any way relating to these presents, shall be first at the discretion of the UIIC attempted to be resolved in good faith by mutual discussion within 30 days of the dispute or question being raised failing which the same shall be settled by arbitration in accordance with provisions of Indian Arbitration and Conciliation Act, 1996, as amended up to date.

14) Electrical Consultant:

The term Electrical Consultant in the said conditions shall mean the said **Mr S Chandrasekaran** or in the event of he being ceased to be the Consultant for the purpose of this Contract, such other person as shall be nominated for that

purpose by the Employer, not being a person to whom the Tenderer shall object for reasons considered to be sufficient by the Employer mentioned in the said Conditions provided always that no person subsequently appointed to be Consultants under this Contract shall be entitled to disregard or overrule any provision, decision or approval or direction given or expressed by the Consultants for the time being.

IN WITNESS whereof the said contracting parties have set their hands and seals on the day and year first hereinabove witness.

Witness Address
Employer

Witness Address
Tenderer

6. GENERAL CONDITIONS OF CONTRACT

1. DEFINITIONS / INTERPRETATIONS:

In construing these Conditions and the Specifications, Schedule of Quantities and Contract Agreement, the following words, shall have the meanings herein assigned to them except where the subject or context otherwise requires:

(a) The `Contract' means the documents forming the tender and acceptance thereof and the agreement duly executed between the Employer and the Tenderer , together with the documents referred to therein including those conditions, the specifications, schedule of quantities, tender agreement, designs, drawings and instructions issued from time to time by the Engineer-in-Charge. All these documents taken together, shall be deemed to form one contract and shall be complementary to one another.

(b) The `Tenderer' or `Supplier' or `Licensed Electrical Contractor' shall mean the individual Kartha, or Manager of HUF, firm or Company, whether incorporated or not, undertaking the works and shall include the legal heirs/representatives of such individual or the partners composing firm and theirs legal heirs and successors, or company's authorised and constituted attorneys/agents and permitted assignees of such firm or company.

© The `Employer' shall mean 'United India Insurance Co Ltd., with their Regional Office at S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017 ' and shall include their heirs, legal representatives, assignees and successors in interest.

(d) Engineer – in- Charge shall mean the persons nominated by the Employer/ Electrical Consultant and shall include those who are expressly authorized by him to act for and on his behalf for operation of the contract and co- ordination of different works.

(e) The **Electrica**l **consultant** shall mean **Mr. S Chandrasekaran,** having his Office at Mylapore, Chennai 600 004, appointed by Employer for the said works.

(f) Contract Price shall mean the final accepted rates in the Price Bid hereto.

(g) Date of Contract means the `Calendar date on which the Employer and Electrical Contractor have signed the Agreement on the Stamp Paper.

(h) Accepting Authority shall mean the UIIC (the Employer).

(i) Approval' wherever used in the specifications or schedule of Quantities shall mean, respectively, approved by or approval of the `Accepting Authority' in writing.

(j) Appellant Authority' shall mean the UIIC (the Employer), who shall also be the authority to consider any extension of time or compensation as defined in clause hereunder.

(k) Notice in writing' or `written notice' shall mean a notice in writing typed or printed characters delivered to or sent by registered post to the last known address private or business address or registered office address, and shall be deemed to have been received when in ordinary course of post it would have been delivered, and/or delivered personally, or otherwise proved to have been received.

(l) Virtual completion' shall mean that the work/installation is complete in all respects in the opinion of the Employer and for which the completion/clearance certificate has been issued by the Engineer -in-charge / Consultant and the installation is fit for usage.

(m) `Drawings' shall mean all drawings and/or design drawings furnished by the Tenderer/ sketches duly signed by the authorised Engineer-in-charge or the Consultant on behalf of the Employer before commencement or during the progress of the work.

(n) Letter of Acceptance' shall mean an intimation by a letter issued by the Accepting Authority to tenderer that his tender has been accepted in accordance with the provisions in the said letter.

(o) **"Defect Liability Period" (DLP) shall mean a period of TWELVE (12) months. The DLP shall commence from the date of handing over of entire HV and MV installations by the supplier/Tenderer/Licensed Electrical Contractor with safety certificate to commission the HV and MV installations from CEA/Local Electrical Inspectorate and certified by the consultant / Engineer-in-charge and accepted by the Employer.**

(P) Schedule of quantities" shall mean the schedule of quantities as specified and forming part of this contract.

(q) “Priced Schedule of Quantities” shall mean the schedule of quantities duly priced with the accepted quoted rates of the tenderer.

(r) "The work” shall mean the work or works to be executed or done under this contract.

(s) "Act of Insolvency" shall mean any act defined by the Presidency Towns Insolvency Act or in Provincial insolvency Act or any amending statutes.

2) SCOPE OF WORKS TO BE CARRIED OUT:

1. Supply and Installation of RMU for availing the supply from UT, Electricity Department. It is seen generally that RMU unit is located opposite to consumer's premises inside parking area (on the roads). The exact location from where electricity department supply is to be tapped is not known, a tentative length of 150 metrs of 3 core 150 sq. mm. cable (2 runs x 75 metrs) is included in the BOQ.

2. Supply and Installation 11 KV CT/PT metering unit and 11KV VCB at ground floor of consumer's premises.

3. It is seen in nearby building that the 11 KV/433V HV substation with connected MV switchgear has been installed in the terrace of the building in a compact form since sufficient space is not available for the installation of same in Ground Floor. Similarly, due to the site constraints, the 11KV/433V substation in the compact form is proposed in the terrace of the building (UIIC).

4. Supply and installation of CSS consisting of 11 KV HT VCB, 400 KVA Dry type cast resin transformer, MV panel, automatic power factor correction panel (APFC), connectivity between each and every items mentioned above, earth connections etc.,

5. LT cabling from the CSS to the existing panels located below the staircase landing at Ground Floor.

6. Providing earthing and earth connections.

7. Liasioning work with the concerned department for the smooth execution and commissioning of work.

The works should be carried out in accordance with the "drawings" and "schedule of quantities". It includes providing all the materials, wastage of material, labour, transport, tools & equipments and management necessary for and incidental to the completion of the work. 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. Should any detail essential for efficient completion of the work be omitted from the

drawings and specifications it shall be the responsibility of the Tenderer to inform the employer so that upon completion of the work the same will be acceptable and ready for use.

If there are varying or conflicting provisions made in any one or more document(s) forming part of the contract, the Accepting Authority shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on tenderer.

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

Employer or their authorized representative may in their absolute discretion issue further drawings and/or written instructions, details, directions & explanations which are, hereafter collectively referred to as " The employer's instructions" in regard to:

a) The variation or modification of the design quality or quantity of works or the addition or omission or substitution of any work.

b) Any discrepancy in drawings or between the schedule of quantities and/or drawings and/or specifications.

c) The removal from the site of any defective material brought thereon by the Tenderer and substitution of any other material thereof.

d) The demolition, removal and re-execution of any work executed by the tenderer/s.

e) The dismissal from the work of any persons employed thereupon.

f) The opening up for inspection of any work covered up.

g) The rectification and making good of any defects under clauses hereinafter mentioned and those arising during the defect liability period(retention period).

The Tenderer shall forthwith comply with and duly execute any work comprised in such Employer's or his agent/Engineers instructions, provided always that verbal instructions, directions and explanations given to the Tenderer or his representative upon the works by the employer or his agent shall, if involving a variation, be confirmed in writing to the Tenderer/s within seven days. No works for which rates are not specifically mentioned in the priced schedule of quantities, shall be taken up without written permission of the employer or his agent. Rates of items not mentioned in the priced schedule of quantities shall be fixed by the employer as provided in clause "variation".

Regarding all factory made products for which ISI marks are available, only products bearing ISI marking shall be used in the work.

Materials of approved makes as prescribed in tender shall only be used and also colours to be as advised by the employer.

3. TENDERER SHALL VISIT THE SITE: The tenderers are advised to have a free inspection of the site before tendering to ensure that the RMU, CSS etc. shall be installed in the proposed location with required specifications as per norms prescribed by Local Electrical Inspectorate.

Also the Tenderer shall visit the site and make himself thoroughly acquainted with the local site conditions, nature and requirements of the works, facilities of transport condition, effective labor and materials, access and storage for materials and removal of rubbish. Tenderer shall provide in their tender for cost of carriage, freight and other charges as for any special difficulties and including the police restriction for transport etc. For proper execution of works 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 Employer or his agent/engineer might be deemed to have reasonably been inferred to be so existing before commencement of work.

4. DRAWINGS AND SPECIFICATIONS : The Work shall be carried out to the entire satisfaction of the Employer and the Electrical consultant and in accordance with the signed drawings, specifications and other Contract documents and such further drawings and details as may be provided by the Electrical Consultant and in accordance with such written instructions, directions and explanations as may from time to time be given by the Employer / Electrical Consultant.

No drawing shall be taken as in itself an order for execution unless, in addition to the Electrical Consultant's signature, it is marked "VALID FOR CONSTRUCTION". No claim for payment for extra work shall be allowed unless the said work shall have been executed under the provisions of Clause 21 (Authorities, Notices, Patent Rights and Royalties), or by the authority, directions in writing of the Electrical consultant as herein mentioned.

On receipt of work order, the Tenderer shall submit the following Drawings within 10 days for approval of UIIC/Consultant.

1) Electrical Physical Layout Drawings
2) Electrical single line diagram, control wiring single line diagram, cable layout,panel GA drawing etc.even if part may have been provided by the owner.
3) Location of earth pits and details of earthing even though these may have been provided by owners.

5. SCHEDULE OF QUANTITIES: The Schedule of the Quantities unless otherwise stated shall be deemed to have been prepared in accordance with the standard procedure of quantity measurement, and shall be considered to be approximate and no liability shall attach Employer for any error that may be discovered therein.

6. SUFFICIENCY OF SCHEDULE OF QUANTITIES: The Tenderer shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the prices stated in the Schedule of Quantities. The Tenderer's Rates and Prices shall cover all his obligations under the Contract, and all matters and things necessary for the proper completion of the works.

7. ERRORS IN SCHEDULE OF QUANTITIES: Should any error appear in the Schedule of Quantities, other than in the Tenderer's prices and calculations, it shall be rectified, and such rectification shall not vitiate the Contract but shall constitute a variation of the Contract and shall be dealt with as an authorized extra or deduction.

8. NOTICES: The Tenderer shall give all notices and pay all fees and royalties to the Government departments in connection with his constructional activities and shall comply with all Acts and Regulations for the successful completion of the Contract Works.

9. TENDERS: The entire set of tender paper issued to the tenderer should be submitted fully priced and also signed on the last page together with initials on every page. Initials/signature will indicate the acceptance of the tender papers by the tenderer (Also see General Rules and instructions for the guidance of Tenderer).

The schedule of quantities shall be filled as follows

a) The "Rate" column to be legibly filled in ink in both English figures and English words.
b) Amount column to be filled in for each item and the amount for each subhead as detailed in the schedule of quantities.
c) All corrections to be initialed.
d) The "Rate" column for alternative items shall be filled up.
e) The "Amount" column for alternative items of which the quantities are not mentioned shall not be filled up.
f) In case of any errors/omissions in the quoted rates, the rates given in the tender marked "Original shall be taken as correct Rates.

No modifications, writings or corrections can be made in the tender papers by the tenderer, but he may at his option offer his comment modifications in a separate sheet of paper attached to original tender papers.

The employer reserve the right to reject the lowest or any tender and also to discharge any or all of the tenders for each section or to split up and distribute any item of work to any specialist firm or firms, without assigning any reason.

The tenderer should note that the tender is strictly on item rate basis and their attention is drawn to the fact that the rates for each and every item should be correct, workable and self-supporting. If called upon by the Employer / Consultant, detailed analysis of any or all the rates shall be submitted.

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

All items of work described in the schedule of quantities are to be deemed and paid as complete works in all respects and details including preparatory and finishing works involved, directly, related to and reasonably detectable from the drawings, specifications schedule of quantities and no further extra charges will be allowed in this connection. In the case of lump-sum charges in the tender in respect of any item of works , the payment such items of work will be made for the actual work done on the basis of lump-sum charges as will be assessed to be payable by the Employer/Consultant.

The Employer has power to add to, or omit from the scope of work, any work as shown in the drawings or described in the specifications or included in schedule of quantities and intimate the same in writing but no addition, omission or variation shall be made by the tenderer without authorization from the Employer. Any such unauthorized variation shall vitiate contract.

The tenderer shall note that his tender shall remain open for consideration for a period of **90 days** from the date of opening of the price bid of the tender.

10. **AGREEMENT**: The successful tenderer, shall be required to sign the contract agreement, the proforma of which is enclosed and shall pay for all stamps and legal expenses, incidental thereto.

11. **PERMITS AND LICENSES**: Permits and licenses for release of materials or its purchases which are under Government control will be arranged by the tenderer. The employer will render necessary assistance, Sign any forms or applications that may be necessary.

It may be clearly understood that no compensation or additional charges can be claimed by the tenderer for non-availability of such materials in due time on this account or according to his own requirements.
The tenderer may, however, be eligible to a proportionate extension of time on this account that in the opinion of the Employer is reasonable.

12. **GOVERNMENT AND LOCAL RULES**: The tenderer 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. The tenderer shall give all notices required by the said Act, Rules , Regulations and bye-laws etc and shall indemnify the Employer against such liabilities and shall defend all actions arising from such claims or liabilities. The tenderer shall get necessary approvals, if any, required from the competent authority at their own cost for carrying out the work.

13. **TAXES AND DUTIES**: The tenderer must include in their tender prices quoted for all duties royalties, cess and sales tax , value added tax or any other taxes or local charges if applicable. No extra claim on this account will in any case be entertained.

    The tenderer shall keep necessary books of accounts and other documents for the purpose of this condition as may be necessary and shall allow inspection of the same by a duly authorised representative of the Employer and / or the Engineer-in-charge and further shall furnish such other information / document as the Employer may require from time to time.

14. **QUANTITY OF WORK TO BE EXECUTED**: The quantities shown in the schedule of quantities are intended to cover the entire works as per the drawings / scope of work, and therefore the Tenderer is bound to complete the works at the same quoted rates. In the event of quantity exceeding the specified bill of quantity, the Employer reserves the right to execute only a part or the whole or any excess thereof without assigning any reason therefore.

15. **OTHER PERSONS OR AGENCIES ENGAGED BY THE EMPLOYER**: The Employer reserves the right to execute any part of the work included in this contract by other agency or persons and Tenderer shall allow reasonable facilities and use of his facilities for the execution of such work. The main Tenderer shall extend all co-operation in this regard.

16. **EARNEST MONEY, INITIAL SECURITY DEPOSIT, RETENTION MONEY & TOTAL SECURITY DEPOSIT** : The Tenderer will have to deposit the specified amount in the form of Demand Draft drawn in favour of United India Insurance Co Ltd., payable at Chandigarh (or) Bank Guarantee in the approved format from any Scheduled Bank in favour of United India Insurance Co Ltd. Chandigarh, at the time of submission of tender as Earnest Money. No interest shall be paid on the earnest money. The earnest money of unsuccessful tenderer will be refunded without any interest soon after the acceptance of the selected Tenderer or after the expiry of the validity period of the tender.

    The successful tenderer to whom the contract is awarded will have to deposit as Initial Security Deposit 2% (two percent) of the value of the accepted tender including the Earnest Money. The Initial Security Deposit will have to be made within 14 days from the date acceptance of tender failing which the employer at his discretion may revoke the letter of acceptance and forfeit the Earnest Money Deposit furnished along with the tender. **The security deposit may be furnished in the form of Demand Draft / Bank Guarantee payable in favour of UIIC (or) BG drawn on any Scheduled Bank for the duration of the contract period plus defect liability period of 12 months.**

The Initial security Deposit(2%) made above together with retention money deducted from the progressive running bills @ 5% (five percent) of the Gross value of each running bill will constitute **Total Security Deposit** i.e. The initial Security Deposit plus retention money equals to; 7.0 % of the contract value. On virtual completion of work, the employer shall refund 50% of the total Security Deposit. The Balance Security Deposit of 50% will be refunded after completion of the Defect Liability Period. Further the balance Security Deposit held by the employer shall be returned against submission of Bank Guarantee in the approved format from any Scheduled Bank .

No interest is allowed on Total security Deposit .

17. **TENDERER TO PROVIDE EVERYTHING NECESSARY**: The Tenderer shall provide everything necessary for the proper execution of the work according to the intent and meaning of the drawings, technical specifications, and schedule of quantities taken together whether the same may or may not be particularly shown or described therein provided that the same can be reasonably inferred there from, and if the Tenderer finds any discrepancies therein, he shall immediately and in writing, refer the same to the employer / consultant whose decision shall be final and binding.

The rates quoted against individual items will be inclusive of everything necessary to complete the said items of work within the contemplation of 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.

The Tenderer shall supply, fix and maintain at his own cost, for the execution of the work, all tools, tackles, machineries and equipments and other required facilities for execution of work including the safety aspects.

The Employer on no account shall be responsible for storage of materials or loss or pilferage or theft either in respect of the material stored or material already built and paid for by the Employer.

The Tenderer shall at all times give access to workers employed by the Employer.
Any facilities available at site shall be utilized only with prior permission of the Employer or the in-charge of the site / building Employer and cannot be taken as granted and for such services utilized the Employer is entitled to charge. No extra charges shall be paid over and above what has been quoted for any of the above or for similar such services.

18. TIME OF COMPLETION, EXTENSION OF TIME & PROGRESS CHART ::

i). **Time of Completion:** The entire work is to be completed in all respects within stipulated period of **120 days** (including obtaining safety certificate from Electrical Inspectorate for commissioning the electrical installations). The work shall be deemed to be commenced within 14 days from the date of acceptance letter. Time is the essence of the contract and shall strictly observed by the Tenderer.

The work shall not be considered as complete until the Employer/ Consultant have certified in writing that the work has been virtually completed and defect liability period shall commence from the date such certificate.

ii). **Extension of Time** : If in the opinion of the Employer **a)** by reason of any exceptionally inclement weather, or **b)** by reason of instructions from the employer in consequence of proceedings taken or threatened by or disputes with adjoining or neighbouring Employers or **c)** by the works, or delay, of other Tenderers or trades men engaged or nominated by the employer and not referred to in the specification or **d)** by reason of authorised extra and additions or **e)** by reason of any combination of workmen or strikes or lockout affecting any of the building trades or **f)** from other causes which the employer may consider being beyond control of the Tenderer , the employer at the completion of the time allowed for the contract shall make fair and reasonable extension of time for completion in respect thereof. In the event of employer failing to give possession of site upon the day specified above the time of completion shall be extended suitably.

In case of such strikes or lock-outs, as are referred to above, the Tenderer shall, immediately give the employer, written notice thereof. Nevertheless the Tenderer shall use his best endeavors all that to prevent delay and shall do all that may be reasonably required to the satisfaction of the employer to proceed with the works and on his doing so that it will be ground of consideration by the employer for an extension of time as above provided.
The decision of the Employer as to the period to be allowed for an extension of time for completion hereunder (which decision shall be final and binding on the Tenderer) shall be promulgated on completion of the work or at the conclusion of such events based on which the extension of time was sought by the Tenderer , and the Employer shall then, in the event of an extension being granted, determine and declare the final completion date. The provision in clause 14 with respect to payment of liquidated damages shall in such case, be read and construed as if the extended date fixed by the employer were substituted for and the damage shall be deducted accordingly.

iii). **Progress of Work:** During the period of work, the Tenderer shall maintain proportionate progress on the basis of a **program chart submitted by the Tenderer before the commencement of work**. Tenderer should also include planning for procurement of scarce materials well in advance and reflect the same in a program chart so that there is no delay on the part of the Tenderer in completion of the project.

19. **LIQUIDATED DAMAGES**: **Time is the essence of the contract**. Hence the Tenderer shall be aware that non completion of the work will affect the UIIC's committed programs and thus the loss by way of delayed services / completion of related works etc, are valuable and cannot be easily quantified. Therefore, it is part of the agreed terms that in the event of any delay in completion of the work, the UIIC is liable to charge the Tenderer without the necessity of providing for any details of such losses suffered by the UIIC.

    Hence if the work is not completed as per the contract terms or to the satisfaction of the employer within the stipulated period , the Tenderer shall be bound to pay to the employer a sum of amount calculated **at 1% of the contract sum per week of delay subject to a ceiling of 10% of the contract sum** by way of liquidated damages and not as penalty during which the work remains un-commenced or unfinished after the expiry of the completion date.

    For this purpose the term `Contract sum' shall be value at the tender rates of the work as ordered / accepted.
    Therefore the Tenderer is required to maintain progress in terms of the contract to complete the work within the stipulated period.

20. **TOOLS, STORAGE OF MATERIALS, PROTECTIVE WORKS AND SITE OFFICE REQUIREMENTS**:: The Tenderer shall provide, fix up and maintain his establishment in an approved position at site and clear away on completion of the works and make good all works disturbed.

    The Tenderer shall not fix or place any advertisement of any description or permit the same to be fixed or placed in or upon any hoarding, gantry, building structure other than those approved by the Employer.

    Tools : The odolite level, prismatic compass, steel tape ,threads and all other instruments found necessary on the works shall be provided by the Tenderer for the due performance of the contract as instructed by the employer.

    All suitable scaffolding, ladders and stools that may be required for safe taking of the measurements shall be supplied by the Tenderer .

Storage of materials: The Tenderers shall provide and maintain proper enclosures for the storage and adequate protection of materials, tools at the space allocated for the purpose including their watch & ward arrangements shall be the responsibility of the Tenderer. Any materials taken out of the premises shall get the "out pass" from the employer.

Protective Measures: The Tenderer shall make suitable arrangements for watching and protecting the works and materials. The Tenderer shall indemnify the employer against any possible damage to the building, roads and members of public in course of the execution of the work.

The Tenderer should cover in his rates for making provisions for all the above and reasonable facilities for the use of his scaffolding, tools and plant etc., for their work.

21. **NOTICE AND PATENTS OF APPROPRIATE AUTHORITY AND EMPLOYERS**: The Tenderer shall conform to the provisions of any Acts of the Legislature relating to the work, and to the regulations and bye-laws of any authorities, and or other Companies (Indian or International) and / or Statutory Authorities, with whose system and design or technical know how are/were proposed to have connection with this work.

So also the Tenderer shall before making any variations from the drawings or specification that may be associated to so conform, give the Employer / Consultant written notices specifying the variations proposed to be made and the reasons for making them and apply for instruction thereon. The Employer / Consultant on receipt of such intimation, shall give a decision within a reasonable time.

The Tenderer shall arrange to give all notices required for by the said Acts, regulations or Bye-laws to be given to any authority, and to pay to such authority or to any public officer all fees that may be properly chargeable in respect of the work and lodge the receipts with the Employer.

The Tenderer shall indemnify the Employer against all claims in respect of patent rights, royalties, 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 Employer saved and harmless and indemnified in all respects from such actions, cost and expenses.

22. **CLEARING SITE AND SETTING OUT WORKS** : The site shall be cleared of all obstructions, waste materials, rubbish of all kinds. All material damages at the site like on the walls, ceiling or flooring or on any other connected place/ equipments, materials or installations shall be re-done to maintain originality and shall be leveled at Tenderers own cost.

The Tenderer shall set out the works and shall be responsible for the true and perfect setting out the works and for the correctness of the positions, levels, dimensions and alignment of all parts thereof. If at any time, any error shall appear during the progress of any part of the work, the Tenderer shall at his own expenses rectify such error, if called upon to the satisfaction of the Employer.

The Tenderer shall further set out the works to the alternative positions at the site until one is finally approved and the rates quoted in his tender should include for this and no extra on this account will be entertained.

23. **TENDERER IMMEDIATELY TO REMOVE ALL OFFENSIVE MATTERS**: All waste materials and other matters of any offensive nature shall be taken out once the works are completed. The Tenderer shall keep the site free from dangerous materials like industrial gases, welding machines and any such devices or material of toxic and poisonous nature & shall not carry within the site or building any material which are explosive in nature. Any such offensive materials which are essentially required in course of work shall be undertaken with due written permission of the Employer provided such materials are permissible under Law.

24. **ACCESS** : Any authorized representatives of the Employer shall at all reasonable times have free access to the works and / or to the workshops factories or other places where materials , or equipments are being fabricated or constructed for the work and also to any place where materials are lying or from where they are being obtained, and the Tenderer shall extend necessary facility to the Employer or their representatives for inspection examination and testing of the materials and workmanship.

Except the representatives of the Employer no person shall be allowed at any time without the written permission of the Employer.

The work shall be offered for inspection at every stage of the work and more specifically before painting, polishing and lamination.

25. **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 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 Employer during the execution of the work, and to his entire satisfaction.

If required by the Employer the Tenderer shall have to carry out tests on materials and workmanship in approved material testing laboratories or as prescribed by the Employer at his own cost to prove that the materials etc. under test conform to relevant I.S. standards or as specified in the specifications. The necessary charges for

sample material, transporting, testing etc. shall have to be borne by the Tenderer . No extra payment on this account should in any case be entertained.

All materials required for the full performance of the work under the contract must be provided through proper channels and must include duties ,taxes octries and other charges if any and must be best of their kind available and the Tenderer must be entirely be responsible for proper and efficient carrying out of the works. Samples of all the materials to be used must be submitted / displayed to the Employer / Consultant when so directed by the Employer.

Should the work be suspended by any reason, the Tenderer shall take all precautions necessary for the protection of work and at his own expenses shall make good any damages arising from any of these causes.

26. **REMOVAL OF IMPROPER WORK** : The Employer shall during the progress of the work have power to order in writing from time to time the removal, from the work site within such reasonable time or times as may be specified in the order, of any materials which in the opinion of the Employer are not in accordance with specification or instructions, the substitution or proper re-execution of any work executed with materials or workmanship not in accordance with drawings and specifications or instructions.

In case the Tenderer refuses to comply with the order the Employer 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 Employer shall be borne by the Tenderer or may be deducted from any money due to or that may become due to the Tenderer .

No certificate which may be given by the Architects / Consultants / UIIC shall relieve the Tenderer from his liability in respect of unsound work or bad materials.

27. **SAFETY PRECAUTIONS**: The Tenderer shall follow all necessary safety precautions with respect to the work. All necessary safety equipments / gadgets shall be used by the workmen. The Tenderer shall comply and ensure the enforcement of rules and regulations relating to the safety precautions. The arrangements be made by the Tenderer shall be open for inspection by any statutory authorities.

28. **TENDERER 'S EMPLOYEES** : The Tenderer shall employ technically qualified and competent supervisors for the work who shall be available (By turn) throughout the work and shall participate during site meetings and be available to take and comply with instructions of the Employer. The Tenderer shall employ in connection with the work persons having the appropriate skill or ability to perform their job efficiently. Any laborers supplied by the Tenderer to be engaged on the work on day work basis either wholly or partly under the direct order or control of the Employer or his representative shall be deemed to be a person employed by the Tenderer .

CHILD LABOUR: No Labourer below the age of sixteen years and who is not an Indian national shall be employed on the work.

LABOUR LEGISLATION: The Tenderer shall comply with the provisions of the payment of all legislation including the requirement of The payment of Wages Act, 1936, Minimum Wages Act, 1948, Employer's Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits Act, 1961, and the Contract Labor (Regulation and Abolition) Act 1970, Apprentices act 1961, or the modifications thereof or any other laws relating thereto and the rules made there under from time to time. Report on PF & ESI paid to the employees on monthly basis has to be submitted to the employer.

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

The Tenderer 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 Employer and also to the Competent Authority where such report is required by law.

The Tenderer shall indemnify and keep indemnified the Employer against payments to be made under and for the observance of the laws aforesaid and the Tenderers' Labor Regulations. The laws aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

Compliance of Labour Regulations: The Tenderer shall at his own expense arrange for all the safety provisions for the safety of all workers and employees directly or indirectly employed on the work by the Tenderer .

The Tenderer shall be fully responsible for compliance at his own expense all the labor regulations and rules to be observed by him. The Tenderer shall fully indemnify the Employer against any action by the state and/or Central Government for any default or alleged default by the Tenderer , sub Tenderer or Employer of any of such rules and regulations. If, due to any default of the Tenderer or his sub-Tenderer s, the Employer has to incur any expenditure for compliance of the rules and regulations or for any other reason connected with such default, the Employer shall be entitled to recover from the Tenderer all such expenditure in full from any payment due to the Tenderer.

29. **DISMISSAL OF WORKMEN**: The Tenderer shall on request of the Employer immediately dismiss from works any person employed thereon by him, who may in the opinion of the Employer be unsuitable or incompetent or who may misconduct himself. Such discharge shall not be the basis of any claim for compensation or damages against the Employer or any of their officer or employee.

30. **ASSIGNMENT**: The whole of the works included in the contract shall be executed by the Tenderer and the Tenderer shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein nor, change in constitution and no subletting shall relieve the Tenderer from the full and entire responsibility of the contract or from active superintendence of the work during their progress.

31. **INJURY TO PERSONS AND DAMAGE TO PROPERTY - INSURANCE:**

The Tenderer shall be responsible for all injury to the work or workmen to persons, animals or things and for all damages to the structural and/or decorative part of property which may arise from the operations or neglect of himself or his employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of this contract.
The clause shall be held to include interalia, any damages to buildings whether immediately adjacent or otherwise, and any damage to roads, streets, footpaths or ways as well as damages caused to the buildings and the works forming the subject of this contract by rain, wind or other inclemency of the weather.

The Tenderer shall indemnify the employer and hold harmless in respect of all and any expenses arising from such injury or damages to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of compensation or damage consequent upon such claim.

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

The Tenderer shall effect the insurance necessary and indemnify the employer entirely from all responsibility in this respect. The insurance must be placed with a company approved by the employer and must be effected jointly in the name of the Tenderer and the employer and the policy lodged with the latter. The scope of insurance is to include loss or damage to the work and workmen due to carelessness, accident including fire, earthquake, floods, etc., damage or loss to the contract itself till this is made over a complete state. Insurance is compulsory and must be effected from the very initial stage. The Tenderer shall also be responsible for anything which may be excluded from damage to any property arising out of incidents, negligence or defective carrying out of this contract.

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

Unless otherwise instructed the Tenderer 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. The insurance must be placed with a company approved by the Employer, in the joint names of the Employer and the Tenderer for such amount and for any further sum if called to do so by the employer and lodge receipts of premiums paid with the employer within 21 days from the date of issue of letter of acceptance unless otherwise instructed.

In default of the Tenderer insuring as provided above, the Employer on his behalf may so insure and may deduct the premiums paid from any money due, or which may become due to the Tenderer. The Tenderer 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 fire has not occurred and in all respects under the conditions of the contract. The Tenderer in case of rebinding or reinstatement after fire shall be entitled to extension of time for completion as the Employer may deem fit.

32. **ACCOUNTS RECEIPTS & VOUCHERS :** The Tenderer 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 Tenderer shall use materials less than what is required under the contract, the value of the difference in the quantity of the materials that was required to use and that actually used shall be deducted from his dues. The decision of the Employer shall be final and binding on the Tenderer as to the amount of materials the Tenderer is required to use for any work under this contract.

33. **MEASUREMENT:** Measurements of completed works shall be as per Bureau of Indian Standards code IS-1200 & its relevant parts.

Before taking any measurement of any work, the Employer shall give reasonable notice to the Tenderer. If the Tenderer fails to attend at the measurements after such notice or fails to countersign or to record the difference within a week from the date of measurement in the manner required by the Employer then in any such event the measurements taken by the Employer or by the subordinate deputed by him as the case may be is final and binding on the Tenderer and the Tenderer shall have no right to dispute the same.

The measurements particularly concealable in nature shall be jointly taken and recorded and such statement of measurement shall be enclosed along the bill or running bills.

The works will be paid for as “measured work" on item rate basis i.e. on actual work done. All items of work described in the schedule of quantities are to be deemed and paid as complete works in all respects and details including preparatory and finishing works involved, directly, related to and reasonably
detectable from the drawings, specifications and schedule of quantities and no further extra charges will be allowed in this connection. The work shall be strictly according to the design / dimensions given in the drawings. The payment will be

restricted to the design dimensions and no payment will be made due to increase in thickness/ depth/width. All the dismantling items shall be PREMEASURED and APPROVAL of the employer shall be sought before dismantling.

34. **PAYMENTS**: All bills shall be prepared by the Tenderer in the form agreed or furnished by the Employer based on the accepted measurements. A maximum of three bills are allowed during the currency of contract which includes the final bill. The minimum bill value shall be Rs.15 Lakhs. The interim bills shall be in proper forms must be duly accompanied by detailed measurements in support of the quantities of the work done and must show deductions for all previous payments.

The Employer shall issue a certificate after due scrutiny of the Tenderer s' bill stating the amount due to the Tenderer from the Employer and the Tenderer shall be entitled to payment thereof, within the 21 days from the date of the receipt of the recommendations of the consultants on the interim bill. In case of delay due to some reasons in the processing of such bills for payment, an adhoc advance of 75% of the billed amount may be paid on the request of the Tenderer for the smooth progress of the work.

The amount stated in an interim certificate shall be the total value of work properly executed and 75% of invoiced value of material brought to site for permanent incorporation into the work up to the date of the bill less the amount to be retained by the Employer as retention money vide clause 16 of these conditions and less installments previously paid under these conditions, provided that such certificate shall only include the value of said material and goods as and from such time as they are reasonably, properly and not prematurely brought to or placed adjacent to the work and then only if adequately protected against weather or other casualties.

The Employer will deduct retention money as described in clause 16 of these conditions. The refund of retention money will be made as specified in the said clause.

All interim payments accepted by the Tenderer shall be regarded as payments by way of advances against final payment only. These shall not preclude requiring of bad, unsound and imperfect or unskilled work to be rejected, removed, 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 approving of any claim nor shall conclude, determined of affect in any way the power of the employer under these conditions for 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.

All payments are subject to statutory deductions of Income Tax & its Surcharge, Sales tax deductions or any other statutory deductions as notified by respective State/Central Government/Authority and any such instructions conveyed from time to time. From the interim bills, the retention money as detailed elsewhere in this tender shall also be deducted.

The final bill shall be submitted by the Tenderer within 1 (one) month from the date of completion of work or from the date of certification of virtual completion certified by the employer. No further claims shall be made by the Tenderer after submission of the final bill.

The final bill shall be accompanied by no claim certificate by consultant and a certificate of completion from the Employer. Payments of final bill shall be made after deduction of all previous payments and Retention Money as specified in clause 16 of these conditions, which sum shall be refunded after the completion of the Defects Liability Period after receiving the Employer certificate that the Tenderer has rectified all defects to the satisfaction of the Employer. The acceptance of payment of the final bill by the Tenderer would indicate that he will have no further claim in respect of the work executed.

35. **VARIATION / DEVIATION** : The Employer shall have power to make alteration in, omissions from, additions to or substitutions for the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work, and the Tenderer shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the employer. Such alterations, omissions, additions or substitution shall form part of the contract as if originally provided therein and any altered , additional or substituted work which the Tenderer may be directed to do in the manner specified above as part of the works, shall be carried out by the Tenderer on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided.

(a) No work which radically changes the original nature of the contract shall be ordered by the employer as a deviation.

(b) The price of all such additional items / non tendered items will be worked out on the basis of rates quoted for similar items in the contract wherever existing or on engineering rate analysis based on prevalent fair price of labour, material and other components as required.

The tendered rates, shall hold good for any increase or decrease in the tendered quantities up to variation of 25% and as stipulated elsewhere for legitimate completion of works as per original design or scope of work and on account of any modification or alteration suggested and where the variation is for the respective item is beyond 25%, the rate for the respective item may be reviewed on mutually agreed terms.

In the event of any deviation being ordered which in the opinion of the Tenderer changes the original nature of the Contract, he shall within fifteen days of having been so ordered bring this to the notice of the Employer with the reasons but nevertheless carry it out and the disagreement as to the nature of work and the rate to be paid therefore shall be resolved in accordance with Clause under caption "SETTLEMENT OF DISPUTES AND ARBITRATION".

36. **SUBSTITUTION**: Should the Tenderer desire to substitute any materials and workmanship, he must obtain the approval of the Employer in writing for any such substitution well in advance. In respect of Materials whose makes are not specified in the tender, specific approval of the Employer has to be obtained in writing before their usage.

37. **PREPARATORY WORK FOR UTILIZATION OF THE FACILITY AFTER COMPLETION**: The whole of the work shall be thoroughly inspected by the Tenderer and deficiencies & defects, if any shall be set right. On completion of such inspection, the Tenderer shall inform the Employer that they have completed the work and it is ready for inspection.

    On completion the Tenderer shall clean all the area and its surroundings, equipments etc. and will leave the entire area clean and ready for immediate usage to the satisfaction of the Employer.

38. **CLEARING SITE ON COMPLETION** :: On completion of the works the Tenderer shall clear away and remove from the site all construction materials, plant & equipments, tools, surplus materials, scraps, rubbish and temporary works of every kind and leave the whole of the site and the works clean and in a workmanlike condition to the satisfaction of the Employer.

39. **DEFECT AFTER COMPLETION (defect liability period**): The electrical installations should be guaranteed against faulty design, materials manufacture and workmanship at least for a period of 12 months from the date of handing over of the system to the organization in perfect working condition. The guarantee should cover free replacement of defective parts, accessories, etc., and of whatever necessitated during the guarantee period. Items found defective during the guarantee period will be replaced by new one or repaired free of cost to the full satisfaction of the client. All parts supplied / replaced / fitted during the guarantee period shall not attract transport charges etc. If at any time during the guarantee period the installations are out of order for more than Seven days at a time, then the guarantee period will be extended by the period of break down.

    The Tenderer shall make good at his own cost and to the satisfaction of the Employer all defects, or other faults which may appear within **12 months** after completion of the work(defect liability period). In default, the Employer may employ and pay other agency or persons to amend and make good such damages, losses and expenses consequent thereon or incidental thereto such expenses shall be made good and borne by the Tenderer and such damages, loss and expenses shall be recoverable from the payment due to the Tenderer and in the event of amount retained being insufficient, recover the balance from the Tenderer from the amount retained under clause No 16. together with any expenses the Employer may have incurred in connection therewith.

During the defect Liability period (DLP), the Tenderer has to supply the required materials to carry out AMC at periodical intervals as prescribed by the manufacturer. This is in addition to regular and preventive maintenance works during DL period. The AMC charges during Defect Liability Period shall be deemed to have been included in the rates quoted by the Tenderer in the BOQ.

40. CONCEALED WORKS :: The Tenderer shall give due notice to the Employer wherever any work is to be buried or concealed in the building in the earth, flooring, walls or otherwise becoming inaccessible later on, in order that the work may be inspected and correct dimensions or measurements taken before such burial. In default whereof the same shall, in the opinion of the Employer / Consultant be either opened up for measurement at the Tenderer s expenses or no payment may be made for such materials. Should any dispute or difference arise after the execution of any work as to measurements etc. or other matter which cannot be conveniently tested or checked, the notes of the employer shall be accepted as correct and binding on the Tenderer .

41. ESCALATION :: The rate quoted shall be firm throughout the tenure of the contract (including extension of time, if any granted) and will not be subject to any fluctuation due to increase in cost of materials, labor, sales tax, Octroi or any other reason.

42. IDLE LABOUR :: 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.

43. SUSPENSION OF WORKS :: If the Tenderer except on account of any legal restraint upon the Employer 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 Employer shall have the power to give notice in writing to the Tenderer 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 Tenderer 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 Tenderer 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 44** (Termination of Contract by Employer).

44. TERMINATION OF CONTRACT BY EMPLOYER :: If the Tenderer being a company shall goes into liquidation whether voluntary or compulsory, or being a firm shall be dissolved, or being an individual shall be adjudicated insolvent or shall make an assignment or a composition for the benefit of the greater part, in number of amount of his creditors, or shall enter into a Deed or arrangement with his creditors, or if the Official Assignee in insolvency, or the Receiver of the Tenderer in insolvency, shall repudiate the contract, or if a Receiver of the Tenderer'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 Employer that he is able to carry out and fulfill the contract, and if so required by the Employer to give reasonable security therefore or shall suffer any payment under this contract to be attached by or on behalf of and of the creditors of the Tenderer, or shall assign, charge or encumber this contract or any payments due or which may become due to the Tenderer thereunder, or shall neglect or fail to observe and perform all or any of the acts, matters or things by this contract, to be observed and performed by the Tenderer within three clear days after the notice shall have been given to the Tenderer in manner hereinafter mentioned requiring the Tenderer to observe or perform the same or shall use improper materials or workmanship in carrying on the works, or shall in the opinion of the employer not exercise such due diligence and make such due progress as would enable the work to be completed within due time agreed upon, and shall fail to proceed to the satisfaction of the employer after three clear days notice requiring the Tenderer so to do shall have been given to the Tenderer as hereinafter mentioned, or shall abandon the contract, then and in any of the said cases, Employer may notwithstanding previous waiver determine the contract by a notice in writing to the effect as hereinafter mentioned, but without thereby effecting the powers of the employer of the obligations and liabilities of the Tenderer 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 Tenderer (without thereby creating any trust in favour of the Tenderer) further the employer or his agent, or servants, may enter upon and take possession of the work and all plants, tools, scaffolding, sheds, machinery, steam and other power, utensils and materials lying upon premises or the adjoining lands or roads and sell the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by employing any other Tenderers or other persons or person to complete the works, and the Tenderer shall not in any way interrupt or do any act, matter of thing to prevent or hinder such other Tenderers 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 employer shall give notice in writing to the Tenderer to remove his surplus materials and plants and should the Tenderer fail to do so within a period of 14 days after receipt by him the employer may sell the

same by Public Auction and shall give credit to the Tenderer for the amount so realized. Any expenses or losses incurred by the employer in getting the works carried out by other Tenderers shall be adjusted against the amount payable to the Tenderer by way of selling his tools and plants or due on account of work carried out by the Tenderer prior to engaging other Tenderers or against the Security Deposit.

45. SETTLEMENT OF DISPUTES AND ARBITRATION :: All disputes or differences of any kind whatsoever which shall at any time arise between the parties hereto touching or concerning the works or the execution or maintenance thereof of this contract or the rights touching or concerning the works or the execution of maintenance thereof of this contract or the construction remaining operation or effect thereof or to the rights or liabilities of the parties or arising out of or in relation thereto whether during or after determination foreclosure or breach of the contract (other than those in respect of which the decision of any person is by the contract expressed to be final and binding) shall after written notice by either party to the contract to the other of them and to the Employer hereinafter mentioned be referred for adjudication to a sole Arbitrator to be appointed as hereinafter provided.
For the purpose of appointing the sole arbitrator referred to above, the employer will send within thirty days of receipt of the notice, to the Tenderer a panel of three names of persons who shall be presently unconnected with the organization for which the work is executed.

The Tenderer shall on receipt of the names as aforesaid, select any one of the persons name to be appointed as a sole Arbitrator and communicate his name to the employer within thirty days of receipt of the names. The employer shall thereupon without any delay appoint the said person as the sole Arbitrator. If the Tenderer fails to communicate such selection as provided above within the period specified, the competent authority shall make the selection and appoint the selected person as the Sole Arbitrator.

If the employer fails to send to the Tenderer, the panel of three names as aforesaid within the period specified the Tenderer shall send to the employer a panel of three names of persons who shall all be unconnected with either party. The employer shall on receipt of the named as aforesaid select any one of the person's names and appoint him as the Sole Arbitrator. If the Employer fails to select the person and appoint him as the Sole Arbitrator within thirty days of receipt of the panel and inform the Tenderer accordingly, the Tenderer shall be entitled to appoint one of the persons from the panel as the Sole Arbitrator and communicate his name to the employer.

If the Arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another Sole Arbitrator shall be appointed as aforesaid.

The work under the contract shall, however, continue during the arbitration proceedings and no payment due or payable to the Tenderer 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 differences 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 or in Chandigarh only.
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 Indian Arbitration 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 employer and the Tenderer hereby also agree that arbitration and Conciliation 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.

46. CO -ORDINATION OF WORKS: The Tenderer shall execute the works in co-ordination with the other agencies like air-conditioning, electrical etc., involved in the works. The work site shall be neatly cleaned as and when necessary so that the works of other agencies can be carried out. Failure on part of the Tenderer to clean the work site will empower the employer to engage other agencies and recover the cost from the Tenderer.

47. ELECTRICAL POWER, WATER AND TOILET FACILITIES: The Tenderer have to make his own arrangements towards the electrical power required for the works inview of the power restrictions imposed by the Government or electricity supplying authority. The Tenderer shall engage a licensed electrician to carryout and maintain his electrical system. The work shall not be stopped on account of power failure.

The tenderer has to make their own arrangements for procurement of water for construction purposes.

Common toilet facility is available at the work site. A portion of the same can be used by the tenderer and they shall always maintain the same in a hygienic and clean condition.

48. TENDERED VALUE: The lowest tendered value shall be the total of all the items including the buyback items.

49. The work should be carried out with full co-ordination / co-operation of occupants in the Office without damaging any permanent structures or furniture belonging to them. If any damage occurs, the cost of same will have to be reimbursed by the Tenderer.

50. The tenderer shall quote under Annexure – A – Price Bid towards annual non-comprehensive maintenance contract for a period of three years for the HV and MV electrical installations after the defect liability period of twelve months. This amount under Annexure A shall be taken into consideration for tender evaluation purposes. The tenderer should also produce Bank guarantee for a value of 10% of the charges quoted under Annual maintenance contract before submission of final bill for the capital work.

51. TESTING, MANUFACTURER'S TESTS, PRE-COMMISSIONING TESTS AND COMPLETE COMMISSIONING

The General intent of this specification is to mention the relevant tests to be done and finished to the employer by the Tenderer. These are guide lines. However the Tenderer shall carry out such tests and complete all formalities as per relevant **Indian standard specification**s, and/or Electricity rules and Regulations as prescribed by the Government Or other Local Authorities.

51.1 Testing of equipment:

The electrical installations shall be subjected to the tests as per BS or IS requirements at the site. These tests shall be witnessed by representative of the client and consultant. The book let published by BS or IS (as the case may be) on these tests shall be made available in advance before the tests are carried out to the owner and consultant.

All equipment before installing at the site shall be tested and all such results produced to the employer. Nothing shall absolve the Tenderer from re-performing any tests that Tenderer may be called upon specifically by consultant/ employer/supply Company or Electrical inspector. All equipments shall be tested jointly with the consultants/ employer as required by various sections of specifications and test data shall be furnished as required.

At the Employers Site:

Testing the adequacy, suitability and the efficiency of the newly erected electrical installations has to be ascertained only by during operation. Hence, it shall be essential on part of the Tenderer who has supplied and erected the electrical installations to commission the same before presentation of the final bill for the entire satisfaction of the UIIC / Consultant. **Necessary operators for the operation of electrical installations during the testing period shall be arranged by the tenderer at no extra cost.**

51.2 Mechanical Operational Test:

Mechanical Operational Tests for all movable parts of switchgears, breakers, tripping decises etc.

Phase Sequence Test:
Phase Sequence Tests at all the relevant points for connecting correct R, Y and B as per the supply utility sequence, interlocks and tripping.

- All panels should be tested for interlocks, control tripping and all breakers to be tested for sequential tripping.
- Continuity Test
- Continuity tests shall be done for noting any short circuits and / or earthing of phases.
- Earthing Test
  Earthing tests for continuity of Earth by earth Megger, on L.V. side. The earth resistance values shall not exceed 5 ohm.

51.3 Commissioning:

The tenderer shall make initial arrangements for obtaining permission for the erection of electrical installations from the Electrical Inspectorate at Chandigarh. On completion of installations, necessary safety certificate for commissioning the same is to be obtained from Electrical Inspectorate. **Any expenditure payable to Electrical Inspectorate in obtaining safety certificate shall be borne by the tenderer.**

Prior to commencement of installation work, the Tenderer shall obtain the approval for the drawings such as electrical physical layout drawings, schematic diagrams, road cutting etc. for the proposed work from respective statutory bodies. In addition, the location from where Electricity Department supply is to be tapped, the exact location where the RMU is to be installed, the specifications of RMU, CT/PT metering unit etc. shall be obtained in consultation with the officials of the Electrical Department, Chandigarh and the work executed as per their specifications and instructions.

51.4 Operation of the electrical installations after erection:

The Tenderer shall arrange to depute a senior operator to the site of works to operate and maintain the installations for a minimum period of a fortnight after successful installation and approval of the installation by the local authorities. The operator shall impart training to the owners operators/Technicians in proper up – keep of the electrical installations. The cost of these activities shall be deemed to have been included in the rates quoted by the Tenderer in the BOQ.

7. SAFETY CODE

Scaffolds

i) Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration work which can be done safely from ladders. When a ladder is used, it shall be of rigid construction made either of good quality wood or steel. The steps shall have a minimum width of 450 mm and maximum rise of 300 mm. Suitable hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than ¼ to 1 (¼ horizontal and 1 vertical).

ii) Scaffolding or staging more than 4 m above the ground floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly bolted, braced or otherwise secured, at least 1 m above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings 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.

iii) Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform, gangway or stairway is more than 4 m above ground level or floor level, they shall be closely boarded and shall have adequate width and be suitably fenced as described in (ii) above.

iv) Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 1 m.

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.

v) Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m in length while the width between side rails in rung ladder shall in no case, be less than 260 mm for ladder up to and including 3 m in length. For longer ladders this width shall be increased at least 20 mm for each additional meter of length.

vi) A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to construction.

Other Safety Measures

vii) All personnel of the Tenderer working within the plant site shall be provided with safety helmets, belts etc. 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.

viii) 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.

Excavation & Trenching

ix) All trenches, 1.25 m or more in depth shall at all times be supplied with at least one ladder for each 30 m in length or fraction thereof. The ladder shall be extended from bottoms of the trench to at least 1 m above the surface of the ground. Sides of trenches which are 1.5 m or more in depth shall be stepped back to give suitable slope or securely held by timber bracing so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m 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.

x) The Tenderer shall take all measures on the site of the work to protect the public from accidents and shall be bound to bear the expenses of defense of every suit, action or other proceedings at law that may be brought by any persons for injury sustained owing to neglect of the above precautions and to pay any such persons or which may with the consent of the Tenderer , be paid to compromise any claim by any such person.

Demolition

xi) Before any demolition work is commenced and also during the process of the work:

a. All roads and open areas adjacent to the work site shall either be closed or suitably protected.

b. 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.

c. All practical steps shall be taken to prevent danger to persons employed from the 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.

Personal Safety Equipments

xii) All necessary personal safety equipment as considered adequate 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 Tenderer should take adequate steps to ensure proper use of equipment by those concerned.

a. Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.

b. 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.

c. Those engaged in welding works shall be provided with welder's protective eyesight lids.

d. Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

e. When workers are employed in sewers and manholes, which are in use, the Tenderer shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into manholes and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accidents to the public.

f. The Tenderer shall not employ men below the age of 18 years and women on the work of painting with products containing lead or any toxic material in any form. Wherever men above the age of 18 are employed on the work of such painting the following precautions should be taken:

i. No paint containing lead or lead products shall be used except in the form of paste or ready made paint. Paints like vinyl and epoxies having toxic fumes should be applied after following all precautions laid down by manufacturers.

ii. Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

iii. Overalls shall be supplied by the Tenderer to the workmen and adequate facilities shall be provided to enable the working painters to wash during or after the cessation of work.

xiii) When the work is done near any public place where there is risk of drownings all necessary equipments 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.

Hoisting Machines

xiv) Use of hoisting machines and tackle including their attachments anchorage and supports shall conform to the following standards or conditions:

a. These shall be of good mechanical construction, made of sound material of adequate strength and free from patent defects, and shall be kept in good repair and the good working order.

Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

b. Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be incharge of any hoisting machine including any scaffolding winch or give signals to operator.

c. In case of every hoisting machine and of every chain ring hook, shackle shovel and pulley block used in hoisting or as means of suspension the 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 and 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.

d. In case of departmental machines, the safe working load shall be notified by the Engineer. As regards Tenderer's machines, the Tenderer shall notify the safe working load of the machine to the Engineer whenever he brings any machinery to site of work and get it verified by the Engineer concerned.

xv) Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum of the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulting 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.

xvi) All scaffolds, ladders and other 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.

Adequate washing facilities should be provided at or near places of work.

xvii) These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the Tenderer.

xviii) To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the Tenderer shall be open to inspection by the Labour Officer, Engineers of the Department or their representatives.

xix) Notwithstanding the above clauses from (i) to (xviii), nothing stated hereinabove shall exempt the Tenderer from the operations of any other Act or Rule in force in the Republic of India.

8. BRIEF DESCRIPTION OF SCOPE OF WORK

I) Scope

a) The scope of Bid is to avail HT Supply at United India Insurance Company Limited, Regional Office, S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017

The detailed scope of work under this contract is limited to the building with number of stops as detailed in bill of quantities / schedule of items.

1. Supply and Installation of RMU for availing the supply from UT, Electricity Department. It is seen generally that RMU unit is located opposite to consumer's premises inside parking area (on the roads). Since the exact location from where electricity department supply is to be tapped is not known, a tentative length of 150 metrs of 3 core 150 sq. mm. cable (2 runs x 75 metrs) is included in the BOQ.

2. Supply and Installation 11 KV CT/PT metering unit and 11KV VCB at ground floor of consumer's premises.

3. In the first instance, the tenderer is to meet and discuss with the Electricity Department, Chandigarh officials to finalise the location of RMU and also the location from where the HT supply to the RMU is to be tapped.

4. It is seen in nearby building that the 11 KV/433V HV substation with connected MV switchgear has been installed in the terrace of the building in a compact form since sufficient space is not available for the installation of same in Ground Floor. Similarly, due to the site constraints, the 11KV/433V substation in the compact form is proposed in the terrace of the building (UIIC).

5. Supply and installation of CSS consisting of 11 KV HT VCB, 400 KVA Dry type cast resin transformer, MV panel, automatic power factor correction panel (APFC), connectivity between each and every items mentioned above, earth connections etc.,

6. LT cabling from the CSS to the existing panels located below the staircase landing at Ground Floor.

7. Providing earthing and earth connections.

8. Liasioning work with the concerned department for the smooth execution of work.

a) During the guarantee period of one year after successful commissioning of electrical installations and handing them over to the Employer, the Tenderer shall carry out comprehensive maintenance of electrical installations free of cost. After this guarantee period, the Employer will reserve the right to enter into Annual Maintenance Contract as described in the Bid document.

The makes of materials mentioned in the Bid document are indicative only and are, by and large, of Indian Origin. Any other equivalent product of International Repute will be acceptable subject to the products satisfying the specified elsewhere in the Bid.

b) The Tenderer shall furnish any other details relevant to the work and not covered in the tender with financial bearing if any explicitly.

c) As the tender documents shall form part of the agreement, the provisions covered therein should be noted carefully and any deviation felt necessary there from shall be high lighted at the time of tendering only and not after. For this a statement of deviation, if any shall be prepared by Tenderer and shall be enclosed "Technical Bid". If no deviation is proposed, still this form shall be submitted with an entry "No deviation proposed". No deviation in commercial conditions is acceptable.

d) The Tenderer shall give rates for all items given in the schedule of quantities.

e) No extra payment shall be considered either due to escalation or amendments / modifications to statutory act / rules issued during the contract period.

f) **The Tenderer shall be responsible to obtain necessary safety certificate from Electrical Inspectorate and permission from Local Competent Authority for cutting the public roads, excavation, laying of cables and making good of the roads. Payments to these bodies are to be borne by the tenderer.**

All minor civil works under the Tenderer's responsibility include Cutting, Chasing and making good of the same at all levels, conceal the conduits and boxes for panels etc. The minor civil works shall also include items connected with provision of concrete pedestrals / beds / bearing plate etc. for the installation of HT panel, RMU Panel, CSS etc.

9. SPECIAL CONDITIONS

1. The Tender shall be valid for 90 days from the date of opening.

2.

a. The tenderers are advised to have a free inspection of the site before tendering.

b. The following tests and any other tests prescribed by the ISI shall be carried out in the completed electrical installations before it is handed over. The necessary instruments for testing purposes will be provided by the firm.

Test to determine the insulation resistance between line and earth.

Test to determine that the earthing of conduit, switch and similar metal works are continuous.

3. Guarantee

a. The electrical installations shall be guaranteed against faulty design, materials manufacture and workmanship for a period of 12 months from the date of handing over the electrical installations in perfect working condition. If the installations go out of order during the guarantee period, the guarantee period will be extended by the period during which the installation is out of order and not functioning.

b. The guarantee shall cover replacement of defective parts, lubricating the parts, during the guarantee period, transport charges for taking the defective materials to the company / factory and bringing them back to the site.

c. Free Servicing

The installation shall be thoroughly serviced regularly every month during the guarantee period of 12 months. Break down calls shall be attended to immediately free of charge during the guarantee period. The tenderer's capability in ensuring required after sales services must be stated.

d. Firms having full-fledged after-sales service station in Punjab / Haryana will alone be considered. The full address of the after-sales service station shall be stated.

4. GA Drawings

The successful tenderer shall submit the GA drawings such as electrical physical layout drawings, single line diagram etc. within two weeks from the date of receipt of formal work order in consultation with the UIIC / Consultant and get the approval of the GA drawings from the Local Electrical Inspectorate for commencing the work.

5. Price quoted by the tender shall be firm throughout the contract period. No price variation clause shall be applicable for this work.

6.

a. Only the tenders complete in all respects for all items of work will be considered.

b. Tenders received within the due date alone will be considered.

7. Printed conditions enclosed to the tender shall be scored out and initialed wherever not applicable with respect to this specific tender.

8. Any tender clarification affecting the price structure after tender opening will not be considered.

9. The tenderers are requested to go through the enclosed specifications carefully and quote for the job. The tenders for a portion of the work will not be considered and tenders must be in full conformity with those specifications (without any deviation).

10. The UIIC reserves the right to reject any or all the tenders received without assigning any reasons.

11. The details of size, weight of steel, members such as sill projection, sill angles machine, beam, door frames buffer support channel, facial plate etc. shall be included in the main offer.

12. Training the Employer's personnel :

The tenderers shall be ready to train the Clients persons in the operations, maintenance and fault detection in the electrical installations during the erection period and servicing periods also.

13. Any damage or disfigurement caused by the Tenderer to the building during the execution of the work shall be made good at the Tenderer's cost.

10. TECHNICAL SPECIFICATIONS

14. All the electrical wiring shall be done as per the latest I.E. rules

Necessary physical layout and electrical schematic line diagram of the proposed work shall be prepared and got approved by the Local Electrical Inspectorate, Chandigarh. The tenders shall also see to it that the safety certificate to commission the installations from the Local Electrical Inspectorate, Chandigarh is obtained for the work at tenderer's cost. The inspection charges payable to Electrical Inspectorate will be borne by the tenderer. 3 sets electrical wiring diagram and 3 set maintenance instructions shall furnished while handing over the work to the UIIC among which one copy shall be neatly framed for keeping it in the substation.

15. Liasoning work with statutory bodies such as Local Electrical Inspectorate, Local Electricity Department, Municipality Department etc. for obtaining necessary permission for smooth execution of work. The contractor shall take full responsibility in availing HT supply from the Electricity Department, in obtaining safety certificate from the Local Electrical Inspectorate for commissioning the installations, from local municipal bodies for cutting the public roads, excavation, laying of cables and making good of the roads.

CONTENTS

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I. SCOPE OF WORK

Design, supply, erection, testing, commissioning, operation and maintenance of the following:

ELECTRICAL SYSTEM DETAILS

Incoming Voltage - 11KV, 3 phase supply earthed system

11KV XLPE H.T cable from Chandigarh Electricity Department Mains to RMU and from RMU to consumer's H.T panel and from HT panel to compact substation at terrace consisting of 11 KV H.T. switch gear, 400 KVA 11 KV / 433 V cast resin dry type transformer, MV panel and APFC panel.

1 No. 400KVA, 11KV /433V cast resin dry type indoor / outdoor transformer.

Single Busbar type Main Power Control Centre including hardware control cabling.

Earthing of all the substation equipments, RMU, Metering unit, CSS, MV panel, sub switch boards, distribution boards, control switches, copper busduct, etc.

Preparation of drawings, submission to the Electrical Inspectorate, Chandigarh and obtaining approval, arranging inspection after completion of work and obtaining safety certificate etc. Necessary statutory fees will be paid by the contractor against demand notice.

The tenderer shall take full responsibility in obtaining electrical loads sanction from Chandigarh Electricity Department with necessary follow – up, obtaining service connection and energize the installation and also obtaining permission from competent authority for cutting the public roads, excavation of tranches, laying of cables, making good of roads etc. **In addition, the location from where Electricity Department supply is to be tapped, the exact location where the RMU is to be installed, the specifications of RMU, CT/PT metering unit etc. shall be obtained in consultation with the officials of the Electrical Department, Chandigarh and the work executed as per their specifications and instructions.**

The statutory fees and other incidental expenditure, if any, payable to the Electrical Inspectorate and other statutory bodies. will be borne by the tenderer.

The client will render necessary assistance to the successful tenderer in the form of furnishing letter and documents for obtaining above approval from statutory authorities. But the responsibility for obtaining above approvals including arrangements for inspection etc. is with the tenderer.

Necessary minor civil works required for execution of works such as beds / pedestals for installation of transformer, HT panel board, MV panel, cable trays etc. shall be included under the scope of electrical agency.

Chipping breaking grouting and making good of damaged civil works for cable trays, conduit pipes etc.

Construction of earth pits with heavy duty RCC slab / C.I cover for cover shall be included.

Automatic Power Factor Control Panels.

Termination of cables at equipment end for equipments supplied by others.

DRAWINGS

The contractor shall prepare detailed 'Good for construction' drawings for the entire electrical installations both physical and schematic layout based on the tender drawings and shall submit the same to the client / architect within two weeks from the date of receipt of work order for approval by the client / architect.

APPROVAL BY ELECTRICAL INSPECTORATE

It is the responsibility of the contractor to prepare all detailed working drawings required for approval by Electrical Inspector, Chandigarh and obtain his approval. The contractor has to arrange for site inspection and get safely certificate to commission the installation for the entire scope of work carried out by him.

I. TECHNICAL SPECIFICATION OF COMPACT RMU:

I. CODES AND STANDARDS

a. The equipment shall comply with the requirements of latest revision of relevant standards issued by BIS (Bureau of Indian Standards), unless otherwise specified.

b. The equipment shall also conform to the provisions of Indian electricity rules and other statutory regulations currently in force in the country.

c. In case Indian standards are not available for any equipment, standards issued by IEC / BS/ VDE/IEEE/NEMA or equivalent agency shall be applicable.

II. DESIGN CRITERIA

a. The 11kV Extensible type, Non-metering Switchgear shall be installed at outdoor application. 11kV 630A SF6 Load Break Switches shall be used for isolating the incoming of the HT feeder cables of the 11kV distribution system and 630Amps continuous rating SF6 Insulated Vacuum Circuit Breaker for isolating the 11kV/433V distribution transformers.

b. Outdoor Enclosure: The whole switchgear (RMU) should be enclosed in an MS enclosure, suitable for outdoor conditions. The same should be tested for IP54. The outdoor enclosure shall be fabricated from **sheet steel having thickness not less than 2mm**.

c. The switchgear and component thereof shall be capable of withstanding the mechanical and thermal stresses of short circuit as listed in the ratings and requirements clause without any damage or deterioration of the materials.

d. For continuous operation at specified ratings temperature rise of the various switchgear components shall be limited to permissible values stipulated in the relevant standard and / or this specification.

e. SYSTEM :- The system network is 11000 Volts, 3 phase 3 wires 50 cycles. The voltage and frequency are subject to variation as per statutory limits governed by Indian Electricity Rules 1956 with latest amendments in force.

III. GENERAL

a) PAINTING: The surface of all metallic parts shall be thoroughly cleaned, scrapped and degreased preferably by sand / shot blasting or any other treatment. The exterior surface shall be given weather resisting epoxy coating. The paint shall withstand the operating conditions described above and equipment shall not show any sign of the rust formation.

b) RATING: The copper bus bar shall be capable to withstand continuous rating of 630 Amps. The isolator should have continuous rating of 630 Amps and VCB shall have a continuous rating of 630 Amps. All connection including band joints for bus bars etc shall be of ample cross section to cater the rated load current continuously and shall be suitable for short time rating of not less than 21kA for 3 seconds.

IV. BREAKING AND MAKING CAPACITY :-The Vacuum circuit breaker shall be capable of having rupturing capacity of 400 MVA symmetrical at 11000 Volts three phase. Symmetrical breaking capacity shall be not less than 21kA rms for 3 seconds and the making capacity of not less than 50 kA peak at 11000 Volts. The isolators shall be capable for breaking rated full load current and shall have fault making capacity of 50 kA peak.

V. EXTENSIBILITY :-The whole switchgear (RMU) should be suitable for extension on either sides, with separate bushings for left and right extensibility, located on both the sides on the upper part of the tank. Extensible bus-bar bushings on the roof or rear or bottom are not acceptable. The extensible Busbars should be Plug-in/push-on type to facilitate easy and fast connection and

installation. Bolted types of extensible Busbars are not acceptable. They should be

designed in such a way that after connection the Busbars are not visible / exposed to the atmosphere. The gap between the RMU on being connected after the extension should not be more than 10mm.

VI. EARTHING SWITCH :- Each switching device should be equipped with an inbuilt integrated earthing switch. The earthing switch must be designed accordance to IEC 60129 or DIN VDE 0670 part 2. The earthing switch with making capacity must be integrated in a comprehensive interrogator interlocking system and must be equipped with an ON snap action drive. The direction of rotation must be clockwise when switching ON and counterclockwise when switching OFF the earthing switch.

VII. CONSTRUCTONAL FEATURES:-

a) The equipment shall be compact, totally enclosed in as self-contained self supporting, gas tight compartment, mounted on base frame or channels. The assembly shall be equipped with common power bus bars, load break switches and vacuum circuit breaker as specified in BOQ. All medium voltage parts should be totally enclosed in an SF6 environment. The gas tank shall be made by using metalised stainless steel with IP 67 degree of protection.

b) The freestanding metal housing shall be designed to withstand internal pressure and external mechanical loads without distortion. SF6 gas insulated switchgear housing shall have an over pressure relief device vented to the rear / back side of the equipment.

c) An operating mimic diagram shall be provided on the front side of RMU.

d) Each unit shall be provided with lifting facility of proven design for easy handling.

e) Isolator/Breaker ON-OFF, Earth, 'SF6 gas pressure low' indication etc. shall be provided.

f) Handle operated 'spring charged' mechanical operation shall be provided. Local control of switch/isolator shall be possible

VIII. BUSBARS:- The bus bar shall be of copper and SF6 insulated type. The cross sectional area of the copper bus bar and jointing accessories shall be brought out by the

tenderer in their tender document.

IX. LOAD BREAK SWITCHES:- The Load Break Switches offered shall conform to IEC-60265 OR DIN VDE 0670 as amended to date. The Load Break Switches shall be SF6 insulated, triple pole, spring assisted hand operated type with quick break contacts. SF6 gas pressure gauge shall be provided for pressure indication purpose.

a) The operating handle shall have the three positions "ON", "OFF", and "EARTH" which shall be clearly marked with suitable arrangement to padlock in any position. A safety arrangement for interlocking shall be provided by which the isolator operation shall be prevented from "ON" position to "EARTH ON" position or vice versa in a single operation. This can also be achieved by using separate handles.

b) Integral cable test terminals with interlocked cover shall be provided. The interlocks shall be so arranged that, the cable test terminals will be accessible only in the "EARTH" position of the isolator.

c) To facilitate testing of cables, it shall be possible to bring the Load Break Switches to OFF position while the cable testing is in progress, but operation to ON position shall be prevented so long as the cable testing is in progress.

d) The Load Break Switches shall be capable of breaking full load current and a fault making of 50 KA peak.

e) Load Break Switches are to be operated manually.

X. CIRCUIT BREAKER :-

a) The 11 KV, 630 Amps SF6 insulated VCB (for controlling transformers), shall be load breaking and fault breaking type fitted with three 630 Amps continuously rated SF6 insulated bus bars and arrangement for cable to the primary side of the transformer. The circuit breaker

shall be suitable for manual closing and opening and also for provision for remote tripping in future. The operating mechanism shall be suitable for direct hand

operated trip free with a mechanically operated indicator, positively coupled to the operating mechanism to indicate whether the breaker is in the closed or in the open position.

b) VCB shall have three positions i.e. ON, OFF & EARTH.

c) There should be **fault passage indicator** for incoming feeder. In case of fault current passing through the isolator, the flag must indicate that the fault current has passed through it. There shall be provision of resetting the indication.

d) The HT panel shall be provided with accessories for tripping such as CT operated series trip coils for over current and earth fault protection. Breaker shall be provided with a shunt trip coil suitable for 230V AC supply.

XI. Current Transformer:- The Ratio of the tape wound CTs shall be suitable for protection circuits of transformer capacities indicated in the BOQ and shall have secondary winding of 1 Amps. The VA burden of the CTs shall be sufficient to supply the energy required by the relay for normal operation and tripping of the circuit breaker and as per BOQ.

XII. Protection System for VCB:- The protection system for all VCBs should be provided with the provision of suitable self powered relays having scheme for both over current and earth fault. It must provide immediate protection and can detect faults instructing the circuit breaker to trip in less than 60 ms. The protection system shall be a self-powered relay, which requires no external power source or batteries. It must have improved operation and control with the Relay settings clearly displayed on the front of the panel. Manual reset flag shall show separate tripped on fault for either phase or earth fault conditions. It should have the provision for the trip test on circuit breaker.. Secondary injection can also be carried out using conventional test equipments.

Provision for oil temperature controller of transformer :- The VCB shall be provided with necessary arrangement for connecting the trip / alarm contacts of oil temperature controller of the transformer. Necessary Hand reset auxiliary relay for trip / alarm indication along with acknowledge & reset buttons and alarm bell shall be provided in the VCB section for achieving the trip / alarm functions.

Anunciator unit combining all these functions in to single unit is also acceptable.

XIII. **SF6 Insulation:-** Switchgear housing shall be completely gas tight. In the power compartment provision shall be made for filling up the gas at site. A manometer should be provided to indicate the healthy state of SF6 gas pressure inside the tank. SF6 gas pressure inside the tank shall not be less than 1.3 bar at 20 Deg Centigrade. The above Isolators , breaker , Busbars should be mounted inside a TIG (Tungsten Inert Gas) welded / Robotically welded, sealed for life, stainless steel tank of 2 mm thick sheet metal. The tank should be filled with SF6 gas at adequate pressure. The degree of protection for gas tank should be IP67, leak rate of SF6 gas less than 0.1% and tested as per IEC 60056/60694/60298.

XIV. OPERATION AND INTERLOCKING:-

a) All operations shall be from front of the equipment via spring assisted mechanism. The Ring Main Unit VCB should be provided with a series trip coil for tripping. It shall be possible to operate the switches and circuit breaker manually and spring assisted mechanism shall ensure speed of operation of switches. Operation handle shall be considered as part of the unit and should be provided with each RMU.

b) Load break switches and earthing switches shall be fully interlocked to ensure that operation is carried out in correct sequence. Movement of operating handle against interlock shall not by any means originate, store or activate the energy mechanisms. Padlocking facility shall be provided for operation of load switch and earthing switch.

Safety of operation shall be ensured by interlocks to prevent simultaneously closing of the main switch and earth switch. This interlock shall be integral part of the operating mechanism. Also separate operating shafts shall be provided for operation of earthing switch and main switch for the same purpose.

c) The fully interlocked integral test facilities are to be provided underneath the units, so that access to the test terminals is achieved only by removal of a cover.

d) The SF6 insulated isolators and VCB breaker operating mechanisms shall be totally enclosed and self-lubricating type. The manually operated handle shall be mounted in front of the isolators and so designed that the operation is complete by one movement without any undue stain on the operator. All mechanical interlock shall be robust so as not to give-way during normal operation. The tripping of breaker unit should be provided with push button or manual operating lever.

XV. SECONDARY WIRING:- The secondary wiring supplied for the equipment shall consist of non-deteriorating fire proof superior grade stranded copper PVC wires suitably colored and fitted with numbered ferrules at both ends.

XVI. EARTHING ARRANGEMENT:- It shall be easily possible to test the cables by a simple earthing arrangement. Equipment earthing by copper strips of adequate size shall be provided. A set of earthing arrangement and a set of three phase test bushings shall form an integral part of RMU panel and shall be all enclosed within an interlocked cover to prevent incorrect operation. The access of the test bushing shall be fully interlocked.

XVII. **Fault Passage indicator**:- These shall facilitate quick detection of faulty section of line. The fault indication may be on the basis of monitoring fault current flow through the device. The unit shall be self-contained requiring no auxiliary supply.

XVIII. **Voltage presence indicator:-** All the load break switches and VCBs of the RMU shall be equipped with a permanent voltage indication to indicate whether or not there is voltage on cable.

a. A mechanical 'ON/OFF' indicator shall be provided on SF6 insulated isolators and VCB breaker to indicate whether switch is ON or OFF.

b. SF6 insulated switches shall be fitted with correct sequence device having "ON/OFF' and re-set and test position and shall have provision for padlocking operating handle.

XIX. **CABLE BOXES:-** The isolators and VCB shall be provided with suitable and identical cable boxes for connecting 3 core, 11KV XLPE cables of size up to 300 mm^2 approaching vertical from below. The cable boxes shall be so located at convenient height to facilitate easy cable jointing work. The access to all the cable should be from the front of HT panel. The cable boxes shall be with detachable front cover for ease of termination. The design of the cable box shall be such that any type of jointing methods such as heat shrinkable/push on type/cold shrinkable type termination's can be adopted.

XX. **Earthing:-** All ring main units shall have a special earth bar with a sectional area of not less than 100 mm^2 run along the whole of metal enclosed switch structure, each end being connected to the main earthing system where metal cases are used on instruments these shall be connected to this bar by conductors of suitable section.

XXI. RATINGS AND REQUIREMENT:-

A) GENARAL SWITCHGEAR DATA:-

a)	Service	Outdoor
b)	Type	Metal clad
c)	Number of phases	3
d)	Voltage	11000V
e)	Rated Frequency	50 Hz
f)	Rated Current	630 Amps
g)	Short Circuit rating –Breaking Short time 1 Sec.	*Not less than 21kA for 3 sec*
h)	Insulation Level	75 KV peak
i)	System earthing	Solidly earthed at Sub-station

A - 1) **Vacuum Circuit Breaker:-**

a)	Type	VCB encapsulated in SF6 Environment
b)	Rated Voltage	11 KV
c)	Breaking Current	Not less than 21KA rms for 3 sec
d)	Making Current	Not less than 50 KA peak
e)	Rupturing Capacity	400 MVA
f)	Rated Current	630 Amps
g)	No. of Poles	3
h)	Operating mechanism	Trip free and free handle type with mechanically operated indicator

A - 2) **Load Break Switches:-**

a)	Type	SF6 insulated load breaking and fault making
b)	Duty cycle	50hz
c)	Rated current	630 Amps
d)	Rated breaking capacity	Not less than 21KA rms for 3 sec
e)	Fault making capacity	Not less than 50 KA peak
f)	Rupturing Capacity	*400 MVA*
g)	No. of poles	3 Poles
h)	Operating mechanism	Operating handle with ON, OFF, Earth positions with arrangement for padlocking in each position.
i)	SF6 tank	Stainless steel only
j)	Interlocks	Suitable interlocks for: 1. Cable test terminals on the orifices will be accessible only in “Earth” position. 2. Test plugs can be inserted and withdrawn only in the “Earth” position.
		3. To prevent operation from “ON” position to “Earth” position or vice versa in a Single operation. 4. To bring isolator to “OFF” position with test plugs inserted but to prevent operation to “ON” position with test plugs inserted or test terminals kept open.
k)	Operation safety	Safety against explosion and fire hazards etc

B) Busbars:-

a)	Material	Copper
b)	Type	SF6 insulated
c)	Rated Current	630 Amps
d)	Short time rating for Sec.	21kA for 3Sec
C)	**Cable Boxes:-**	Vacuum circuit breaker shall be provided with identical cable boxes for connecting 1 No. 11KV 3C, 50 to 300 mm^2 XLPE cable.
D)	**Protection:-**	Three phase over current and earth fault Self Powered Relay.

D - 1 Relays :-

Relays		Numerical type relays for over current and earth fault Protection Anti pumping relay Master Trip relay
Instruments		1 - 96mm x 96 mm digital Ammeter, 0-150 Amps with Ammeter selector switch.
Cable Particulars		The outgoing cable is 11 kV(E)type, 3 core x 240 Sq.mm, XLPE insulated aluminum conductor. The cable entry will be from bottom.
Additional equipment for the switchboard:		
Accessories	Space Heater with Thermostat	
	illumination lamp (CFL) in each relay /instrument panels.	
Padlock and keys	One set for each panel	

XXIII. TESTS:-

Each type of H.V. Switchgear shall be completely assembled, wired, adjusted and tested at the factory as per the relevant standards and during manufacture and on completion.

a) **ROUTINE TEST:-** The tests shall be carried out in accordance with IS: 12729 or IEC 60298. The tests shall include but not necessarily limited to the following:-

i. Withstand voltage at Power Frequency for all current carrying parts including wiring.

ii. Measurement of resistance of the main circuit.

iii. Gas Leakage test.

iv. Partial Discharge Test

iv. Withstand voltage on auxiliary circuits.

v. Operation of functional locks, interlocks, signaling devices and auxiliary devices.

ϖι. Suitability and correct operation of protections, control instruments and electrical

connections of the circuit breaker operating mechanism (primary and secondary injection).

ϖιι. Verification of wiring.

ϖιιι. Visual Inspection.

Routine test shall be carried out on all equipment such as circuit breakers, current transformers, relays, meter etc,. as per relevant standards.

b) **TYPE TEST:-** The following tests shall be performed on a typical section of the bus assembly of each type of switchgear. Units shall be type tested in accordance with IS: 12729 or IEC Standards 60056, 60129, 60265, 60298, 60529 and 60694. The tests shall include:-

i. Impulse test with breaker inside the cubicle.

ii. Temperature rise test with breaker inside the cubicle.

iii. Short Circuit test with breaker inside the cubicle.

iv. Dielectric Tests.

v. Test of apparatus i.e. circuit breaker and earthing switch.

vi. Arc Fault test.

c) **TEST WITNESS:-** All Routine tests shall be performed in presence of client / electrical consultant's representatives, as desired by the client / electrical consultant. The Contractor shall give at least Ten (10) Days advance notice of the date when tests are to be carried out.

d) **TEST CERTIFICATES:-** Certified reports of all the tests carried out at the works shall be furnished in three (3) copies for approval of the client / electrical consultant. The equipment shall be dispatched from works only after receipt of client / electrical consultant's written approval of the test reports. Type test certificate on any equipment, if so desired by the client / electrical consultant, shall be furnished; otherwise the equipment shall have to be type tested, free of charge, to prove the design.

XXIV. **DRAWING APPROVAL:-** The Contractor has to take the approval for the various drawings of the RMU unit including the protection scheme from Electricity Department, Chandigarh. The contractor has to provide us all relay characteristics. The entire unit should conform to the specifications of the Electricity Department, Chandigarh.

XXV. **MANUAL:-** The contractor has to provide the complete manual for the operation of the breaker.

III. CAST RESIN DRY TYPE TRANSFORMER

GENERAL REQUIRMENT OF DRY TYPE TRANSFORMER

The transformer cubicle will be fitted with Cast Resin as per the Technical Specification detailed below.

General

The Transformer shall be of Cast Resin type, generally in accordance with is : IS-2026/1977 I.E.C.726 & IS – 11171/1985 reaffirmed in 1991 for dry type transformers as applicable unless specified otherwise should be ISO 9001 certified company manufacturing Cast Resin Transformer and also in accordance with the following requirement.

The transformers shall be designed and suitably insulated for continuous operation at the rated KVA , under the prevailing site conditions at the rated voltage, frequency and temperature rise stipulated hereinafter.

Variation in Voltage & Frequency

The rated no load voltage shall be as under:

HV	-	11,000 Volts
LV	-	433 Volts

The rated frequency shall be 50 Hz.

The transformers shall be designed for satisfactory operation of any supply voltage with + 5 % to –5 % of rated voltage of 11,000 volts . Fault level at 11 kV systems is 350 MVA.

Nature of the Load

The Transformer will be commissioned to provide supply to a software Industry.

The Transformer shall have percentage impedance as specified in data sheet.

Winding

The HV & LV winding shall be of copper and shall be circular. The arrangement of the windings shall be such that there is no magnetic unbalance under all conditions of operation.

The HV and LV winding shall be made of electrolytic grade high conductivity copper. The HV & LV coils should be first Vacuum Impregnated with unfilled Resin and then the HV coil shall be cast with resin. Silica flour and accelerator in moulds and cured in a high vacuum furnace to form hollow tubular blocks.

The co-efficient of expansion of the resin & winding shall be comparable to prevent unequal expansion and possibility of thermal stress in operation of the moulded core blocks. The hollow winding cylinders shall be arranged concentrically in the core ad clamped and supported elastically to absorb expansion and contraction in operation.

The Design and construction of the core coil assembly shall feature the following.

Interterm short circuit around the core is avoided.

Windings are totally impervious to moisture and designed for operation of 50 degree "C" ambient temperature.

No creep age path can form under dusty & humid atmosphere condition.

The coils are non-inflammable and self-extinguishing.

The design, treatment, and construction of the transformer and bracings of the windings shall be such as to withstand the heavy mechanical & thermal stresses, which may be experienced under the normal conditions of daily cycles of heating and cooling due to fluctuations in load and of dead short circuits on either side of the transformers due to fault conditions. The windings shall be capable of withstanding a fault of the level of 350 MVA for 1 second without any permanent damage to insulation.

All clearances of windings and other live parts shall be adequate for maximum voltage of operations of 11,000 volts plus 10% for these transformers.

Connections

The windings shall be connected delta on the primary and star on the secondary with neutral brought out to an insulated terminal for direct earthing. The connections shall be made in accordance to the vector symbol Dyn 11.

Insulation

The primary windings of the transformers shall be suitable for highest system voltage of 12KV for 11KV primary voltage and shall withstand power frequency test voltage as per table 2 of IS 2026/1981 part (III). The power frequency test voltage for the primary & secondary windings shall be 2.5 KV R.M.S. The tenderer must clearly state in his tender

the value of the power frequency test voltage for which the primary and secondary windings of the transformers are designed. Minimum insulation level for primary shall be 75 KV impulse and 28KV power frequency and secondary and 2.5 KV power frequency.

The inter-turns and end-turns of the HV & LV windings shall be insulated for protection against surges and transients.

The insulation shall be of class 'H' or higher conforming to IS 1271 / 1958(latest) Windings shall be epoxy resin impregnated under vacuum and resin cast.

Temperature Rise

The temperature rise of the transformer above the cooling air temperature when tested at the rated KVA shall not exceed the limit in table 4 of IS 11171/1985 reaffirmed in 1991 for 'F' temperature class of insulation when tested in accordance wit Clause No.17 of IS 11171/1985 reaffirmed in 1991 i.e. winding rise by resistance method should be less than 90 degree C.

Overload Capacity

The permissible overloading of the transformer under the following operation conditions shall be clearly stated by the tendered.

However the minimum requirement of the overload capacity is 110% for one-hour operation.

Radio interference and Noise level:

The transformer shall be designed with particular attention to the suppression of maximum harmonic voltages, especially the third and fifth, so as to minimize interference with communication circuits.

The Noise-level, when energized at normal voltage and frequency, shall not exceed, when measured under standard conditions the value specified by NEMA.

The maximum flux density in any part of the core and yokes at normal voltage and frequency shall be such that the flux density under over voltage conditions shall not exceed the maximum permissible values for the type of core and yoke material used. The type of material and values of flux sensate in the core/yoke for the 100%, 110%, 125% and 140% and the hysteretic characteristic curves shall be included in the bid and shall be subject to the purchaser's approval.

The transformers shall be designed for the following over fluxing withstand capability:

110%	-	Continuous
125%	-	for 1 minute
140%	-	for 5 seconds

Transformers shall be capable of operating under natural air cooled condition to the specified capacity. Transformers shall be capable of operating continuously in accordance with the application standard loading guide at their rated KVA and at any of the specified voltage ratios.

IMPEDANCES

The percentage impedance voltage at principal tapping on the ratio primary/secondary KVA base shall be as per is IS 2026. The permitted tolerance on this value is as specified in IS 2026

CURRENT TRANSFORMERS

Bar primary current transformer shall be provided on the neutral of the power transformers in the bushing turrets. (1/2 of the full load of the transformers)

The details of the current transformers may be incorporated in the rating and diagram plate.

The current transformers shall be of low resistance type, complying with IS: 2705 (Part IV) of latest issue. The bushing current transformers shall be housed in separate turrets and shall not be an in-built unit of the transformer. The housing of current transformers shall be so arranged that bushing can be removed, without disturbing the current transformers. The magnetization characteristic curves, indicating the knee point voltage; excitation current and secondary resistance shall be furnished.

TECHNICAL SPECIFICATION FOR 400KVA 11KV /433V INDOOR TYPE CAST RESIN DRY TYPE DISTRIBUTION TRANSFORMER.

Transformer rating (continuous) KVA	:	400 KVA
Quantity	:	1 No.
Duty/Application	:	continuous/Power Distribution.
Service	:	Indoor / Outdoor.
Type of Winding/Core	:	Double wound/Core type.
Winding type	:	Electrolytic grade Copper.
No. Of Phases	:	Three, H.V , L.V 4 Wire.
Supply Frequency	:	50Hz.

Primary winding (HV/Incoming Side)	:	Delta.
Secondary winding (LV/Outgoing side)	:	Star .
Vector group Symbol (as per IS 2026)	:	Dyn11
Ambient conditions (as per IS 2026)	:	
Max. ambient air temperature.	:	50°C
Max.daily average temperature	:	40°C
Max.yearly weighted average temperature	:	32°C
Min. ambient air temperature.	:	-5°C

Min. Altitude (above M.S.L)

Guaranteed Temperature rise over above ambient conditions:

a) By thermometer	:	32°C
b) By winding resistance method.	:	55°C

Nominal primary voltage (No-Load)	:	11KV
Nominal secondary voltage (No-Load)	:	433V
Tapping in HV side.	:	Provided for variation of Incoming Voltage
Tapping Range	:	+5% to - 5%
Incoming side voltage compensation range	:	11.55 KV to 9.35 KV

The Transformer shall conform to IS 2026 (parts-HV) and CBIP Manual on power transformers, and standard manufacturing practice.

GUARANTEED TECHNICAL PARTICULARS FOR TRANSFORMERS
(TO BE FILLED IN BY THE BIDERS)

S.No	Description	Units	To be filled by the bidders
1	Name of the Manufacturer or Type of Transformer		
2	Services (Indoor)		
3	Rating		
	a. Dry type air cooled	KVA	
4	Rated Frequency	HZ	
5	Number of phases		
6	Rated Voltage		
	a. HV Winding	KV	
	b. LV Winding	KV	
7	Vector group symbol		
8	Type of cooling	(Air cooled)	
9	Tapping		
	a. Range		
	b. Number of Steps.		
	c. Tapping provided on HV Side.		
10	Losses (at 75 Deg Centigrade and principal tapping)		
	a. No load loss at rated voltage and frequency.		
	b. Load loss at rated current - Subject to IS Tol.		
	c. Total loss at maximum rated power.		
11	Impedance voltage at 75 deg Centigrade.		
	a. At principal tapping	%	
	b. At maximum tapping	%	
	c. At minimum tapping	ORDER	
12	Reactance at rated current and frequency	%	
13	Resistance at rated current and 75 deg. Centigrade.		
	a. HV	OHMS/ PHASE	
	b. LV	OHMS/ PHASE	
14	Zero sequence impedance	%	

15	Zero sequence capacitance of HV winding	MICRO FARAD	
16	Temperature rise 45 deg. Centigrade above ambient		
S.No	Description	Units	To be filled by the bidders.
17	Hottest spot temperature in winding limit to over an maximum yearly weighted average ambient temperature of 32 deg. Centigrade.		
18	Efficiency at 75 deg Centigrade and 0.9 PF		
	a. At full load	%	
	b. At 75% load	%	
	c. At 50% load	%	
19	Load and Power Factor at which maximum efficiency occurs % full load		
20	Maximum efficiency		
21	Regulation at full load and at 75 deg. Centigrade.		
	a. At unit PF	%	
	b. At 0.8 PF lagging	%	
22	No Load current referred to 0 HV and 50 HZ (apprx.)		
	a. At 90% rated voltage	A	
	b. At 100% rated voltage	A	
	c. At 110% rated voltage	A	
23	Maximum current density at rated power		
	a. HV winding		
	b. LV Winding		
24	Maximum Flux density in iron at rated voltage ratio and at rated frequency		
	a. At 100% rated voltage	TESLA	
	b. At 110% rated voltage	TESLA	
25	Maximum clearance in air		
	a. Between phases (HV/LV)	MM	
	b. Between Phases & Ground.	MM	
26	Insulation Level		
	a. Impulse		
	I. HV	KV(PEAK)	
	ii. LV	KV(PEAK)	
27	Power Frequency		
	HV	KV (rms)	

	LV	KV (rms)	
28	Winding Type		
	HV		
	LV		
29	Insulation Material		
	HV		
	LV		
	Tapping leads		
	Core to LV		
	HV to LV		
30	Details of Core		
	a. Core Lamination Materials		
	Thickness of laminations		
	Insulation of lamination		
	Type (Shell or Core)		
	Specific loss of Core steel at 1.5 tesla		
31	Details of tank:		
	a. Material		
	Thickness of side	mm	
	Thickness of bottom	mm	
	Thickness of cover	mm	
	Thickness of Tube	mm	
	Maximum internal pressure the tank is capable of		
	No. of Limbs(core type)		
32	Maximum Noise Level	db	
33	Approximate Maximum overall dimensions including fittings.		
34	Height	mm	
	Breadth	mm	
	Length	mm	
35	Shipping Dimensions		
A	Height	mm	
B	Breadth	mm	
C	Length	mm	
36	Weight		
	Core winding	kg	
	Shipping weight	kg	
37	Reference Standard		

SPECIAL PROPERTIES:

Flexural Strength	N/Sq.mm	:
Impact Strength	N mm/Sq.mm	:
Compressive strength	N/Sq.mm	:
Tensile Strength	N/Sq.mm	:
Heat Deflection constant	N/Sq.mm	:
Heat Deflection constant (Martens Temperature)		:
Di-electric constant		:
Dissipation Factor		:
Limiting Temperature		:

IV. GENERAL REQUIREMENT OF MV PANEL BOARDS

SCOPE

Design, Supply, Integration, Delivery, Testing and Commissioning of Compartmentalized LT Panel Boards in accordance with this specification.

Note: Integration includes supply of materials like Meters, CTs, Bus bars, Bus Supports, Indicating Lamps, Metering Fuses**,** PLC**,** etc.,

Related Items not included

- Foundations Hardwares
- External connections to the equipments.

Conformance to Standards:

The Tenderer shall control the quality of items and services to meet the requirements of this specification, applicable codes and standards and other procurement documents.

STANDARDS

The Panel Boards shall comply with the latest issue of the following standards

IS 8623	:	General requirement for factory built assemblies upto 1000 Volts.
IS 10118	:	Code of Practice for selection and maintenance of Switchgear and control gear.
IS 13947-2	:	A.C. Circuit breaker requirements – Voltage not exceeding 1000Vs Part I & II, Sec 1 and IEC 60947 part I & III
IS 2147	:	Degree of protection provided by enclosures for low voltage Switchgear and Control gear
IS 2705	:	Specification for current transformers
IS 1248	:	Specification for direct acting electrical indicating instruments.
IS 3156	:	Voltage transformers
IS 3231	:	Relays

IS 13703	:	Specification for HRC cartridge fuse links upto 650 Volts.
IS 6875	:	Control Switches / Push Buttons
IS 11353	:	Marketing and identification of conductors and apparatus
IS 13947	:	Part I & II – Moulded Case Circuit Breaker
IS 375	:	Arrangement for Busbars main connection and accessories
IS 6005	:	Code of practice for phosphating Iron and Steel
IS 5082	:	Wrought Aluminium & Aluminium Alloy for Electrical Purposes

GENERAL

The LT Panels shall be of,

- Metal enclosed, indoor, floor mounted freestanding type.
- Made up of the requisite vertical sections, which when coupled together shall form continuous dead front switchboards.
- Provide dust and vermin proof design.
- Readily extensible on both sides by the addition of vertical sections after removal of the end covers.
- The panels shall be 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.

Each vertical section shall comprise: -

- A front-framed structure of rolled/folded sheet steel / Angle channel section, of minimum 14SWG thickness, rigidly bolted / welded together. This structure shall house the components contributing to the major weight of the equipment, such as circuit breaker cassettes, MCCB's, main horizontal busbars, vertical risers and other front mounted accessories.
- The structure shall be mounted on a rigid base frame of folded sheet steel of minimum 3mm thickness and 75mm height. The design shall ensure that weight of the components is adequately supported without deformation or loss of alignment during transit.

- The design shall ensure generous availability of space for installation and maintenance of cabling, and adequate safety for working in vertical section without coming into accidental contact with live parts in an adjacent section.

- Front doors and rear covers fitted with dust excluding synthetic rubber gaskets with fasteners designed to ensure proper compressions of gaskets. When covers are provided in place of doors, generous overlap shall be assured between sheet steel surface with closely spaced fasteners to preclude the entry of dust.

- The height of the panel should not be more than 2100mm.The total depth of the panel should be adequate to cater for proper cabling space and shall not exceed 1200mm for ACB sections.
- Doors shall be minimum 14SWG sheet steel. Sheet steel shrouds and partitions shall be of minimum 16SWG thickness. All sheet steelwork forming the exterior of switchboards shall be smoothly finished, leveled and free from flaws. The corners should be rounded.
- Apparatus forming part of the panel shall have the following recommended minimum clearances for un-insulated bus bars are should as per relevant IS codes
- All insulating material used in the construction of the equipment shall be of non-hygroscopic material, duly treated to withstand the effects of high humidity, high temperature tropical ambient service conditions.
- Metallic/insulated barriers shall be provided between adjacent sections to ensure prevention of accidental contact.
- All doors/covers providing access to live power equipments circuits shall be provided tool operated fasteners to prevent unauthorized access.
- Provision shall be made for permanently earthing the frames and other metal part of the switchgear by two independent connections.
- Operating devices shall be incorporated only in the front of the switchgear. No handle needing manual operation shall be located less than 450mm and not higher than 1800mm above ground level.

BUSBARS

- The bus bars shall be air insulated and made of high conductivity, high strength, 99.99% Purity Electrolytic grade **COPPER.**
- A current density of not less than 800 A /Sq.inch. shall be provided for COPPERS busbars/Interconnect, Cable connectors etc. For Panel , the size of the busbars shall be designed on the basis of a short circuit rating as of incomer feeder.

- The bus bars shall be mounted suitably on non-hygroscopic SMC / FRP supports rigidly fixes to the panel and the supports shall be fixed to the main frame without affecting the clearance structure as per IS and should also be capable of withstanding the stress of electrical fault.
- Large clearances and Creepage distances shall be provided on the busbars system to minimize the possibility of a fault.
- High tensile bolts and spring washers shall be minimized the possibility of a fault.
- 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.
- Busbars shall be color coded for easy identification of individual phases and neutral with heat shrinkable PVC sleeves.
- The main busbars shall have uniform current ratings through their length. The current rating of the neutral shall be half that of the phase busbars throughout the length of the switchboard. However for the UPS Panels, the Neutral Busbars shall be Double the size of Phase busbars. Removable neutral links shall be provided on feeders to permit isolation of the neutral busbar.
- The busbar and supports shall be capable of withstanding Short circuit current as of the incomers in panel .Only zinc passivated or cadmium plated high tensile strength steel bolts, nuts and washers shall be used for all bus bar joints and supports. All bus bar supports shall be SMC / FRP only.
- All bus bars shall be sleeved with colour coded heat shrinkable sleeves with the exception of joints. Red, yellow and blue colour shall be used for Phase busbars and Black colour shall be used for neutral bus bars.
- The Busbars shall be capable of withstanding rated capacity without any deration at 55°C over 45ºC Ambient.
- The Bus Bar to switch gear terminal connections shall be with rectangular COPPER Bar with current density as desired for Bus Bars and shall be rigidly fixed with Bus & Switch gear ends with high tensile Bolts with spring washers & flat washers with necessary full nut and locking nuts to have proper contact area.
- The Inter connections also shall be sleeved wit h heat shrinkable OVC sleeves with appropriate colour coding with the exception of joints.
- The inter connections between Bus & Switch gear terminals shall be provided with necessary FRP / SMC support to avoid strain to the switch gear terminal .
- The outgoing shall be provided with suitable & Adequately rated connections to receive the cables / Bus duct terminal connections .The connection should be supported to main frame in such a way that strains of cable connections shall not transmitted to the switch gear terminal & to withstand the electrical stress.
- These connections also shall be sleeved in the colour coded PVC heat shrinkable sleeves with the exception of joints.

WIRING AND CABLE TERMINATIONS

- Inside the switch boards the wiring for power, control, signaling, protection and instrument circuits shall be done with PVC Insulated FRLS multistrand copper conductors. The insulation grade for these wires shall be 660 volts. All control wiring shall preferably be enclosed in plastic channels or neatly bunched together.
- For 16 AMPS control fuse circuit, 2.5 Sq.mm size COPPER wires shall be used. Each wire shall be terminated at a separate terminal. Termination of not more than two outgoing wires on a single terminal will not be acceptable. Wires shall not be joined or tied between terminal parts. Shorting links shall be provided for all C.T. Terminals at metering / relay / instrument..
- Each wire shall be identified at both ends by self-sticking wire marker tapes or PVC Ferrules. Ferruling of wires shall be as per relevant IS / BS 108.
- A minimum of 10% spare terminals shall be provided on each terminal block. Conductors shall be terminated with adequately sized compression type lugs. "ELMEX" (direct conductor termination) type terminals will be acceptable for wires up to 10 sq.mm.
- The control terminals shall be mounted in such a way that they are separate from the power terminals and shall be easily accessible without any hindrance from the power circuitry.
- The cabling chamber of adequate size for accommodation, support and termination of aluminium cables shall be provided at the rear.
- Facility to extend cabling area by additional cable chamber shall be preferred.
- The wiring shall be complete in all respects so as to ensure proper function of control, protection and interlocking schemes.

COMPONENTS

Air circuit breaker

- ACB shall confirm to / IEC 60947 (Part I & III) / IS 13947 (Part I & III)
- Suitable for a service voltage of 3 Phase, 660 V minimum, 50 Hz AC supply and shall have an insulation voltage of 1000 V.
- Possible to upgrade the degree of protection of ACB to IP:54. Minimum degree of protection of the ACB shall be IP:43.
- Suitable for mechanism from front access.
- The microprocessor based Relay shall comply with IS 13947-1 for general rules and IS 13947-1 for standards pertaining to contactor shall be designed for AC3.

- The microprocessor based Relay shall be suitable for Type 2 coordination as per suitable clause in the relevant Indian Standards.
- The microprocessor based Relay shall be capable of offering differential protection and shall be ambient compensated type, operable upto 70 °.C.
- The microprocessor based Relay shall be capable of withstanding short circuit equal to seventeen times the rated thermal current (17 Ie).
- The microprocessor based Relay should have built in single phasing protection and phase unbalance protection as per IEC947-4.
- The ACB shall be provided with 4 NO & 4 NC spare auxiliary contacts apart from their inherent usage.

Interlock and Safety Arrangement

- The ACB's shall be Three-position draw out type. Any attempt to with draw the Air Circuit Breaker, which the unit is in service, will automatically trip the breaker.
- It shall be possible to rack the ACB main contacts in to disconnected position with the door closed.
- Remote electrical indication of the circuit breaker status should be possible for all the positions.
- Possible to close the ACB electrically and the spring charging time shall be preferably by less than 5 seconds. The mechanism shall be of stored energy type. The electrical closing mechanism shall have a built- in anti pumping feature minimum 4 NO & 4 NC spare control contacts should be available for external use.
- The ACBs are to be operated through a PLC programmer and should also provided with electrical interlocking in between them incase of failure of PLC. And shall have a selector switch to select PLC / Electrical Interlock mode.

Rating and Breaking Capacity

- The ACB shall have Minimum Service Breaking Capacity (Ics) equal to Ultimate Breaking Capacity (Icu).
- The Minimum Service Breaking Capacity (Ics) for rating 2500 amps shall be 65KA.

Protection

- There shall be an option to select the curves (minimum 80 combinations) and also change the operating time for minimum of 8 settings for overload, 7 for short circuit and 7 settings for earth fault.
- There shall be facility for selecting various type of E/F protection if required.
- Trip history feature shall be available.
- Neutral protection of 50 to 100% should be available.

- Self - diagnostic malfunction alarm for microprocessor should be available.
- "The trip unit shall have thermal memory.
- I^2 t cropping facility shall be available for short circuit and earth fault.
- Facility should be there to monitor the load and intimate a pre-trip alarm or have load-shedding feature.
- Fault indication by means of LED should be available for Overload, Short Circuit and Earth Fault and also LCD display for indication of menu's, settings, recorded information.
- Trip reset facility should be manual / automatic.

MOULDED CASE CIRCUIT BREAKERS

- MCCBs should comply with IEC 947 Part 2. / IS 13947
- The MCCB shall be suitable for universal mounting (i.e) the Load / Line must be interchangeable.
- The MCCB shall be suitable for operating Voltage of 415 V minimum and an Insulation Voltage of 660 V.
- MCCBs starting from 200 amps shall both variable (O/L, SC) and below shall be variable over load / both fixed and fixed short circuit.

Rating and Breaking Capacity

The Service Breaking Capacity (Ics) in KA for MCCB shall be as mentioned in Bill of quantities.

Protection

Overload and short circuit setting details:-

- All outgoing MCCBs in the Main Changeover panel and incoming MCCBs of all Sub Panels shall be of adjustable overload and short circuit settings.
- The outgoing MCCBs in the Sub Panels needs adjustable thermal overload settings only and fixed short circuit setting.
- The Thermal setting shall be adjustable from 80% to 100% of its normal rated current.
- The magnetic setting shall be continuously adjustable from 5 to 10 times of its set current.
- Trip reset should be available Manual / Automatic.

CONTACTORS

- Contactors shall comply with IS 13947 1 for general rules and IS13947-4-1 for standards pertaining to contactors and motor starters. The contactor shall be capable of withstanding breaking & making capacities per following:
- AC3 Category
  a) Making Current - 10 times Rated Current
  b) Breaking current - 8 times Rated current
- Contactor shall be capable of withstanding an impulse voltage of 8KV and have an insulation voltage of 1000V.
- The Contactors shall be capable of frequent switching and should operate without any deration at 55°C for AC3 application.
- The coil shall have 3 terminals and the insulation class shall be preferably "H" class, to sustain frequent switching operations. The auxiliary contact block shall have a switching capacity of 240V at 2A.
- Contactors shall have one auxiliary in-built and it shall be possible to have additional 2NO &2 NC contacts and they shall be easily interchangeable from NO to NC.
- Contactors used for capacitor application shall have built in damping resistors & block of early make poles. For capacitors only capacitor duty contactors of respective rating to be provided.

Instrument Transformers

- Current Transformers shall be tape wound. The CT ratio and VA burden shall be such that it can power all meters.
- Current transformers shall generally conform to IS: 2705.
- Current transformers for instruments shall have an accuracy class 0.5 for MV Panel and class 1.0 for sub panels and accuracy limit factor less than 5.0. The current transformers shall be capable of withstanding the peak momentary short circuit current for 1.0 second. The neutral side of the current transformers shall normally be earthed through a link.
- Wherever provided, the voltage transformers shall generally conform to IS : 3156 and shall be cast resin type. The voltage transformers shall be provided with primary fuses. Miniature circuit breakers with auxiliary contact shall be provided on the secondary side.
- The voltage transformers shall have an accuracy class 3.0 from 50% to 110% of normal voltage and class 1.0 from 80% to 120% of normal voltage.

Measuring Instruments

- All measuring instruments Digital / Analogue shall be of 144 x 144 mm (or) 96 x 96 mm square flush mounting pattern.
- All A.C Ammeter s, Voltmeters, KW meters shall be of Digital type except for the Incoming meters or as per BOQ.
- Control and selector switches shall be CAM operated rotary switches
- The voltmeter selector switches shall be to measured voltage between phases with "OFF" and 10A ratings.
- The ammeter selector switches shall be 10A rating and to measure phase current through CT's of 5A secondary.

Indicating Lamps

Indicating lamps shall be provided in all the panels as required and they shall be centre to the visibility requirement as per I.S.

TESTS

- The Panel design shall have undergone all the type tests as per IS: 8623. Type test certificate shall be submitted along with the panels.

- Routine test as per IS: 8623 on each completed switch boards shall be carried out in the factory and witnessed by owner /Architect representative and approval obtained before despatch and test certificates for the same shall be submitted.
- Tests required as per IS on the completed panel boards as mentioned above and commissioning are included in the tenderer's scope.

INSPECTION

The Inspection of the panel will be carried out by architect / client's representative at various stages of fabrications.

LABELLING

General

- Every switchboard, switchboard control contactor, time switch, relay, indicator lamp, meter, motor starter, link and any control or protection equipment within or on a switchboard shall be clearly and accurately labelled.
- Labels shall be engraved laminated plastic or photo anodized rigid aluminum and shall comply with the following requirements.

- Except where otherwise required labels shall be fixed adjacent to, but not on any item of equipment.
- Engraved lettering shall be black on a white background, except that the label for a main switch shall have red lettering on a white background, and warning and caution labels shall have white lettering on a red background.

Fixing of Labels

- Labels shall be securely fixed by :
- Screws and adhesive, are fixed in an extruded aluminum section which shall be countersunk screw fixed or countersunk riveted to the panel. Screws shall be tightened with nuts or into tapped holes in the switchboard. Mechanically expanded plastic rivets of minimum 6 mm. head diameter are acceptable instead of screws. Aluminum rivets may be used to fix aluminum labels only. *Self – tapping screws, thread – cutting screws or other fixing are not acceptable.*

Labels on Exterior of Switchboards and Schedules

- All switchboards shall be labeled with the manufacture's name.
- A switchboard designation label shall be provided. For other than main switchboards, the designation label shall also state the source of electrical supply. Separate sections of enclosures shall be identified. The label for any section or enclosure containing supply Authority equipment shall be to the satisfaction of the Consultant / Employer and the Supply Authority.
- Every switchboard control shall be labeled and shall include:
- Circuit designation for all main switches, main controls and sub main controls.
- Details of the Consumer's mains and all sub mains
- Incoming busbar & cable rating
- The minimum height of lettering shall be as per the local Inspection regulatory stipulation.

Labels on Interior of Switchboards

- Labels identifying equipment within a switchboard shall be located such that the item referred to is obvious and the lettering is not substantially obscured by the temporary or permanent position of any equipment or wiring.
- For plug- in equipment where items are physically but not functionally interchangeable, the label wording shall be expanded to clearly identify the removable section (e.g to identify the contact configuration or timing range). Where this is not possible, a second identifying label shall be glue fixed to the removable section.
- The function and coding shown on the circuit diagram shall be used.

Earthing

- Switchgear in the panel shall be provided with COPPER double earth connection of size indicated in the schedule and connected to the earth bus
- Earth bus bar shall be supported at suitable intervals
- All instruments and metering panel doors shall be connected to earth by using 2.5 sq.mm. 1100V, FRLS PVC multistranded copper conductor or flexible braided copper wire of equivalent size and directly connected to the earth bus of the panels
- The materials and size of the earth bus bar shall be as specified in the schedule
- At either end of the earth bus provision shall be made for bolting the earth bus to the earth electrode with nuts & bolts and spring washer. The earth bus bar shall run along the entire length of the board

Drawings and Data:

Vendors shall furnish following drawings for Architect / Client approval before fabrication of the panel.

- Tenderer shall also provide detailed GA diagram, sectional drawings
- Terminal drawings and other drawings with all dimensions indicating compartments cutouts, drill holes etc., for all the panel boards to the Architect / Client.
- Front and rear view of all switch boards indicating Switch Gear arrangements of
- Various feeders/starters giving its location numbers and tag numbers for each as per single line diagram.
- Typical control schematic diagram for each type giving type designation to be referred on
- Single line diagram.
- Switch board foundation/fixing details with all dimensions and details of shipping sections.
- All the catalogues, manuals pertaining to each and every ACB, MCCB, PLC, Meters,
- CTs etc should be sent along with the panel boards.
- Bill of Materials used in panels indicating the make of each items
- Manufacturers and service providers address, contact person, contact no etc., has to be sent to us for all the components.

GENERAL

- The gland plates shall be left undrilled and of 3mm thick
- Inter panel partitions / barriers in sheet steel are required to be provided.
- Busbar joint shrouds are required to be provided , so that it can be easily removed and refitted.
- All internal wiring shall be done with crimping type lugs and all terminals are to be identified / feruled properly.
- All vacant compartments above 100mm to be provided with earth strip.
- "Danger" labels on rear doors shall be provided.
- Necessary terminals has to be provided for BMS interface at all Panels.
- Data sheet shall be referred for specification of the ACB & MCCB to be used in panels.
- No alterations drill holes welding etc., are to be done at site after the panel boards are received from the factory.
- *The LT panel board shall comply with all rules & regulations as per CEIG norms and any modifications pointed out by them or any other statuary agencies during their inspection also to be carried at free of cost before commissioning.*
- The LT Panels Degree of Protection : IP 52

COMMISSIONING:

The supplier shall render the service of his supervisor during the Installation and commissioning of the panels at free of cost.

V. GENERAL REQUIRMENT OF AUTOMATIC POWER FACTOR CORRECTION PANEL CAPACITORS

INTRODUCTION

The design, manufacturing, testing and performance of the equipment and components there off, included in this specification shall comply with all currently applicable Indian Standards & IEC standards and specific standards and codes specified in the design data sheets.

GENERAL REQUIREMENTS

Capacitor Unit

Capacitor unit shall be self-contained with rating as indicated in data sheets. Each capacitor unit shall have a proper name plate. Each capacitor element shall have individual fuses.

Capacitor Banks

Capacitor bank shall consist of individual capacitor units with supporting insulators, steel racks assembly, busbars connectors mounting channels, frame etc. If capacitor bank is located outdoor, the rack and the associated hardware shall be hot dipped galvanised.

When specification calls for capacitor bank and associated accessories to be metal enclosed, such panels shall have adequate ventilation with louvers covered with brass mesh. Individual capacitors unit and the cubical shall be earthed to separate earth bus in case of non-effectively earthed system.

Discharge Device

MV capacitors discharge resistance shall be externally mounted.

Control and protection

- Switch Fuse Unit
- MCBs
- Contactors Automatic Power Factor correction relay
- Timer relays and sequence relays for automatic switching of capacitors units.
- Auto Manual Selector Switches.
- Start / stop push button stations.
- Protective relays
- Power factor correction relay shall be solid-state type with output contacts for automatic switching.

Inspection and testing

This shall be carried out based on the latest revision of this specification and approved vendor drawing certified for construction.

Client shall have the right to carry out stage inspection.

All routine and type tests as specified in the relevant IS shall be carried out during the final inspection.

Vendor shall ensure that the meters associated with the testing equipments are calibrated and are valid at the time of testing.

Power factor improvement panel

The panel shall be designed as per the relevant Indian Standards. The capacitors shall be polypropylene, double layered type. Automatic power factor correction panels shall be provided in case of 440V system. The LT capacitors shall be controlled by magnetic contactors and shall have their control through the APFC panel.

The APFC panel shall be totally enclosed, fully compartmentalized, fixed type, free standing, sheet fabricated dust and vermin proof, dead front type in single front having feeders compartments in tier formation to form vertical panels.

All the meters switches lamps protective relays shall be housed on the front panel and the cable alley compartments shall be besides feeder compartments.

Doors of all the switchgears shall be of gaskets to prevent entry of lizards, rats and dust.

The 3 phase / neutral main shall be extended through all the units of the APFC panel line up. The main busbars shall be of uniform section throughout and shall be sized to continuously carry the rated current without exceeding the temperature rise of 20 deg. C over the ambient and shall be capable of withstanding the full fault current without any deformation. The rating of the busbar shall be the same as the Incomer breaker rating. The busbars shall be either electrolytic copper with proper plating at the joints. The busbars shall be PVC sleeved and colour coded. The neutral busbars shall be 50% of the phase busbars and shall be insulated from the structure.

A continuous ground bus running through all the compartments and solidly connected shall be provided. Two earthing connections shall be provided for connection to external earthing network of plant.

Control signaling protection and metering wiring shall be PVC insulated 1.1 KV grade copper conductor wires of minimum 2.5 sq.mm. Wiring shall run in enclosed channels and shall leave at least 25% space for future use. Wires for connection between the

moving parts shall be of stranded copper. The terminal block shall be Elmax type of adequate rating, conveniently located for easy accessibility. All spare contacts from equipments shall be wired up to the terminal block.

All 415 V circuit breakers shall be MCCB's with manual and power operation. Sufficient number of auxiliary contacts, shunt trip device, operation counters local / remote switches etc. The circuit breakers shall have current to suit the capacitor breaking maximum current.

The isolators shall be heavy-duty type equipped with auxiliary contacts and quick make type. The operating handle shall be on door and interlocked to the ON position. Fuses shall be HRC cartridge type with rupturing capacities not less than full fault level on the busbars.

Contactors shall be magnetically held air break type. They shall be provided with 3 main contacts, one hold on contact and at least two NO + NC auxiliary contacts. The contactors shall have current rating suitable for withstanding breaking capacity current of the capacitor. The coils shall be rated for 250V AC and shall work satisfactorily between + 10% and – 15%.

Protective relays shall be of reputed make as specified in approved makes,

Indicating lamps shall permit replacement from the front.

Provision shall be made for addition of future panels on either side of all the panels.

On APFC panels at least one fully equipped spare unit shall be provided.

Following indicates bare minimum requirements of each typical feeder. For individual applications final provisions have to be detailed out and whatever specific material relays, auxiliary relays, timers, meters and devices required for APFC Panel.

Incoming Feeder

One set TP & N air insulated, PVC sleeved with the exception of joints capacitor duty rated busbars, on capacitor duty rated ACB with all the accessories for normal operation, auxiliary contacts, shunt trip release test, ON OFF switch, position indicator, tripping device.

- One voltmeter with selector switch.
- Three indicating lamps for voltage indication after MCCB
- Auto manual selector switch.
- Automatic Power Factor Correction relay.
- Auxiliary relay, wiring fuses, terminals and devices as may be required.
- Over voltage relays.

CAPACITOR BANK FEEDERS:

- One set duty rated, TPN, air insulated, PVC sleeved busbars.
- One duty rated MCCB with handle.
- Two red / green lamps for ON / OFF indication.
- One set of fuses with base.
- TP magnetic Air break capaitor duty contactors as required.

- ON & OFF push button.
- One no.single CT operated misc 96mm square flush Ammeter suitably scaled for indicating capacitor current.
- One no. CT of suitable ratio/accuracy burden etc., to record capacitor current.

DESIGN DATA SHEET

RATING :
BANK CONNECTION : Delta
EARTHING : 2 Studs
INITIAL PF : Lag
CORRECTED PF : 0.95
DIELECTRIC FOR : Gas Filled/Heavy Duty voltage WITHSTAND VALUE 110 %
OVER LOAD CAPACITY : 135 % of rated value banks

FUSES

Type : MCCB non Deteriorating
Applicable standard : IS 9224 – part 2
Mounting : Internal
Category of duty : capacitor duty

VI. XLPE (FRLS) INSULATED AND PVC POWER AND CONTROL CABLES

This specification covers the design, manufacture, testing at works, inspection and delivery at site of XLPE (FRLS) insulated and PVC power and Control cables.

STANDARDS

The cables covered by this specification shall, unless otherwise stated, be designed manufactured and tested in accordance with the latest revisions of relevant Indian standards.

IS-694	PVC insulated cables for working voltages upto and including 1100 volts.
IS-1554	PVC insulated heavy duty cables for working voltages upto and including 1100V.
IS-3961	Recommended current ratings for PVC insulating and PVC sheathed heavy-duty cables.
IS-8130	Conductors for insulated electric cables and flexible cords.
IS-5831	PVC insulation and sheath of Electric cables.
IS-3975	Mild steel wires, strips and tapes for armouring of cables.
IS-7098	Cross linked polyethene insulated PVC sheathed cables.
IS-6130	Conductors for insulated electric cables and flexible cords

CONDUCTOR

The conductor shall be Aluminium / Copper as specified in the Schedule of Quantities. It shall be smooth, uniform in quality and free from scale and other defects. The stranded conductor shall be clean and reasonably uniform in size and shape. The conductor shall be either circular or shaped.

CONDUCTOR SHIELD

Conductor shield shall be extruded in the same operation as the insulation. The semi-conductor polymer shall be cross linked.

INSULATION

- Insulation shall be cross linked polyethylene and it shall preferably be gas-cured for XLPE (FRLS) cable
- Insulation shall be PVC for PVC cable as specified in the Schedule of quantities.

OUTER SHEATH

All cables specified in the Schedule of Quantities shall have Outer sheath with Fire retardant low smoke PVC (FRLS) to reduce the Fire hazard.

- Oxygen Index - 29 when tested at 27 + 2C
- Temperature Index -Minimum 250C at Oxygen Index 21.
- Flammability -As per IS 10810 Part 53 – 61 & 62.
- Smoke Generator -Smoke density rating shall not be more than 60%.
- Acid gas generation -Less than 20% by weight.

INSULATION SHIELD

This shall preferably be of the strippable, triple-extruded thermoset type.

ARMOUR

The armour may be of galvanized steel wires or galvanized steel strips

SERVING

The cable serving shall protect the cable sheath and armour from electrolysis caused by stray currents, and from galvanic action. It shall also protect the cable from mechanical damage and corrosion.

GENERAL

The cable shall withstand all mechanical and thermal stresses under steady state and transient operating conditions.

TEMPERATURE RISE

The maximum conductor temperature shall not exceed 90 degree C during continuous operation at full rated current. The temperature after short circuit for 1.0 second shall not exceed 250 degree C with initial conductor temperature of 90 degree C.

Bidder shall give the following information in the Bid for each conductor cross section specified.

- Rated continuous current
- Rated 1.0 second short circuit / short time current

Rating factor shall be given by the Bidder for the following:

- Variation in ground temperature
- Variation in soil thermal resistivity
- Variation of Ambient Temperature
- For the cables laid side by side, at ID spacing and in Tier formation.

The Bidder shall also indicate the percentage overload that the cable can carry and its duration, when operating initially at a conductor temperature of 90 degree C, with peak conductor temperature of 130 degree C.

CABLE DRUMS

Cables shall be supplied in non-returnable drums of sturdy construction. All ferrous and other metal parts of drum shall be treated with a suitable rust preventive finish or coating to avoid rusting during transit or storage. Type of dust preventive finish and coating adopted may be mentioned.

The length of cable on each drum shall be determined by manufacturer considering the transport limitations from manufacturer's works to the site.

TESTS

Routine Tests (To be performed on each drum length)

All tests as per relevant IS shall be conducted and shall be witnessed by Client/Architect.

Type Tests

The contractor shall furnish two (2) copies of type test certificates conducted on similar cables.

- Partial discharge test
- Bending test followed by partial discharge test
- Dielectric power factor as function of voltage
- Dielectric power factor as function of temperature
- Heating cycle test followed by dielectric power factor as a function of voltage and partial discharge tests.
- Impulse withstand test
- High voltage test.

SPECIFICATION FOR PVC ARMOURED CABLE

All codes and standards mean the latest. Where not specified otherwise the installation shall generally follow the Indian Standard codes of practice or the British Standard Codes of practice where Indian standards are not available.

Cables

All cables shall be 1100 Volt grade PVC insulated, sheathed with or without steel armouring as specified and with an outer PVC protective sheath. Cables shall have high conductivity stranded aluminium or copper conductors and cores shall be colour coded to the Indian Standards.

All cables shall be new without any kinds or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on the surface of the cable at every 600 mm centers.

Installation

Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the site and obtain the approval of the Architect / Client before laying the cable. Procurement of cables shall be on the basis of actual site measurements and the quantities shown on the schedule of work shall be regarded as a guide.

Cables rising indoors shall be laid on walls, ceiling, inside shafts, or trenches. Single cables laid shall be fixed directly to walls or ceiling. All supports shall be at not more than 500 mm. Where number of cables is run, necessary cable trays shall be provided wherever shown. Cables laid in built-up trenches shall be on steel supports. Aluminium identification tags shall be provided at every 20 m.

Cables shall be bent to a radius not less than 12 times the overall diameter of the cable, or in accordance with the manufacturer's recommendations whichever is higher.

In case of direct buried cables, the cable route shall be parallel or perpendicular to roadways, walls, etc., Cables shall be laid in an excavated, graded trench, over a sand cushion to provide protection against abrasion. Width of excavated trenches shall be as per drawings. Backfill over the cables shall be sifted earth 90% compacted cables shall be buried with a minimum earth cover of 600 mm. The cables shall be provided with cable markers at every 20 metres.

The general arrangement of cable laying is shown on drawings. All cables shall be full runs from panel to panel without any joints or splices. Cables shall be identified at end terminations indicating the feeder number and the Panel / Distribution Board from where it is being laid. All cable terminations for conductor’s upto 4 sq. mm may be insertion type and all higher sizes shall have tinned copper compression lugs. Cables terminations shall have necessary brass glands. The end-terminations shall be insulated with a minimum of six- half-lapped layers of PVC tape. Cable armouring shall be earthed at both ends.

Testing

MV cables shall be tested upon installation with a 500 V Megger and the following readings established.

- Continuity on all phases
- Insulation Resistance between conductors & All conductors and ground

All test readings shall be recorded in the separate book and the same to be handed over to Client / Architect.

VII. GENERAL REQUIRMENT OF CABLE MANAGEMENT SYSTEM TRAYS

LADDER TYPE CABLE TRAYS

Shall consist of a Bolted rung assembly of field proven design. It shall consist of side rails of 2.5 mtr standard lengths and Slotted rung spaced 250mm center to center.

Coupler, Coupler fasteners, tray assembly fasteners should form the part of the equipment.

The Ladders should be light sheet metal constructions yet robust enough to carry a cable load of 50 kg/m on a span of 1.25 mtrs.

The design shall be flexible enough to accommodate change of widths at site.

Sections of 1.6/2mm shall be standard for different widths of trays as detailed in BOQ.

However where locations demand lighter sections those too shall be detailed in BOQ.

Horizontal bends, Vertical internal / external, tees, crosses shall be standard products.

Provision to add on earth flat holding clamps, trays fixing clamps should be part of cable tray design.

Perforated cable trays of 1.6mm / 2mm thickness and standard lengths 2.5 mtrs as detailed in BOQ shall be offered by bidder if required. Finish shall be as specified earlier.

Wire ways of enclosed type with covers, cover screws, coupler, coupler screws of Pre-Galvanized sheet constructions or of powder coated finish with all accessories shall be offered by bidder as detailed in BOQ. Such Wire ways should be suitable for surface laying or on / under floors.

CONSTRUCTION

The cable trays shall be either ladder or perforated type. The cable trays and accessories shall be fabricated out of hot rolled steel sheets, which shall be hot dipped galvanized. The complete assembled cable tray sections shall be corrosion resistant, high strength and with extreme smooth surface. Accessories Cable tray manufacturer shall supply suitable accessories for clamping the cable trays on cable tray supports from ceiling and beams of the building structure. Cable trays shall be supplied with GI coupler plates, hardware, nuts bolts and washers for joining the standard lengths of cable tray section.

LOAD DEFLECTION CRITERIA

For tray system design in addition to self-load, following criteria shall be applied to determine section and thickness of cable tray.

Support span	2000 mm
Cable load for 300 mm	50 Kg / m
Cable load for 400 mm	75 Kg / m
Cable load for 500 mm	85 Kg / m
Cable load for 600 mm	100 Kg / m

In addition to this 70 Kg/m concentrated load at the center span shall be considered.

Allowable mid span deflection < 7 mm

SURFACE PREPARATION

For treatment and preparation of surface of fabricated trays, seven tank process shall be employed comprising of the following cleaning all the members, plates shall be free from grease, paints or any foreign matter. A chemical solvent as trichloroethylene / carbon tetrachloride or a combination of solvent cleaning and heating shall be employed. Immediately after degreasing the material shall be rinsed with hot / cold water.

Pickling Hydrochloric acid and sulphuric acid solutions may be used from pickling. After pickling the material shall be rinsed in running water. After surface treatment, cable trays shall be galvanized.

GALVANIZING

Zinc confirming to grade Zn 98 of IS 209 shall be normally used for galvanizing. As far as practicable, the fabricated tray and accessories shall not be sunk to the bottom of the bath. Tray and accessories shall be galvanized at the lowest possible temperature, which will allow free drainage of zinc from the work piece during withdrawal. The thickness of the coating shall be minimum 100 microns. The zinc deposited shall not be less than approximately 720 gm/sq.m.The thickness shall be checked by a magnetic method as per IS 3203.

Small components handed in baskets shall be centrifuged to remove excess of Zinc immediately after galvanizing while the coating is still in molten condition. Hardware such as nuts and bolts shall be Electro galvanized / zinc passivated.

PAINTING

If necessary at site - only, especially after cutting / jointing. The metal surface after cleaning shall be prepared by applying a coat of phosphate paint and a coat of yellow zinc chromate primer. After preparation the tray surface shall be spray painted with two coats of yellow paints.

TESTING AND INSPECTION

All the cable trays and accessories shall be offered for inspection at the fabricators works to client / consultant. Physical inspection and tests will be conducted on the trays to check its compliance with the specification and approved drawings.

Measurement of the thickness of Zinc coating- Elkometer shall be used to check the thickness of galvanizing. Deflection load test at the manufacturer's works Test span shall be simple bream span with free unrestrained ends.

The cable tray shall be uniformly loaded along the span with cable tray simply supported at the two ends as per the load criteria. Vertical deflection of the tray shall be measured at the two points along the midway between the supports. The average of these two readings shall be considered to be the vertical deflection of the tray. Vertical deflection shall be within the design criteria.

EARTHING

The cable tray /floor raceways shall be provided with brass earth clamps every 3000mm for connecting suitable copper wire earth continuity.

VIII. TECHNICAL SPECIFICATION FOR DISTRIBUTION BOARD

SCOPE

This specification covers the design, manufacture, assembly, testing at works and supply of distribution boards, complete with all accessories for efficient and trouble free operation.

CONSTRUCTION

The distribution boards shall be fabricated out of 2mm thick sheet steel and shall be totally enclosed, dust and vermin proof, dead front, with hinged door type of bolted / welded construction suitable for wall mounting.

Each DB shall have individual hinged / bolted gasketed doors with cam lock. Removable conduit entry plates shall be provided at top and bottom of the DB to facilitate drilling the conduit holes at site to suit individual requirements or knockout shall be provided.

Protective insulated cover plate shall be provided inside the panel to shroud all the live parts. Only the operating handle of the switch and the operating knobs of the miniature circuit breakers shall be projecting outside the cover plate. The unused outgoing gap of DB shall be suitably shrouded to avoid accidental contact. Each phase or way shall also be suitably shrouded with DMC / SMC. The boards shall be factory wired and assembled. Circuit identification cables shall be provided on the cover.

All lighting / power distribution boards shall be provided with double door arrangements with phase segregation type.

All components in the distribution boards shall be same make.

BUSBARS

The busbars shall be air insulated and made of high conductivity high strength copper busbars liberally sized with high safety factor for the required rating (both short circuit and continuous currents). The neutral busbar shall have adequate number of terminals for all outgoing single phase circuits. A copper earth bus of suitable size shall be provided in each DB for earthing of the power, lighting circuits and earthing of DB.

MINIATURE CIRCUIT BREAKERS

The Miniature Circuit Breakers (MCBs) shall be heat resistant, moulded type, designed, manufactured and tested as per IS 8828. The MCBs shall have inverse – time tripping characteristics against over loads and instantaneous trip against short circuits. The MCBs shall be of fault current limiting type also. The MCBs shall be slip on type to the busbar.

The ON and OFF machines of the switch handle shall be clearly marked. The MCBs shall be suitable for operating in ambient of 45°C without derating. The incoming and outgoing of the MCBs shall be accessible only after opening the front door of the DB.

The MCBs shall be suitable for 415V, 3 phase, 4 wire, 50HZ system with the fault level of 9KA RMS symmetrical. The terminals of MCB knobs shall be suitable for use with eye lugs. The 4 pole, 3 pole and 2 pole MCB knobs shall be trunked with adequate strength tandem pin.

EARTH LEAKAGE CIRCUIT BREAKERS

Incomer of the DB shall be provided with current operated Earth leakage circuit breakers with a sensitivity of 30mA. The ELCB shall have trip free mechanism and shall operate even on neutral failure.

The ELCB shall be provided with a test push button to stimulate leakage and test the ELCB. The ELCB shall operate and switch off the circuit within 30 milliseconds in case of a fault.

The enclosures of the ELCB shall be moulded from high quality insulating materials, which shall be fire retardant, anti-tracking, non-hygroscopic, impact resistant and shall withstand high temperatures.

GROUNDING

The DBs shall be provided with two nos brass earthing stud terminals with suitable nuts, washers etc for connection to earth bus outside the DB.

PAINTING

Care shall be taken in workmanship and selection of materials to prevent the occurrence of any form of damage or corrosion due to damp or highly humid conditions.

The DB shall be prepared, primed, filled and painted to the highest standards.

All items shall be cleaned and deburred after fabrication and welding is complete. External surfaces shall be filled and rubbed down as necessary to obtain a perfectly flat smooth surface free from blemishes and imperfections and the whole shall be powder coated with epoxy paint and the shade shall be indicated later.

TESTS

All necessary routine shall be performed on the equipment to demonstrate satisfactory performance to owner / consultant at works without any extra cost. Equipment shall not be dispatched without obtaining approval of test certificates for type, routine and acceptance tests.

DRAWING & INSTRUCTION MANUALS

Along with the offer, the bidder shall submit the following documents, in triplicate.

- General arrangement of DB.
- Technical leaflets on DB, MCB, isolator etc.
- Type test reports as per IS 8828
- Tripping characteristics curves for MCB

After award of the order, the contractor shall submit the following documents for approval, in six copies.

- General arrangement drawing showing the constructional features, dimensions, installation details etc.
- Complete technical particulars of distribution boards, miniature circuit breakers, isolators etc.
- Tripping characteristics curves for MCB.

Before taking up manufacturing of the equipment the bidder shall have to take the approvals shall be rectified by the bidder at his own cost and the equipment shall also be supplied within the stipulated period.

IX. GENERAL REQUIRMENT OF EARTHING

SCOPE

Supply, fabrication, installation, testing and commissioning of earth pits. Conforming to relevant IS Specifications and standards. The scope includes all related civil work for making pit, providing suitable covers and writing identifications marks etc.

GENERAL

All the non-current carrying metal parts of electrical installation shall be earthed as per IS: 3043.All equipments, metal conduits, rising main, cable armour, switch gear, distribution boards, meters, cable glands and all other metal parts forming part of the work shall be bonded together and connected by two separate and distinct conductors to earth electrodes. Earthing shall be in conformity with the provisions of Rules 32, 61, 62, 67 and 68 IER 1956.

CONSTRUCTION

Copper plate earth

Plate electrodes shall be made of 3.3mm thick copper plate of 600X 600mm size. The plate shall be buried vertically in ground at a depth of not less than 2.5 meters to the top of the plate. The pit should be filled with charcoal in such a way that the electrode is encased to a minimum thickness of 300mm all round. The electrode, to the extent possible, should be buried in a depth where subsoil water is present. Earth leads to the electrode shall be laid in a heavy duty GI pipe and connected to the plate electrode with brass bolts, nuts and washers.

A GI pipe of not less than 40mm dia shall be clamped with bolts vertically to the plate and terminated in a wire meshed funnel. The funnel shall be enclosed in a masonry chamber of 450mm x 450mm dimensions. The chamber shall be provided with GI frame and CI inspection cover. The earth station shall also be provided with a suitable permanent identification label tag.

Earthing Conductors:

All earthing conductors shall be of high conductivity copper/GI strips and shall be protected against mechanical damage and corrosion. The connection of earth electrodes shall be strong, secure and sound and shall be easily accessible. The earth conductors shall be rigidly fixed to the walls, cable trenches, cable tunnel conduits and cables by using suitable clamps.
Main earth bus shall be taken from the main medium voltage panel to the earth electrodes. The number of electrodes required shall be arrived at taking into consideration the anticipated fault on the medium voltage network.

Earthing conductors shall be run from the exposed metal surface of the equipment and connected to a suitable point on the sub main or main earthing bus. All Switch Boards, Distribution Boards, Disconnecting Switches and Isolators shall be connected to the earth

bus. Earthing conductors shall be terminated at the equipment end using suitable lugs, bolts, washers and nuts.

All conduits, cable armouring etc., shall be connected to the earth all along their run by earthing conductors of suitable cross sectional area. The electrical resistance of earthing conductors shall be low enough to permit the passage of fault current necessary to operate a fuse/protective device and Circuit Breaker and shall not exceed 2 ohms.

Precautions

Earthing system shall be mechanically robust and the joints shall be capable of retaining low resistance always. Joints shall be tinned, soldered and/or double riveted. All the joints shall be mechanically and electrically continuous and effective. Joints shall be protected against corrosion.

The following table gives an idea on selection of size of earth conductors for electrical equipments such as Transformers, Motors, Generators, Switch gears, Cable Glands, etc.,

Size of the Conductor

Rating of 400 V, 3 ϕ **50 Hz Equipment** (KVA)	Bare Copper swg	Aluminium PVC Insulated sqmm
Up to 5	14	6
6 to 15	10	16
16 to 50	10	16
51 to 75	8	25
76 to 100	6	35
101 to 125	4	50
126 to 150	2 or 1”x1/16”	70
151 to 200	2 or 1”x1/16”	70
201 and above	1” x 1/8”	185

Conductors shall be protected so that no mechanical damage could be caused.

Earth connections for all HT switchgears and equipments shall be carried out by not less than 0.1sq. inch. Copper tapes or 185 Sq.mm PVC insulated stranded aluminium conductor or 2” *1/4” Galvanised iron strip.

X. SPECIFICATION FOR INSTALLATION

SCOPE

The specification covers the installation, testing and commissioning of all electrical equipments and accessories required for the switchyard for efficient and trouble free operation.

STANDARDS

The electrical installation work covered by this specification shall unless otherwise stated comply with the requirements of the latest edition of relevant Indian Standard, statutory regulations and codes of practices.

- Indian Electricity Rules –1956
- Tariff advisory committee - Approvals.
- IS – 10118 : Code of practice for selection, installation & maintenance of Switch gear and control gear
- IS – 6600 : Guide for loading of oil immersed transformers.
- IS – 3043 : Code of practice for earthing.
- IS – 2309 : Code of practice for protection of building and allied structures against lightning.
- IS – 2274 : Code of practice for electrical wiring installation.
- IS – 6665 : Code of practice for industrial lightning.

GENERAL REQUIREMENTS

The installation shall be carried out by an electrical contractor holding a valid license as required by the respective State Government. The contractor shall provide particulars of the license held by him or his subcontractor to the client. The installation shall require approval of the Chief Electrical Inspector to the Government of Tamilnadu and the contractor shall prepare all necessary drawings / documents and submit to CEIG and get safety certificates from CEIG. He shall also fully assist the client in obtaining approval from any other statutory authorities for the successful commissioning of the Substation. Getting approval for other areas like 11KV/22KV/33KV switch gear, Diesel generator, control and relay panels, auxiliary transformers and LT panels shall also be in the contractor's scope.

Any modification in the equipment or installation that may be demanded by the inspector shall be carried out at no additional cost to the purchaser.

In accordance with the specific installation instructions or as directed by the purchaser, the contractor shall unload, erect, assemble, install, wire, test and commission all electrical equipments included in this contract. Equipments shall be installed in a neat workman like manner with highest regard for safety.

The purchaser shall not supply erection materials, tools, testing instruments or any other machinery of any nature. The contractor shall arrange for the same in a timely manner and he shall not be allowed to claim for any delay or extra cost of any nature.

Consumable materials of any nature required for the erection job shall also have to be arranged by the contractor

Clearing the site after completion of erection as well as regular clearance of unwanted, materials from site, returning all packing material and excess material and excess material shall also be covered under the scope of work.

All equipments and instruments of indoor and out door, shall be inscribed with number, nomenclature, danger boards and other instructions.

The contractor shall touch up the surface for all equipments, which are scratched and / or damaged during transportation and erection. The paint used shall match exactly the surface being touched up.

The contractor shall employ skilled and semi-skilled laborers for erection, installation & testing as required. All electricians, cable jointers, wire men, welders and others employed shall be suitably qualified possessing valid certificates / licenses recognized by the competent authorities

The contractor shall also furnish a list of Engineers/Supervisors and staff employed by him for erection and installation jobs, giving in brief, qualification and experience of such staff and indicating whether they hold such competency certificates / licenses to supervise the electrical installation jobs as required under Indian Electricity Rules & State electrical Inspectorate Rules.

The contractor shall set up his own workshop and other facilities at site to undertake fabrication jobs, pipe bending, threading etc.

The contractor shall be responsible for recording of all readings and observations during erection, testing and commissioning, in registers or on prescribed proforma. These shall be carried the presence of purchaser's representative. All such test data and records shall be duly signed by the contractor's Engineer / client's representative and shall be submitted to client in triplicate.

The contractor shall carry out all tests at site for outdoor and indoor electrical equipment and commission the installation in the presence of client's representative. The contractor shall be responsible for final adjustment of relays, instruments, meters breakers etc., and also for submission of relay settings and calculations.

EQUIPMENT ERECTION

All support insulators, Circuit breakers, Isolators, Power Transformers, Instrument Transformers, etc. shall be properly handled an erected as per the relevant codes of practice and manufacturer's drawings and instruction manuals.

For power transformer, drying out and oil filling as required, after checking and testing the dielectric strength shall be carried out by the contractor. If required oil filtration shall be carried out and the contractor shall arrange for the necessary equipment.

Handling equipment, sling ropes etc. should be tested before erection and periodically for strength.

For cleaning the inside and outside of hollow insulators, only muslin or leather clothes shall be used.

Necessary Junction boxes for CT's and PT's shall be supplied and installed.

POWER CABLES

Contractor's scope of work includes unloading, laying, fixing, jointing, bending and terminating of cables. Contractor shall also supply all the necessary hardware's for jointing and terminating of cables. Cable shall be laid directly buried in earth, on cable racks in built up trenches, on cable trays and supports in conduits and ducts or bare on walls, ceiling etc. Where specific cable layouts are not shown in the drawing contractor shall route these cables as directed by Consultant/Client.

It is the contractor's responsibility to ensure that he acquaints himself with the nature of the ground conditions of the project site.

Markers shall be installed at all road crossing where the cables cross and as well as cable joint positions. Their provision and installation shall be included in the areas.

The contractor while designing, excavating trenches and installation of cables, must take all necessary care.

Contractor shall install, test and commission the cables specified in accordance with the latest revisions of Indian Standards.

All cable work and the allied apparatus shall be designed an arranged to reduce the risk of fire and any damage that may cause in the event of fire. Wherever cables pass through any floor or wall opening suitable bushes supplied shall be sealed using fire-resisting materials to prevent fire spreading.

Standard cable installation tools shall be utilized for cable pulling. Maximum pull tension shall not exceed the manufacturer's recommended value. Cable grips, reels or pulleys used shall be properly lubricated. The lubricant shall not injure the overall covering and shall not set up undesirable conditions of electrostatic stress.

Sharp bending and kicking of cables shall be avoided. The bending radius for various types of cables shall not be less than those specified by manufacturer.

Power and control cables shall be laid in separate cable trays. The order of laying of various cable in trenches shall be as specified below:

- 11KV cables on top most tiers from top.
- 415V cables on middle tier.
- Control cables in bottom most cable tier.

Where cables cross roads and water, oil, gas or sewage pipes the cables shall be laid in reinforced spun concrete pipes. For road crossing the pipe for the cable shall be buried at not less than one-meter depth. Cable shall be protected at all times from mechanical injury and from absorption of moisture.

Some extra length shall be kept in each cable run at a suitable point to enable one or two straight through joint to be made at a later date, if any fault occurs.

Cable jointing shall be in accordance with relevant Indian Standard Codes of practice and Manufacture's special instruction. Contractor should supply materials and tools required for cable jointing work. Cable shall be firmly clamped on either sides of a straight through joint at not more than 300 mm away from the joints. Identification tags shall be provided at each joint and at all cable terminations. Before jointing insulation resistance of both sections of cables to be jointed shall be checked.

Metal sheath and armour of the cable shall be bonded to the earthing system of the station.

Each cable shall be identified with its designation number as indicated in the drawings.

Cable clamps shall be of 3 mm thick galvanized M.S. spaced at every 1.5-M interval.

TESTING OF CABLES

TESTS

Cable Insulation Tests shall be conducted between phases and between phase and earth for each length of cable, before and after jointing. As such all phase cables may be checked before being laid for above tests. On completion of cable laying work, the following tests shall be conducted in the presence of the Architect / Client.

CONSTRUCTION TESTS

- Test for conductor and compaction
- Test for aluminium conductor
  - Tensile test
  - Wrapping test
  - Annealing test
  - Resistance test for both copper and aluminium
- Test of eccentricity of insulation.
- Test for thickness of insulation
- Test for laying up along with Polypropylene tape and fillers.
- Virgin material test for PVC insulation.
- Test for thickness of inner sheath
- Test for armouring and armour coverage which should be more than 35%
- Test for thickness of outer sheath.
- Insulation Resistance Test (sectional and overall)
- Continuity resistance test.
- Cable size, sequential and manufacturers identification marking on the outer sheath.
- Earth test.

All tests shall be carries out in accordance with relevant Indian Standard Code of Practice and Local Electricity Rules. The contractor shall provide necessary instruments, equipments and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Architect / Client.

CABLE TRAYS, ACCESSORIES AND TRAY SUPPORTS

- Cable trays shall either be run in concrete trenches or overhead supports from building steel, floor slab, etc.
- Cables shall be clamped to the cable trays in both horizontal runs and vertical runs by suitable prefabricated clamps.
- All cable trays and fitting will be ladder type and fabricated from M.S. sheet. They shall be hot dip galvanized.
- Cable trays shall be suitably supported at an interval of not more than one meter.

CIRCUIT BREAKER

The vacuum circuit breaker shall be tested and installed in accordance with the manufacturer's inspection.

The operating mechanism shall be installed and connected to the three poles and the control cubicle with compressor, air receiver, etc. shall be connected to the breather pole operating mechanism through pipes.

Each pole of the circuit breaker and operating mechanism shall be accurately positioned not to cause any undue strain on the terminals and they shall be properly earthed.

ISOLATOR

The contractor shall inspect, clean, assemble and install the isolator on the fabricated base structure.

The operating mechanism shall be installed on the structure and shall be tested by slowly bringing the isolator to the closed position and necessary adjustments shall be carried out as per manufacturer's instruction.

Earth switches, frames, operating handles, etc. shall be earthed.

LIGHTNING ARRESTORS

The earth terminal of each lightning arrestor shall be connected to a separate earth electrode by as short direct lead as possible.

Insulating base and surge counter shall be installed as per manufacturer's instruction.

INSTRUMENT TRANSFORMERS

- The CT's and PT's shall be installed on the fabricated base structure.
- The phase to phase clearance between three units of each set shall be accurately and adjusted so as not to cause strain on the terminals.
- Oil in each unit shall be properly checked for insulation.

LIGHTING SYSTEM

The contractor shall provide lighting of the complete switchyard. Flood light fixtures with HPSV/MH lamps shall be used and shall be mounted on steel pole of required height with adequate facility for revamping without the help of any portable ladder. The contractor shall prepare the lighting layout drawings showing the approximate location of lighting fixtures for approval. The Contractor will submit all foundation drawings. All illumination system including switchgear, lighting fixtures, poles, cabling, etc. shall be in contractor's scope.

The switchyard lighting shall be designed to have mean illumination level of 50 lux.

Lighting wiring between lighting panel and lighting fixtures shall be done by PVC insulated 3 core (phase, neutral and earth) 2.5 sq.mm copper conductor armored cables. Wiring between power panel and 20A sockets shall be done with PVC insulated 3 core (phase, neutral and earth) 4 sq.mm. copper conductor armoured cables.

Emergency DC lighting shall also be considered for switchyard for which necessary cabling, switch gear, etc. will be in contractor's scope.

LIGHTING AND POWER PANELS

Lighting and Power Panels shall be located in the control room. The panel shall be made of 2.5mm CRCA sheet steel. The panels shall have hinged lockable doors with gaskets. Removable bottom gland plate shall be provided along with nickel plated double compression glands. An earth bus shall also be provided with two external grounding terminals.

MISCELLANEOUS ITEMS

The successful bidder shall supply and install the safety devices as required by the statutory authorities, but not limited to the following:

- Danger boards.
- Fire extinguishing appliances.
- Rubber mats for switchgear panels, power distribution boards battery charges, control and relay panel, etc.
- Rubber gloves, first aid charts, first aid box, etc.
- Earthing rods.

XI. TESTING AND COMMISSIONING

TESTING AT WORKS

All major components / sub-systems / materials forming part of the works shall be duly tested at the place of manufacture / assembly before despatch. The manufacturer shall have stringent quality control for the pre-delivery installation schedules and the product, when it leaves the manufacturing / assembly plant, be proved to be capable of performing to the specified criteria. The Client / Architects reserve the right to be present at the time of testing of such major components / sub-systems / materials at the manufacturer's factory / assembly shops. For this purpose, the successful Bidder shall submit a detailed schedule of manufacturing and testing of components / sub-systems / materials giving details of the expected dates of testing, location, duration of testing as well as nature of testing for the concurrence of the Client/ Architects. The Bidders shall note that they should include in the quoted rates the cost of travel and accommodation for a maximum of two persons representing Client / Architect for being present at the place of testing.

GENERAL

The testing and commissioning for all electrical equipment at site shall be according to the procedure laid down below.

- **All electrical equipment shall be installed, tested and commissioned in accordance with the latest relevant standards and codes of practices published by Indian standards, institution wherever applicable and stipulations made in relevant general specifications.**
- **The testing of all electrical equipment as well as the system as a whole shall be carried out to ensure that the equipment and its components are in satisfactory condition and will successfully perform its functional operation. The inspection of the equipment shall be carried out to ensure that all materials, workmanship and installation conform to the accepted design, engineering and construction standards, as well as accepted codes of practice and stipulations made in the relevant general specifications.**
- **The contractor using his own instruments, testing equipment as well as qualified testing personnel shall carry out all tests.**
- **The results of all tests shall be conforming to the specification requirements as well as any specific performance data guaranteed during finalization of the contract. General**
- **At the completion of the work, the entire installation shall be subject to the following tests in presence of Architect / Client.**

◊ Wiring Continuity Test
◊ Insulation Resistance Test
◊ Earth Continuity Test
◊ Earth Resistivity Test

PREPARATION OF THE ELECTRICAL SYSTEM FOR COMMISSIONING

After completion of the installation at site and for the preparation of Electrical system commissioning, the contractor shall carry out check and testing of all equipment and installation in accordance with the agreed standards, codes of practice of Indian Standards Institution and specific instructions furnished by the particular equipment suppliers.

Checking required to be made on all equipment and installations at site shall comprise, but not be limited, to the following:

The following checks shall be made on all equipment and installation at site:

- Physical inspection for removal of any foreign bodies, external defects, such as damaged insulators, loose connecting bolts, loose foundation bolts etc.
- Check for grease, insulating/lubricating oil leakage and its proper quantity.
- Check for the free movement of mechanism for the circuit breakers, rotating part of the rotating machines and devices.
- Check for tightness of all - cable, bus bars at termination/joints ends as well as earth connections in the main earthing network.
- Check for Clearance of live bus bars and connectors from the metal enclosure.
- Check the proper alignment of all draw out device like draw out type circuit breakers.
- Continuity checks in case of power cables.
- Checking of all mechanical and electrical interlocks including tripping of breakers using manual operation of relay.
- Checking of alarm and annunciation circuits by manual actuation of relevant relays.
- Check and calibrate devices requiring field adjustment/ calibration like adjustment of relay settings etc.,
- Check proper connection to earth network of all non-current carrying parts of the equipment and installation.
- Test reports for all meters are to be furnished.
- These tests shall be carried out on the equipment shall include but not be limited to the above.

H.T. BREAKER PANEL

The following tests shall be carried out in accordance with IS 13118.

- Mechanical operation tests.
- Power frequency HV test.

- Insulation resistance test.
- Functional tests on control circuits.
- Relay operation tests by primary, secondary injection method.

- Checking of settings of all relays/releases as per single line diagram/specification.

DISTRIBUTION TRANSFORMER

The following tests shall be carried out in accordance with IS

MEASUREMENT OF INSULATION RESISTANCE TEST BETWEEN:-

- HT & LT Windings
- Between HT & Earth
- Between LT & Earth

EARTH RESISTANCE TEST

- Earth resistance of the Body earth Electrodes
- Earth resistance of the Neutral earth Electrodes
- Earth continuity

VOLTAGE RATIO TEST:

Ratio test on all taps of the transformers

TRANSFORMER TEST:

- Winding resistance at all taps
- Measurement of voltage ratio on all taps.
- Vector group check.
- Measurement of impedance voltage / Short Circuit impedance
- At principal tapping and load loss.
- Measurement of no load loss and current.
- Measurement of insulation resistance.
- Power frequencies withstand test.
- Operational tests to know the correct functional of all devices associated with the transformer.
- Low Voltage Switch gear (up to 1000V AC OR 1200V DC)

- Insulation resistance test with 1000V megger for main circuits. The minimum value of insulation resistance shall be 1mega ohm.

- Insulation resistance test with 500V megger for control, metering and relaying circuits. The minimum value of insulation resistance shall be 1mega ohm.
- Relay operation test by primary & secondary injection method.
- Functional tests of control circuit.

- Checking of settings of all relay/releases as per single line diagram/specification.
- ON/OF operation of breakers both manually and electrically in "Test" as well as "service" positions.

CABLES

Insulation resistance test with 2,500V megger for high voltage power cables rated above 1.1KV grade and 1,000V megger for cables rated up to 1.1KV grade.

All cables of 1.1KV and all H.V. cables shall be subjected to high voltage test after joining and terminating but before commissioning as per relevant standards.

In each test, the metallic sheath/screen/armour should be connected to earth.

Continuity of all the cores, correctness of all connections as per wiring diagram, correctness of polarity and phase of power cables and proper earth connection of cable glands, cable boxes, armour and metallic sheath, shall be checked.

EARTHING SYSTEM

Tests to ensure continuity of all earth connections.

Tests to obtain earth resistance of the complete network by using earth tester. The test values obtained shall be within the limits.

All documents / records regarding test data, oscillographs and other measured values of important parameters finalized after site adjustment shall be handed over to the Architect / Client in the form of test reports for their future use and reference.

ELECTRICAL

1. The scope of work for testing and commissioning of the total installation shall be for the capital equipment's like switchgears, cables, etc., and also for the associated equipment like relays Cts, Pts cable etc.,
2. The scope of work for testing and commissioning of electrical equipment for the above shall include but not limited to the following.

Providing sufficient number of experienced Engineers, supervisors, Electricians, so that the installation can be commissioned in stipulated time.

All the instruments, tools, and tackles required for carrying out the testing and the bidder shall provide commissioning.

The testing of electrical equipments shall be carried but as per the relevant Indian standards/codes practices/Manufacturers instructions.

Cleaning of Electrical equipment, contracts, cleaning and greasing etc., all the equipments and materials required for above shall be supplied by the bidder.

Correcting the panel/equipment wiring for proper functioning for the schemes required /called etc.,

Installation and wiring of additional equipment on panels like auxiliary contractors, timers, etc., which may be additionally required for proper functioning of the schemes.

Checking of equipment earthing and system earthing as a whole.

Testing of all the cables.

Co ordination with other contractors for testing and commissioning of interface cables.

TEST TO BE CONDUCTED

a. All tests shall be performed in the presence of the bidder and customer/consultant. For all types of visual inspections, checkings, precommissioning, commissioning test and acceptance tests, relevant IS for the tests given therein shall be followed in addition to the instructions in this technical specification the intention of giving the few test procedures, described below, is to provide a guideline for the bidder. However bidder shall not restrict themselves in carrying out only the tests described in this document.

b. Bidder shall submit their proposed test procedures for approval and shall not commence testing without such approval is given.

c. Bidder shall check and test all electrical equipment and system installed and supplied them, including equipment supplied by the owner.

d. Bidder shall ensure that no tests are applied which may stress equipment above the limits for field-testing recommended by the manufacturer. Bidder shall be responsible for any damage to personnel or equipment resulting from improper test procedure including the equipments supplied by Client.

e. All defective materials furnished by the bidder and defects due to poor workmanship revealed through field testing, shall be corrected at bidder expense without affecting the completion of the project.

f. CLIENT reserves the right to interpret and approve all test results prior to energisation of circuits or apparatus.

g. Bidder shall visually inspect all equipment for defects immediately results upon arrival at site including those supplied by CLIENT.

h. Bidder shall test the buried earth grid and shall record the values. Bidder shall inspect and test all earthing work carried out by him, including all interconnections between ground loops, grounding of equipment and ensure all connections are permanent and that the earthing circuit is continuous.

i. Bidder shall meggar and record earth resistance at various earth connection points.

j. Switchgear rated 433 volts or more shall be tested with a 1000 volts megger.

k. Auxiliary wiring rated less than 415 volts shall be tested with a 500 volts megger.

l. ALL protective relays shall be tested at sufficient points to establish their proper functioning in accordance with manufacturer's specification and curves.

m. Operation checks and functional checks on all switchgear panels.

n. Busbar Wires and cables rated 433 volts or more shall be tested joints check with torque wrench for tightness.

o. Continuity testing of all wires and cables with a 1000 volts megger.

p. Cables rated less than 433 volts shall be tested with a 500 volts megger.

q. No wires or cable having resistance between conductors or between conductors and ground if less than 100 megaohm shall be accepted.

r. All precommissioning test stated as per IS for respective items.

NOTE: The tenderers shall note that all the rates quoted by them are including the testing charges for doing the above tests. Client shall not reimburse separately any amount for any testing of materials.

MAINTENANCE LIABILITY

The duration of the maintenance period will be one year from the date of completion. The electrical contractor shall be responsible for maintenance and rectification of defects during this period.

Any defects, deficiencies or failures noted during this period shall be rectified within 7 days of intimation in writing failing which the same will be done at electrical contractor's risk and cost. The contractor has to inspect the works periodically or often as called by the Architect / Client due to any exigencies.

XII. APPROVED MAKES OF EQUIPMENTS / COMPONENTS

S. No.	Name of Equipments	Approved Make
1.	11 KV / 433 V cast resin dry type transformer	CGL / KIRLOSKAR / VOLT – AMP
2.	RMU	ABB / SIEMENS
3.	11 KV HT VCB	ABB / SIEMENS
4.	Moulded Case Circuit Breaker	ABB / SIEMENS / MERLIN GERIN
5.	LT Contractors	SIEMENS / L & T / ABB
6.	LT Cables	POLYCAB / KEI / UNIVERSAL
7.	HT Cables	POLYCAB / KEI / UNIVERSAL
8.	CSS consisting of 11 KV VCB, 400 KVA cast resin dry type transformer, MV Panel and APFC Panel	SIEMENS / ABB
9.	Relays, CTs / PTs	Proposed make shall be got approved by the client before commencement of work.

NOTE:

a) The successful tenderer shall submit test reports for all the materials / equipments.
b) If any make is not in accordance with the tender specification, it will not be accepted even if the make is indicated in the above list.
c) The client reserves the right to select any of the make specified above. Hence, the tenderer shall quote accordingly.

XIII. SCHEDULE OF ELECTRICAL CONTRACTOR'S SITE MANAGEMENT STAFF (DURING EXECUTION)

Bidder must enter below the name, qualifications and experience of their key full time site personal in the proposed site organization.

Name	Qualification	Position	Experience	Period when available from start of work

Signature of Bidder

NOTE

A qualified engineer with valid supervisory competency certificate issued by Chandigarh Electricity Department should be available at site during the execution of work and also during the maintenance period of one year (defect liabilities period).

XIV. SCHEDULE OF ELECTRICAL CONTRACTOR'S SITE MANAGEMENT STAFF (DURING DEFECT LIABILITY PERIOD)

Bidder must enter below the name, qualifications and experience of their key full time site personal in the proposed site organization.

Name	Qualification	Position	Experience	Period when available from start of work
1. For Maintenance				
2. For Operations				

Signature of Bidder

NOTE

- A qualified engineer with valid supervisory competency certificate issued by Chandigarh Electricity Department should be available at site during the execution of work and also during the maintenance period of one year (defect liabilities period).

- The scope of the Non-Comprehensive Maintenance Service Contract entail the successful tenderer to bear the full responsibility for all kinds of maintenance such as short term, long term, routine, emergency maintenance etc. The successful tenderer shall be required to post at site adequate number of personal for full time, round the clock maintenance. Such personal posted at site must have appropriate qualification and experience to ensure trouble free and continuous operation of the entire system. Senior officers from the successful tenderer's organization must monitor the work of the field personal periodically. Detailed documentation must be maintained of all the work periodically. Detailed documentation must be maintained of all the work undertaken at site. Adequate essential spares must be maintained at site to ensure that the down time is minimal. Payments shall be made by UIIC for the spares replaced by them. Maintenance schedule and routines must be submitted to client and any maintenance work must be undertaken after obtaining approval / permission of the client.

11. NON COMPREHENSIVE MAINTENANCE SERVICE CONTRACT

1. The scope of the Non Comprehensive Maintenance Service Contract entail the successful tenderer to bear the full responsibility for all kinds of maintenance such as short term, long term, routine, emergency maintenance etc. The successful tenderer shall be required to post at site adequate number of personnel for full time, round the clock maintenance. Such personal posted at site must have appropriate qualification and experience to ensure trouble free and continuous operation must monitor the work of the field personal periodically. Detailed documentation must be maintained of all the work undertaken at site. Essential spares must be maintained at site to ensure that the down time is minimal and payment shall be made by UIIC for the spares supplied. Maintenance schedule and routines must be submitted to UIIC, Chandigarh. And any maintenance work must be undertaken after obtaining approval / permission of the owner (UIIC).

2. The service contract shall be for full 3 (three) years after the guarantee period of twelve months with effect from the date of handing over.

3. A lump sum offer for the entire period of Comprehensive Service Contract of three years shall be made and the offer shall remain firm till the end of service contract period and no escalation on whatsoever account shall be considered. **The amount quoted towards service contract shall be taken into consideration for tender evaluation purposes.**

4. Payment shall be considered in 12 (Twelve) equal instalments, one at the end of each quarter of a year of satisfactory completion, which decision rests with the UIIC, Chandigarh – 160 017.

5. Any expenditure incurred by the UIIC, Chandigarh – 160 017 due to defective service rendered under the service contract shall be recovered from the payment of installment(s).

6. The successful Tenderer shall also provide performance guarantee of 10% of the value of work for the non comprehensive maintenance of the electrical installations for 3 years in the form of irrevocable Bank Guarantee valid for a period of 3 years. The final bill for the main work shall be released only on receipt of this performance guarantee.

12. BANK GUARANTEE FORMAT TOWARDS EMD

To,
UNITED INDIA INSURANCE CO. LTD.
Regional Office: S.C.O. 123 – 124, Sector
17-B, Chandigarh – 160 017

Dear Sirs,

WHEREAS, UNITED INDIA INSURANCE CO. LTD.**, having its Regional Office at** S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017 (hereinafter called **"the Employer"**) have issued bid documents for the work of availing HT supply **at** S.C.O. 123 – 124, Sector 17-B, Chandigarh – 160 017**,** and whereas ---------- is the contractor for the aforesaid work (hereafter called **"the Contractor"**)**.**

AND WHEREAS under the terms and conditions of the said bid documents, the Contractor is required and has undertaken to furnish a Bank Guarantee of **Rs. (Rupees)** as Earnest Money Deposit as contained in the said tender document.

We, ---------- **,** having registered office at ---------- and branch office at ---------- (hereinafter called **"the Bank"**) hereby unconditionally and irrevocably undertake to the Employer immediately upon receipt of the first written demand such amount or amounts as may be demanded by the Employer from us under this Guarantee not exceeding a sum of **Rs……. (Rupees)** in aggregate without demur or reference to the Contractor and agree that the Employer's demand shall be final and binding on the Bank under all circumstances.

We hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor up to an aggregate sum of **Rs……(Rupees)** such sum or sums being payable in Indian currency and we undertake to pay on your first written demand and without any demur and/or condition, and sum or sums with the aggregate limit of **Rs. …….. (Rupees)**

We agree that no change or addition to or modification of the terms of the tender or of the works is to be performed there under or of any of the tender documents which may be made between you and the Contractor shall in any way release the Bank from any liability under this Guarantee, and we hereby waive notice of any such change, addition or modification.

We further agree that the Employer shall have the right to invoke a claim up to the last date of the validity of this Bank Guarantee and that the Employer shall remain the sole judge of the validity of the claim and the Bank agrees not to contest any claim.
We further agree that any change in the Contractor 's constitution or their liquidation or dissolution shall not discharge the Bank's liability under this Guarantee.

We further agree that the right of the Employer to make a claim shall not be vitiated by any dispute raised or pending with any Statutory Authority, arbitrator, tribunal or any other body or person.

It is agreed that the Employer's claim shall remain valid even if the Employer has not issued a prior notice or has not proceeded against a Contractor before making such claim.

This Guarantee is confirmed and irrevocable and shall remain valid upto and including** **----------** and shall remain valid upto such extended period which may be mutually agreed to.

Unless a demand or claim under this Guarantee is made on the Bank in writing on or before **----------,** the Bank shall be discharged from all liability under this Guarantee.

** BG should be Valid for 120 days from the date of submission of tender.