SBI INFRA MANAGEMENT SOLUTIONS PVT LTD  
(WHOLLY OWNED SUBSIDIARY OF SBI)

INVITES TENDERS ON BEHALF OF SBI LHO, HYDERABAD.

IN A SINGLE BID THROUGH E-TENDERING PROCESS.

Contractors who are on the panel of SBI, Hyderabad Circle, (LHO) for electrical works in the appropriate category are only eligible. (Contractors should submit proof of the same)

FOR

RELOCATION OF ELECTRICAL PANEL ROOM AND RELATED ELECTRICAL WORKS AT STATE BANK INSTITUTE OF CONSUMER BANKING, BEGUMPET, HYDERABAD

The Vice president& Head,
SBI Infra Management Solutions Pvt. Ltd.
Ground Floor, Adj Commercial Branch, SBI LHO campus,
Bank Street, Koti,
Hyderabad – 500 095
Phone:040-23466310/46
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<th><strong>NOTICE INVITING TENDER. (NIT)</strong></th>
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<tbody>
<tr>
<td>1.</td>
<td><strong>Name of the Work</strong>&lt;br&gt;Electrical works for relocation of electrical panel room and related works at State Bank Institute of Consumer Banking, Begumpet, Hyderabad</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Eligibility of the contractor</strong>&lt;br&gt;Electrical contractors empanelled with SBI, LHO, Hyderabad for appropriate category.</td>
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<td>3.</td>
<td><strong>Estimated cost of work:</strong>&lt;br&gt;Rs.41,42,700.00 plus GST as applicable</td>
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<td>4.</td>
<td><strong>Earnest Money Deposit. (EMD)</strong>&lt;br&gt;<strong>Rs. 42000/-</strong>&lt;br&gt;all Drafts/BCs shall be in favour of “SBIIMS, Hyderabad”.&lt;br&gt;Payable at Hyderabad.&lt;br&gt;Upload copy of EMD / one time EMD in etender.sbi.</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Tender Cost</strong>&lt;br&gt;<strong>Rs.3000/-</strong>&lt;br&gt;Upload copy of tender cost( receipt of SBI collect) in etender.sbi. Offline tender cost will be not acceptable and we will treat it as rejected.</td>
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<td>6.</td>
<td><strong>Time of Completion:</strong>&lt;br&gt;90 DAYS.</td>
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<td>7.</td>
<td><strong>Payment terms</strong>&lt;br&gt;Minimum ₹15 Lakh in each running bill</td>
</tr>
<tr>
<td>8.</td>
<td><strong>Date of download of tender documents from Bank’s web site</strong>&lt;br&gt;<strong><a href="http://www.sbi.co.in">http://www.sbi.co.in</a></strong> under “procurement news.”&lt;br&gt;<strong>From 13.04.2020 to 02.05.2020</strong></td>
</tr>
<tr>
<td>9.</td>
<td><strong>Last date and time for submission of online e-tender. At</strong>&lt;br&gt;<strong><a href="https://etender.sbi">https://etender.sbi</a></strong>&lt;br&gt;<strong>Date: 02.05.2020 by 3.00 P.M.</strong></td>
</tr>
<tr>
<td>10.</td>
<td><strong>Date and Time of opening of e-Tenders:</strong>&lt;br&gt;(Technical Bid and Price Bid)&lt;br&gt;<strong>Date: 02.05.2020 at 3.10 P. M. (IST).</strong></td>
</tr>
<tr>
<td>11.</td>
<td><strong>Address of opening of tender</strong>&lt;br&gt;Vice President, SBI Infra Management Solutions Pvt. Ltd., Office, Ground floor, Adj to commercial branch, SBI LHO campus, Bank Street, Kothi, Hyderabad – 500 095. Technical Bid of those firms / contractors who do not submit EMD shall be rejected. Those who are already submitted the one time EMD need not to be submitted again. Representatives of Bidder may be present during opening of Bids. However Bids would be opened even in the absence of any or all the bidder’s representatives.</td>
</tr>
<tr>
<td>12.</td>
<td><strong>EMD &amp; Tender cost to be submitted at:</strong>&lt;br&gt;EMD should be submitted physically at above mentioned address before due date. Contact: Vice President. 040-23466346.</td>
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</table>
| 13. Bidder Contact Details. | Bidder to provide following information.  
1) Name of Company. 2) Contact Person.  
2) Mailing address with Pin Code. 4) Telephone number and Fax number. 5) Mobile number and E-MAIL. |
e-Procurement technologies Limited, Ahmedabad.  
Primary Contact Numbers: M:- 9081000427, 9904407997 |

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|   | Sujith Nair: 079-68136857, sujith@eptl.in  
1. Jaymeet Rathod: 079-68136829, jaymeet.rathod@eptl.in  
2. Vinayak Khambe: 079-68136835, vinayak.k@eptl.in  
3. Nadeem Mansuri: 079-68136853, nadeem@eptl.in  
4. Nandan Valera: 079-68136843, nandan.v@eptl.in  
5. Hemangi Patel: 079-68136852, hemangi@eptl.in  
6. Kanchan Kumari: 079-68136820, kanchan.k@eptl.in  
7. Deepak Narekar: 079-68136863, deepak@eptl.in  
8. Anshul Juneja: 079-68136840, anshul.juneja@eptl.in  
9. Salina Motani: 079-68136831, salina.motani@eptl.in  
10. Devang Patel: 079-68136859, devang@eptl.in  
Primary Contact person: Ms. Shubhangi Banodiya,  
Contact No.: 079-68136826/6824/6868, +91-9879996111  
Email: shubhangi@auctiontiger.net  
Secondary contact person: Mr. Samjad Khan  
Contact No.: 079-68136868, +91-9265871720  
Email: samjad@auctiontiger.net  
Alternate Contact No.: Mr. Yashrajsinh Rathod: 079-68136815, 9879996111, yashrajsinh@auctiontiger.net |

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<tr>
<td>15. Initial Security Deposit</td>
<td>2% including EMD.</td>
</tr>
<tr>
<td>16. Defects Liability Period</td>
<td>12 Months (Twelve months)</td>
</tr>
<tr>
<td>17. Total Security Deposit</td>
<td>5% of contract value including initial security deposit. Out of which 2.5% will be released against completion of the work</td>
</tr>
<tr>
<td>18. Liquidated Damages</td>
<td>0.50% per week subject to max 5% of the value of work</td>
</tr>
<tr>
<td>19. Validity</td>
<td>90 days</td>
</tr>
<tr>
<td>20. Working time</td>
<td>Contractor has to work round the clock including holidays, for which no extra payment will be paid</td>
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The SBIIMS reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever.
INSTRUCTIONS TO THE TENDERERS

1.0 Scope of Work

Sealed Tenders are invited by M/s SBIIMS, Hyderabad for and behalf of State Bank of India for the work of relocation of electrical panel room at State bank Institute of Consumer Banking (SBICB), Begumpet, Hyderabad.

1.1 Site and Its Location

The proposed work is to be carried out at SBICB, Hyderabad

2.0 Tender Documents

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

- Instructions to tenderers
- General Conditions of Contract
- Special Conditions of Contract
- Additional Conditions for Electrical Installation
- Technical Specifications
- Drawings
- Priced Bid

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

- Price Bid
- Technical Specifications
- Additional Conditions for Electrical Installation
- Special Conditions of Contract
- General Conditions of Contract
- Instructions to Tenderers

2.3 The tender documents are not transferable.

3.0 Site Visit

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

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

4.0 Earnest Money

4.1 The tenderers are requested to submit the Earnest Money as specified in the NIT

4.2 EMD in any other form other than Demand Draft will not be accepted. Tender not accompanied by the EMD in accordance with clause 4.1 above shall be rejected.

4.3 No interest will be paid on the EMD.

4.4 EMD of unsuccessful tenderers will be refunded within 30 days of award of Contract.

4.5 EMD of successful tenderer will be retained as a part of security deposit.

5.0 Initial Security Deposit

The successful tenderer will have to submit a sum equivalent to 2% of contract value less EMD by means of D/D drawn in favour of State Bank of India within a period of 15 days of acceptance of tender.

6.0 Security Deposit

6.1 Total security deposit shall be 5% of contract value. Out of this 2% of contract value is in the form of initial security deposit which includes the EMD. Balance 3% shall be deducted from the running account bill of the work at the rate of 10% of the respective running account bill i.e. deduction from each running bill account will be 10% till total 3% of contract value is reached. 50% of the total security shall be paid to the contractors on the basis of architect’s certifying
the virtual completion. The balance 50% would be paid to the contractors after the defects liability period as specified in the contract.

6.2 No interest shall be paid to the amount retained by the Bank as Security Deposit.

7.0 Signing of Contract Documents

The successful tenderer shall be bound to implement the contract by signing an agreement and conditions of contract attached herewith within 15 days from the receipt of intimation of acceptance of his tender by the Bank. However, the written acceptance of the tender by the Bank will constitute a binding agreement between the Bank and successful tenderer whether such formal agreement is subsequently entered into or not.

8.0 Completion Period: As specified in the NIT

9.0 Validity of Tender

Tenders shall remain valid and open for acceptance for a period of 3 (Three) months from the date of opening price bid. If the tenderer withdraws his/her offer during the validity period or makes modifications in his/her original offer which are not acceptance to the Bank without prejudice to any other right or remedy the Bank shall be at liberty to forfeit the EMD.

10.0 Liquidated Damages

The liquidated damages shall be 0.5% per week subject to a maximum of 5% of contract value.
GENERAL CONDITIONS OF CONTRACT

1.0 Definitions

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

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

1.1.1 ‘SBI’ shall mean State Bank of India (client) a body Corporate created under State Bank of India Act 1955, having its Corporate Centre at State Bank Bhavan, Madame Cama Road, Mumbai 400 021 and a LHO at Hyderabad and includes the client’s representatives, successors and assigns.

‘Architects/Consultants’ shall mean M/s……………………………………………….

1.1.2 ‘Site Engineer’ shall mean an Engineer appointed by the Bank as their representative to give instructions to the contractors.

1.1.3 ‘The Contractor’ shall mean the individual or firm or company whether incorporated or not, undertaking the works and shall include legal personal representative of such individual or the composing the firm or company and the permitted assignees of such individual or firms of company.

The expression ‘works’ or ‘work’ shall mean the permanent or temporary work described in the ‘Scope of Work” and/or to be executed in accordance with the contract and includes materials,
apparatus, equipment, temporary supports, fittings and things of all kinds to be provided, the obligations of the contractor hereunder and work to be done by the contractor under the contract.

1.1.4 ‘Engineer’ shall mean the representative of the Architect/consultant.

1.1.5 ‘Drawings’ shall mean the drawings prepared by the Architects and issued by the Engineer and referred to in the specifications and any modifications of such drawings as may be issued by the Engineer from time to time ‘Contract value shall mean the value of the entire work as stipulated in the letter of acceptance of tender subject to such additions thereto or deductions there from as may be made under the provision herein after contained.

1.1.6 ‘Specifications’ shall mean the specifications referred to in the tender and any modifications thereof as may time to time be furnished or approved by the architect/consultant “Month” means calendar month.

1.1.7 “Week” means seven consecutive days.

1.1.8 “Day” means a calendar day beginning and ending at 00 Hrs and 24 hrs respectively.
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11. SCHEDULE OF MATERIALS............................................53
ARTICLES OF AGREEMENT made the ______________ day of __________ 2020
between ________________________________________________________________
of _____________________________________________________________________
(hereinafter called the “Employer”) of the one part and ________________________
of ______________________________________ (hereinafter called “The Contractor”) of the
other part, where as the Employer is desirous of getting the work of
“______________________________________________________________________” executed
and has caused drawings, conditions of contract, specifications and schedule of quantities
etc., describing the works prepared by SBIIMS, Hyderabad.

AND WHEREAS the SAID DRAWINGS numbered as per list attached inclusive of and the
conditions of contract, specifications and schedule of quantities etc., have been signed by or
on behalf of the parties hereto.

AND WHEREAS THE CONTRACTOR has agreed to execute upon and subject to the
conditions set forth in the Schedule hereto (hereinafter referred to as “Said Conditions”) the
works shown upon the said drawings and described in the same specifications and included
in the said schedule of quantities for such sum as may be ascertained to be payable in terms of
the Bills of Quantities, and which sum is estimated to be Rs. __________
(Rupees____________________________________________________ (hereinafter referred to as
“Said Contract Amount”).
NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said sum to be paid at the times and in the manner set forth in the said conditions, the contractor shall upon and subject to the said conditions, execute and complete the work shown in the said drawings and described in the said specifications.

2. The Employer shall pay the contractor the said sum or such sums as shall become payable hereunder at the times and in the manner specified in the said conditions.

3. The term “Architect” in the said conditions shall mean the said SBIIMS, or in the event of their ceasing to be the Architect 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 contractor shall object for reasons considered to be sufficient by the Arbitrator mentioned in the said conditions provided always that no persons subsequently appointed to be the Architect under this contract shall be entitled to disregard or overrule any previous decision or approval or direction given or expressed by the Architect for the time being.

4. Tender documents containing work order Notice to the Contractor, Conditions of Contract, Appendix thereto, Special Conditions of Contract, Specifications and Schedule of Quantities with the rates entered therein, shall be read and studied as forming part of this agreement and the parties hereto shall respectively abide by and submit themselves to the conditions and stipulations and perform the agreement on their part respectively in such conditions contained.

5. The contract is neither a fixed lumpsum contract or a piece work contract, but is a contract to carry out work in respect of the entire works to be paid for according to actual measured quantities, including variations from BOQ at the rates contained in the Schedule of rates and Probable bill of quantities or as provided in the said conditions.

6. The Employer through the Architect, reserves to himself the right of altering the drawings and natures of the work, of adding/substitution to or omitting any items of work or having portions of the same carried out through alternate agencies without prejudice to this contract.

7. Time shall be considered a the essence of this agreement and the contractor hereby agrees to commence the work soon after the site is handed over to him but within 15 days reckoned from the date of issue of work order to execute the work, as provided for in the said conditions and complete the entire work in 15 days subject to nevertheless to the provisions for extension of time.
8. This agreement and contract shall be deemed to have been made in Hyderabad and any questions or dispute rising out of or in any way connected with this Agreement and Contract shall be deemed to have arisen in Hyderabad and only the courts in Hyderabad shall have jurisdiction to determine the same. The limitation period will be 90 days from the date of dispute having arisen.

AS WITNESS our hand this ______________ day of ____________ 2018

Signed by the said in the presence of:

WITNESS : SIGNATURE

NAME : 

ADDRESS : EMPLOYER

WITNESS : SIGNATURE

NAME : 

ADDRESS : 

4. APPENDIX TO GENERAL CONDITIONS OF CONTRACT

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<td>Earnest Money Deposit (EMD)</td>
<td>AS SPECIFIED IN NIT</td>
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<tr>
<td>2</td>
<td>Initial Security Deposit (ISD)</td>
<td>2% of contract value including EMD.</td>
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<tr>
<td>3</td>
<td>Period of completion</td>
<td>AS SPECIFIED IN NIT</td>
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<tr>
<td>4</td>
<td>Defects Liability period</td>
<td>12 months after completion as recorded in the completion certificate.</td>
</tr>
<tr>
<td>5</td>
<td>Agreed Liquidated Damages</td>
<td>½% of contract amount per week of delay subjected to a maximum of 5% of contract value.</td>
</tr>
<tr>
<td>6</td>
<td>Period of final measurement</td>
<td>Three months after completion as recorded in the completion certificate.</td>
</tr>
<tr>
<td>7</td>
<td>Minimum value of work to be executed for issue of interim certificates for making payment</td>
<td>First &amp; Final</td>
</tr>
<tr>
<td>8a</td>
<td>Retention money from each bill</td>
<td>10% of gross value of each interim bill, subject to 8(b) below.</td>
</tr>
<tr>
<td>8b</td>
<td>Total retention money including Earnest money and initial security Deposit</td>
<td>5% of the contract value.</td>
</tr>
<tr>
<td>9</td>
<td>Release of Security deposit after Virtual completion.</td>
<td>50% of the total security to be released along with final certificate of payment, but only after removing all his materials, equipment, labour, huts/force, temporary sheds/stores, all his installations, machinery etc., from the site. Balance payment to be released on submission of Bank Guarantee on any Scheduled Bank, Other than SBI, and its associated banks in the prescribed manner and valid till the completion of defects liability period of 12 months plus 3 months.</td>
</tr>
<tr>
<td>10</td>
<td>Period for honouring certificate</td>
<td>15 working days from date of Architects certificate of payment for interim bills and 45 working days for final certificate.</td>
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WITNESS : 

DATE : SIGNATURE OF THE CONTRACTOR WITH DATE
5. INDEX TO GENERAL CONDITIONS OF CONTRACT

1. Interpretations
2. Scope of Contract
3. Drawings and Specifications
4. Schedule of Quantities
5. Sufficiency of Schedule of Quantities
6. Errors in schedule of Quantities
7. Contractor to provide everything necessary
8. Authorities, Notices, Patent rights and royalties
9. Materials and workmanship to conform to description.
10. The setting out
11. Removal of all offensive matters
12. Opening up works
13. Contractor’s superintendence and representative on the work
14. Dismissal of workmen
15. Access to works
16. Employer’s representative/PMC
17. Assignment of sub-letting
18. Sub contractors
19. Variations not to vitiate contract

20. Measurement to works

21. Prices of Extras etc., Ascertainment of

22. Unfixed materials

23. Removal of improper work and materials

24. Defects after completion

25. Certificate of virtual completion

26. Other persons engaged by the Employer

27. Insurance in respect of damage to persons and property

28. Contractor’s All risk policy

29. Minimum amount of third party Insurance

30. Commencement and completion

31. Delay and extension of time

32. Damages for Non-completion

33. Failure by contractor to comply with Architect’s instructions

34. Architect’s delay in progress.

35. Supervision of works

36. Prime cost and provisional sums
37. Certificates and payments

38. Notices

39. Termination of contract by the Employer.

40. Termination of contract by the contractor.

41. Matters to be finally determined by the Architects

42. Settlement of dispute (Arbitration)
1. Contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause of the delays may be, including delays arising out of modifications to the work entrusted to him or in any subcontract connected there with or delays in awarding contracts for other trades of the project or in commencement or completion of such works in obtaining water and power connections for construction purpose or for any other reason whatever and the Employer shall not be liable for any claim in respect thereof. The Employer does not accept liabilities for any sum besides the tender amount, subject to such variations as are provided for herein.

2. The successful tenderer is bound to carry out any items of work necessary for completion of the job if such instructions in respect of such additional items and their quantities will be issued in writing by the Architects with the prior consent in writing of the Employer.

   a) The contractor must bear in mind that the work shall be carried out strictly in accordance with specifications made by the Architects.

4. The rates quoted in tender shall also include electric consumption charges for power. If no power is available at site the contractor shall have to make his own arrangement to obtain power connection and maintain at his expense an efficient service of electric light and power and shall pay for the electricity consumed. The Employer shall give all possible assistance to the contractor to obtain the requisite permission from the various authorities, but the responsibility for obtaining the same shall be that of contractor.

5. Contractor shall strictly comply with the provisions of safety code in addition to all local rules and regulations.

6. The contractor shall be responsible for the observance of all rules and regulations framed by the government under the contract labour act. The Employer shall be entitled to deduct all losses, damages that he might suffer on account of non-observance of these rules by the contractor, from the amount payable to the contractor.

   b) Time shall be considered the essence of this contract. The entire work must be completed within 45 DAYS from the commencement of the work. If the completion of the work is delayed beyond 1 month, a penalty at the rate of ½ % per week over the contract value will be imposed subjected to a maximum of 5%.

   If the work is delayed beyond 30 days after the date of completion, the remaining work will be carried out through other agencies at the risk and cost of the contractors under the contract with prevailing market rates.

   c) The successful tenderer shall submit the phased programme of execution of different items of work within 2 days after receipt of acceptance letter.

   d) Payment will be made First & Final and will be made within a period of TWO weeks after the bill is submitted to the Employer’s Office with Architects Certificate.

   e) Before filling in the tender the contractor will check all the drawings and schedule of quantities and will get an immediate clarification from SBIIMS / Architects on
item not clearly understood. No claims for any loss or compensation will be entertained on this account.

f) All the work shall be carried out as per detail drawings and specifications or as directed by SBIIMS/Architects.

g) The rates quoted in the tender shall be for the finished items of work. They shall include all the charges labour, materials, transportation of material equipment, double scaffolding water and electric charges, tool and plants, marking out and cleaning of site, to do all things necessary to provide complete finished item for work consistent with the specifications attached to this tender document. The rates shall be inclusive of octroi duty, excise duty, packing and forwarding, loading or unloading or any other duties or fees levied by any government, public or local bodies. The rates shall be firm and shall not be subject to exchange variations, labour conditions or any other conditions whatsoever.

13. The calculations made by the tenderer should be based upon the probable quantities of the several items of work which are furnished for the tenderer’s convenience in the schedule of quantities, but it must be clearly understood that the contract is not a lumpsum contract, that neither the probable quantities nor the value of individual items nor the aggregate value of the entire tender will form part of the contract and that SBIIMS/Architects do not in any way assure the tenderer or guarantee that the work would correspond there to.

14. Adequate engineering and technical staff to be appointed at site. ELECTRICAL contractor should inform of their number and qualification. An Approval of SBIIMS/Architects should be taken prior to appointing such technical staff on site.

15. The contractor shall keep the tender submitted by him open for acceptance for a minimum period of three months from the date of it’s submission. When once the tender is accepted the rates quoted by the successful tenderer shall be firm and the variation in rates of any one or all the items on any account shall not be allowed during the entire duration of the contract.

16. During the execution of work, contractor must check the work with his drawings. The contractor shall be responsible for all the errors in this connection and shall have to rectify all the defects at his own cost, failing which the client reserves the right to get the same rectified at the risk and cost of contractor.

17. No claim for extra item or deviation from specification shall be entertained unless the same is pointed out and accepted as such before the work is taken in hand or within 15 days of work by the successful tenderer.

18. The contractor shall comply with all bye-laws and tax regulations (including GST) of local and other statutory authorities having jurisdiction over the works and shall be responsible for the payment of all the fees and other charges and for giving and receiving of all necessary notices drawings and test certificates.
19. The successful tenders shall properly safeguard against damage or injury to the public and to any property or thing and shall alone be responsible for any such damage and injury to any person or persons or thing arising in connection with it’s execution of work. The successful tenderer shall protect and hold harmless the SBIIMS against any or all claims for any such injury or damage.

h) The work in every respect during the progress and till final acceptance by the SBIIMS, including raw materials delivered at the site to be incorporated or used in ELECTRICAL work by the successful tenderer will be at his own risk. Any loss or damage to any such material or work shall immediately be replaced by the successful tenderer at his own expense.

i) The SBIIMS shall have the right to direct the contractor to purchase and use the materials from any source for proper execution of work.

22. The employer / SBIIMS / Architects or their authorized representatives shall have full power for inspecting the contractor’s works or at any place from which the material is obtained. Acceptances of any such materials shall no way relieve the contractor of his responsibility for meeting the requirements and/or analysis not called for in the specifications shall be borne by the SBIIMS in case the material or work is found defective or of inferior quality. Tests and/or analysis shall be done in the laboratory approved by the client and the contractor shall permit SBIIMS and/or the client’s or their authorized representative to be present during any of the tests and/or analysis.

23. INSURANCE

The contractor shall indemnify SBIIMS up to CAR Policy (Contractor’s All Risk Policy) against all claim which may be made against SBIIMS by any member of the public or the third party in respect of anything which may arise in consequence thereof and shall at his own expense arrange to effect and maintain up to one month after the virtual completion from an office approved by SBIIMS a policy of insurance in the joint names and deposit such policy or policies with SBIIMS from time to time during the currency of this contract. The contractor shall also indemnify SBIIMS against all claims which may be made upon the SBIIMS under the workman’s compensation act or any other statute in force during the currency of this contract or at common law in respect of any employee of the contractor or any sub contractor and shall at his own expenses effect and maintain up to one month after virtual completion of the contract from an office approved by SBIIMS a policy or policies of insurance in the joint names of SBIIMS and the contractor as aforesaid. The contractor shall be responsible for any other thing which may exclude from the insurance policies above referred to and also for any other damage to any property arising out of and incidental to the negligent or defective carrying out of this contract.

He shall also indemnify SBIIMS in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any award of compensation or damage arising therefrom. SBIIMS shall be at liberty and is hereby empowered to deduct the amount of any damages, compensation caused, charges and expenses arising or occurring from or in respect of any such claims or damages from any sum or sums due or to become due to the contractor.
24. WORKMAN AT SITE:

The contractors workpeople shall not be allowed to live on the site at any time throughout the contract nor to trespass beyond the limits of the site. The contractor will be held responsible for any acts of trespass by his workpeople.

25. DIMENSIONS:

Figures dimensions are to be taken in preference to scaled dimensions in all cases. Before commencing any work the contractor shall verify all measurements. If any discrepancies are found they shall immediately be brought to the notice of the Architects.

26. DISCREPANCIES

All the items shown on the drawings or specifications are taken to be included in both. Any discrepancies, which occur in either the drawings or specifications, shall immediately be brought to the attention of the Architects.

27. CUTTING AND MAKING GOOD

Where it is found necessary to interfere with finished work in order to execute this contract, the contractor will be required to do all necessary work at his expenses. Only approved hangers and bolts or other metal fixing devices shall be used to secure frames panels and other units in position. Wooden plugs will not be permitted. Holes shall be formed with electric drills whenever possible. Structural members shall not be cut or drilled without prior consent of the client.

28. MAINTENANCE AND GUARANTEE

The whole of the work to be performed under this contract shall be completed to the satisfaction of the Architects/Bank.

The contractor without additional charge to SBIIMS renew or replaces any works which prove faulty from workmanship or materials and fully maintain the whole installations for a period of 6 months after the commencement of defects liability period of the main contract and a sum of 5% of the contract amount shall be retained by SBIIMS for his period.

29. PREVENTION OF SPOIL DUMPING

The contractor shall take all reasonable steps to prevent spoil, rubbish, debris surplus materials etc., arising from a work being dumped on an area other than a recognized or approved tipping area and the Contractor will be held responsible for and shall indemnify SBIIMS against any claim or loss arising therefrom.
30. LEAVE PERFECT:

The Contractor shall remove all rubbish and superfluous material from the site of the works with all reasonable speed from time to time and at completion. On no account shall W.C’ S or the SBIIMS’s receptacles to be used for this purpose.

The client reserves its right to clear contractors un cleared debris at contractors own cost without any reasons & not more than one notice will be given for this.

31. SETTLEMENT OF DISPUTES AND ARBITRATION:

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

(a) If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the Architect or in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or dispute to The Vice President, SBI Infra Management Solutions Pvt. Ltd., Circle Office, Ground Floor, State Bank of India, Adj to commercial branch, SBI LHO CAMPUS, Bank Street, Kothi, HYDERABAD – 500 095 and endorse a copy of the same to the Architect, within 30 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the bank be in any way liable in respect of any claim by the contractor unless notice of such claim have been given by the Contractor to The Vice President, SBI Infra Management Solutions Pvt. Ltd., Circle Office, Ground Floor, Adj to Commercial branch, State Bank of India, LHO Campus, Bank Street, Kothi, HYDERABAD – 500 095 in the manner and within the time as aforesaid. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to The Vice President, SBI Infra Management Solutions Pvt. Ltd., Circle Office, Ground Floor, Adj to Commercial Branch, State Bank of India, LHO Campus, Bank Street, Kothi, HYDERABAD – 500 095 in writing in the manner and within the time aforesaid.
(b) The Vice President, SBI Infra Management Solutions Pvt. Ltd., Circle Office, Ground Floor, Adj to Commercial Branch, State Bank of India, LHO campus, Bank Street, Kothi, HYDERABAD – 500 095 shall give his decision in writing on the claims notified by the contractor. The contractor may within 30 days of the receipt of the decision of The Vice President, SBI Infra Management Solutions Pvt. Ltd., Circle Office, Ground Floor, Adj Commercial Branch, State Bank of India, LHO campus, Bank Street, Kothi, HYDERABAD – 500 095 submit his claims to the conciliating authority namely the Circle Development Officer, State Bank of India, Local Head Office, Hyderabad for conciliation along with all details and copies of correspondence exchanged between him and The Vice President, SBI Infra Management Solutions Pvt. Ltd., Circle Office, Ground Floor, Adj to commercial Branch, State Bank of India, LHO campus0, Bank Street, Kothi, HYDERABAD – 500 095.

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

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

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

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

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

It is also a term of the contract that if any fees are payable to the arbitrator these shall be paid equally by both the parties. However, no fees will be payable to the arbitrator if he is a Bank Officer.
It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their settlement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parities. The cost of the reference and of the award (including the fees, if any of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof, shall be paid and fix or settle the amount of costs to be so paid.

32. TERMINATION OF CONTRACT BY EMPLOYER:

If the contractor (being an individual or a firm) commit any “Act of Insolvency”, or shall be adjudged as insolvent, or shall make an assignment or composition of the greater part in number of amount of his creditors, or shall enter into a Deed of Assignment with his creditors, or (being an incorporated Company) shall have an order made against him or pass an effective Resolution for winding up either compulsorily, or Subject to the supervision of the court or voluntarily, or if the official Assignee of the contractor shall repudiate the Contract, or if the Official Assignee or the Liquidator in any such winding up shall be unable, within seven days after notice to them requiring him to do so, to show to the reasonable satisfaction of the Architect that he is able to carry out and fulfill the Contract and if required by the Architect to give a security there for, or if the contractor shall suffer any payment under this contract to be attached by or on behalf of any of creditors of the Contractor, if the Contractor shall assign or sublet the contract without the consent in writing of the Architect first obtained, or if the contractor shall charge or encumber this Contract for any payments due or which may become due to the Contractor thereunder, or if the Architect shall certify in writing to the SBIIMS that in his opinion the Contractor:

(a) Has abandoned the Contract, or
(b) Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the work for fourteen days after receiving from the Architect written notice to proceed, or
(c) Has failed to proceed with the work with such due diligence and failed to make such due progress as would enable the works to completed within time agreed upon or
(d) Has failed to remove materials from site or to pull down and replace works within seven days after receiving from Architect written notice that the said materials or work where condemned and rejected by the Architect under these conditions or
(e) Has neglected or failed persistently to observe and perform all or any of the acts, matters or things required by this Contract to be observed and performed by the Contractor for seven days after written notice shall have been given to the Contractor requiring the contractor to observe or perform the same, or
(f) Has to the detriment of good workmanship or in defiance of the Architects instructions to the Contrary, submit any part of the contract or has used in the permanent works important materials which are substandard and not as per specification fraudulently making the Architect / SBIIMS to believe that it is the specified material.
Then and in any of the said caused the SBIIMS with the written consent of the Architect may, notwithstanding any previous waiver, after giving seven days notice in writing to the Contractor, determine the contract, but without thereby affecting the powers of the Architect or the obligations and liabilities of the Contractor, the whole of which shall continue to be in force as fully as if the contract has not been so determined and as if the works subsequently executed and being executed by or on behalf of the contractor. And further, SBIIMS with the consent of the Architect by his agents or servants may enter upon and take possession of the works and all plant, tools, scaffoldings, shed, machines, steam and other power utensils and materials lying upon premises or the adjoining lands or roads, and use the same as his own property or may employ the same by means of his own servants and workman in carrying on and completing of the works or by employing any other Contractor or any other person or persons to complete the works and the Contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other Contractor or other person or persons employed for completing and finishing or using the materials and plant for the works, when the work shall be completed, or as soon thereafter as convenient, the Architect shall give a notice in writing to the Contractor, to remove his surplus material and plant and should the Contractor fail to do so within a period of fourteen days after receipt thereof by him, the SBIIMS may sell the same by public auction and shall give credit to the Contractor for the amount so realized. The Architects shall thereafter shall assertion and certify in writing under his hand what (if anything) shall be due or payable to or by the SBIIMS, for the value of the said plant and materials so taken possession of by SBIIMS, and the expense or loss which the SBIIMS shall have been put to in getting the works to be so completed, and the amount, if any owing to the Contractor and the amount which shall be so certified shall, thereupon, be paid by SBIIMS to the Contractor or by the Contractor to SBIIMS as the case may be, and the certificate of the Architect shall be final and conclusive between the parties.

33. The mode of measurements shall be as per IS: 1200.

34. The contractor should co-ordinate with other agencies viz., INTERIOR, HVAC (Air-Conditioning), Civil, LAN cabling etc.,

35. CONTRACTOR SHOULD WORK AT ODD HOURS, ON HOLIDAYS TO KEEP UP TIME SCHEDULE.

36. The Contractor shall not be eligible for any material advance.
SPECIAL CONDITIONS AND SAFETY CONDITIONS

The contractor is hereby advised to read the following conditions carefully before quoting rates and to be strictly adhered during execution of work.

SPECIAL INSTRUCTIONS

a) Contractor shall submit copies of all statutory compliance certificates such as ESIC, PF, Contract labour registration, shop & establishment and or any other local authority registration as applicable.

b) All workmen, engineers, supervisors shall be converted as per ESIC, PF & minimum wages act.

c) All workmen, engineers, supervisors shall under go pre employment medical check up through company recognized medical officer and submit copies of test report.

Contractor to provide proof of monthly remittances with regard to the workmen deployed at the site.

Contractor is responsible to ensure that his workmen are confined to their work area and comply with all safety, security and administrative instructions given by the site engineer.

Contractor shall provide identification badges to all his people.

On completion of day’s work, the entire area shall be kept clean and neat. All debris, surplus material etc., shall be removed immediately from the site.

Any such standard material used during execution will be rejected and fully deducted from the bills.

The contractor has to carry out the work in coordination with the other appointed agencies. The contractor should study the situation at site and organize the work accordingly. Whenever work needs to be done in coordination with other agencies, the contractor shall work out the actual time required to complete his part of the job in respects and inform the company.

Revision of rates is not allowed and will be not paid for any reason due to unexpected increase in the cost of the materials or delay in completing the works etc.,

No labour hutment is allowed inside the premises.

The areas is in “No smoking Zone” therefore smoking is strictly prohibited.

All workmen, Mastri, supervisor and Engineers wearing shoes and safety helmets are only allowed to enter the gate.

Every day contractor / his supervisor should take necessary “ Work permit” from the company engineer before starting the job.

Workers are not allowed to sleep during night and cook good inside the premises.

Work to be carried out only under supervision of the qualified engineer.

Contractor should strictly following safety guidelines.

Contractor should use only angle/pipe scaffolding. Wooden scaffolding is not allowed.

All contractor’s people need to undergo induction/safety training and formal interview by company selection committee.

Contractor shall submit a copy of competency certificates like wiremen license, supervisor’s license, IBR welder license etc., issued by competent authority before starting
Contractor shall maintain daily master roll book for his people at site. Based on that, ESIC & PF contribution to be made.

COMPANY SAFETY GUIDE LINES

WORKING BELOW GROUND LEVEL:

Check that there are no underground cables/water/sewage lines prior to start of work area. If found inform site in-charge. Disconnect power supply to any cables found in work areas with permission.

For pits deeper than 3 feet workmen should be provided with lifelines. Ladders should be provided for quick escape from the pit. Provide firmly supported side shuttering or shoring to prevent accidental collapse of earth into pits; cordon off the area around the pit to prevent accidental falls. (cordon must be at least 3 feet beyond the pit edge) excavated earth from the pit must be stacked only beyond the cordon.

Refill the pit promptly on completion.

In case pits need to be left open for any reason, ensure proper covers over the pits.

WORKING AT HEIGHTS:

All personnel working at heights beyond 1.8M should wear safety belts.

Ensure that safety belts are tied securely to anchors while working at heights.

Ensure that rigging is well anchored to solid supports prior to erecting items like trusses at a height.

Ensure that debris is cleared on a daily basis from work spots.

Ensure that a nylon safety net is securely fitted under the trusses to provide safety against accidental falls to personnel (who will need to have safety belts securely fastened) working on the trusses and roofing. Alternatively well-supported platforms with protected railings should be used a height suitable for personnel to work while standing.

Ensure that roof top ladders are used while laying and working on the roof.

Ensure that ladders used for climbing to heights are firmly secured against slippage.

All scaffolding should be in steel frames.

Scaffolding should be provided with 3 feet wide working platforms. The platforms should be provided with protective railings.

WORKING WITH ELECTRICITY

Ensure proper earthing of all electrical machines used.

Ensure that all connections are taken throughout earth leakage’s circuit breakers. Providing ELCB on the main distribution board prevents accidental shocks.

Ensure that welders always use suitable welding goggles and gloves while welding.
Ensure availability of 2 CO2 type fire extinguishers at any easily accessible location at site for fire fighting

Provide a paid of fire buckets filled with dry sand for fire fighting at site.

As far as possible DC generators sets shall be used instead of AC transformer sets.

Contractor shall get his welding sets certified by inspector of electrical department.

The welding transformer shall be fed through an armored cable.

All connections from main to individual M/C (such as cutter, planer, compressor etc) to be taken through shielded cable and 3-pin plug only. The potable machines should be of fully insulated or plastic body. No metal body is allowed.

During welding the earthling to be provided directly to the member to be welded throughout cable only not using any reinforcement rod/angles.

PERSONAL PROTECTIVE GEAR

Following is a list of items to be provided to workmen by the contractor as and when required the items must be ISI certified.

Safety shoes
Hard hats
Safety belts
Goggles
Gloves
Safety nets
Roof top laddes
GENERAL

BREAKING WORKS:

Workmen engaged in breaking stones/chipping of concrete should wear safety goggles.
OTHER CONDITIONS:

CONTENTS:

A) SPECIAL CONDITIONS
B) TECHNICAL SPECIFICATIONS

Chapter 1 INTERNAL ELECTRIFICATION
Chapter 2 POWER CONTROL CENTERS
Chapter 3 LAYING OF CABLES
Chapter 4 EARTHING
Chapter 5 STANDARD DRAWINGS
   GI PIPE EARTH STATION
   COPPER PLATE EARTH STATION

j) RECOMMENDED MAKES OF MATERIAL
k) SCHEDULE OF QUANTITIES

SPECIAL CONDITIONS

General:

m) These special conditions shall be read in conjunction with the description of the item of work in the Bill(s) of Quantities, the particular Specifications, Local Statutory Regulations, Indian Standards Specifications/Codes and the drawings. All the above quoted documents, shall be considered supplementary to each other. However, in the case of conflict amongst the various provisions the owner’s and the consultants opinion will be final and shall be adopted.

n) The tenderer is advised to inspect the site to ascertain the nature of site, access thereto, local facilities for procurement of materials and working labour rates prevalent in the area, in fact all matters affecting his prices and execution of the work. The tenderer shall be deemed to have full knowledge of the site and drawings whether or not he actually inspects them.

2. Rates

o) The rates quoted shall be deemed to allow for all minor extras and constructional details which are not specifically shown on drawings or given on the specifications but are essential in the opinion of the Engineer-in-charge to the execution of works to confirm to good workmanship and sound engineering practice. The Consultant/SBIIMS reserves the right to make any minor changes during the execution without any extra payment.

2.2 The Consultants/SBIIMS decision to clarify any item under minor changes, minor extras and constructional details shall be final, conclusive and binding on the Contractor.

p) The rates quoted by the Contractor shall be net so as to include all requirements described in the contract agreement and no claim whatsoever due to fluctuations in the price of material and labour will be entertained.
2.4 The rates quoted by the Contractor shall include for supplying materials and labour necessary for completing the work in the best and most workmanship like manner to the satisfaction of the Consultant/SBIIMS and which in the opinion of the Consultant cannot be made better, and for maintaining the same. The rates shall be complete in all respects also including cost of materials, erection, fabrication, labour, supervision, tools and plant, transport, sales and other taxes, royalties, duties and materials, contingencies, breakage, wastage, sundries, scaffoldings, etc., on the basis of works contract. The rates quoted shall include all transport, insurance, octroi, or any other levies applicable under the statute.

3.0 Materials:

3.1 The Contractor shall ensure to the satisfaction of the Consultant/SBIIMS that the materials are packed in original sealed containers/packing bearing manufacturer’s markings and brands etc., except where the gross quantity required is a fraction of the smallest packings. Materials not complying with this requirement shall be rejected.

q) Testing of Materials:

r) When required by the Consultant / SBIIMS, the Contractor shall provide all facilities at site or at manufacturer’s works or in an approved laboratory for testing the materials and/or workmanship. All the expenditure in respect of this shall be borne by the Contractor unless specified otherwise in the Contract. The Contractor shall, when required to do so by the Consultant shall submit at his own cost, manufacturer’s certificate of tests, proof sheets, mill sheets etc., showing that the materials have been tested in accordance with requirements of these specifications. The samples for Tests shall be selected by SBIIMS/ Consultant.

4.0 Rectification of Defects:

4.1 Any defect in the work done or materials used in the works pointed out by the Consultant / SBIIMS shall be rectified within a week or such extended time as may be allowed in this failing which the said defect shall be got rectified by the Consultant at the risk and cost of the Contractors.

5.0 Conduit and Cables Layout:

5.1 Prior to the pulling of wires, the Contractor shall verify the conduits laid at site by Civil Contractors and satisfy themselves about the adequacy of the same. The contractors shall prepare Wiring layout along with Conduit layout and submit for approval. Prior to laying of the cables, the Contractor shall submit to the Consultant / SBIIMS detailed layout plans of the cable net work and get the same approved. The layout plans shall contain particulars regarding size and routes of the cables. The Cables shall be procured only after approval of Layout Drawings.
s) Regulations & Standards:

t) The installation shall conform in all respects to Indian Standard Code of Practice for Electrical Wiring Installation IS:732 and IS:2274. It shall also be in conformity with the current Indian Electricity Rules and Regulations and requirements of the local Electric Supply Authority in so far as these become applicable to the installation. Wherever this specification calls for a higher standard of material and/or workmanship than those required by any of the above regulations then this specification shall take precedence over the said regulations and standards.

u) Shop Drawings:

v) The Contractor shall prepare and submit to the Consultant/ SBIIMS for the approval of detailed fabrication drawings for Main LT Panels/ SwitchGears/ Rising Mains special boxes and Distribution Board, switch board, special any other equipment to be fabricated by Contractor within 7 days of signing of the contract.

w) Completion Drawings:

x) At the completion of the work and before issuance of certificate of virtual completion the contractor shall submit to the consultant/ SBIIMS layout drawings drawn at approved scale indicating the complete wiring system “As Installed”. These drawings shall in particular, give the following information.

y) Run and size of conduits, inspection, junction and pull boxes.

(b) Location and rating of sockets and switches, controlling the light and power outlets.

I Number and size of conductors in each circuit.

(d) Location and details of distribution boards, mains, switches, switchgear and other particulars.

I A complete wiring diagram, as installed and schematic drawings showing all connections in the complete electrical system.

z) Location of telephone outlets, T.V. Music & Fire Alarm outlet boxes, junctions boxes, sizes of various conduits.

aa) Locations of all earthing stations, routs and size of all earthing conductors, manholes etc.

bb) Layout and particulars of all cables.
9.0 Manufacturer’s Instructions:

9.1 Where manufacturers have furnished specific instructions, rating to the materials used in this job, covering points not specifically mentioned in the documents, these instructions shall be followed in all cases.

10.0 Completion Certificate:

10.1 On completion of the Electrical Installation a certificate shall be furnished by the Contractor counter signed by a licensed supervisor, under whose direct supervision the installation was carried out.

This certificate shall be in the prescribed form as required by the local supply authority. The Contractor shall be responsible for getting the drawings and Electrical Installation inspected and approved by the local Authority concerned.

11.0 Qualified Competent Supervision:

11.1 The Contractor shall employ competent fully licensed, qualified full time Engineer to direct the work of Electrical installation in accordance with drawings and specifications. The Engineer shall be available at all times on the site to receive instructions from Consultant in the day to day activities, throughout the duration of the contract. The foremen shall co-relate the progress of the work in conjunction with all relevant requirements of the supply authorities.

cc) Approval from SEB/ Electrical Inspectorate:

The Contractor shall prepare and submit all the relevant drawings as per the Requirement of AP TRANSCO/ Electrical Inspectorate and obtain the Approvals from CEIG, CEA, Hyderabad. No incidental expenses will be paid towards the same. Only statutory fees if any will be paid by SBIIMS.
TECHNICAL SPECIFICATIONS
CHAPTER 1
INTERNAL ELECTRIFICATION

dd) Scope:

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

ee) Standards:


ff) Construction:

Wall mounted switch boards shall be installed such that the bottom is at a minimum height of 1.35 m above finished floor level wherever applicable, as indicated in the drawing.

Equipment which is on the front of a switch board shall be so arranged that inadvertent personnel contact with live parts is unlikely during the manipulation of switches, changing of fuses or similar operation.

In every case in which switches and fuses are fitted on the same pole, these fuses, shall be so arranged that the fuses are not live when their respective switches are in ‘OFF’ position.

No fuses other than fuses in instrument circuit shall be fixed on the back or behind a switch board panel or frame.

gg) Capacity of circuit:

Lighting Circuits shall not have more than a total of ten points of fans, 5A socket outlets and light points and its total load shall not exceed 800 watts. Lights, fans, and 5A socket outlets can be wired on a single common circuit. If fan circuit is drawn separately, circuit shall not be used more than eight points and load shall not exceed more than 800 watts. In the circuit, the neutral and earth wires can be looped up to 10 points. From distribution boards Neutral & Earth wires shall be run for every circuit.

The power circuits shall not have more than two outlets per circuit if load to be fed by each outlet is less than 1KW, and if load is more than 2KW, each outlet shall be connected to a separate circuit.

Switches: All switches shall be placed in the live conductor of the circuit and no single pole switch or fuse shall be inserted in the earth or earthed neutral conductor of the circuits. Single pole switches (other than for multiple control) carrying not more than 15 amperes may be of the piano flush type and the switch shall be ‘ON’ When the knob is down.
Lamp holders: Lamp holders for use on brackets and the like shall have not less than 1.3 cm nipple and all those for use with flexible pendant shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where centre contact Edison screw lamp holders are used, the outer or screw contact shall be connected to the ‘middle wire’ or the neutral or to the earthed conductor of the circuit.

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

Ceiling rose: a) A ceiling rose or any other similar attachment shall not be used on circuit, the voltage of which normally exceeds 250 volts.

A ceiling rose shall not embody fuse terminals as an integral part of it.

Every socket outlet shall be controlled by a switch. The switch controlling the socket shall be on the ‘live’ side of side line. 5 Amps and 15 Amps socket-outlet shall normally be fixed at any convenient place 60 cm above the floor level or near such level as indicated in drawing. 15 Amps socket outlets in kitchen shall be fixed at convenient place 23 cm above the working platform. In a room containing a fixed bath or shower, there shall be no socket outlet and there shall be no provision for connecting a portable appliance.

hh) Recessed MS conduit wiring system

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

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

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

jj) Types of accessories to be used: All outlets, such as switches and sockets, may be either of flush mounting type or of surface mounting type.

The switches and other outlets shall be mounted on such boxes. The metal box shall be efficiently earthed with the earth continuity wire run along the conduit.
When crossing through expansion joints in buildings, the conduit sections across the joint may be through flexible copper bellows of the same size as PVC conduit. The number of wires that can be drawn through a conduit shall be strictly as per IS 732 and as mentioned in Drawings.

kk) MS Conduits:

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

Bunching of cables: Separate conduits shall be used for bunching of conductors of AC supply and DC supply for lighting and small power outlet circuits.

All outlets of conduit systems shall be properly drained and ventilated, but in such a manner so as to prevent the entry of insects etc. as far as possible.

Bends in conduit: Wherever necessary, bends or diversions may be achieved by bending the conduits or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings.

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

ll) TESTING OF WIRING:

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

mm) Insulation resistance test,

ii) Electrical continuity test,

iii) Earth continuity test,

iv) Earth electrode resistance test,

v) Switch polarity test.

nn) Insulation Resistance test:

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

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

Between earth and whole system of conductors with all fuses in place, all switches closed and all lamps in position.
Between all conductors connected to one phase of the supply of the above tests shall not be less than 50 divided by the number of points on the circuit. Where a whole installation is being tested, a lower value than that given by the above formula is acceptable subject to a minimum of one megaohm.

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

(ii) Electrical continuity test:

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

(iii) Earth continuity test:

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

(iv) Earth electrode resistance test:

The earth electrode resistance shall be tested as specified in section

(v). Switch polarity test:

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

oo) Distribution Boards:

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

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

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

All marking shall be clear and legible.

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

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

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

The incoming and outgoing cables shall be neatly bunched.

MOUNTING HEIGHTS:

The Mounting heights of various fixtures shall be as specified in the Drawings.
CHAPER 2

POWER CONTROL CENTRES

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

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

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

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

Constructional requirements:
The power control centre shall be of

Metal clad, cubicle, indoor, free standing type suitable for Mounting on Built up Trenches with U Channels of adequate size.

Made up of the requisite vertical sections, which when coupled together shall form continuous dead front switch board.

Dust and damp protected, the degree of protection shall be better than IP – 54 as specified in IS-2147.

Readily extendable on both sides by the addition of vertical sections after removal of the end covers.

Single front construction with the circuit beaker feeder and switch fuse feeders suitable for operation from the front of the panel.

The PCC shall have the feeder ratings as per the schematic diagrams enclosed with the schedule and constructed only of materials capable of withstanding the mechanical, electrical and thermal stresses as well as the effects of humidity, which are likely to be encountered in normal service.
3.3 Vertical Sections: Each vertical section shall comprise a front framed structure rolled folded sheet steel channel section of minimum 2 mm thickness rigidly bolted together. This structure shall house the components contributing the major weight of the equipment such as circuit breaker, switch fuse units, main horizontal busbars, vertical risers and other front mounted accessories. The structure shall be mounted on a rigid base frame of folded sheet steel of minimum of 2.5 mm thickness and 100mm height. The design shall ensure structural stability during Transit and also during Operation after Commissioning. Suitable cable chamber housing the cable end connections and power / control cable terminations shall be provided. The design shall ensure generous availability of space for ease of installation and maintenance of cabling and adequate safety for working in one vertical section without coming into accidental contact with live parts in the adjacent section.

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

3.4 Sheet Steel Cubicle:

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

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

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

uu) between phases - 25 mm,

ii) between phase and neutral - 25 mm,

iii) between phases and earth - 25 mm,

iv) Between neutral and earth - 19 mm,

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

3.4.3 All insulating materials used in the construction of the equipment shall be non hygroscopic duly treated to withstand the effect of high humidity, high temperature and tropical ambient service conditions.
3.4.4 Functional units such as circuit breakers and fuse switches shall be arranged in multtier formation, except that not more than one air circuit breaker housed in a single vertical section.

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

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

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

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

3.5 Metal treatment and finish:
All steel works used in the construction of the switchboards shall have undergone a suitable rigorous metal treatment process so as to remove oxide scales and rust formation and to facilitate a durable coating of the paint on the metal surfaces and also to prevent the spreading of rust, in the event of the paint film being mechanically damaged.
Two coats of Anti Corrosive primer followed by a finishing coat of Epoxy spray power coating of the shade 631 of IS : 5 (i.e. Siemens grey) shall be given. The total thickness of paint shall not be less than 25 micron.

3.6 Bus Bars:

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

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

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

3.6.5 The continuous rating of the busbar shall be 125% of the rated current. Maximum temperature of the bus and the connections shall not exceed 85 degrees centigrade. The busbars shall be of liberal design for the required current rating i.e. 0.8Amp/sq.mm.

The main phase busbars shall have continuous current rating throughout the length of each power control centre and the neutral busbars shall have continuous rating of at least 50% of phase busbars.
3.6.6 Connections from the main busbars to functional circuits shall be arranged and supported so as to withstand without any damage or deformation, the thermal and dynamic stresses due to short circuit currents.

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

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

4.0 Circuit Breakers:

4.1 General:

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

   i) A short circuit breaking capacity of not less than 50 KA RMS at 415 volts, 50 Hz AC.

   ii) A short circuit making capacity of 105 KA.

   iii) A short time withstand capacity of 150 KA for one second.

   iv) Electrical overload performance at 6 times the rated current, 100% of the rated voltage as recovery voltage at 0.5 power factor.

   v) Dielectric test of 2.5 KV applied for one minute on main circuits.

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

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

4.2 Operating Mechanism:

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

The operating mechanism shall be such that the breaker is at all times free to open immediately when the trip coil is energized.
Mechanical operation indicators shall be provided to show open and close positions of the breaker. Electrically operated breakers shall be additionally provided with mechanical indications to show charged and discharged conditions of the charging spring.

Means shall be provided for slow closing and opening of the breaker for maintenance purposes, and for manual changing and closing of electrically operated breakers during emergencies.

4.3 Protection:

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

4.4 Housing of Circuit Breaker:

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

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

xx) `Service’ position: With main and auxiliary contacts connected.

ii) `Test’ position: with power contacts fully disconnected and control circuit contacts connected.

iii) `Isolated’ position: with both power and control circuit contacts fully disconnected.

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

yy) Interlocking:

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

zz) It shall not be possible either to isolate it from the connected position, or to plug it in from the isolated position with the breaker closed.

ii) The circuit breaker can be closed only when it is in one of the three positions or when it is fully out of the castle.

iii) It shall not be possible to open the hinged door of the castle unless the breaker is drawn to the isolated position.
iv) Inadvertent with drawl of the circuit breaker too far beyond the supporters is prevented by the suitable stops.

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

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

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

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

5.0 Switch Fuse Units:

5.1 General:

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

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

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

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

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

5.2 Interlocks and Safety:

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

The interior arrangement of the switch fuse unit shall be such that all ‘Live’ parts are shrouded.
5.3 HRC Fuses:

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

aaa) Current Transformers.

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

bbb) Indicating / Integrating Meters:

All indicating instruments shall be of flush mounted industrial pattern conforming to the relevant latest amended IS. The instrument shall have non reflecting bezels, clearly, divided and indelibly marked scales, and shall be provided with zero adjusting devices in the front. Integrating instruments shall be of flush mounted switch board pattern complying with the requirements of relevant latest IS.

ccc) Relays:
Circuit breakers shall be provided with integrally mounted relays as specified in the schedule.

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

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

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

10.0 Indicating lamps and push buttons:

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

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

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

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

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

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

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

12.0 **Control wiring**:

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

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

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

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

13.0 **Terminal blocks and labels**:

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

Terminal block shall have minimum current rating of 10 amps and shall be shrouded.

Provisions shall be made for label inscriptions.

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

ddd) The power control centre shall be completely assembled, wired, adjusted and tested for operation under simulated conditions to ensure correctness of wiring and interlocking and proper functioning of all components.

ii) Each power control centre and components shall be subjected to standard routine tests as per applicable clauses of relevant standards.

iii) All current carrying parts and wiring of power control centre shall be subjected to power frequency voltage withstand test.

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

eee) Outline dimensional drawing of the PCC showing the general arrangement indicating the following:

a) Busbar clearances;
b) Power and control cable entry points;
c) Configuration of busbars;
d) Details of support insulations and spacings;
e) Outgoing power cable termination arrangements.

ii) Single line diagram of power control centre showing Protection, Metering etc.

iii) Cubicle wiring diagram.

iv) List of Firements with Ratings & makes / Models

16.0 Installation Testing and commissioning:

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

The pre-commissioning tests as required shall be done and the PCC shall be commissioned.
CHAPTER 3
LAYING OF CABLES

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

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

3.0 Laying of Cables:

hhh) General:

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

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

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

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

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

3.1.6 A cable loop of about five meters length and as directed by the Engineer-in-Charge / SBIIMS shall be provided at the following locations.
   a) Near the termination points
   b) Near to the straight through joint

3.1.7 The method of cable laying and routing of cables, shall in every case be as directed by the Engineer-in-Charge / consultant / SBIIMS.
### 3.1.8 Whenever cable passes through hume pipes/GI pipes embedded across the wall in a building, both the ends of the pipe shall be suitably sealed.

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

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

#### iii) Cable laid in ground:

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

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

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

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

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

#### jjii Cables laid in built up trench:

### 3.3.1. Before the commencement of cable laying the cable trench shall be drained properly. Cable shall be laid as explained in item 3.2. Cable shall be properly clamped to the cable supports, which are provided in the cable trench. The method of clamping shall suit the size of the cable and the cable supports, which are provided in the cable trench. The method of clamping shall suit the size of the cable and the cable supports, as directed by the Engineer-in-Charge / SBIIMS.
Care shall be taken while removing and replacing the trench cover slab. It is the responsibility of the contractor to make good any damaged trench covers.

3.4. **Cable terminations and straight through joints**:

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

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

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

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

3.5 **Sealing boxes**:

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

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

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

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

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

In all cases where screwed plugs are used, one or more air vents shall be provided to ensure complete expulsion of air and total filling of the box with compound.

3.5.6 The box shall be of sufficient length to allow for manipulation of the insulated cover without damage to them or to the insulation.

3.5.7 A sealing box intended to be attached directly to the apparatus shall be designed such that the box together with the connected cable may be detached from the apparatus without disturbing the sealing compound.
3.5.8 Cable sealing and dividing boxes intended for use in the flame proof areas shall comply additionally with the relevant requirements of IS:2148-1968.

4.0 Testing

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

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

Tests conducted shall be as per Indian Standards and National Electrical Code.
CHAPTER 4
EARTHING

SCOPE:

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

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

STANDARDS:

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

3.0 Earth electrode arrangement:

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

3.1.2 Electrodes shall be embedded below permanent moisture level.

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

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

3.2.1 GI plate electrode : 600 x 600 x 6 mm thick.
3.2.2 Copper plate electrode : 600 x 600 x 3.15 mm thick
3.2.3 The electrode shall be buried in ground, with its faces vertical and top not less than 2.5 M from the surface of the ground.

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

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

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

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

4.0 **General**:

ppp) All materials used for connecting the earth lead with electrode shall be of GI in case of GI pipe and GI plate electrodes, and of tinned brass in case of copper plate electrode. The earthing lead shall be securely connected at the other end to the main board.

ii) The earthing lead from electrode onwards shall be suitably protected against mechanical injury by routing the earth wire / strip through a suitable size of GI pipe.

iii) All medium voltage equipments shall be earthed by two separate and distinct connections with the earth. In the case of high and extra high voltages, the neutral points shall be earthed by not less than two separate and distinct connections with the earth, each having its own electrode at the generating station or substation.

iv) All materials, fittings etc. used in earthings shall conform to Indian standard specifications wherever they exist. In the case of materials for which Indian standard specifications do not exist, such materials shall be approved by the Engineer-in-Charge.

v) The earth electrode shall be kept free from paint, enamel and grease.

vi) It shall be ensured that similar materials for respective earth electrodes and earth conductors are used.

vii) Earth electrode shall not be installed in proximity to a metal fence.

viii) Copper/GI strip shall be connected to the respective earth electrodes, either by brazing or welding respectively. The Copper/GI strip shall be jointed only either by brazing or by riveting at the end of over lapping portions. The over lap shall not be less than 50 mm.

ix) Earthing clamps used for supporting earth strips shall be made of such materials so as to avoid bimetallic action between strip and clamps.

5.0 **Testing**:

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

qqq) EXTERNAL ELECTRIFICATION wiring installation (system voltage not exceeding 650V) IS 732 – 1989

2. Graphical symbols used in Electro-technology art-XI-Electrical Installation buildings IS 2032-1969

3. Fire safety of buildings (General) Electrical Installation IS 1646-1961

4. 3 pin plugs and sockets IS 1293

5. Earthing. IS 3043-1966

6. Rigid steel conduits for electrical wiring IS 9537-PII-1989

7. Fittings for electrical wiring IS 2667-1964

8. Flexible steel conduits electrical wiring IS 3430-1966

9. Accessories for rigid steel conduit insulated cables IS 3837-1966

10. General and safety requirements for electric lighting fittings IS 1913-1969

11. Protecting of buildings and allied structures against lightning IS 2309-1967

12. Busbar ratings IS 8084-1976

13. On load change over switches IS 4064-1978
### Brief Description

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<th>Description</th>
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<tr>
<td>Output</td>
<td>KVA</td>
<td>500</td>
</tr>
<tr>
<td>No load voltage ratio at rated &amp; frequency</td>
<td>KV</td>
<td>11/0.433</td>
</tr>
<tr>
<td>Cooling</td>
<td>ONAN</td>
<td>ONAN</td>
</tr>
<tr>
<td>Type of Tap Changer –off circuit/OLTC with RTCC/AVR</td>
<td>Yes</td>
<td>OLTC+RTCC+AVR</td>
</tr>
<tr>
<td>Tap range and step (Plus/Minus/Step)</td>
<td>%/%/%</td>
<td>+10% to −10% @ 1.25 % in steps</td>
</tr>
<tr>
<td>Total loss at 50% rated load</td>
<td>KW</td>
<td>1.510KW (Max)</td>
</tr>
<tr>
<td>Total loss at 100% rated load</td>
<td>KW</td>
<td>4.3KW (Max)</td>
</tr>
<tr>
<td>% Impedance (SUB IS Tol)</td>
<td>%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Vector Group</td>
<td></td>
<td>Dyn11</td>
</tr>
<tr>
<td>Temp. rise at rated load over an ambient of</td>
<td>Deg C</td>
<td>50</td>
</tr>
<tr>
<td>Temp. rise in oil by thermometer/of winding by resistance</td>
<td>Deg C</td>
<td>40/45</td>
</tr>
<tr>
<td>Paint shade to IS:5(Epoxy)</td>
<td>IS 5</td>
<td>631/632</td>
</tr>
</tbody>
</table>

### Fittings and Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating and Diagram plate</td>
<td></td>
</tr>
<tr>
<td>Earthing Terminals</td>
<td></td>
</tr>
<tr>
<td>Lifting Lugs</td>
<td></td>
</tr>
<tr>
<td>Air release hole with plug</td>
<td></td>
</tr>
<tr>
<td>Dehydrating Silica Gel Breather</td>
<td></td>
</tr>
<tr>
<td>Prismatic oil level gauge</td>
<td></td>
</tr>
<tr>
<td>Oil filling hole with plug on conservator</td>
<td></td>
</tr>
<tr>
<td>Oil Conservator with drain plug</td>
<td></td>
</tr>
<tr>
<td>Thermometer pocket</td>
<td></td>
</tr>
<tr>
<td>Jacking lugs</td>
<td></td>
</tr>
<tr>
<td>Bottom drain cum filter valve</td>
<td></td>
</tr>
<tr>
<td>Top filter valve</td>
<td></td>
</tr>
<tr>
<td>4 nos bidirectional rollers</td>
<td></td>
</tr>
<tr>
<td>Pressure relief device</td>
<td></td>
</tr>
<tr>
<td>100 mm OTI/150mm OTI with alarm &amp; trip</td>
<td></td>
</tr>
<tr>
<td>Buchholz relay with alarm and trip</td>
<td></td>
</tr>
<tr>
<td>Shut off valve for Buchholz relay</td>
<td></td>
</tr>
<tr>
<td>Magnetic oil level guage</td>
<td></td>
</tr>
<tr>
<td>Radiator</td>
<td>DETACHBLE</td>
</tr>
</tbody>
</table>

### Terminal Arrangement

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV side</td>
<td>Cable box</td>
</tr>
<tr>
<td>LV side</td>
<td>Cable box</td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATION FOR OUTDOOR TYPE DISTRIBUTION TRANSFORMERS 11 Kv/433 – 250V

1 SCOPE:

rrr) This specification covers design, engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site of oil immersed, naturally cooled 3 phase 11 Kv/433 – 250 V distribution transformers for outdoor use.

sss) It is not the intent to specify completely herein all the details of the design and construction of equipment. However the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to the SBIIMS, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered equipment shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of bidder’s supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

ttt) The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment.

uuu) All outdoor apparatus, including bushing insulators with their mountings, shall be designed so as to avoid any accumulation of water.

vvv) STANDARD RATINGS:

www) The standard ratings shall be 500 Kva for 11 Kv distribution transformers.

xxx) STANDARDS:

yyy) The materials shall conform in all respects to the relevant Indian/International Standards, with latest amendments thereof unless otherwise specified herein. Some of them are listed below:

<table>
<thead>
<tr>
<th>Indian Standard</th>
<th>Title</th>
<th>International and Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS -2026</td>
<td>Specification for Power Transformers</td>
<td>IEC 76</td>
</tr>
<tr>
<td>IS – 1180</td>
<td>Outdoor distribution Transformer up to and including 100 Kva</td>
<td></td>
</tr>
<tr>
<td>IS 12444</td>
<td>Specification for Copper wire rod</td>
<td>ASTM B-49</td>
</tr>
<tr>
<td>IS-335</td>
<td>Specification for Transformer Oil</td>
<td>BS 148, D-1473, D-1533-1934 IEC Pub 296</td>
</tr>
<tr>
<td>IS- 5</td>
<td>Specification for colors for ready mixed paints</td>
<td></td>
</tr>
<tr>
<td>IS – 104</td>
<td>Ready mixed paint, brushing zinc chromate, priming</td>
<td></td>
</tr>
<tr>
<td>IS – 2099</td>
<td>Specification for high voltage porcelain bushing</td>
<td></td>
</tr>
<tr>
<td>IS – 649</td>
<td>Testing for steel sheets and strips and magnetic Circuits</td>
<td></td>
</tr>
<tr>
<td>IS – 4257</td>
<td>Dimensions for clamping arrangements for bushings</td>
<td></td>
</tr>
<tr>
<td>IS – 7421</td>
<td>Specification for Low Voltage bushings</td>
<td></td>
</tr>
<tr>
<td>IS – 3347</td>
<td>Specification for Outdoor Bushings</td>
<td>DIN 42531 to 33</td>
</tr>
<tr>
<td>IS – 5484</td>
<td>Specification for Al Wire rods</td>
<td>ASTM B – 233</td>
</tr>
<tr>
<td>IS – 9335</td>
<td>Specification for Insulating Kraft Paper</td>
<td>IEC 554</td>
</tr>
<tr>
<td>IS – 1576</td>
<td>Specification for Insulating Press Board</td>
<td>IEC 641</td>
</tr>
<tr>
<td>IS – 6600</td>
<td>Guide for loading of oil Immersed Transformers</td>
<td>IEC 76</td>
</tr>
<tr>
<td>IS – 2362</td>
<td>Determination of water content in oil for porcelain bushing of transformer</td>
<td></td>
</tr>
<tr>
<td>IS – 6162</td>
<td>Paper covered aluminium conductor</td>
<td></td>
</tr>
<tr>
<td>IS – 6160</td>
<td>Rectangular Electrical conductor for electrical machines</td>
<td></td>
</tr>
<tr>
<td>IS - 5561</td>
<td>Electrical power connector</td>
<td></td>
</tr>
<tr>
<td>IS – 6103</td>
<td>Testing of specific resistance of electrical insulating liquids</td>
<td></td>
</tr>
<tr>
<td>IS – 6262</td>
<td>Method of test for power factor and dielectric constant of electrical insulating liquids</td>
<td></td>
</tr>
<tr>
<td>IS – 6792</td>
<td>Determination of electrical strength of insulating oil</td>
<td></td>
</tr>
<tr>
<td>IS – 10028</td>
<td>Installation and maintenance of transformers.</td>
<td></td>
</tr>
</tbody>
</table>

zzz) Material conforming to other internationally accepted standards, which ensure equal or better quality than the standards mentioned above, would also be acceptable. In case the bidders who wish to offer material conforming to other standards, the bidder shall clearly bring out the salient points of difference between the standards adopted and the specific standards in relevant schedule. Four copies of such standards with authentic English translations shall be furnished along with the offer.

aaaa) SERVICE CONDITIONS:

4.1 The Distribution Transformers to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per IS 2026 (Part – I).

i) Location: At various locations in the the state of Telangana

ii) Maximum ambient air temperature (°C): 50

iii) Minimum ambient air temperature (°C): -5

iv) Maximum average daily ambient air temperature (°C): 40
v) Maximum yearly weighted average ambient temperature (°C): 32

vi) Maximum altitude above mean sea level (Metres): 542 Meters
Note:

1. The climatic conditions specified above are indicative and can be changed by the user as per requirements.

2. The equipment shall generally be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth unless otherwise specified.

PRINCIPAL PARAMETERS:

5.1 The transformers shall be suitable for outdoor installation with three phase, 50 Hz, 11 Kv system in which the neutral is effectively earthed and they should be suitable for service with fluctuations in supply voltage upto plus 10% to minus 10%.

5.2 The transformers shall conform to the following specific parameters:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Item</th>
<th>11 Kv Distribution Transformers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System voltage (max.)</td>
<td>12 Kv</td>
</tr>
<tr>
<td>2</td>
<td>Rated voltage HV</td>
<td>11 Kv</td>
</tr>
<tr>
<td>3</td>
<td>Rated voltage LV</td>
<td>433 – 250 V</td>
</tr>
<tr>
<td>4</td>
<td>Frequency</td>
<td>50 Hz +/- 5%</td>
</tr>
<tr>
<td>5</td>
<td>No. of Phases</td>
<td>Three</td>
</tr>
<tr>
<td>6</td>
<td>Connection HV</td>
<td>Delta</td>
</tr>
<tr>
<td>7</td>
<td>Connection LV</td>
<td>Star (Neutral brought out)</td>
</tr>
<tr>
<td>8</td>
<td>Vector group</td>
<td>Dyn-11</td>
</tr>
<tr>
<td>9</td>
<td>Type of cooling</td>
<td>ONAN</td>
</tr>
</tbody>
</table>

Audible sound levels (decibels) at rated voltage and frequency for liquid immersed distribution transformers shall be as below (NEMA Standards):

<table>
<thead>
<tr>
<th>Kva rating</th>
<th>Audible sound levels (decibels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>48</td>
</tr>
<tr>
<td>51-100</td>
<td>51</td>
</tr>
<tr>
<td>101-300</td>
<td>55</td>
</tr>
<tr>
<td>301-500</td>
<td>56</td>
</tr>
<tr>
<td>750</td>
<td>57</td>
</tr>
<tr>
<td>1000</td>
<td>58</td>
</tr>
<tr>
<td>1500</td>
<td>60</td>
</tr>
<tr>
<td>2000</td>
<td>61</td>
</tr>
<tr>
<td>2500</td>
<td>62</td>
</tr>
</tbody>
</table>
cccc) TECHNICAL REQUIREMENTS:

dddd) CORE MATERIAL – CRGO / AMORPHOUS METAL

eeee) CRGO Material

ffff) The core shall be stack / wound type of high grade cold rolled grain oriented annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, bolted together and to the frames firmly to prevent vibration or noise. The core shall be stress relieved by annealing under inert atmosphere if required. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated in the offer.

6.1.2.2 The bidder should offer the core for inspection and approval by the SBIIMS during manufacturing stage.

6.1.2.3 The transformers core shall be suitable for over fluxing (due to combined effect of voltage and frequency) up to 10% without injurious heating at full load conditions and shall not get saturated. The bidder shall furnish necessary design data in support of this situation.

gggg) No-load current shall not exceed 3% of full load current and will be measured by interlocke the transformer at 433 volts, 50 Hz on the secondary. Increase of voltage of 433 volts by 10% shall not increase the no-load current by 6% (maximum) of full load current.

hhhh) AMORPHOUS METAL:

iii) The core shall be high quality amorphous ribbons having very low loss formed into wound cores of rectangular shape, bolted together to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the flux density allowed in the design shall be clearly stated in the offer. Curve showing the properties of the metal shall be attached with the offer.

jjjj) The transformer core shall be suitable for over fluxing (due to combined effect of voltage and frequency) upto 10% without injurious heating at full load conditions and shall not get saturated. The bidder shall furnish necessary design data in support of this situation.

kkkk) WINDINGS:

llll) Material: Double paper insulated (DPC) electrolytic grade insulated Copper shall be used. 7.2 Current density for HV and LV should not be more than 2.5A/mm² for copper (with a tolerance of +5% for LV winding).

mmmm) H.V. Cross-section shall be not less than 5.5 mm².

nnnn) L.V. Cross-section shall be not less than 240 mm²

oooo) L.V winding shall be in even layers so that `neutral" formation will be at top.

Vertical ducts and spacers shall be provided within each coil for HV & LV windings.

pppp) TAPS:
qqqq) The tapping shall be provided on the higher voltage winding for variation of HV voltage within range of (+) 10.0 % to (-) 10.0 % in steps of 1.25%.

rrrr) Tap changing shall be carried out by means of an OLTC+RTCC+AVR.

9 OIL:

9.1 The insulating oil shall comply with the requirements of IS 335 or BS 148. Use of recycled oil is not acceptable. The specific resistance of the oil shall not be less than 2.5 X1012 ohm-cm at 27 0C when tested as per IS 6103.

9.2 Oil shall be filtered and tested for break down voltage (BDV) and moisture content before filling.

9.3 The oil shall be filled under vacuum.

9.4 The design and all materials and processes used in the manufacture of the transformer, shall be such as to reduce to a minimum the risk of the development of acidity in the oil.

10 INSULATION LEVELS:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Voltage (Kv)</th>
<th>Impulse Voltage (Kv Peak)</th>
<th>Power Frequency Voltage (Kv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.433</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>95</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>33</td>
<td>170</td>
<td>70</td>
</tr>
</tbody>
</table>

11 LOSSES:

11.1 The bidder shall guarantee individually the no-load loss and load loss without any positive tolerance. The bidder shall also guarantee the total losses at 50% and 100% load condition (at rated voltage and frequency and at 75°C).

11.2 For transformers of other ratings the following maximum allowable losses at rated voltage and frequency and at 75°C shall be taken:

<table>
<thead>
<tr>
<th>Voltage Ratio</th>
<th>Rating (KVA)</th>
<th>Max. Losses at 50% loading (Watts)</th>
<th>Max. Losses at 100% loading (Watts)</th>
<th>% impedance (subject to tolerance to as per IS2026)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11000/433 – 250 V</td>
<td>500</td>
<td>1510</td>
<td>4300</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

The above losses are maximum allowable and there would not be any positive tolerance. Bids with higher losses than the above specified values would treat as non-responsive. There is no price preference for lower losses. Bidder has to supply the transformer as per no load losses, load losses and Maximum losses at 50% and 100% as mentioned GTP.

12 TOLERANCES:

12.1 No positive tolerance shall be allowed on the maximum losses displayed on the label for both 50% and 100% loading values.

13 (A) PERCENTAGE IMPEDANCE:

The value of impedance of transformers at 75 0 C shall be 4.5% for transformers up to and 200 Kva and for ratings above 200 Kva shall be in accordance with IS 2026.
(B) Temperature rise: The temperature rise over ambient shall not exceed the limits given below:

13.1 Top oil temperature rise measured by thermometer: 35°C
13.2 Winding temperature rise measured by resistance method: 40°C

Bids not meeting the above limits of temperature rise will be treated as non-responsive.

13.3 The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bidder shall submit the calculation sheet in this regard.

14 PENALTY FOR NON PERFORMANCE:

14.1 During testing at supplier’s works if it is found that the actual measured losses are more than the values quoted by the bidder, the SBIIMS shall reject the transformer.

14.2 SBIIMS shall reject the transformer during the test at supplier’s works, if the temperature rise exceeds the specified values.

14.3 SBIIMS shall reject transformer during the test at supplier’s works, if the impedance values differ from the guaranteed values including tolerance.

15 INSULATION MATERIAL:

15.1 Electrical grade insulation epoxy dotted Kraft Paper/Nomex and pressboard of standard make or any other superior material subject to approval of the SBIIMS shall be used.

15.2 All spacers, axial wedges / runners used in windings shall be made of precompressed Pressboard-solid, conforming to type B 3.1 of IEC 641-3-2. In case of cross-over coil winding of HV all spacers shall be properly sheared and dovetail punched to ensure proper locking. All axial wedges / runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. Insulation shearing, cutting, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations.

16 TANK:

16.1 The transformer tank shall be of robust construction rectangular in shape and shall be built up of tested MS sheets of the following thickness with tolerance as per IS 1852

   i) Side walls (Min) : 4.00 mm thickness
   ii) Top & bottom plates (Min) : 6.00 mm thickness

   The four walls of the tank shall be made of TWO “L” shaped sheets (without joints) fully welded at the corners from inside and outside of the tank for withstanding a pressure of 1Kg/Sq.cm for 10 minutes. All the tank plates shall be of such a strength that the complete transformer with oil and fittings can be lifted bodily my means of lifting lugs provided. The top cover of the tank shall be bent “L” shape 4 sides to avoid entry of water through cracks of gasket.

   Reinforced of welding stiffener angle (50x50x6 mm) on all the outside walls of the tank shall be provided to form three equal compartments (applicable for tanks with cooling tubes / radiators). The tank through longer sidewalls shall be reinforced additionally by welding suitable size flat/angle vertically to provide sturdy and robust construction to withstand extreme pressure conditions. All joints of tank and fittings shall be oil tight and no bulging should occur during the service. The tank design shall be such that the core coil assembly can be lifted freely. The hooks that will be used for anchoring the core shall be so located as not to fold with the core coil assembly. “U” shaped pressure relief vent of 2” dia pipe with 0.025mm copper shim sheet / 0.4 mm bakelite sheet as diaphragm shall be provided on the top cover of the tank such that the pressure released should be directed to the ground. The diaphragm shall be provided near to the top cover and other end of the vent pipe shall guarded with suitable mesh against entering of worms and resting. The diaphragm should burst at a pressure between 0.76Kg./Sq.cm to 0.95Kg./Sq.cm Permanent deflection
when the tank without oil is subjected to vacuum of 760mm Mercury shall not be more than 5mm upto 750mm length 6mm upto 1250mm length. The tank shall be capable of withstanding a pressure upto 0.7Kg./Sq.cm without any deformation. Inside of the tank shall be painted with hot oil proof paint.

16.2 Pressure test will be conducted by the inspecting officer on a transformer vent pipe against each lot offered for inspection. The diaphragm should burst at a pressure between 0.76Kg./Sq.mm to 0.95Kg./Sq.mm. For any operational failure of vent pipe and consequent damaged to the tank an addition to insisting for free replacement of the tank, the AMD may at its option, recover an estimated loss sustained by it from the manufacturer.

16.3 The transformer tank top cover shall be fixed with bolts and four M12 anti-theft fasteners shall be provided at corners, to prevent opening of the cover at site by miscreants.

16.4 The tank shall be fitted with round cooling tubes of minimum of 38mm outer dia and 1.25mm thick bent and directly welded on both sides i.e., inside and outside of the tank. The cooling tubes shall not be provided underneath the LV bushing to avoid puncturing of the tubes due to falling down of LV lead on them or In addition to the cooling tubes. The radiators can be Press fin type of 1.2mm thickness to achieve the desired cooling to limit the specified temperature rise. They should be fixed at right angles to the sides and not diagonally. The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. The size of the radiator shall be such that it covers at least 50% of the bottom yoke, full core and complete top yoke. Bidder shall submit the calculation sheet.

16.5 Heat dissipation by tank walls excluding top and bottom should be limited to 500W/Sq.mt upto the oil level, 250 Watts/Sq.mt above oil level and 300Watts/Sq.mt for cooling tubes. The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Tenderer shall submit the calculation sheets.

**CORRUGATED TANK:**

The bidder may offer corrugated tanks for 500 KVA Distribution Transformers with top mounted bushes

1. The transformer tank shall be of robust construction corrugated in shape and shall be built up of tested sheets.

2. Corrugation panel shall be used for cooling. The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bidder shall submit the calculation sheet in this regard.

3. All joints of tank and fittings shall be of oil tight and no bulging should occur during service. The tank design shall be such that the core and windings can be lifted freely.

4. Tanks with corrugations and without conservator shall be tested for leakage test at a pressure of 0.25 Kg/sq. cm measured at the top of the tank.

5. The transformers with corrugation should be provided with a pallet for transportation the dimensions of which should be more than the length and width of the transformer tank with corrugations.

16.6 Total minimum Oil volume.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>KVA Rating</th>
<th>Oil in Ltrs. Incl. of oil observed in Core coil Assembly</th>
<th>Permissible oil absorption in Ltrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>500 KVA</td>
<td>700</td>
<td>22</td>
</tr>
</tbody>
</table>
16.7 Total minimum weights.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>KVA Rating</th>
<th>Core lamination in Kgs.</th>
<th>Winding with insulation in Kgs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>500 KVA</td>
<td>630</td>
<td>334</td>
</tr>
</tbody>
</table>

16.8 Lifting Lugs: 4 Nos. welded heavy duty lifting lugs of MS plate 8 mm thick suitably reinforced by vertical supporting flat welded edgewise below the lug on the side wall.

16.9 Pulling Lugs: 4 Nos. of welded heavy duty pulling lugs of MS plate 8 mm thick shall be provided to pull the transformer horizontally.

16.10 Top cover fixing bolts of M12/M10 bolts (hot dip galvanized) spaced not more than 100 mm between each bolt, 6 mm Neoprene bonded cork gaskets conforming to IS: 4253 Part-II will be placed between tank and cover. The bolts outside tank shall have 2 flat washers & one spring washer.

16.11 The top cover shall be provided with two sealing bolts of M12 anti-theft at all corners with 2 mm hole on tail side.

16.12 The transformer shall be capable of giving their continuous rated output without exceeding the specified temperature rise.

17 CONSERVATOR:

17.1 The total volume of conservator shall be such as to contain 10% quantity of the oil. Normally 3% quantity of the total oil will be contained in the conservator. Dimensions of the conservator shall be given in the general arrangement drawing.

17.2 Oil level indicator shall be provided on the side which shall be fixed with fully covered detachable range with single gasket and belted with MS nuts and bolts.

17.3 The pipes from conservator tank connecting to main tank shall have a sloping flaps so that oil falling from the pipe shall not fall directly on the active parts but on the side walls only. The pipe shall be of 25-50 mm dia and it should project at least 20mm above the bottom of conservator.

17.4 The conservator shall be provided with a drain plug and a plugged filling hole.

18.0 BREATHER: Clear view design based on DIN standard 42567 Silica gel Breather housed in a transparent compartment. Approval of Board to be taken for the make of breather. Volume of breather shall be suitable for 500 gms. Of Silica gel.

19 SURFACE PREPARATION AND PAINTING:

19.1 GENERAL

19.1.1 All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.

19.1.2 All primers shall be well marked into the surface, particularly in areas where painting is evident and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to manufacturer’s recommendations. However, where ever airless spray is not possible, conventional spray be used with prior approval of SBIIMS.
19.2 CLEANING AND SURFACE PREPARATION:

19.2.1 After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.

19.2.2 Steel surfaces shall be prepared by shot blast cleaning (IS9954) to grade Sq. 2.5 of ISO 8501-1 or chemical cleaning including phosphating of the appropriate quality (IS 3618).

19.2.3 Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale. These methods shall only be used where blast cleaning is impractical. Manufacturer to clearly explain such areas in his technical offer.

19.3 PROTECTIVE COATING:

19.3.1 As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anti-corrosion protection.

19.4 PAINT MATERIAL:

19.4.1 Following are the types of paint which may be suitably used for the items to be painted at shop and supply of matching paint to site: Heat resistant paint (Hot oil proof) for inside surface.

19.4.2 For external surfaces one coat of thermosetting powder paint or one coat of epoxy primer followed by two coats of synthetic enamel/polyurethane base paint. These paints can be either air drying or stoving.

19.4.3 For highly polluted areas, chemical atmosphere or for places very near to the sea coast, paint as above with one coat of high build micaceous iron oxide (MIO) as an intermediate coat may be used.

19.5 PAINTING PROCEDURE:

19.5.1 All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours, whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is still warm.

19.5.2 Where the quality of film is impaired by excess film thickness (wrinkling, mud cracking or general softness) the supplier shall remove the unsatisfactory paint coating and apply another coating. As a general rule, dry film thickness should not exceed the specified minimum dry film thickens by more than 25%.

19.6 DAMAGED PAINTWORK:

19.6.1 Any damage occurring to any part of a painting scheme shall be made good to the same standard of corrosion protection and appearance as that was originally applied.

19.6.2 Any damaged paint work shall be made good as follows:

19.6.2.1 The damaged area, together with an area extending 25 mm around its boundary, shall be cleaned down to bare metal.

19.6.2.2 A priming coat shall be immediately applied, followed by a full paint finish equal to that originally applied and extending 50 mm around the perimeter of the original damage.

19.6.2.3 The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before and after priming.
19.7 DRY FILM THICKNESS:

19.7.1 To the maximum extent practicable the coats shall be applied as a continuous film of uniform thickness and free of pores. Overspray, skips, runs, sags and drips should be avoided. The different coats may or may not be of the same colour.
19.7.2 Each coat of paint shall be allowed to harden before the next is applied as per manufacturer’s recommendation.

19.7.3 Particular attention must be paid to full film thickness at the edges.

19.7.4 The requirements for the dry film thickness (DFT) of paint and the materials to be used shall be as given below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Paint type</th>
<th>Area to be painted</th>
<th>No. of coats</th>
<th>Total dry film thickness (min.) (microns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thermo setting powder paint</td>
<td>inside outside</td>
<td>01 01</td>
<td>30 60</td>
</tr>
<tr>
<td>2</td>
<td>Liquid paint</td>
<td>outside outside</td>
<td>01 02</td>
<td>30 25 each 35/10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.8.1</td>
<td>The painted surface shall be tested for paint thickness.</td>
</tr>
<tr>
<td>19.8.2</td>
<td>The painted surface shall pass the cross hatch adhesion test and impact test as acceptance tests and Salt spray test and Hardness test as type test as per the relevant ASTM standards. Note: Supplier shall guarantee the painting performance requirement for a period of not less than 5 years.</td>
</tr>
</tbody>
</table>

**20 BUSHINGS:**

ssss) The bushings shall conform to the relevant standards specified and shall be of outdoor type. The bushing rods and nuts shall be made of brass material 12 mm diameter for both HT and LT bushings. The bushings shall be fixed to the transformers on side with straight pockets and in the same plane or the top cover for transformers above 100 Kva. For transformers of 100 Kva and below the bushing can be mounted on pipes. The tests as per latest IS 2099 and IS 7421 shall be conducted on the transformer bushings.

tttt) For 33 Kv, 52 Kv class bushings shall be used for transformers of ratings 500 Kva and above. And for transformers below 500 KVA, 33 Kv class bushings, for 11 Kv, 17.5 Kv class bushings and for 0.433 Kv, 1.1 Kv class bushings shall be used.

uuuu) Bushing can be of porcelain/epoxy material. Polymer insulator bushings conforming with relevant IEC can also be used.

vvvv) Bushings of plain shades as per IS 3347 shall be mounted on the side of the Tank and not on top cover.

www) Dimensions of the bushings of the voltage class shall conform to the Standards specified and dimension of clamping arrangement shall be as per IS 4257

xxxx) Minimum external phase to phase and phase to earth clearances of bushing terminals shall be as follows:
Voltage | Clearance  
---|---
| Phase to phase | Phase to earth  
11 Kv | 255 mm | 140 mm  
LV | 75 mm | 40 mm  

The clearances in case of cable box shall be as below:

| Voltage | Clearance  
---|---
| |  
| Phase to phase | Phase to earth  
11 Kv | 127 mm | 76 mm  
LV | 45 mm | 20 mm  

yyyy) Arcing horns shall be provided on HV bushings.
zzzz) Brazing of all inter connections, jumpers from winding to bushing shall have cross section larger than the winding conductor. All the Brazes shall be qualified as per ASME, section – IX.

aaaaa) The bushings shall be of reputed make supplied by those manufacturers who are having manufacturing and testing facilities for insulators.

bbbb) The terminal arrangement shall not require a separate oil chamber not connected to oil in the main tank.

21 TERMINAL CONNECTORS:

21.1 The LV and HV bushing stems shall be provided with suitable terminal connectors as per IS 5082 so as to connect the jumper without disturbing the bushing stem. Connectors shall be with eye bolts so as to receive conductor for HV. Terminal connectors shall be type tested as per IS 5561.

22 LIGHTNING ARRESTORS:

22.1 9 Kv, 5 Ka metal oxide lightning arrestors of reputed make conforming to IS 3070 Part-III, one number per phase shall be provided. (To be mounted on pole or to be fitted under the HV bushing with GI earth strip 25x4 mm connected to the body of the transformer with necessary clamping arrangement as per requirement of SBIIMS.) Lightening arrestors with polymer insulators in conformance with relevant IEC can also be used.

23 CABLE BOXES:

23.1 In case HV/LV terminations are to be made through cables the transformer shall be fitted with suitable cable box on 11 Kv side to terminate one 11Kv/ 3 core aluminium conductor cable up to 240 sq. mm. (Size as per requirement). The bidder shall ensure the arrangement of HT Cable box so as to prevent the ingress of moisture into the box due to rain water directly falling on the box. The cable box on HT side shall be of the split type with faces plain and machined and fitted with Neo-k-Tex or similar quality gasket and complete with brass wiping gland to be mounted on separate split type gland plate with nut-bolt arrangement and MS earthing clamp. The bushings of the cable box shall be fitted with nuts and stem to take the cable cores without bending them. The stem shall be of copper with copper nuts. The cross section of the connecting rods shall be stated and shall be adequate for carrying the rated currents. On the HV side the terminal rod shall have a diameter of not less than 12 mm. The material of connecting rod shall be copper. HT Cable support clamp should be provided to avoid tension due to cable weight.
23.2 The transformer shall be fitted with suitable LV cable box having non-magnetic material gland plate with appropriate sized single compression brass glands on LV side to terminate 1.1 Kv/3.5 core XLPE armoured cable (Size as per requirement).

24 TERMINAL MARKINGS:

24.1 High voltage phase windings shall be marked both in the terminal boards inside the tank and on the outside with capital letter 1U, 1V, 1W and low voltage winding for the same phase marked by corresponding small letter 2u, 2v, 2w. The neutral point terminal shall be indicated by the letter 2n. Neutral terminal is to be brought out and connected to local grounding terminal by an earthing strip.

25 FITTINGS:

25.1 The following standard fittings shall be provided:

   ccccc) Rating and terminal marking plates, non-detachable.

   ii. Earthing terminals with lugs – 2 Nos.

   iii. Lifting lugs for main tank and top cover

   iv. Terminal connectors on the HV/LV bushings (For bare terminations only).

   v. Thermometer pocket with cap – 1 No.

   vi. Air release device vii. HV bushings – 3 Nos.

   viii. LV bushings – 4 Nos.

   ix. Pulling lugs

   x. Stiffener

      xi. Radiators – No. and length may be mentioned (as per heat dissipation calculations)/ corrugations.

      xii. Arcing horns or 9 Kv, 5 Ka lightning arrestors on HT side – 3 No.

   xiii. Prismatic oil level gauge.

   xiv. Drain cum sampling valve.

   xv. Top filter valve

   xvi. Oil filling hole having p. 1-¼” thread with plug and drain plug on the conservator.

   xvii. Silica gel breather
xviii. Base channel 75x40 mm for up to 100 Kva and 100 mmx50 mm above 100 Kva, 460 mm long with holes to make them suitable for fixing on a platform or plinth.

xix. 4 No. rollers for transformers of 200 Kva and above.

xx. Pressure relief device or explosion vent.

xxi. OLTC+RTCC+AVR.
The transformers shall be provided with a plate showing the relative physical position of the terminal and their markings. The relative position of the tapping switches, wherever necessary, shall also be shown in the plate, corresponding to the different tapping voltage. This shall be in accordance with IS:2026. The transformers shall be provided with rating plate furnishing the information as specified in IS:2026.

26 FASTENERS:

26.1 All bolts, studs, screw threads, pipe threads, bolt heads and nuts shall comply with the appropriate Indian Standards for metric threads, or the technical equivalent.

26.2 Bolts or studs shall not be less than 6 mm in diameter except when used for small wiring terminals.

26.3 All nuts and pins shall be adequately locked.

26.4 Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt will remain in position.

26.5 All ferrous bolts, nuts and washers placed in outdoor positions shall be treated to prevent corrosion, by hot dip interlocked, except high tensile steel bolts and spring washers which shall be electro-galvanised/plated. Appropriate precautions shall be taken to prevent electrolytic action between dissimilar metals.

26.6 Each bolt or stud shall project at least one thread but not more than three threads through the nut, except when otherwise approved for terminal board studs or relay stems. If bolts and nuts are placed so that they are inaccessible by means of ordinary spanners, special spanners shall be provided.

26.7 The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members.

26.8 Taper washers shall be provided where necessary.

26.9 Protective washers of suitable material shall be provided front and back of the securing screws.

27 OVERLOAD CAPACITY:

The tenderer should state clearly the percentage over load the transformers can take for a continuous period of 1 hour. The transformers shall be suitable for loading as per IS.6600/1972.

28 TESTS:

28.1 All the equipment offered shall be fully type tested by the bidder or his collaborator as per the relevant standards including the additional type tests. The type test must have been conducted on a transformer of same design during the last five years at the time of bidding. The bidder shall furnish four sets of type test reports along with the offer. Offers without type test reports will be treated as non-responsive.
28.2 Special tests other than type and routine tests, must have been conducted on a transformer of same design during the last five years at the time of bidding. The bidder shall furnish four sets of type test reports along with the offer. Offers without type test reports will be treated as non-responsive.

28.3 The requirements of site tests are also given in this clause.

28.4 The test certificates for all routine and type tests for the transformers and also for the bushings and transformer oil shall be submitted with the bid.

28.5 The procedure for testing shall be in accordance with IS1180/2026 as the case may be except for temperature rise test.

28.6 Before interloc each of the completely assembled transformers shall be subjected to the routine tests at the manufacturer’s works.

**29 ROUTINE TESTS:**

29.1 Ratio, polarity, phase sequence and vector group.

29.2 No Load current and losses at service voltage and normal frequency.

29.3 Load losses at rated current and normal frequency.

29.4 Impedance voltage test.

29.5 Resistance of windings at each tap, cold (at or near the test bed temperature).

29.6 Insulation resistance.

29.7 Induced over voltage withstand test.

29.8 Separate source voltage withstand test.

29.9 Neutral current measurement-The value of zero sequence current in the neutral of the star winding shall not be more than 2% of the full load current.

29.10 Oil samples (one sample per lot) to comply with IS 1866.

29.11 Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 110% rated voltage.

29.12 Pressure and vacuum test for checking the deflection.

**30 TYPE TESTS (no need to conduct- submit the type & special test must have been conducted on a transformer of same design during the last five years at the time of bidding):**

In addition to the tests mentioned in clause 29 and 30 following tests shall be conducted:

30.1 Temperature rise test for determining the maximum temperature rise after continuous full load run. The ambient temperature and time of test should be stated in the test certificate.

30.2 Impulse voltage test: with chopped wave of IS 2026 part-III. BIL for 11 Kv shall be 95 Kv peak instead of 75 Kv

30.3 Short circuit withstand test: Thermal and dynamic ability.
30.4 Air Pressure Test: As per IS – 1180.

30.5 Magnetic Balance Test.

30.6 Un-balanced current test: The value of unbalanced current indicated by the ammeter shall not be more than 2% of the full load current.

30.7 Noise-level measurement.

30.8 Measurement of zero-phase sequence impedance.

30.9 Measurement of Harmonics of no-load current.

30.10 Transformer tank shall be subjected to specified vacuum. The tank designed for vacuum shall be tested at an internal pressure of 0.35 kg per sq cm absolute (250 mm of Hg) for one hour. The permanent deflection of flat plates after the vacuum has been released shall not exceed the values specified below:

<table>
<thead>
<tr>
<th>Horizontal length of flat plate (in mm)</th>
<th>Permanent deflection (in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto and including 750</td>
<td>5.0</td>
</tr>
<tr>
<td>751 to 1250</td>
<td>6.5</td>
</tr>
<tr>
<td>1251 to 1750</td>
<td>8.0</td>
</tr>
<tr>
<td>1751 to 2000</td>
<td>9.5</td>
</tr>
<tr>
<td>2001 to 2250</td>
<td>11.0</td>
</tr>
<tr>
<td>2251 to 2500</td>
<td>12.0</td>
</tr>
<tr>
<td>2501 to 3000</td>
<td>16.0</td>
</tr>
<tr>
<td>Above 3000</td>
<td>19.0</td>
</tr>
</tbody>
</table>

30.11 Transformer tank together with its radiator and other fittings shall be subjected to pressure corresponding to twice the normal pressure or 0.35 kg / sq.cm whichever is lower, measured at the base of the tank and maintained for an hour. The permanent deflection of the flat plates after the excess pressure has been released, shall not exceed the figures for vacuum test.

30.12 Pressure relief device test: The pressure relief device shall be subject to increasing fluid pressure. It shall operate before reaching the test pressure as specified in the above class. The operating pressure shall be recorded. The device shall seal-off after the excess pressure has been released.

30.13 Short Circuit Test and Impulse Voltage Withstand Tests: The SBIIMS intends to procure transformer designed and successfully tested for short circuit and impulse test. In case the transformer proposed for supply against the order are not exactly as per the tested design, the supplier shall be required to carry out the short circuit test and impulse voltage withstand test at their own cost in the presence of the representative of the SBIIMS.

30.13.1 The supply shall be accepted only after such test is done successfully, as it confirms on successful withstand of short circuit and healthiness of the active parts thereafter on un-tank after a short circuit test.

30.13.2 Apart from dynamic ability test, the transformers shall also be required to withstand thermal ability test or thermal withstand ability will have to be established by way of calculations.

30.13.3 It may also be noted that the SBIIMS reserves the right to conduct short circuit test and impulse voltage withstand test in accordance with the IS, afresh on each ordered
rating at SBIIMS cost, even if the transformer of the same rating and similar design are already tested. This test shall be carried out on a transformer to be selected by the SBIIMS either at the manufacturer”s works when they are offered in a lot for supply or randomly from the supplies already made to SBIIMS”s stores. The findings and conclusions of these tests shall be binding on the supplier.

30.13.4 Type test certificates for the tests carried out on prototype of same specifications shall be submitted along with the bid. The SBIIMS may select the transformer for type tests randomly.

31 ACCEPTANCE TESTS:

31.1 Transformer of the offered shall be subjected to the following routine/ acceptance test in presence of SBIIMS”s representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS:1180 and IS:2026.

31.2 Checking of weights, dimensions, fitting and accessories, tank sheet thickness, oil quality, material, finish and workmanship as per GTP and contract drawings.

31.3 Physical verification of core coil assembly and measurement of flux density of one unit of each rating, in every inspection with reference to short circuit test report.

32 TESTS AT SITE:

The SBIIMS reserves the right to conduct all tests on transformer after arrival at site and the manufacturer shall guarantee test certificate figures under actual service conditions.

33 INSPECTION:

33.1 In respect of raw material such as core stampings, winding conductors, insulating paper and oil, supplier shall use materials manufactured/supplied by standard manufacturers and furnish the manufacturers” test certificate as well as the proof of purchase from these manufacturers (excise gate pass) for information of the SBIIMS. The bidder shall furnish following documents along with their offer in respect of the raw materials:

   ddddd) Invoice of supplier.

   ii. Mill”s certificate.

   iii. Packing list.

   iv. Bill of landing.

   v. Bill of entry certificate by custom.

34 INSPECTION AND TESTING OF TRANSFORMER OIL:

34.1 To ascertain the quality of the transformer oil, the original manufacturer”s tests report should be submitted at the time of inspection. Arrangements should also be made for testing of transformer oil, after taking out the sample from the manufactured transformer and tested in the presence of SBIIMS”s representative.

34.2 To ensure about the quality of transformer, the inspection shall be carried out by the SBIIMS”s representative at following two stages:
34.2.1 Online anytime during receipt of raw material and manufacture/assembly whenever the SBIIMS desires.

34.2.2 At finished stage i.e. transformer is fully assembled and are ready for interloc.

34.3 The stage inspection shall be carried out in accordance with Annexure-II.

34.4 After the main raw-material i.e. core and coil material and tanks are arranged and transformers are taken for production on shop floor and a few assembly have been completed, the firm shall intimate the SBIIMS in this regard, so that an officer for carrying out such inspection could be deputed, as far as possible within seven days from the date of intimation. During the stage inspection a few assembled core shall be dismantled (only in case of CRGO material) to ensure that the CRGO laminations used are of good quality. Further, as and when the transformers are ready for interloc, an offer intimating about the readiness of transformers, for final inspection for carrying out tests as per relevant IS shall be sent by the firm along with Routine Test Certificates. The inspection shall normally be arranged by the SBIIMS at the earliest after receipt of offer for pre-delivery inspection. The proforma for pre delivery inspection of Distribution transformers is placed at Annex-III.

34.5 In case of any defect/defective workmanship observed at any stage by the SBIIMS’s Inspecting Officer, the same shall be pointed out to the firm in writing for taking remedial measures. Further processing should only be done after clearance from the Inspecting Officer/ SBIIMS.

34.6 All tests and inspection shall be carried out at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and SBIIMS at the time of purchase. The manufacturer shall offer the Inspector representing the SBIIMS all reasonable facilities, without charges, to satisfy him that the material is being supplied in accordance with this specification. This will include Stage Inspection during manufacturing stage as well as Active Part Inspection during Acceptance Tests.

34.7 The manufacturer shall provide all services to establish and maintain quality of workmanship in his works and that of his sub-contractors to ensure the mechanical/electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000.

34.8 SBIIMS shall have every right to appoint a third party inspection to carryout the inspection process.

34.9 The SBIIMS has the right to have the test carried out at his own cost by an independent agency wherever there is a dispute regarding the quality supplied. SBIIMS has right to test 1% of the supply selected either from the stores or field to check the quality of the product. In case of any deviation SBIIMS have every right to reject the entire lot or penalize the manufacturer, which may lead to blacklisting, among other things.

35 QUALITY ASSURANCE PLAN:

35.1 The bidder shall invariably furnish following information along with his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of equipment offered.

35.2 Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests
normally carried out on raw materials in the presence of bidder”s representative, copies of test certificates.

35.3 Information and copies of test certificates as above in respect of bought out accessories.

35.4 List of manufacturing facilities available.

35.5 Level of automation achieved and list of areas where manual processing exists.

35.6 List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspection.

35.7 List of testing equipment available with the bidder for final testing of equipment along with valid calibration reports. These shall be furnished with the bid. Manufacturer shall posses 0.1 accuracy class instruments for measurement of losses.

35.8 Quality Assurance Plan (QAP) with hold points for SBIIMS”s inspection.

35.9 The successful bidder shall within 30 days of placement of order, submit following information to the SBIIMS:

35.9.1 List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished along with offer.

35.9.2 Type test certificates of the raw materials and bought out accessories.

35.9.3 The successful bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material at the time of routine testing.

36 DOCUMENTATION:

36.1 The bidder shall furnish along with the bid the dimensional drawings of the items offered indicating all the fittings.

36.2 Dimensional tolerances.

36.3 Weight of individual components and total weight.

36.4 An outline drawing front (both primary and secondary sides) and end elevation and plan of the tank and terminal gear, wherein the principal dimensions shall be given.

36.5 Typical general arrangement drawings of the windings with the details of the insulation at each point and core construction of transformer.

36.6 Typical general arrangement drawing showing both primary and secondary sides and end-elevation and plan of the transformer.

37 PACKING AND FORWARDING:

37.1 The packing shall be done as per the manufacturer”s standard practice. However, it should be ensured that the packing is such that, the material would not get damaged during transit by Rail / Road / Sea.

37.2 The marking on each package shall be as per the relevant IS.

38 MANADATORY SPARES:

38.1 Mandatory spares shall be supplied as per the SBIIMS”s requirement.
39 GUARANTEE

39.1 The manufacturers of the transformer shall provide a guarantee of 24 months from the date of receipt at the stores of the Utility or 18 months from the date of commissioning, whichever is earlier. In case the distribution transformer fails within the guarantee period the SBIIMS will immediately inform the supplier who shall take back the failed DT within 15 days from the date of the intimation at his own cost and replace/repair the transformer within forty five days of date of intimation with a roll over guarantee.

39.2 The outage period i.e. period from the date of failure till unit is repaired/ replaced shall not be counted for arriving at the guarantee period.

39.3 In the event of the supplier’s inability to adhere to the aforesaid provisions, suitable penal action will be taken against the supplier which may inter alia include blacklisting of the firm for future business with the SBIIMS for a certain period.

40 SCHEDULES:

40.1 The bidder shall fill in the following schedule which will be part of the offer. If the schedule are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule-A: Guaranteed Technical Particulars

Schedule-B: Schedule of Deviations

41 DEVIATIONS:

41.1 The bidders are not allowed to deviate from the principal requirements of the Specifications. However, the bidder is required to submit with his bid in the relevant schedule a detailed list of all deviations without any ambiguity. In the absence of a deviation list in the deviation schedules, it is understood that such bid conforms to the bid specifications and no post-bid negotiations shall take place in this regard.

41.2 The discrepancies, if any, between the specification and the catalogues and / or literatures submitted as part of the offer by the bidders, shall not be considered and representations in this regard shall not be entertained.

41.3 If it is observed that there are deviations in the offer in guaranteed technical particulars other than those specified in the deviation schedules then such deviations shall be treated as deviations.

41.4 All the schedules shall be prepared by vendor and are to be enclosed with the bid.
ANNEXURE-1

SCHEDULE IA
GUARANTEED AND OTHER PARTICULARS FOR DISTRIBUTION TRANSFORMERS
(To be furnished by the Manufacturer)

Sl.No. Description

1. Make
2. Name of Manufacturer
3. Place of Manufacture
4. Voltage Ratio

5. **Rating in Kva**
6. Core Material used and Grade:
   a) Flux density
   b) Over fluxing without saturation
      (Curve to be furnished by the

7. Maximum temperature rise of:
   a) Windings by resistance method
   b) Oil by thermometer

8. Magnetising (no-load) current at:
   a) 90% Voltage
   b) 100% Voltage
   c) 110% Voltage

9. Core loss in watts:
   a) Normal voltage
   b) Maximum voltage

10. Resistance of windings at 20°C
    (with 5% tolerance):
eeeee) HV Winding
   (ohms) b. LV Winding
   (ohms)

11. Full load losses (watts) at 75 0C
12. Total Losses at 100% load at 75 °C
13. Total Losses at 50% load at 75 °C
14. Current density used for: (Amper/sq mm)
   a) HV Winding
   b) LV Winding

15. Clearances: (mm)
   a) Core and LV
   b) LV and HV
   c) HV Phase to Phase
   d) End insulation clearance to earth
   e) Any point of winding to tank

16. Efficiency at 75°C:
   a) Unity P.F. and
   b) 0.8 P.F.
      1) 125% load
      2) 100% load
      3) 75% load
      4) 50% load
      5) 25% load

17. Regulation at:
   a) Unity P.F.
      ffff) 0.8 P.F. at 75°C

18. % Impedance at 75°C

19. Flash Test:
   ggggg) HV 28 Kv / 50 Hz for 1 minute
   (ii) LV 3 Kv/50 Hz for 1 minute
20. Over potential Test (Double Voltage and Double frequency for 1 minute)

21. Impulse test

22. Mass of : (kg)

   hhhhh) Core lamination (minimum)

   b) Windings (minimum)

   iiiii) Tank and fittings
d) Oil

e) Oil quantity (minimum) (litre)

f) Total weight

24. Oil Data:
   a) Quantity for first filling (minimum) (litre)
   b) Grade of oil used
   c) Maker’s name
   d) BDV at the time of filling (Kv)

25. Transformer:
   a) Overall length x breadth x height (mm x mm x mm)
   b) Tank length x breadth x height
   c) Thickness of plates for
      d) Side plate (min)
      e) Top and bottom plate (min)

4) Conservator Dimensions

25. Radiation:
   1) Heat dissipation by tank walls excluding top and bottom
   2) Heat dissipation by cooling tube
   3) Diameter and thickness of cooling tube
   4) Whether calculation sheet for selecting cooling area to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise is enclosed.

26. Inter layer insulation provided in design for:
   1) Top and bottom layer
   2) In between all layer
   3) Details of end insulation
   4) Whether wedges are provided at 50% turns of the HV coil
27. Insulation materials provided a) For Conductors
   (1) HV
   (2) LV
   
f) For Core
28. Material and Size of the wire used
   1) HV Dia (mm) (SWG)

   2) LV
      a) Strip size
      b) No. of Conductors in parallel
      c) Total area of cross section (sq mm)

29. Whether the name plate gives all particulars as required in Tender
30. Particulars of bushings HV/LV

   1) Maker’s name
   2) Type IS-3347/IS-2099/IS7421

   3) Rating as per IS

   4) Dry power frequency voltage withstand test

   5) Wet power frequency voltage withstand test

Note:
The following shall be specifically confirmed:
1) Whether the offer conforms to the limits of impedance mentioned in the specification
2) Whether the offer conforms to the limits of temperature rise mentioned in the specification.

3) Whether the losses of the transformers offered are within the limits specified.

4) Whether the transformer offered is already type tested for the design and test reports enclosed.
### SCHEDULE IB
#### ADDITIONAL DETAILS

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Core Grade</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Core diameter</td>
<td>mm</td>
</tr>
<tr>
<td>3.</td>
<td>Gross core area</td>
<td>sq cm</td>
</tr>
<tr>
<td>4.</td>
<td>Net core area</td>
<td>sq cm</td>
</tr>
<tr>
<td>5.</td>
<td>Flux density</td>
<td>Tesla</td>
</tr>
<tr>
<td>6.</td>
<td>Mass of core</td>
<td>kg</td>
</tr>
<tr>
<td>7.</td>
<td>Loss per kg of core at the specified flux density</td>
<td>watt</td>
</tr>
<tr>
<td>8.</td>
<td>Core window height</td>
<td>mm</td>
</tr>
<tr>
<td>9.</td>
<td>Centre to centre distance of the core</td>
<td>mm</td>
</tr>
<tr>
<td>10.</td>
<td>No. of LV Turns</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>No. of H V turns</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Size of LV conductor bare/covered</td>
<td>mm</td>
</tr>
<tr>
<td>13.</td>
<td>Size of HV conductor bare/covered</td>
<td>mm</td>
</tr>
<tr>
<td>14.</td>
<td>No. of parallels</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Current density of LV winding</td>
<td>A/sq mm.</td>
</tr>
<tr>
<td>16.</td>
<td>Current density of HV winding</td>
<td>A/sq mm</td>
</tr>
<tr>
<td>17.</td>
<td>Wt. of the LV winding for Transformer</td>
<td>kg</td>
</tr>
<tr>
<td>18.</td>
<td>Wt. of the HV winding for Transformer</td>
<td>kg</td>
</tr>
<tr>
<td>19.</td>
<td>No. of LV Coils/phase</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>No. of HV coils / phase</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Height of LV Windings</td>
<td>mm</td>
</tr>
<tr>
<td>22.</td>
<td>Height of HV winding</td>
<td>mm</td>
</tr>
<tr>
<td>23.</td>
<td>ID/OD of HV winding</td>
<td>mm</td>
</tr>
<tr>
<td>24.</td>
<td>ID/OD of LV winding</td>
<td>mm</td>
</tr>
<tr>
<td>25.</td>
<td>Size of the duct in LV winding</td>
<td>mm</td>
</tr>
<tr>
<td>26.</td>
<td>Size of the duct in HV winding</td>
<td>mm</td>
</tr>
<tr>
<td>27.</td>
<td>Size of the duct between HV and LV</td>
<td>mm</td>
</tr>
<tr>
<td>28.</td>
<td>HV winding to LV winding clearance</td>
<td>mm</td>
</tr>
<tr>
<td>29.</td>
<td>HV winding to tank clearance</td>
<td>mm</td>
</tr>
<tr>
<td>30.</td>
<td>Calculated impedance</td>
<td>%</td>
</tr>
<tr>
<td>31.</td>
<td>HV to earth creepage distance</td>
<td>mm</td>
</tr>
<tr>
<td>32.</td>
<td>LV to earth creepage distance</td>
<td>mm</td>
</tr>
</tbody>
</table>
# ANNEXURE – II

## SOURCE OF MATERIALS/PLACES OF MANUFACTURE, TESTING AND INSPECTION

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item</th>
<th>Source of Material</th>
<th>Place of Manufacture</th>
<th>Place of testing and inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Core Laminations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Copper winding wire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Steel Castings/sections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tank</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Insulating Cylinders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bushing HV/LV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Las</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Radiators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Insulators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Insulation Paper</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The bidder has to invariably furnish the above information.
LIST OF FITTINGS AND PARTICULARS TO BE FURNISHED IN THE DRAWING

1. Rating and terminal marking plate (non detachable)
2. Earthing terminal with lugs 2 Nos.
3. Lifting lugs 4 Nos. for main tank and 2 Nos. for top cover
4. Pulling lugs 4 Nos.
5. HV bushings 3 Nos. with bimetallic terminal connector
6. LV Bushings 4 Nos. with bimetallic terminal connector
7. Thermometer pocket with cap
8. Metal oxide lightning Arrestors (Disconnector type)
9. Stiffner angle (40x40x5 mm)
10. U shaped pressure relief vent with 0.025 mm copper diaphragm / 0.4 mm Bakelite sheet pressure relief vent on the top cover of the tank.
11. Cooling tubes if required (length of the cooling tubes is to be furnished along with heat dissipation calculation)
12. LV Epoxy bushings 4 Nos.
13. Base channels 125x65 mm
14. Tank and over all dimensions
15. Weights of (a) Core (b) windings (c) Tank and fittings (d) Weight Qty. of oil (e) Over all weight
16. Die cast oil level gauge indicating three positions of oil marked as minimum 5 degrees, 30 degrees and maximum as 98 degrees

NOTE: 1) The top cover shall be fitted with nut and bolt and continuous neoprene gasket (Rectangular Ring) arrangement.
2) Corner bolts are to be welded to prevent the top cover being removed in the field.
3) All bolts shall have spring washers.
SOURCE OF MATERIALS/PLACES OF MANUFACTURE, TESTING AND INSPECTION

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Item</th>
<th>Source of material</th>
<th>Place of manufacture</th>
<th>Place of testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lamination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Copper aluminium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Core plate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Steel castings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Tank</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Radiators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Insulators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Cylinders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Insulation paper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Bushing HV/LV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Insulated winding wire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>a) Tap changer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Pressure relief vent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SCHEDULE OF DEVIATION

TECHNICAL

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Requirements / Specification Clause</th>
<th>Deviations</th>
<th>Remarks</th>
</tr>
</thead>
</table>

Signature of the contractor with seal
It is hereby conformed that except for deviations mentioned above, the offer conforms to all
the other features specified in Technical Specification Section ____ of this Bid Document.

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

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Item name</th>
<th>Makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MV Panels (PCCs)</td>
<td>Manufacturers with CPRI Test Certificate.</td>
</tr>
<tr>
<td>2</td>
<td>DBs/ Metal clad sockets</td>
<td>ABB/Siemens/ Legrand / Schneider /L&amp;T/ Havells</td>
</tr>
<tr>
<td>3</td>
<td>Transformer</td>
<td>Kirloskar/ ABB/ Cromption Greaves/ Volt Amp/ Esennar</td>
</tr>
<tr>
<td>4</td>
<td>MCB/MCCB</td>
<td>ABB/Siemens/ Legrand / Schneider /L&amp;T/ Havells</td>
</tr>
<tr>
<td>5</td>
<td>SWITCH &amp; SOCKET/ STEP TYPE REGULATOR</td>
<td>Legrand –Mosaic- My link / MK-wrap around/ Anchor –Woods / SchneiderClipsal/ Crabtree (Havell’s) / PANASONIC/PHILIPS</td>
</tr>
<tr>
<td>6</td>
<td>CABLES/COPPER CONDUCTOR WIRIES</td>
<td>Havells/ Polycab/Universal/KEI/</td>
</tr>
<tr>
<td>7</td>
<td>CABLE LUGS</td>
<td>Dowells / Jainsons/3D</td>
</tr>
<tr>
<td>8</td>
<td>CABLE GLANDS</td>
<td>HMI / Comet/ Cosmos/Dowells (Biller India)/ Hax Brass</td>
</tr>
<tr>
<td>9</td>
<td>PVC conduits, Casing , Capping &amp; Accessories (ISI MEDIUMUM)</td>
<td>Precision / Sudhakar/ Avon plast/ FINOLEX</td>
</tr>
<tr>
<td>10</td>
<td>Steel Conduit</td>
<td>BEC / AKG / PRECISION / ATUL</td>
</tr>
<tr>
<td>11</td>
<td>M.S. Cable Tray</td>
<td>Stelco / Steelways / Slotco / Pilco / Patny</td>
</tr>
<tr>
<td>12</td>
<td>Capacitor Bank</td>
<td>Epcos / Neptune / Tibcon</td>
</tr>
<tr>
<td>13</td>
<td>Light Fixtures (LED)</td>
<td>Philips / Havells/ CG (only commercial models)</td>
</tr>
<tr>
<td>14</td>
<td>LED COVE/ROPE Lighting Strip</td>
<td>Philips / GE/ Havells/ CG/ Wipro/Jaguar</td>
</tr>
<tr>
<td>15</td>
<td>Ceiling Fans, Wall mounted fans &amp; Exhaust Fans</td>
<td>Havells/Bajaj/ CG/Orient / USHA/ Almonard</td>
</tr>
<tr>
<td>16</td>
<td>Selector Switches:</td>
<td>Vaishno / Salzer / Kaycee</td>
</tr>
<tr>
<td>17</td>
<td>Indication Lamps LED</td>
<td>L &amp;T/ Siemens/Technique/ ESBEE/Schneider / Vaishno / Binay</td>
</tr>
<tr>
<td>18</td>
<td>Resign cast CTs</td>
<td>KALPA/KAPPA/ Automatic Electric</td>
</tr>
<tr>
<td></td>
<td><strong>CT SHORT CIRCUITING TERMINALS</strong></td>
<td><strong>ELMEX or equivalent</strong></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td><strong>Telephone Wires</strong></td>
<td>Lapp / Delton / Polycab / Finolex / SKY TONE / HAVELLS</td>
</tr>
<tr>
<td></td>
<td><strong>LAN Cables</strong></td>
<td>D LINK, Finolex, Ploycab, Legrand / SKY TONE / HAVELLS</td>
</tr>
<tr>
<td></td>
<td><strong>LAN SWITCHES/ I/O PORTS</strong></td>
<td>Kramer / Extron / Crestron / CISCO</td>
</tr>
<tr>
<td></td>
<td><strong>CAT 6 / LAN cables / OFC</strong></td>
<td>Dlink / DigiLink / Aten</td>
</tr>
<tr>
<td></td>
<td><strong>AV Audio Rack Floor Mounted</strong></td>
<td>VALRACK / NETRACK / EMERSON</td>
</tr>
<tr>
<td></td>
<td><strong>Occupancy sensors</strong></td>
<td>Schneider / Legrand / Philips / Havells</td>
</tr>
<tr>
<td></td>
<td><strong>GI pipes / MS pipe</strong></td>
<td>Jindal / GST / Tata / Zenith</td>
</tr>
<tr>
<td></td>
<td><strong>CONTACTORS( POWER / AUX)</strong></td>
<td>SCHNEIDER / L&amp;T / ABB / SIEMENS</td>
</tr>
<tr>
<td></td>
<td><strong>Protection Relays</strong></td>
<td>L&amp;T / Areva / ABB / Siemens</td>
</tr>
<tr>
<td></td>
<td><strong>Measuring Instruments</strong></td>
<td>L&amp;T / Siemens / ABB</td>
</tr>
<tr>
<td></td>
<td><strong>Fuse Disconnector Switch / SFU / Fuse</strong></td>
<td>L&amp;T / Siemens / ABB</td>
</tr>
<tr>
<td></td>
<td><strong>Pipes</strong></td>
<td>Jindal / GST / Tata / BST</td>
</tr>
<tr>
<td></td>
<td><strong>HOOTER</strong></td>
<td>VPRO or equivalent</td>
</tr>
<tr>
<td></td>
<td><strong>GI sheet</strong></td>
<td>Jindal / Sail / Tata / Equivalent</td>
</tr>
<tr>
<td></td>
<td><strong>Grilles / Fire dampers / Diffusers / VCD</strong></td>
<td>Caryaire / Premier / Dynacraft / Ravistar / Equivalent</td>
</tr>
<tr>
<td></td>
<td><strong>Expanded Polystyrene</strong></td>
<td>Thermolloyd / Beardsell / Astha polymer / Equivalent</td>
</tr>
<tr>
<td></td>
<td><strong>3/2 Way mixing valves</strong></td>
<td>3/2 Way mixing valves</td>
</tr>
<tr>
<td></td>
<td><strong>EPABX SYSTEM – PC BASED OPERATOR CONSOLE</strong></td>
<td>SIEMENS / MATRIX / PANASONIC / NEC UNIVERGE</td>
</tr>
<tr>
<td></td>
<td><strong>ANALOG PHONE</strong></td>
<td>SIEMENS / PANASONIC / NORTEL / BEETEL</td>
</tr>
<tr>
<td></td>
<td><strong>MDF / IDF, TAG BLOCKS</strong></td>
<td>KRONE or equivalent</td>
</tr>
</tbody>
</table>

**Note:** All Items Materials Used on site shall be ISI Mark only.

**Important:** Please Tick (/) the make of materials considered in the Tender. Any other material not specified above should be used after approval of the same by the consultant / SBIIMS.

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

Signature of the contractor with seal
<table>
<thead>
<tr>
<th>Sl No</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
<th>Unit Rate</th>
<th>Total amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply, installation, testing and commissioning only of 11 Kv/433V, 50Hz, 500 Kva oil type, Delta/Star, Dyn11, ONAN, 17 positions OLTC (± 10% in steps of 1.25%), outdoor, Transformer with AVR &amp; RTCC Panel, HV/LV cable boxes, with complete set. Cost should include loading, transportation, unloading, placement on the plinth etc. including crane charges complete with all necessary supports, accessories as per the drawings as required. The transformer should be designed and manufactured as per IS: 1180 (Part 1): 2014 &amp; IS: 2026-2011 and should be supplied with first filling of oil to IS: 335 of 2018. Paint finish: Enamel Light Grey Shade No. 631 – IS: 5 and as per Energy Efficiency Level-2. The scope of work includes (a) keeping provision to connect the buchloz realy, winding temperature and oil indicator to VCB (b) filling of 90interlocked oil in the transformer at site. (c) construction of suitable plinth for transformer</td>
<td>No</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Supply, installation, testing and commissioning only of outdoor panel with 800A FP MCCB (50Ka) with Microprocessor based releases and Metering (Voltmeter, Ammeter and Indication Lamps) in Outdoor type enclosure made out of 2mm thick CRCA sheet with 7 tank treatment including all accessories. Panel should be of floor mounting, free standing, cubicle type, weatherproof enclosure to isolate immediately after the Transformer. It should be made suitable to receive incoming 3 nos. of 3.5 core 300 sq.mm A2XFY cables and also with suitable terminal arrangements on outgoing side for 3 nos. of 3.5 core 300 sq.mm A2XFY cables at the bottom for both incoming and outgoing cables. The weatherproof enclosure should be provided with ventilating louvers with rodent proof mesh and rain water protective cowl with floor mounting frame of 450 mm high (50 x 50 x 6mm M.S angle frame), complete with all necessary supports, accessories as per the drawings as required.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shifting of existing 500KVA DG set with AMF panel including Providing and making of foundation of size 5.5 M x 2.5 M x 0.6 M for D.G.Set in PCC(1;2;4) including excavation in all types soils and rock, back filling, finishing the surface with plastering complete at new location.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Supply and laying following size 1.1KV grade PVC insulated armoured aluminium/Cu. FRLS conductor under ground cable on the surface of wall, below true ceiling. The cable shall conform to IS 1554 Part-I. <strong>Scope also includes termination of the cable as required with suitable glands and lugs.</strong> The scope of work includes filling of sand bricks, route</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
markers at 1 meter distance and near turnings etc

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>3.5C *150Sqmm Aluminium Armored cable</td>
<td>rmt</td>
</tr>
<tr>
<td>b</td>
<td>3.5C *120Sqmm Aluminium Armored cable</td>
<td>rmt</td>
</tr>
</tbody>
</table>

**Relaying of cable from new panel to auditorium:**
The scope of work includes removing of cable terminals from the existing panel and re routing of cables from existing place to auditorium and re glanding and re termination to the new panel.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td>Job 1</td>
</tr>
</tbody>
</table>

**Shifting of new panel to auditorium:**
This panel is having two no of 500A ACB and two number of 800A changeover switches and it it having 10 no of outgoing feders each rating is 250A MCCB

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td>Job 1</td>
</tr>
</tbody>
</table>

**APFCR PANEL – INCOMER**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>250A, 4P, 25KA MCCB – 1No</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Phase Indicating lamps LED type with fuse control – 1Set</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>On, off, trip, indication lamps - 2Set</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>0 to 250A Ampere meter with selector switch with 3nos of 250A/5A, CL-1, 15VA CT’s with tape wound – 1job</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>0 to 500V voltage meter with selector switch – 1job</td>
<td></td>
</tr>
</tbody>
</table>

**OUT GOINGS**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100A,25KA TP+NL MCCB with 100A heavy duty Contactor and 50KVAR MPP 480V Delta connected heavy duty Capacitors-1sets</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>63A,25KA TP+NL MCCB with63A heavy duty Contactor and 20KVAR MPP 480V Delta connected heavy duty Capacitors-2set</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>63A,25KA TP+NL MCCB with63A heavy duty Contactor and 15KVAR MPP 480V Delta connected heavy duty Capacitors-2set</td>
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<tr>
<td>4</td>
<td>32A,25KA TP MCB with63A heavy</td>
<td>Job 1</td>
</tr>
</tbody>
</table>
duty Contactor and 10KVAR MPP 480V Delta connected heavy duty Capacitors-3set 8-STAGE APFCR RELAY along with all accessories.

**DISTRIBUTION PANEL**
Fabrication, Supply, installation, Testing and Commissioning of 3 phase and neutral 415V, 4 wire, free standing floor mounted M.V panel made out of 14SWG MS sheet after seven tank process and painting with epoxy powder coating. The panel shall consist of suitable rating TPN Copper busbar (at the rating of 1.5A/sq.mm) supported with DMC/ SMC barriers and colour coded with heat shrinkable sleeves. The metering shall be provided as specified. The panel shall have short circuit withstanding capacity of minimum 50KA and consist of switchgear details 93nterlock as below. The panel shall be fabricated with CPRI test certificate only. The size of all panel mounting meters shall be 96 X 96 MM. The panels shall be mounted on U channels including supply and fixing of the same. Every / ACB shall be provided with ON/ OFF/ TRIP indication lamps of LED type and auto manual switch. The scope of work includes transportation, loading, unloading of the panel and connection of cables with glands & terminations with lugs to the new panel, with the 3 sets of hard copy drawings and one set of soft copy. The the ACBs should be connected electrically and mechanically 93nterlocked. Complete the work as directed by the Bank. Input: 500A, 4P, MCCB, 50KA, with extendable handle. (DPX³ MCCB with Electronic Sg (LSIg) Protection Unit, DPX3-1600 _ Job 1
Outgoings: 250A, 4P MCCB 35KA-12no.

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>Supply, fabrication and fixing of M.S angles, channels for support of HT Panels, HT Cables, Transformer, Cable trays, making angle frame mesh by using 50X50X6mm MS angles for keeping loop lengths. Including supply of all consumables for welding and also welding machine along with wiring connections to be arranged by the contractor only. Power supply will be provided at one point by the client.</td>
<td>Kg</td>
<td>100</td>
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<tr>
<td>Getting statutory approvals including CTL of cables/ transformer etc, transportation, CEIG approval, Electrical scheme approval, sanction letter, supervision, Handover etc. (excluding the statutory payments/fees, which will be paid or reimbursed separately by Bank)</td>
<td>job</td>
<td>1</td>
</tr>
<tr>
<td>Buyback of existing old panel (which is having 800A ACB as an input and 250A MCCB as bus coupler and outgoings are switch fuse unit, the existing life of the panel is more than 15 years old.</td>
<td>Job</td>
<td>-1</td>
</tr>
</tbody>
</table>

Note: Applicable GST on quoted amount will be paid extra.