NIT NO	HYD/2025-26/07
DATE	11.08.2025

EXTERNAL ELECTRICAL WORKS FOR CONSTRUCTION OF DWARAKAPURI COLONY BRANCH & TOP EXECUTIVE GUEST HOUSE AT DWARAKAPURI COLONY, PUNJAGUTTA, HYDERABAD.

TENDER SCHEDULE.

CONSULTANTS:

M/S abhikram-s
architects, interior designers, urban planners
valuers & project managers
#3-6-134 FLAT NO 302
SVC ROYAL DM APARTMENTS
STREET NO 18, HIMAYATNAGAR
HYDERABAD-500029
ph.no 040-35561296
abhikramarchitects@gmail.com

Tender to be submitted to :

The Assistant General Manager,
STATE BANK OF INDIA,
Premises and Estate Department,
Local Head Office, Bank Street, Koti,
HYDERABAD – 500 001.

NOTICE INVITING TENDER (NIT)

NAME OF WORK: On behalf of SBI invites e-TENDER FOR EXTERNAL ELECTRICAL WORKS FOR THE CONSTRUCTION OF DWARAKAPURI COLONY BRANCH & TOP EXECUTIVE GUEST HOUSE AT DWARAKAPURI COLONY, PUNJAGUTTA, HYDERABAD.

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1.	Name of the Work	**e-TENDER FOR EXTERNAL ELECTRICAL WORKS FOR THE CONSTRUCTION OF DWARAKAPURI COLONY BRANCH & TOP EXECUTIVE GUEST HOUSE AT DWARAKAPURI COLONY, PUNJAGUTTA, HYDERABAD.**
2.	Estimated cost of work	**Rs.81,00,330.00 plus GST as applicable**
3.	Time for Completion of work	**5 months** from the date of PO or handover of the site whichever is earlier.
4.	Eligibility of the contractor	1. Electrical Contractors of the respective category empanelled with SBI. **2.** The vendor should have a valid digital signature to participate in the online tendering process
5.	Earnest Money Deposit (EMD)	**Rs. 82000/-** Drafts/BCs shall be in favour of "**SBI The Assistant General Manager (P&E), State Bank Of India, Premises and Estate Department, Local Head Office, Bank Street, Kothi,** payable at Hyderabad." Note: Earnest Money Deposit (EMD) shall be exempted for bidders registered as Micro and Small Enterprises (MSEs) under the relevant category
6.	Address for submission of EMD & SB collect receipt for tender fee and opening of tenders :	Original EMD should be submitted (before due date and time) **physically** at the office of State Bank Of India, 3rd floor, Premises & Estate Dept, SBI LHO, Bank Street, Koti, Hyderabad – 500 001. Contact: 040-23466346. agmpre.lhohyd@sbi.co.in/agmcivil.lhohyd@sbi.co.in Technical Bid of those firms / contractors who do not submit EMD or tender fee shall be rejected.
7.	Tender documents available for download from the websites:	1) https://www.sbi.co.in under "SBI in the News" link "procurement news" 2) https://etender.sbi
8.	Availability for download from the above web site	**From 12.08.2025 to 01.09.2025**
9.	Date , time & venue of pre bid meeting	**21.08.2025 at 11.00am** **at Office of AGM(P&E), Premises & Estate Department, 3rd Floor, SBI, Local Head Office, Hyderabad.**
10.	Last date and time of submission of online Tender	**01.09.2025 Up to 03:00PM**
11.	Date, Time and Place of opening of e-Tenders	**01.09.2025 up to 03:10PM** **The Assistant General Manager (P&E),** **SBI (Premises and Estate). Third Floor , SBI LHO Building, Bank Street, Koti, Hyderabad – 500 001**

<table>
<tr><td>12.</td><td>Payment terms</td><td>i) No advance payment.
ii) Minimum payment of 25 Lakhs.</td></tr>
<tr><td>13.</td><td>Initial Security Deposit (ISD)</td><td>2% of the Contract value</td></tr>
<tr><td>14.</td><td>Total Security Deposit</td><td>Retention Money- 5 %of the running bills and total deduction of 5% of value of work including EMD, ISD.</td></tr>
<tr><td>15.</td><td>Defects Liability Period</td><td>12 Months from the date of completion or commissioning and handover of the work.</td></tr>
<tr><td>16.</td><td>Liquidated Damages for delay in work</td><td>If the work is delayed beyond the scheduled completion date, then 0.50% of the total value of the contract per week (or part thereof) of delay will be deducted from the final bill value subject to max 5% of the value of work</td></tr>
<tr><td>17.</td><td>Validity of tender</td><td>90 days.</td></tr>
<tr><td>18.</td><td>Tax Deduction</td><td>As per applicable rates</td></tr>
<tr><td>19.</td><td>Rates quoted by bidder</td><td>1. The quoted rate should be inclusive of Cost of materials, transport, loading , unloading charges, cost of installation, all taxes (excluding GST), wastages, machinery, temporary works such as scaffolding, cleaning, overheads, profit, statutory expenses, incidental charges and all related expenses required for the completion of the work.
2. Additional claims other than the quoted amount will not be entertained.
3. The quoted rates shall be firm throughout the completion of the project</td></tr>
<tr><td>20.</td><td>Check list of documents to be uploaded</td><td>1. Scanned copy of DD/BC of EMD
2. Bidders are required to upload the NIT in PDF as uploaded by M/s SBI. This will satisfy digital signing of the terms and condition of the tender by the bidder.
3. Proof of Empanelment with SBI in the respective category</td></tr>
<tr><td>21.</td><td>Any additional information</td><td>1. The make of materials should be chosen strictly from the preferred makes as given in the tender.
2. Any clarifications sought after opening of the tenders will not be entertained at any cost. Firm should visit the website till last date of submission for changes/ corrigendum, if any
3. The SBI reserves the right to cancel or postpone the tenders at any stage without assigning any reason.
4. Claims for revision of the Quoted price by any bidder after the tender will not be entertained.</td></tr>
<tr><td>22.</td><td>For any queries or support in connection with the online tendering process, please contact our E-procurement solutions agency</td><td>e-Procurement technologies Limited, Ahmedabad.
Primary Contact: Ms. Shubhangi banodiya
<table>
<tr><td>Name</td><td>Mobile</td><td>Mail Id</td></tr>
<tr><td>Vishal Khilosiya</td><td>9510813528</td><td>Vishal.k@eptl.in</td></tr>
<tr><td>Nithya Vallavar</td><td>7859800609</td><td>Nithya@eptl.in</td></tr>
<tr><td>Laxmi Karli</td><td>7859800624</td><td>Laxmi@eptl.in</td></tr>
<tr><td>Nandan Valera</td><td>9081000427</td><td>Nandan.v@eptl.in</td></tr>
<tr><td colspan="3">etender.support@sbi.co.in</td></tr>
</table></td></tr>
<tr><td>23.</td><td>Any additional Information</td><td>The quoted rate should be inclusive of materials, labour, wages, fixtures, transportation, installation, all taxes</td></tr>
</table>

		(excluding GST), wastages, Octroi, machinery, temporary works such as scaffolding, cleaning, overheads, profit, statutory expenses, incidental charges and all related expenses to complete the work
24.	EVALUATION OF PRICE BIDS AND FINALIZATION	1. Only those Bidders who qualify in Technical evaluation would be shortlisted and the online price bid submitted by the bidder will be opened. 2. The L1 Bidder will be selected on the basis of net total of the price evaluation as quoted in the Online bidding. 3. In case, the L1 amount quoted by two or more contractors is the same, such lowest contractors will again be asked to submit sealed / online " Revised + Percentage Offers" on the original Estimated Cost of tender but the revised percentage shall, in no case, be higher than the percentage quoted during their initial offer for the project. The L1 shall be decided on the basis of revised offers. 4. The process of online rebidding amongst the two or more contractors offering same rates shall continue till L1 bidder is discovered. If required, PL shall conduct reverse auction to discover the L1 bidder. 5 In case, any of such contractors or all contractors (who have quoted same tender amount in the initial bidding or subsequent bidding) refuse to submit revised offer, it shall be treated as "Withdrawal of tender" by the Contractor before acceptance by PL and the EMD of such contractors shall be forfeited and they shall not be allowed to participate in the re-tendering process for the work. 6 if the bid price is below 10% of the estimated cost put to tender. The amount of such ASD/ APG shall be the difference between 90% of estimated cost put to tender and the quoted price. ASD in the format of DD / Banker's Cheque / Bank Guarantee shall be submitted within 15 days of intimation of award of work / work order, without which the contractor will not be allowed to start the work and failure of submission of ASD will result in forfeiture of EMD and cancellation of tender. For e.g, if a contractor is quoting 15% below the estimated cost put to tender (i.e. 85% of the estimate), then ASD of 5% of estimated cost is required to be obtained from the contractor (90%-85%). 7. If the L1 bidder refuses to give the PBG, then the EMD will be forfeited and the tender will be re-invited. The L1 bidder will not be allowed to participate in the retendering process.

25.	The tender will be summarily rejected if the Bidder	1. Failed to pay the required tender fee and submit the proc 2. Failed to submit the original EMD at SBI office before due date 3. Failed to upload Entire tender document, which is downloaded from the website as a proof of accepting the terms and conditions 4. Failed to upload the Scan copy of required documents as mentioned in the documents to be uploaded. 5. Partly or fully Modifies, alters or corrects the tender document uploaded by M/s SBI
26.	Address of the Site:	**STATE BANK OF INDIA, LOCAL HEAD OFFICE, SITUATED AT KOTHI, HYDERABAD, TELANGANA.**
27.	SBI reserves the right to accept or reject any or all bids without assigning any reasons thereof, ev after opening of the bids.	
28.	Additional Security deposit (ASD)/Additional performance Guarantee (APG) shall be applicabl the bid price is below 10% of the estimated cost put to tender. The amount of such ASD/ APG sh be the difference between 90% of estimated cost put to tender and the quoted price. ASD in the format of DD / Banker's Cheque / Bank Guarantee shall be submitted within 15 days of intimati of award of work / work order, without which the contractor will not be allowed to start the wo and failure of submission of ASD will result in forfeiture of EMD and cancellation of tender. For e.g., if a contractor is quoting 15% below the estimated cost put to tender (i.e. 85% of the estimate then ASD of 5% of estimated cost is required to be obtained from the contractor (90%-85%).	

1. TENDER FORM

PROJECT: EXTERNAL ELECTRICAL WORKS FOR THE CONSTRUCTION OF DWARAKAPURI COLONY BRANCH & TOP EXECUTIVE GUEST HOUSE AT DWARAKAPURI COLONY, PUNJAGUTTA, HYDERABAD.

REF : EXTERNAL ELECTRICAL WORKS

Dear Sirs,

I/We the undersigned have carefully gone through and clearly understood after visiting the site and the Tender drawings and tender documents comprising of the tender form, Notice to contractors, and conditions for building contract, Special Conditions, Specifications and Schedule of Probable quantities and Draft Agreement prepared by your Architects **M/S ABHIKRAM-S Architects, Interior Designers, Urban Planners, Valuers & Project Managers. #3-6-134, Flat No-302, SVC Royal DM Apartments, Street No-18, Himayat Nagar, Hyderabad-500029.**

I/We do hereby undertake to execute and complete the whole or part of the work (as desired by you) at the respective rates which/I/We have quoted for the respective items of the Probable Bill of Quantities and at which rate the items specified amount to **Rs.81,00,330.00 + GST**

I/We are depositing as Earnest Money a sum of **RS. 82,000.00** in favor of The Assistant General Manager,(P&E) State Bank Of India, Premises and Estate Department, Local Head Office, Bank Street, Koti payable at Hyderabad along with this tender for due execution of the work at my/our tendered rates together with any variations which shall be adjusted by the Architects at prices based on our tendered rates. I/We shall deposit further sum equivalent to 2% of tender amount, less EMD paid in the event of my/our tender being accepted, towards initial security deposit.

In the event of this Tender being accepted I/We agree to enter into an agreement as and when required and execute the contract according to your form of Agreement, within a month of receipt of work order, in default thereof, I/We do hereby bind my-self/ourselves to forfeit the aforesaid initial security deposit.

I/We further agree to complete the work covered in the said schedule of quantities within **6 months** from the 15th day reckoned from the date of issue of the work order to commence the work or on which contractor is instructed to take possession of the site, whichever is later.

I/We agree not to employ Sub-contractors other than those that may be specifically approved by your Architects for this contract work.

I/We agree to pay the Government, General and GST (State and Central), Excise and Octroi duties, Insurance, labour cess and all other taxes including works contract tax and GST etc., as the prevailing from time to time, on such items for which the same are leviable, and to get the work, workers, employees (of contractor, Architect & Employer) engaged on the work at site and all materials at site for execution of the work shall be insured comprehensive insurance including fire/accidents/ rain/ floods/riots/CAR policy (contractor's all risk insurance policy) and the insurance shall cover the period from date of start of work to date of actual completion of work plus 3 months. In case part work is taken over by the Employer before final completion of the whole work, such parts may not be covered by the insurance from the date of taking over that part of work by the Employer. Draft Insurance deed will be got vetted by the Architect, before

obtaining the same. All the rates quoted by me/ us are inclusive of the same in full and nothing extra shall be claimed anytime on account of any of these.

I/We agree to pay Income tax, to be deducted at source, at the rate prevailing from time to time on the Gross value of the work done, and the rates quoted by me/we are inclusive of same.

I/We agree to pay works contract tax, seigniorage fee to be deducted at source, at the rates prevailing from time to time as per Telangana Govt. Act, as amended and rates quoted by me/us are inclusive of the same.

Yours faithfully,

Contractor's Signature

Address: Date:

_____

_____

_____

_____

2. NOTICE TO CONTRACTOR

ADDRESS:

_____

_____

_____

PROJECT: EXTERNAL ELECTRICAL WORKS FOR THE CONSTRUCTION OF DWARAKAPURI COLONY BRANCH & TOP EXECUTIVE GUEST HOUSE AT DWARAKAPURI COLONY, PUNJAGUTTA, HYDERABAD.

REF : EXTERNAL ELECTRICAL WORKS

Dear Sirs,

1. On behalf of our clients, The Assistant General Manager,(P&E) State Bank Of India, Premises and Estate Department, Local Head Office, Bank Street, Koti, Hyderabad – 500001, we have pleasure in inviting you to tender for the aforesaid work.

2. The scope of work broadly as given below is for **EXTERNAL ELECTRICAL WORKS FOR THE CONSTRUCTION OF DWARAKAPURI COLONY BRANCH & TOP EXECUTIVE GUEST HOUSE AT DWARAKAPURI COLONY, PUNJAGUTTA, HYDERABAD.**

3.

4. Pre bid meeting as per date mentioned at NIT will be conducted at below Address :

   Premises and Estate Department , Third Floor , SBI LHO Building , Bank Street, Koti, Hyderabad – 500 001

5. **Tender Documents should be filled and uploaded on the site of** M/S e-procurement Technologies Limited. E-mail: **anshul@auctiontiger.net**

6. The tenderer must obtain for himself, on his own responsibility and at his own expenses, all the information which may be necessary for the purpose of filling this tender and for entering into a contract for the execution of the same and must examine the drawings and inspect the site of the work and acquaint himself with all local conditions and matters pertaining thereto.

5. Each of the tender documents page is required to be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General conditions etc., as laid down. Any tender with any of the documents not so signed will be rejected.

6. The tender documents must be filled in English and all the entries must be made by hand and written in ink. If any of the documents are missing or un-signed, the tender shall be considered invalid.

7. Each and every one of all erasures and additions/alterations made, while filling the tender, must be attested by initials of the tenderer. Over-writing of figures must be attested by initials of the tenderer. Overwriting of figures is not permitted. Failure to

comply with either of these conditions will render the tender void. After submission of the tender no advice or any change in rate or conditions will be entertained. All the rates should be quoted both in figures and words. In-case of any discrepancy in rates quoted in words/figures and the amounts, the rate quoted in words shall be taken as final and binding.

8. The tender shall be valid for a period of 90 days from the date of opening.

9 TOTAL SECURITY DEPOSIT : shall comprise of:
a. Earnest Money deposit
b. Initial Security deposit
c. Retention money

9.1 The intending tenderer shall deposit with The Assistant General Manager,(P&E) State Bank Of India, Premises and Estate Department, Local Head Office, Bank Street, Koti, HYDERABAD – 500001, by Demand Draft a sum of RS. 4,35,000.00 as the Earnest Money, as a guarantee of good faith, which amount shall be forfeited as liquidated damages, in the event of any evasive/direct refusal or delay in starting the work and or signing the contract. The deposit of the unsuccessful tenderers will be returned, without interest, immediately after a decision is taken regarding the award of the contract. The Earnest money of the successful tenderer will be adjusted towards Security Deposit. A tender not accompanied by Earnest money deposit will not be considered.

9.2 The successful tenderer will have to pay further sum equivalent to 2% of his contract value, , as initial Security Deposit (ISD) by means of a D.D./Banker's cheque in favour of The Assistant General Manager, State Bank Of India, Premises and Estate Department, Local Head Office, Bank Street, Koti, HYDERABAD – 500001 within 14 days from the date of issue of work order to commence work. The EMD and Security deposit thus paid shall be held by the State Bank of India as Security deposit, for due execution and fulfillment of the contract, till the completion of the work and defect liability period in all respects and shall not bear any interest.

9.3 Together with the money paid under clause 11.1 & 11.2 above, further retention of 10% of the value of the work done will be deducted from every running bill, till total retention, including EMD and initial SD paid earlier, comes to 5% of the contract value, and same shall be held by the Bank as Total Security Deposit. On the Architect's certifying the completion of work, 50% of the total security deposit shall be released to the contractor along with the final certificate of payment, and the balance amount will be retained in the manner stated elsewhere for a further period of twelve months after the completion date recorded in completion certificate, issued by the Architects and agreed to by the Bank. Also refer condition 23(ii) .

10. Within 7 Days of the receipt of intimation from the Architects of the acceptance of his/their tender, the successful tenderer shall be bound to sign an agreement, on a stamp paper in accordance with the Draft Agreement and conditions of contract attached herewith, but the work order or the written acceptance of a tender by the Employer will constitute a binding agreement between the Employer and the person tendering whether such formal contract is or not signed by the contractor.

11. All compensation or other sums of money payable by the contractors to the clients, under the terms of this contract, may be deducted from the Security Deposit or from any sum

that may be or may become due to the contractor on any account whatsoever, and in the event of the Security deposit being reduced by reasons of any such deductions, the contractor shall within 15 days of being asked to do so make good in cash or cheque, any sum which have been deducted from his security deposit.

12. The rates quoted by the Contractor shall include all eventualities, such as heavy rain, sudden floods, accidents, fire, riots etc., which may cause damage to the executed work or which may totally wash out the work. Until the completion certificate is issued to the Contractors, neither the Architect nor the clients will be responsible for such damage or wash out of the construction work.

13. Time is the essence of the contract. The work should be completed **within 6 Months** from the date of commencement. The date of commencement shall be within ONE WEEK after confirmation.

a) The day two weeks from the date of issue of work order.

Or

b) The day on which the contractor receives the possession of the site which ever is later.

Or

c) The contractor is asked in writing to take over the possession of the site.

The successful contractor will have to give a CPM/PERT chart of various activities of work to be done so that the work gets completed within the stipulated time. The chart shall be submitted within 15 days from the date of acceptance of the tender.

14. If the contractor fails to complete the work by the Scheduled date of completion or within any sanctioned extended time, he will have to pay liquidated damages at the rate of ½% of contract amount for each week of delay the work remains incomplete beyond the completion (Original / extended date), subject to maximum of 5% of the contract value (without extra items) as per clause 31 of the General conditions of contract.

15. The quantities contained in the Schedule are only indicative. The work as actually carried out and done will be measured up from time to time, for which payment will be made subject to the terms and conditions of contract.

16. The unit prices shall be deemed to be fixed prices. In case of extra items, a record of labour charges paid shall be maintained and shall be presented every month for extra/substituted items regularly to the Architects for checking. The settlement will be made based on figures arrived at jointly and taking into account unit prices of items of work mentioned in the contract assigned to the successful tenderers. In case, of extra items, where similar or comparable items are quoted in the tender, extra rates shall invariably be based on those tender rates to the extent reasonable.

17. Our clients, The Assistant General Manager(P&E), State Bank Of India, Premises and Estate Department, Local Head Office, Bank Street, Koti, **HYDERABAD – 500001**, do not bind themselves to accept the lowest or any tender and reserve to themselves the right to accept or reject any or all tenders, either in whole or in part, without assigning any reason whatsoever for doing so.

18. No employee of the SBI bank is allowed to work as a contractor for a period of two years of his retirement from bank service, without the previous permission of the bank. This contract is liable to be cancelled, if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of the bank as aforesaid before submission of the tender or engagement in the contractor's service.

19. The tenderer, apart from being a competent contractor must associate himself with agencies of the appropriate class who are eligible to tender for (1) INTERIOR (2) Air conditioning works (3) Fire fighting systems & (4) Interiors (fixed furniture), 5) Electrical Contractors as the case maybe.

20. Release of security deposit:

    i) 100% of Retention money will also be released as noted under(i) above, subject to submission of a Bank Guarantee, to the satisfaction of SBI for an equivalent amount. This Bank Guarantee shall be valid upto completion of defects/removal liability period plus 3 months.

ARCHITECTS:

M/S abhikram-s
architects, interior designers, urban planners
valuers & project managers
#3-6-134 FLAT NO 302
SVC ROYAL DM APARTMENTS
STREET NO 18, HIMAYATNAGAR
HYDERABAD-500029
ph.no 040-35561296
abhikramarchitects@gmail.com

3. ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made the _____ day of _____ 2025 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 **M/S ABHIKRAM-S Architects, Interior Designers, Urban Planners, Valuers & Project Managers. #3-6-134, Flat No-302, SVC Royal DM Apartments, Street No-18, Himayat Nagar, Hyderabad-500029.**

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 **M/S ABHIKRAM-S Architects, Interior Designers, Urban Planners, Valuers & Project Managers. #3-6-134, Flat No-302, SVC Royal DM Apartments, Street No-18, Himayat Nagar, Hyderabad-500029.** 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 over-rule 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 **6 Months** 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 _____ 2025

Signed by the said in the presence of:

WITNESS : SIGNATURE

NAME :

ADDRESS : EMPLOYER

WITNESS : SIGNATURE

NAME :

ADDRESS :

APPENDIX TO GENERAL CONDITIONS OF CONTRACT

1.	Earnest Money Deposit (EMD)	:	Rs. 82,000/-
2.	Initial Security Deposit (ISD)	:	2% of contract value including EMD.
3.	Period of completion	:	6 Months.
4.	Defects Liability period	:	12 months after completion as recorded in the completion certificate.
5.	Agreed Liquidated Damages	:	½% of contract amount per week of delay subjected to a maximum of 5% of contract value.
6.	Period of final measurement	:	Three months after completion as recorded in the completion certificate.
7.	Minimum value of work to be Executed for issue of interim Certificates for making payment	:	Minimum Rs.25.00 Lakhs
8.a)	Retention money from each bill	:	10% of gross value of each interim bill, subject to 8(b) below.
b)	Total retention money including Earnest money and initial security Deposit	:	5% of the contract value.
9.	Release of Security deposit after Virtual completion.	:	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.

10.	Period for honoring certificate	:	15 working days from date of Architects certificate of payment for interim bills and 45 working days for final certificate.
11.	Price Variation Adjustment	:	NO PVA Clause

WITNESS :

DATE : SIGNATURE OF THE CONTRACTOR WITH DATE

GENERAL CONDITIONS OF CONTRACT

INTERPRETATIONS:

In constructing these conditions and the specifications, schedule of quantities and contract agreement, the following words shall have the meaning herein assigned to them except where the subject or context otherwise required:

a. "Employer" shall mean Asst.General Manager (Premises & Estates), State Bank of India, LHO, Koti, Hyderabadand shall include his/their heirs, legal representatives, assignees and successors.

b. "Contractor" shall mean _____
_____
and shall include his/their heirs, legal representatives, assignees and successors.

c. "Banks Engineer" shall mean any Engineer who is employed by State Bank of India or any other Engineer appointed from time to time by the Employer, and certified in writing to the Architect and the contractor, to act as Engineer for the purpose of the Contract in place of the said engineer.

d. "Employer's Representative" shall mean Project Management Consultants employed by the Bank/any assistant of the Engineer or any site engineer/ PMC appointed from time to time by the employer to perform the duties set forth in clause 17 hereof whose authority shall be notified in writing to the Architect and Contractor by the EMPLOYER.

e. "Architects" shall mean any Engineer/ representative appointed by **M/S ABHIKRAM-S Architects, Interior Designers, Urban Planners, Valuers & Project Managers. #3-6-134, Flat No-302, SVC Royal DM Apartments, Street No-18, Himayat Nagar, Hyderabad-500029.**

f. "Works" shall mean the works to be executed in accordance with contract specifications, quantities etc.

g. "Contract" shall mean the Articles of Agreement, the General Conditions, Special Conditions, the Appendix, the Schedule of Quantities, Specifications and drawings, work order etc., attached hereto and duly signed.

h. "Contract Price" shall mean the sum named in the Tender, subject to such amount additions thereto or deductions there from as may be made under the provisions, hereinafter contained.

i. "Site" shall mean the lands and other places as shown on the site plan, on which the works are to be, provided, by the Employer or Architect for the purpose of the Contract.

j. "Drawings" shall mean the drawings referred to in the contract etc., and any modifications of such drawings approved in writing by the Architect and the Bank and such other drawings as may from time to time be furnished or approved in writing by the Architect and Employer.

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

l. "Act of Insolvency" shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act, or the Provincial Insolvency Act or any act amending such original.

m. "Net Prices" if in arriving at the Contract Amount, the contractor has added to or deducted from the total of the items of the Tender any sum, either as a percentage or otherwise, then the net price of any items, in the tender, shall be the sum arrived at by adding to or deducting from the actual figure appearing in the Tender, as the price of that item, a similar percentage or proportionate sum. Provided always that in determining the percentage or proportion of the sum so added or deducted by the contractor, the total amount of any Prime cost items and provisional sums of money shall be deducted from the total amount of the Tender. The expression "net rates" or "net prices" when used with reference to the contract or account shall be held to mean rates or prices so arrived at.

n. "Virtual Completion" shall mean that the building is in the opinion of the Architect and Employer, sufficiently completed for occupation by the Employer, in relation to the scope of work of this contract.

o. Words importing persons include firms and corporations. Words importing the singular only, also include the plural and vice versa, where the context requires.

Words importing persons include firms and corporations. Words importing the singular only, also include the plural and vice verse where the Context requires.

1.0 SCOPE OF WORK

The detailed scope of the work is given in the BOQ

2.0 SITE AND ITS LOCATION

The proposed work is to be carried out at the site whose address is given in the NIT.

3.0 BID DOCUMENTS

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

- NIT
- General Conditions of Contract
- Price Bid

3.2 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
- General Conditions of Contract
- NIT

3.3 Complete set of Bid documents can be downloaded from the Bank's website http://www.sbi.co.in under "SBI in the News" link "procurement news" and also at our e-procurement agency's portal https://etender.sbi during the period mentioned in the NIT.

4.0 BID PREPARATION:

4.1 The Bidder is advised to inspect the site and satisfy himself on his own responsibility and his own expenses all the following information and data which may be required for the purpose of preparation and submission of their bids:

i) The location of the Panel, DBs, Meter Board, Earth Pits etc

ii) Required civil work like making opening in the wall for cable entry, chipping the wall for concealing the conduits, DBs, space and provision for erection of panel

iii) feasibility for laying the cables and its route

iv) Security gate pass requirements

v) Storage space for the materials

vi) Permissible working hours at the site

vii) any other adverse conditions or hindrance for executing the work

viii) traffic regulations, law &order situations in the area

ix) Whether electrical work has to be executed in coordination with other agencies like interior, AC, Civil contractor etc

4.2 The Bidder will be fully responsible for considering the financial effect of any or all the above factors while submitting his Bid. The SBI or Bank shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder regardless of the conduct or outcome of the bidding process.

5.0 CLARIFICATION /AMENDMENTS AND CORRIGENDUM:

5.1 Bidder requiring any clarification of the bidding document may notify us in writing at the address/by e-mail given in the NIT within the date/time mentioned.

5.2. The clarifications to the queries received or amendments in the tender will be posted on the Bank's website and e-tender portal as a corrigendum/Addendum. No individual communication will be conveyed to the Bidders. The interested parties/Bidders are advised to check the above website regularly till the date of submission of Bid document and ensure that clarifications / amendments issued, if any, have been taken into consideration before submitting the Bid. Such amendments/clarifications, if any, issued by the Bank will be binding on the participating Bidders. SBI will not take any responsibility for any such omissions by the Bidder. SBI, at its own discretion, may extend the deadline for submission of Bids in order to allow prospective Bidders a reasonable time to prepare the Bid, for taking the amendment into account.

5.3 Depending upon the site conditions and the Bank's requirements, a pre-Bid meeting, if required, will be held on the date and time specified in the tender which may be attended by the interested Bidders or their representatives and get their queries clarified.

5.4. SBI reserves the right to amend, rescind or reissue the tender, at any time prior to the deadline for submission of Bids.

5.5. No request for change in commercial/legal terms and conditions, other than what has been mentioned in the tender or any addenda/corrigenda or clarifications issued in connection thereto, will be entertained and queries in this regard, therefore will not be entertained.

5.6. Queries received after the scheduled date and time will not be responded/acted upon.

6.0 EARNEST MONEY DEPOSIT (EMD):

6.1 The Bidder shall submit, as part of its Bid, an EMD as stipulated in the form of Demand Draft or Banker's Cheque in favour of "Assistant General Manager(P&E), Hyderabad" drawn

on any Bank in India. EMD in any other form other than as specified above will not be accepted. **Bid not accompanied by the EMD** as above **shall be rejected.** No interest will be paid on the EMD.

6.2 The EMD of the unsuccessful Bidder shall be refunded soon after the decision to award the contract is taken. EMD of successful Bidder will be retained as a part of security deposit. EMD will be returned by M/s SBI if entire 2% ISD is submitted by contractor as a single DD.

6.3 The EMD shall stand absolutely forfeited :-

a. if the finally selected bidder revokes his Bid at any time during the period when he is required to keep his Bid open for acceptance by the SBI

(or)

b. after the bid is accepted by SBI, the vendor refuses to enter into a formal agreement with the Bank

(or)

c. the bidder fails to pay the initial security deposit as stipulated

(or)

d. the bidder fail to commence the works within the stipulated time.

6.4 If the tendering process is delayed for any reason, the Bank will insist on the revalidation of the DD and the bidder has to get it revalidated and submit again.

7.0 BID SUBMISSION

7.1 Only those bidders satisfying the eligibility criteria given in the NIT need to apply. Tenders should be submitted online in the website https://etender.sbi. Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. The server time (which is displayed on the online portal dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission. Bidder will be responsible for any delay due to other issues.

7.2 The bidders should submit their bids online with their valid digital certificate, which confirms that the bidders have read and understood the tender terms and conditions. Claiming ignorance of all the terms and conditions in this tender either before or after the PO is issued or during the progress of the work will not be accepted.

7.3 The bidder shall submit the documents enlisted in the checklist in the NIT in the softcopy format. ie scanned copy of the documents either in PDF or JPEG format as required. The SBI will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders. The bidder should see that the bid documents submitted should be free from virus and if the documents could not be opened, due to virus, during tender opening, the bid is liable to be rejected.

7.4 The documents submitted online in the **Technical Bid should NOT contain any price information.** Such Bid, if received, will be rejected**.**

7.5 The bidder shall submit his quotes **online** through the PRICE BID in the e-procurement portal. The price bid will be opened only if the Bid is **unconditional** and the bidder qualifies as per eligibility criteria and meets technical specifications**.**

7.6 If required, SBI shall conduct e-reverse auction among the qualified bidders and the same shall be communicated to the bidders.

7.7 No claim for submission of offline bids will be entertained. Such bids will not be considered.

8.0 PRICE BID: RATES QUOTED BY BIDDER

8.1 The contractor shall satisfy himself before Bidding as to the correctness and sufficiency of his Bid for the works and the rates/ amounts stated in the schedule of quantities and / or the schedule of rates and amount as provided covering all his obligations under the contract and all matters necessary for proper completion of the works expected in this document.

8.2 The rate quoted shall be firm and shall include costs of all materials, loading, transport, unloading, Installation charges, wastage of materials during execution, levies, Octroi(if applicable), local body taxes(if applicable), all type of Insurance Charges, temporary works such as scaffolding, cleaning, overheads, profit, statutory expenses, incidental charges and all related expenses to complete the work etc..

8.3 Unless otherwise provided in the Schedule of Quantities/Specifications, the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the work and No extra charges will be paid over and above the contract amount on account of any other charges (existing or future addition) or on any other account.

8.4 The GST shall be paid extra as applicable.

8.5 Rate Revision in the contract amount is not permitted during the validity period of the contract for any reason including during the extended period, if any.

8.6 Any request for review of the price bid after the bid opening will not be entertained.

8.7 The Bidder shall quote their offers he will be willing to execute the work, in terms of "Specific Percentage Numerical Value" (only upto two decimal places) above (+) / below(-) / at par with the total estimated cost put to bid. The same percentage offer is applicable for each and every item of the work including all sections / sub sections / sub heads of the work.

9.0 OPENING AND EVALUATION OF BIDS

9.1 The online Bids will be opened at the office of the State Bank of India, 3rd floor; Premises & Estate Dept, SBI LHO, Bank Street, Koti, Hyderabad – 500 001. 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.

9.2 In the two bid system, the technical bids will be opened at the scheduled time mentioned in the NIT. In case, if the date of opening is declared as nonworking day or Holiday, the bids will be opened on the next working day. The price bid of the qualified vendors will be opened on the same day or on a subsequent date which will be intimated to the bidders.

9.3 **VALIDITY OF BID**

Bids shall remain valid and open for acceptance for a period stipulated in this document from the date of opening of price bid. If the Bidder withdraws his/her offer during the validity period or makes modifications in his/her original offer, which are not acceptable to the Bank, without prejudice to any other right or remedy, the Bank shall be at liberty to forfeit the EMD.

10.0 **PRELIMINARY EXAMINATION**

10.1 M/s SBISPL will examine the Bids to determine whether they are complete, on required formats & accompanied by supporting Documents and the Bids are conforming to all the terms and conditions of the Bidding Document without any deviations and are generally in order.

10.2 If a Bid is not conforming to the terms and conditions, it will be rejected. However, SBISPL will have right to demand submission of more information as required, if any of the document is partly submitted. If the bidder does not respond within the stipulated time, SBISPL will reject or disqualify the bid.

11.0 TECHNICAL EVALUATION

11.1 Only those Bidders and Bids who have been found to be in conformity of the eligibility terms and conditions during the preliminary evaluation would be taken up for further detailed evaluation. Those Bids who do not qualify the eligibility criteria and all terms during preliminary examination will not be taken up for further evaluation.

11.2 During evaluation of bids, the SBI may, at its discretion ask the bidders for clarification of its bid. The request for clarification shall be in writing and no change in prices or substance of the bid shall be sought, offered or permitted. No post bid clarification at the initiative of the bidder shall be entertained.

11.3 The tenders must be unconditional. Conditional tenders leading to unknown / indefinite liability may be summarily rejected.

12.0 EVALUATION OF PRICE BIDS AND FINALIZATION

12.1 Only those Bidders who qualify in Technical evaluation would be shortlisted and the online price bid submitted by the bidder will be opened.

12.2 The L1 Bidder will be selected on the basis of net total of the price evaluation as quoted in the Online Percentage rate bidding or Reverse Auction (if conducted).

12.3 In case, the L1 amount quoted by two or more contractors is the same, such lowest contractors will again be asked to submit sealed / online " Revised + Percentage Offers" on the original Estimated Cost of tender but the revised percentage shall, in no case, be higher than the percentage quoted during their initial offer for the project. The L1 shall be decided on the basis of revised offers.

12.4 The process of online rebidding amongst the two or more contractors offering same rates shall continue till L1 bidder is discovered. If required, SBI shall conduct reverse auction to discover the L1 bidder.

12.5 In case, any of such contractors or all contractors (who have quoted same tender amount in the initial bidding or subsequent bidding) refuse to submit revised offer, it shall be treated as "Withdrawal of tender" by the Contractor before acceptance by SBI and the EMD of such contractors shall be forfeited and they shall not be allowed to participate in the re-tendering process for the work.

12.6 If the final L1 bid is unreasonably low ie L1 bid is less by 10% or more of the Estimated Cost, the contractor shall submit additional Security Deposit in the form of PBG for an amount equal to difference in the estimated cost vis-a-vis final tender amount quoted by the L1 contractor.

12.7 If the L1 bidder refuses to give the PBG, then the EMD will be forfeited and the tender will be re-invited. The L1 bidder will not be allowed to participate in the retendering process.

13.0 CONTACTING THE SBI BANK:

13.1 No Bidder shall contact SBI or Bank on any matter relating to its Bid, from the time of opening of Price Bid to the time the Contract is awarded.

13.2 Any effort by a Bidder to influence SBI or Bank in its decisions on Bid evaluation, or contract award may result in rejection of the Bid.

14.0 AWARD OF WORKS

14.1 SBI will award the Contract to the successful Bidder whose Bid is the lowest evaluated Bid.

14.2 SBI / Bank reserves the right at the time of award of contract to increase or decrease the quantity of work and / or services from what was originally specified while floating the tender, without any change in unit price or any other terms and conditions.

14.3 **SBI's RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS**

SBI reserves the right to accept or reject any Bid in part or in full or to cancel the Bidding process and reject all Bids at any time prior to award of the contract, without incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the SBI action.

14.4 The acceptance of a tender rests with the Competent Authority, who does not bind himself to accept the lowest tender and reserves to himself the authority to reject any or all of the tenders received, without assigning any reasons. All tenders in which any of the prescribed conditions are not fulfilled, or are incomplete in any respect are liable to be rejected.

14.5 The notification of award will constitute the formation of the Contract. The selected Bidder should convey acceptance of the award of contract by returning duly signed and stamped duplicate copy of the PO within 15 days of receipt of the communication and to enter into an agreement with the Bank.

15.0 INITIAL SECURITY DEPOSIT

15.1 Initial security deposit shall be 2% of contract value in favour of the Bank, unless or otherwise specified.

15.2 The successful Bidder will have to submit ISD by means of D/D within a period of 15 days of acceptance of Bid

15.3 No interest shall be paid on the amount retained by the Bank as Security Deposit.

16.0 SIGNING OF CONTRACT DOCUMENTS

The successful Bidder shall be bound to execute the Agreement within 15 days from the receipt of intimation of acceptance of his Bid by SBI. However, the written acceptance of the Bid by the SBI will constitute a binding agreement between the Bank and successful Bidder pending execution of formal agreement. All expenses, stamp duty and other charges/ expenses in connection with the execution of the Agreement as a result of this tendering process shall be borne by the successful bidder.

17.0 EXECUTION OF ELECTRICAL WORKS:

17.1 The Contractor shall carry out and complete the Electrical work as per standard specifications / as stipulated in this contract and relevant IS recommendations in coordination with other agencies like Interior, AC and civil contractors and to the satisfaction of the Bank / SBI with approval of Bank issue further written instructions, detailed directions and explanations with respect to the specifications, quality or quantity of works or the addition or omission or substitution of any work.

17.2 **METER BOARD:**

The Main DB/Meter Board shall be provided in the place free from leakages and in a covered location. The Meter Board shall be as per TSSPDCL requirements and shall be fixed firmly on the wall. Any opening made in the wall for feeder cable entry should be sealed properly after installation to avoid entry of rodents and rain water. The meter Board shall be properly earthed as per the regulatory requirements.

17.3 LT PANEL INSTALLATION:

Panel shall be covered properly to prevent dust, contamination & damage during transportation. In case of damages during transportation or unloading etc, the same shall be rectified and made to perfection before installation. No excuse for delay on account of the above will be accepted.

For floor mounted panel, the exact location of the panel and fixing holes to be marked on the concrete plinth for the installation. Install the panel in proper alignment and fix properly. Tighten all the connections as required. Access around the panel to be provided as per regulatory requirements for future maintenance. Ensure the services like AC drain lines or water pipe lines or sewage lines are away from the panel or the panel is properly protected against any accidental leakages.

Incoming and outgoing cables shall be marked/identified as per approved drawing. All components of the panel shall be verified against the approved panel drawing for correct rating & size. Ensure that all internal connections are proper and loose connections are tightened. All breakers (incoming/outgoing) shall be in "OFF" position and to be locked to prevent mishandling

Before commissioning. All earth terminals of the panel are firmly connected to the designated earth pits with suitable size of GI strips as required. Check whether the metering equipment and indication lamps are working as desired and rectify the defects, if any. After installation, the panel shall be properly cleaned and protected to prevent dust & contamination.

17.4 **INSTALLATION OF DBs** :

All DBs wall mounting and floor mounted arrangement shall be in accordance with BOQ and the approved material. Ensure that painting of the wall is completed prior to marking and mounting of DB. Confirm label/marking to ensure that is the correct DB and check the position according to the approved layout and mark the fixing position of the DB's support. After marking, drill according to the selected sizes of anchor bolts to appropriate depth. Permanently fix the DB to the wall/slab with anchor bolts. If there is more than one DB to be installed at the same location, they shall be installed side by side and clearance shall be maintained for easy maintenance and trouble shooting. The height of Distribution Board shall be maintained so that easy access for termination of cables and other maintenance work can be carried out. Cut-out shall be made for inserting the wire in DB and same cut out shall be provided with a rubber gasket so that there will be no sharp edges and secure the wire insulation from damage.

Wire inserted in the DB shall be cross-checked for existing circuit number and **final ferruling** shall be done. Wire in DB shall be used cable tie and dress with bunching of the **phase-neutral and earth and suitably lugged to the respective MCBs and Bus bar**. **Bunching shall be done as per phase separation respectively R, Y and B**. After Crimping insulation sleeves shall be provided in the Wire/ Cable to avoid accidental short circuit between the adjacent terminals.

DBs shall be provided with body earthing connections as per provisions available in the DB. Identifications labels of approved engraved type nameplate/Radium stickers of suitable font size shall be fixed on DB. After complete termination of wire/cable same DB compartment shall be cleaned before fixing the door.
When the DB is fixed on the partition care should be taken to ensure the holding capacity of the partition, to avoid the DB from falling and getting damaged or causing injury. The installation of DB shall be done in such a way to add to the ambience of the Branch. It shall be firmly fixed on the wall / partition.

17.5 LAYING OF LT CABLE

17.5.1 IN CABLE TRAY:

Wherever the cable trays are provided, the cables shall be laid in the cable tray. The cable shall be laid from one end of the route or any other suitable point as per site conditions. Wherever the cable needs to be bended, the cables bending radius shall conform to the cable manufacturer's recommendation. Prior to cable cutting, check both ends to make sure there is sufficient length for proper dressing and end termination. After cable laying is finished, all cables shall be tested for insulation resistance. Install the cable tags, dress the cables and clamp it as per the standards. Whenever, single core cables are used, Trefoil (three-foil formation) laying shall be used with single-core cables.

17.5.2 LAYING THE LT CABLE UNDERGROUND:

A trench of about 1.5 meters deep and 45 cm wide is dug. Then the trench is covered with a 10 cm thick layer of fine sand. The cable is laid over the sand bed. The sand bed protects the cable from the moisture from the ground. Then the laid cable is again covered with a layer of sand of about 10 cm thick. When multiple cables are to be laid in the same trench, a horizontal or verticle spacing of about 30 cm is provided to reduce the effect of mutual heating. Spacing between the cables also ensures a fault occurring on one cable does not damage the adjacent cable. The trench is then covered with bricks and soil to protect the cable from mechanical injury. The LT Cable route markers shall be provided as per standards.

17.5.3 The end termination shall be provided as per the cable size. Unless specified, the termination shall be single compression type glands of proper size and lugs shall be suitable for termination as per the point of termination like switchgear terminals, Bus bar, terminal connectors etc. Only the respective metal lugs shall be used for termination. Aluminium lugs shall not be used to terminate in the copper bus bars or vice versa.

17.5.4 The cables from the Panel to DB or from Main DB to Sub DBs should be duly fixed with suitable size clamps if laid in the wall. If more number of cables are to be laid, then they shall be laid in cable trays of suitable size firmly fixed to the ceiling with threaded rods.

17.5.5 To avoid rodent menace, the contractor shall close all openings made by him in the wall, the unused knockout holes in the DB, Panels, Junction Boxes with suitable dummies, Blanking plates etc and also provide sufficient protection to the panels, DB. No claim for additional amount towards rectifying the work on account of damages caused by rodents will be entertained during the defects liability period.

17.6 CONDUITS:

Unless otherwise specified all wiring shall be in rigid PVC conduit embedded in wall, or ceiling or concealed in the false ceiling. The size of conduits shall be selected in accordance with the IS regulations and the minimum size of the conduit shall be 20 mm dia unless otherwise indicated or approved. Conduits shall be kept at minimum of 100 mm from the pipes of other non-electrical services.

Separate conduits and runways shall be used for:

1. Lighting system.
2. Power outlets.
3. Emergency light.
4. Telephone system.
5. Fire alarm system.
6. Sound / public address system.
7. Television system.
8. Computer system.

Wiring for short extensions to outlets in hung ceiling or to equipment, motors etc. shall be installed in **flexible MS conduits**. Otherwise rigid conduits shall be used. PVC conduits shall not be used in outdoor system. Conduits shall be free from sharp edges and burrs and grease or oil shall not be used for the purpose of pulling the wire. The entire system of conduits must be completely installed and rendered electrically continuous before the conductors are pulled in.

All PVC conduits shall be jointed with plain PVC couples using approved PVC jointing materials as recommended by the manufacturer. All joints shall be water tight. Junction between conduit and adaptable boxes, back outlet boxes, switch outlet boxes and the like must be provided with entry spouts and smooth PVC bushes.

17.6.1 **LAYING OF CONDUITS IN SURFACE:**

Conduits run on surfaces shall be supported on galvanized / PVC saddles which in turn are properly screwed to the wall or ceiling. Saddles shall be at intervals of not more than 60 cm. Fixing screws shall be with round cheese head or and rustproof materials. Exposed conduits shall be neatly run parallel or at right angles to the wall of the building. Pull boxes must be provided at the right angles and at a distance of not exceeding 20 meter

17.6.2 CONCEALING THE CONDUITS IN THE WALL:

Conduits embedded into the walls shall be fixed by means of staples at not more than 60 cm intervals. Chase in the wall shall be neatly made and refilled after laying the conduit and brought to the finish of the wall.Chasing shall be done with the wall cutting machine. Hammer and chisel shall be used on chased portion to get uniform depth of 50 mm. Uniform depth of 50 mm shall be maintained on chased portion. Conceal Back box shall be installed by using cement mortar. Alignment of the back box shall be done by using a calibrated spirit level. PVC adaptor shall be used for connection between JB and conduit. PVC solvent shall be used.PVC solvent cement shall be applied on conduit before interconnection. Embedded JB shall be protected by covering with brown tape filled with jute/gunny bag. Cement mortar 1:5 ratio(1 portion of the cement+5 portion of sand)shall be used for patchwork in chased area. Chicken (wire) mesh and GI nails shall be used for all chasing width of the embedded conduit. Curing shall be carried out for a minimum of three days.

17.6.3 CONCEALING IN THE CONCRETE:

Conduits buried in concrete structure shall be put in position and securely fastened to the reinforcement and got approved by the consultant/Engineer before the concrete is poured. Proper care shall be taken to ensure that the conduits and boxes are neither dislocated nor choked at the time of pouring the concrete. Suitable fish wires shall be drawn in all conduits before they are embedded. Inspection boxes shall be provided for periodical inspection to facilitate draw and removal of cables. Such inspection boxes shall be flush with the wall in the case of recessed conduits. Inspection boxes shall be spaced at not more than 12 meters apart or two 90 degree solid bends or equal.

17.7 WIRING AND ACCESSORIES:

17.7.1 LAYING OF WIRES:

Unless otherwise specified all wires shall be FRLS PVC insulated single core, stranded copper conductor. All wires shall be colored as follows:
Phase R: Red Color of wire
Phase Y: Yellow Color of wire
Phase B: Blue Color of wire
Neutral: Black
Ground: Yellow Green or Green (One color only to be used for the complete Installation).
The size of wires shall be as indicated in the drawings or in the BOQ.
When more than one wires are installed in the same raceway, they should be pulled in the raceway at the same time. Use guide wires and similar equipment when wire pulling, to support the tension and avoid possible damage. Conductor splices must be enclosed in junction boxes. Use a minimum of 300mm of slack conductors inside DB and at each outlet as needed. Ensure proper wire installation in all boxes. After installation, the Wires Insulation Test should be conducted.

17.7.2 SWITCH BOARDS AND POWER OUTLET SOCKETS:

Switch Boards for light points, socket outlets, power outlets, pull / junction boxes shall be of galvanized steel, and shall be of shapes and size to suit their respective locations and installations and shall be provided with covers to suit their function and installation. All outlet boxes shall be provided with brass ground terminals. All junction boxes/pull boxes shall have suitable covers. Surface mounted outlet and junction boxes in the outdoor locations shall be of weatherproof. The surface mounted indoor boxes shall be of sheet steel painted or PVC for surface installation. For internal use Switches shall be of the grid assembly pattern with rocker operated switch units suitable for operation with inductive loads. Switches shall be either one way or two way as specified in the BOQ. Switch plates shall be of suitable shade and size as specified in BOQ or approved by SBI. Surface installation switches shall be provided with matching steel box.

17.7.3 CIRCUIT WIRING

Unless and otherwise specified in the BOQ, all sub main circuit conductor sizes for lighting and appliances, shall be as shown in the schedule of quantities. Each circuit phase wire from the distribution boards should be followed with a separate neutral wire of the same size as the circuit wire or as specified in the BOQ. For the light/fan point wiring individual phase, Neutral and Earth wires shall be run from the switch board to the respective ceiling rose. Looping of neutral and Earth wires for adjacent light points are not allowed except for the secondary points. For the secondary points Neutral and Earth looping should be done only from the respective primary points. This will avoid nuisance tripping of ELCB/RCCB in case of leakage and identifying the faulty circuit and rectifying will be easy. Each light point and outlet shall be identified with their circuit number and DB number with a label pasted on them. Flexible cords for connection to appliances, fans and pendants shall be 250/440V grade, three or four cores, with tinned stranded copper wires, insulated, twisted and sheathed with strengthening cord. If demanded by SBI, the contractor shall supply a certificate issued by the manufacturer of wires and switches stating origin, date of manufacture, batch number and standard to which it complies and the test certificates. Looping system of wiring shall be used. Wires shall not be jointed. Where joints are unavoidable, these shall be made through approved mechanical connector. 230 V power supply wiring shall be distinctly separate form any other different voltage system and lighting wiring.

17.7.4 CONTROL SWITCHES

Control switches shall be connected in the phase conductors only and shall be 'ON' when knob is down. Switches shall be fixed in galvanized steel boxes. Chromium plated screws shall be used. The rating of the Switches shall as per the BOQ.
For the UPS power sockets provided in the workstations and counters, the control switches shall be provided separately above the counter and the sockets below the counter.
Similarly, for the wall mounting fan points, the control switches shall be provided separately in the Switch board and the socket outlet provided near the wall mounted fans.

17.7.5 TESTING OF ELECTRICAL WIRING SYSTEM

The entire installation shall be tested in accordance with IS regulations for:

1. Insulation resistance.
2. Earth continuity.
3. Polarity of single pole switches.

17.8 LIGHT FIXTURE INSTALLATION:

17.8.1 Inspect the site to install light fixtures as per approved lighting layout. If any mismatch is observed between the approved layout and the actual layout, please consult the SBI Engineer and replan the lighting layout to suit the actual site conditions.
If there is no false ceiling, chalk lines (geru powder cement colour removable type) shall be used to mark the spacing of light fixtures as per approved drawing. After marking, the light fitting support and accessories shall be fixed. Wires shall be connected to the connector of light fitting as per standard. Light fitting shall be mounted on the support fitted. Line level and final alignment shall be checked with line dori.

17.8.2 **INSTALLATION OF LIGHT FIXTURES IN THE FALSE CEILING**:

While installing light fixtures in the false ceiling, the contractor has to check the distance between the roof and the false ceiling and ensure that the sufficient height is available for fixing the light fixtures and if requires any change in the lighting layout. Any hindrance like beams, sewerage pipe lines, electrical cables etc. has to be informed to the SBI Engineer and necessary guidance obtained before installation. Support to hang the fixture to be provided in the roof with suitable length of chain links or GI wires of suitable size, as per recommendation of the light manufacturer. The supports shall be of sufficient length to enable change of location of fixtures to the adjacent grid/cutout, if required by Bank. The supports should not be fixed to the pipes or cables or electrical conduits running above the false ceiling. The Light fixtures should not be loosely laid on the false ceiling grid without any support.

17.8.3 In case of the Gypsum false ceiling, the marking shall be made in the false ceiling first as per the lighting layout and the cutout shall be made in coordination with the interior contractor. Wherever required, the suitable frame required have to provided by the contractor for the 2'x2' fixtures.

17.8.4 The cutouts for the light fixtures and down lighters shall be properly marked in the false ceiling to make the cutout neatly and as per the desired lighting layout. Nylon line dori shall be used to ensure that all light fixtures are in a straight line

17.8.5 If the works involves, some architectural features in the false ceiling, the contractor shall consult the interior contractor and SBI Engineers before installation of light fixtures, ceiling fans, laying of cables above false ceiling to avoid any damage or any hindrance to the proposed architectural features.

17.9 EARTH STRIPS / CABLE TRAYS:

17.9.1 GI/COPPER STRIP LAYING:

Before installation of GI and copper earth strip, the inspection shall be carried out to confirm size, quantity and galvanizing of GI strip. Arrangement shall be made for proper scaffold for strip laying on the tray. Check wall and beam finishing before strip clamping on the wall and beam. Ensure that all Earth strip installation are straight. The earth strip route and size shall be confirmed/verified with approved earthing drawing.
Ensure that there is no overlapping in strips at joints. Where required for Joint area, use "C" type holding clamp for avoiding gap between two strips. GI strip fixing inside cable tray with using of GI nut bolt at every 5 mtr.interval. Clamps shall be fixed at an interval of 1000mm. Copper to GI earth strip connection shall be done by using the bimetallic washer

17.9.2 EARTH STRIP LAYING BY WELDING ON WALL/SLAB.

Whenever longer length of Earth strips are to be Installed on wall/ slab, the overlapping in strips at joints shall be minimum. Overlapping area to be properly welded and ensure no gap in the joint area. Approved PVC sleeve shall be provided to 50x6mm and 75x10mm GI earth strip wherever accessible areas such as inside substation, all embedded portion etc. Welding joints are cleaned with wire brush and then coated with Galva brite. All paint, scale and enamel shall be removed from the contact before the earthing connections are made. All sizes of GI strips shall be fixed by using GI clamp, GI spacer, and 35x8mm GI screw with PVC nylon fasteners (PVC Grip). Clamps shall be fixed at an interval of 1000mm (in case of wall/slab).The earthing for Equipment shall be tapped from the main earth conductor/strip. Equipment earthing shall be done by GI nut bolting. Ensure GI nut bolt shall be fully tightened at equipment earthing. GI strip laid underground shall be at depth of 500mm below finished grade level. All joint below ground level shall be welded by two coats of bitumen paint. All connections to the grounding grid shall be made with earthing strip welded to the grid and bolted at equipment ends. All joints and cut ends shall be properly painted with galvabrite.

17.9.3 CABLE TRAY INSTALLATION:

Cable tray supports and cable tray material shall confirm the size, quantity and quality as per technical specification. Cable tray routes shall be cleared of any debris. Necessary cable tray route and supports shall be checked as per approved drawings. If required, make suitable size opening in the wall for cable tray entry into the building. All accessories used such as joint plate, nut, bolts with washer, bends, reducers, etc. used in cable trays shall be of the same manufacturer as that of the cable trays. Necessary Scaffolding shall be arranged wherever applicable. Throughout the work execution, safety standards shall be followed.
Chalk lines (geru powder cement colour removable type) are used to mark the cable tray route at the deck slab. After marking of supports location, drill the hole & install anchor fastener. Ceiling bracket and top hat section shall be fixed on anchor fastener. Install the threaded rod supports using with ceiling bracket as per approved drawing. Check the vertical and horizontal alignment of threaded rod support by spirit level. Supports shall be installed at spacing not exceeding 1.5 meters and all branches, bends, Endpoints supports shall be installed as shown on the approved drawings. Nylon line dori will be used to ensure that all supports are in a straight line. After the installation of supports install the proper size cable tray and check the alignment using of line dhori & Sprit level. Two lengths of cable tray shall be connected with the joint plate. Minimum clearance shall be maintained between bottom of the tray and the ceiling. End cap to be provided at end cut portion of tray.

17.10 CORE CUT:

Core cut hole shall be carried out at the site as per the site requirement after consulting Civil Engineer. Ensure marking of core cut is in line of existing cut out at the floor above or below to have vertical alignment. If more than one Core cut is required, required spacing shall be provided. Centre of core cut to be drilled with drill machine to receive core bit of machine. This

will avoid displacement of core machine bit. The Core cut Machine will be Fixed to Slab using Machine Clamp and anchor Fastener. Check that machine is firmed enough not to displaced from its location. Check the electrical supply and run the machine with minimal force. Maintain proper gaps between adjacent core cuts to allow pipe jointing in future. Upon completion of the core cut, protect the Core cut hole using the ply piece.

17.11 **CONCEALING INSIDE WALL/PARTITIONS/GROUND/CEILING :**

17.11.1 The contractor shall give due notice to the Employer whenever any work like opening for the earth pits, under ground laying of cables, concealing the conduit piping, cabling or any work is to be concealed in the wall/false ceiling/partitions or finished up or otherwise becoming inaccessible later on, in order that the work may be inspected and correct dimensions taken before concealing.

17.11.2 If the Contractor has concealed the items without informing SBI Engineer, the same shall be opened up for measurement and made good to the original finishing at the contractor's expenses. If the contractor refuses to do so, then the same will not be considered for measurement and no payment may be made for such materials.

17.11.3 The contractor shall not execute any extra work other than the Bank's or SBI written instruction. No works, for which rates are not specifically mentioned in the price bid, shall be taken up without written permission of the Bank/SBI.

17.11.4 Should any dispute or differences arise after the execution of any work as to measurements etc., or other matters which cannot be conveniently tested or checked, the decision of SBI shall be accepted as correct and binding on the contractor.

17.11.5 It is the responsibility of the Contractor to arrange/provide the tools, ladder, stands or any other gadgets or supports required for the execution of the work at site and Bank will not provide or entertain such requests.

18.0 MATERIALS, WORKMANSHIP, SAMPLES, TESTING OF MATERIALS

18.1 All the works specified and provided for in the specifications or which may be required to be done in order to perform and complete any part thereof shall be executed in the best and most workman like manner with materials of the best and approved quality of the respective kinds in accordance with the particulars contained in and implied by the specifications and as represented by the drawings or according to such other additional particulars, and instructions as may from time to time be given by SBI during the execution of the work and to his entire satisfaction. The Contractor shall use only products bearing ISI marking in the work for those materials for which no makes are mentioned in the tender.

18.2 No refurbished, second hand and spurious materials should be used. If required, the contractor has to submit the details of the source of his purchase of materials to SBI. SBI reserves its right to enquire and collect data from the supplier to confirm the authenticity of the materials. SBI has the right to stringent action against the contractor, as deemed fit, in addition to suspend / cancel the contract.

18.3 Contractor should get approval of the samples of materials in advance with SBI Engineer before use of the same in the work.Should be contractor desire to substitute any specified materials with "Equal" or "Other approved" etc., he/they must obtain the specific approval of the Bank/SBI in writing for any such substitution, well in advance.

18.4 Samples of all materials to be used must be submitted when so directed by SBI. If required, the contractor shall have to carry out tests on materials in approved materials testing

laboratories or as prescribed by SBI at his own cost to prove that the materials etc., under test conform to the relevant I.S Standards or as specified in the specifications. The necessary charges, transporting, testing etc., shall have to be borne by the contractor. No extra payment on this account will be entertained.

18.5 If the contractor has used any material which is not complying with the specifications or the workmanship is bad or the material used is substandard or second hand etc, SBIISMPL shall during the progress of the work have power to order the removal and substitution of the material or proper re-execution of the work within a reasonable time. In case the contractor refuses to comply with the order, SBI shall have the power to employ other agencies to rectify or re-execute the work at the cost and risk of the contractor.

18.6 Any damage (during the work) to any part of the work or to the premises for any reasons due to rain, storm or neglect of contractor shall be rectified by the contractor in an approved manner at no extra cost.

18.7 Should the work be suspended by reason of rain, strike, lock-outs or any other cause, the contractor shall take all precautions necessary for the protection of work and at his own expenses shall make good any damage arising from any of these causes.

18.8 When the employer observes that the progress of the work is not satisfactory or very slow or not in a workmanship manner or of poor quality or violative of safety protocols etc, the contractor shall be issued a suitable advise to rectify the same or replace the materials or redo the entire work, within a reasonable time frame. If the contractor could not rectify the things within the time frame given, in the interest of the work, the Employer reserves the right to execute any part of the work included in this contract or the entire work by any other Agency or persons and contractor shall allow all reasonable facilities and extend cooperation for the execution of such work.

18.9 All expenses consequent thereon or incidental thereto as certified by SBI shall be borne by the contractor or may be deducted from any money due to or that may become due to the contractor. No certificate, shall relieve the contractor from his liability in respect of unsound work or bad materials.

19.0 PERIOD OF CONTRACT & EXTENSION OF TIME

19.1 Time is the essence of the contract. The Contract shall be executed within the stipulated period in the NIT. No request for extension will be entertained and the bidder has to plan and mobilize his resources for the satisfactory completion of the project within the time period agreed in the tender.

19.2 If in the opinion of the Employer, the work is delayed due to the following reasons not attributable to the contractor, the employer shall make a fair and reasonable extension of time, for completion of the Contract works

a) By force majure (or)

b) By reason of any exceptionally inclement weather (or)

c) By reason of proceedings taken or threatened by or dispute with adjoining or neighboring owners of public authorities arising, than through the Contractor's own default (or)

d) By the works not referred in the Schedule of Quantities or specifications (or)

e) By reason of civil commotion, workmen strike or lock-out (or)

f) In consequence of the Contractor not having in due time, necessary instructions from the Employer for which he shall have specifically applied in writing ahead of time, giving reasonable time to prepare such instructions

19.3 In case of such strike or lock-out, the Contractor shall as soon as possible give written notice thereof to the employer, but the Contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all they may reasonably be required, to the satisfaction of the employer to proceed with the work.

19.4 In case the work is held up for any site conditions not attributable to the contractors or for any decisions instructions / want of details from Employer or for any of the conditions, the contractor shall be allowed reasonable extension of time by the employer but any claim for idle labour shall not be entertained by the employer. Contractor's quoted rates should include for all such contingencies.

20.0 PAYMENT TERMS

i) No advance payment.
ii) No part payment. For certain works, part payment will be considered if stipulated in the NIT.
iii) Payment shall be made by way of Electronic fund transfer and the bill will be paid by the Branch.
iv) Contractor should furnish details of the bank a/c no, IFSC code along with their invoices.

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

20.2 If the Bank has supplied any materials or goods to the contractor, the cost of any such materials or goods will be progressively deducted from the amount due to the contractor in accordance with the quantities consumed in the work.

20.3 The final bill shall be accompanied by a certificate of completion or Commissioning report signed by an official of the Bank. Payments of final bill shall be made after deduction of Retention Money as specified, which shall be refunded after the completion of the Defects Liability Period provided the contractor has rectified all defects to the satisfaction of the Bank. The acceptance of the payment of the final bill by the contractor would indicate that he has no further claim in respect of the work executed.

20.4 **GST as applicable shall be paid extra** and the same shall be clearly shown in the invoices.

20.5 Statutory deduction towards income tax and other taxes as and when directions from statutory bodies are received will be made at the time of making payments. Currently, I.T. will be recovered @ 2 % plus surcharge or as applicable as per Government Rules. GST-TDS as per applicable rates will be deducted, wherever applicable.

20.6 **GST:**

a. It is the responsibility of the bidder to ensure that the GST is valid and active. Payments will not be made to inactive or invalid GST invoices.
b. Reimbursement of GST will be made only on submission of proper GST invoice as per applicable GST provision. Non-GST invoices will not be accepted. The contractor should comply with the following.
c. Contractor should have GST Registration Number
d. Invoice should specifically disclose the amount of GST levied at applicable rate as per GST provision
e. In case of Correction in the bills after scrutiny,contractor should submit fresh bills for payment
f. Contractor should timely file his GST return in accordance with GST provisions to enable the bank to claim the credit of GST paid to the contractor
g. The GST Number of State Bank of India for Telangana State -36AAACS8577K1ZQ

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

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

21.0 SECURITY DEPOSIT

21.1 Retention Money**:** From each running bill, an amount at the rate of 8% of the gross value of the running bill shall be recovered as retention money, till the total retention amount including the ISD amount already with the Bank become 5% of the value of the contract amount. This amount is called as Total Security Deposit**,** which consists of two components

a) ISD - Initial Security Deposits.
b) RM - Retention Money.

21.2 The total security deposit(5%) will be kept with the Bank. The total security deposit amount shall be refunded without interest to the contractor 30 days after the end of defects liability period, provided he has satisfactorily carried out all the works and attended to rectification of all defects in accordance with the conditions of the contract including clearing the site.

21.3 The contractor shall make good at his own cost and to the satisfaction of the Employer all defects, which may appear within the defects liability period. In case of failure on the part to do so, the cost of rectifying the defects through any other agency shall be deducted from the amount of security deposit due to the contractor.

21.4 During the contract period, all compensation or other sums of money payable by the Contractor to Bank under the terms of this contract, will be deducted from the security deposit, or from any sum that may become due to the Contractor on any account whatsoever.

21.5 In the event of the Security Deposit being reduced by reasons of any such deductions, the Contractor shall within 7 days of being asked to make good, by DD, any sum which have been deducted from his security deposit.

22.0 PENALTY CLAUSE

The successful bidder shall execute the work in a workmanship like manner and complete the work within the stipulated period in the NIT. If the work is delayed beyond the stipulated period for reasons attributable to the bidder, SBI shall penalize them a penalty @ 0.5% per week for every week of delay or part thereof beyond the scheduled date of completion, in any case, not exceeding 5% of the contract value or the completed value of work.

23. VARIATION IN QUANTITY / SUBSTITUTION OF ITEM

23.1 The Schedule of Quantities unless otherwise stated shall be deemed to have been prepared in accordance with the Standard Procedure shall be considered to be approximate and no liability shall attach to the employer for any error which may be discovered therein.

23.2 The Employer reserves the right to increase or decrease or delete or omit or execute only a part or the whole or any excess thereof, as per the site requirements, without assigning any reason therefor at the time of allotment / execution of work. Contractor will be paid for the actual work done at the site. No variation shall vitiate the contract.

23.3 The tender rates shall be fixed and applicable for any increase or decrease in the tendered quantities. Nothing extra will be paid by the Bank on account of omission / deletion of items or decrease in the quantity of items. The Bank shall not entertain any claim whatsoever from the contractor on this account. Payment will be made on actual measurement of the work done. All measurements shall be as per relevant I.S. standards

23.4 Bank reserves the right to order more quantities than what is mentioned in this tender (at the same rate and terms and conditions) either at the same site or other sites as per the need within the validity of this tender.

23.5 The price of all additional items/non-tendered items will be worked out on the basis of rates quoted for similar items in the contract wherever existing. If similar items are not available, the rates for such items will be derived as per standard method of rate analysis based on prevalent fair price of labour, material and other components as required with 15% towards contractor's profit and overheads.

24. CONTRACTOR'S EMPLOYEES

24.1 The Contractor shall employ technically qualified / having appropriate skill and competent personsfully trained and adequately experienced Electricians, who are medically fit. They should be free from any contagious diseases. The Electricians shall be well mannered and properly dressed with shoes etc.

24.2 The contractor shall provide necessary training on safety measures while executing the work wherever necessary so as to avoid accident. The Bank shall not be responsible for any accident occurred or damage incurred or claims arising there from during the execution of work. The contractor shall also provide all risk insurance policy including third party insurance as may be necessary to cover the risk.

24.3 The contractor / firm shall be held responsible for any misdeeds / misbehaviour of their employees within the premises. Bank is not responsible for any damages or claims on account of the misbehavior / misdeeds of his employees. For this purpose, any person supplied by the contractor to be engaged on the work on regular basis or as an alternate arrangement, under the direct order or control of the Employer or his representative shall be deemed to be a person employed by the contractor.

24.4 The contractor shall on the request of the Employer immediately dismiss from works any person employed thereon by him, who in the opinion of the Employer be unsuitable or incompetent or who may misconduct. Such discharges shall not be the basis of any claim for compensation or damages against the Employer or any of their officer or employee.

24.5 No employee of the Bank is allowed to work as a contractor for a period of 2 years of his/her retirement from Bank Services without previous permission of the Bank. This contract is liable to be cancelled, if either the contractor or any of his employees is any time to be such a person who had not obtained the permission of Bank as aforesaid before submission of the tender or engagement in the contractor's service.

24.6 Contractor should not engage child labour in any of the activities in this contract.

24.7 The contractor shall not employ person who is not an Indian National.

24.8 The Electrician shall not over stay in the Bank premises other than the time permitted by the Bank or in the odd hours or holidays unless or otherwise required by the Branch for specific reasons like maintenance, repair works etc.

24.9 In respect of all labour employed directly or indirectly on the work for the performance of the contractor's part of work, the contractor at his own expense, will arrange for the safety provisions as per the statutory provisions, B.I.S recommendations, factory act, workman's compensation act, CPWD code and instructions issued from time to time.

24.10 The Contractor's workmen will not have any right whatsoever to get absorbed in the Bank. The Contractor shall be responsible for all the claims of the employees of the Contractor and shall not make and claim whatsoever against the Bank. The Contractor shall be responsible for all statutory requirements e.g. ESI, PF, labour registrations, Insurance coverage etc. The operator is responsible for compliance of all the rules & safety regulations etc.
Minimum wages as prescribed by the Labour Act shall be payable to the operator(s) by the contractor as the case may be. The Contractor shall bind himself and keep the Employer saved harmless and indemnified against claims if any of the workmen and all costs and expenses as may be incurred by the Employer in connection with any claim that may be made by any workmen.

25. WORKING HOURS AT THE SITE

As instructed by Bank. Contractor to ensure that the routine operations at the site are not affected by the contract work. If required, they have to work on the Bank Holidays in coordination with other agencies and Bank.

26.0 SUBCONTRACTING

26.1 The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein nor, shall take a new partner, without written consent of the Employer and no subletting shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the work during their progress

27.0 STORAGE OF MATERIALS

27.1 The contractor shall store their materials like fixtures, cables, conduits, wires, tools etc in the site with the permission of the Bank. However, the contractors shall be responsible for the custody and security of all materials and equipment at site. No claim for loss or theft will be entertained by SBI or the Bank.

27.2 Shelter or stay and other amenities for the electricians have to be arranged by the contractor at his own expense and responsibility.

27.3 On completion of the works, the contractor shall remove all tools,surplus materials, rubbish and temporary works of every kind and leave the whole of the site and the works clean and in a workmanlike condition to the satisfaction of the Bank

28.0 FORCE MAJEURE

28.1 Notwithstanding the provisions of General terms and conditions of the Contract, the contractor shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default if and to the extent that the delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

28.2 For the purposes of this clause, 'Force Majeure' means and includes wars, insurrections, revolution, civil disturbance, riots, terrorist acts, public strikes, hartal, bandh, fires, floods, epidemic, quarantine restrictions, freight embargoes, declared general strikes in relevant industries, Vis Major Act of Government, impeding reasonable performance of the Contractor and / or Sub-Contractor but does not include any foreseeable events, commercial considerations or those involving fault or negligence on the part of the party claiming Force Majeure.

28.3 If a Force Majeure situation arises, the Vendor shall promptly notify the Bank in writing of such condition and the cause thereof. Unless otherwise directed by the Bank in writing, the Vendor shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

29.0 COMPLIANCE OF STATUTORY REGULATIONS

29.1 The contractor shall conform to the provisions of any Acts of the Legislature relating to the work, and to the Regulations and Bye-Laws of any authorities like Electricity, Pollution Control Boards, Municipal Authorities, water and Sewarage boards and shall before making any variations from the drawings or specifications that may be associated to so conform, give the Employer written notices specifying the variations proposed to be made and reasons for making them and apply for instruction thereon. The Employer on receipt of such intimation shall give a decision within a reasonable time.

29.2 The contractor/s shall arrange to give all notices required for by the said Acts, Regulations or Bye-laws to be given to any authority, and to pay to such authority or to any public officer all fees that may be properly chargeable in respect of the work and lodge the receipts with the Employer. The Contractor shall indemnify the Employer against all claims in respect of patent rights, designs, trademarks or name or the protected rights in respect of any equipment, machine, work or material used for or in connection with the works or temporary works and from and against all claims, demands, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto. The Contractor shall defend all actions arising from such claims, unless he has informed the Employer, before any such infringement and received their permission to proceed and shall himself pay all royalties, license fees, damages, coat and charges of all and every sort that may be legally incurred in respect thereof.

29.3 The contractor should strictly abide by the Central/State labour regulation for the Minimum Wages, Payment of wages, Workmen Compensation, PF, ESI, Contract labour, including the latest amendments, if any and other safety regulations.

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

30.0 INSURANCE & DAMAGE TO PERSONS AND PROPERTY ETC

30.1 The insurance shall be for an amount equal to 110 percent of the value of the contract on "All Risks" basis, valid until the Completion of the project or handing over whichever is later.

30.2 Should any loss or damage occur, the Vendor shall initiate and pursue claim till settlement and promptly make arrangements for repair and / or replacement of any damaged item to the satisfaction of the Bank, irrespective of settlement of claim by the underwriters.

30.3 The contractor shall be responsible for all injury to the work or workmen to persons, animals or things and for all damages to the structural and / or decorative part of property which may arise from the operations or neglect of himself or of any sub-contractor or of any of his or a sub-contractor's employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of this contract.

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

30.5 The contractor shall affect the insurance necessary and indemnify the Employer entirely from all responsibility in this respect.

30.6 The contractor shall be responsible for anything, which may be excluded from damage to any property arising out of incidents, negligence or defective carrying out of this contract.

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

31. TERMINATION OF CONTRACT BY SBI

If the contractor being a company go into liquidation whether voluntary or compulsory or being a firm shall be dissolved or being an individual shall be adjudicated insolvent or shall make an assignment or a composition for the benefit of the greater part, in number of amount of his creditors or shall enter into a Deed or arrangement with his creditors, or if the Official Assignee in insolvency, or the Receiver of the contractor in insolvency, shall repudiate the contract, or if a receiver of the contractor's firm appointed by the court shall be unable within fourteen days after notice to him requiring him to do so, to show to the reasonable satisfaction of the SBI that he is able to carry out and fulfill the contract, and if so required by the SBI to give reasonable security therefore, or if the contractor shall suffer execution to be issued, or shall suffer any payment under this contract to be attached by or on behalf of and of the creditors of the contractor, or shall assign, charge or encumber this contract or any payments due or which may become due to contractor, there under, or shall neglect or fail to observe and perform all or any of the acts matters of things by this contract, to be observed and performed by the contractor within three clear days after the notice shall have been given to the contractor in manner hereinafter mentioned requiring the contractor to observe or perform the same or shall use improper materials of workmanship in carrying on the works, or shall in the opinion of the SBI not exercise such due diligence and make such progress as would enable the work to be

completed within due time agreed upon, and shall fail to proceed to the satisfaction of the SBI after three clear das notice requiring the contractor so to do shall have been given to the contractor as hereinafter mentioned or shall abandon the contract, then and in any of the said cases, the SBI may notwithstanding previous waiver determine the contract by a notice in writing to the effect as hereinafter mentioned, but without thereby effecting the powers of the SBI of the obligations and liabilities of the contractor the whole of which shall continue in force as fully as if the contract, had not been so determine and as if the works subsequently executed by or on behalf of the contractor (without thereby creating any trust in favor of the contractor) further the SBI or his agent, or servants, may enter upon and take possession of the work and all plants tools scaffolding sheds machinery, steam, and other power, utensils and materials lying upon premises or the adjoining lands or roads and sell the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by employing any other contractors or other persons or person 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 contractors or other persons or person employed from completing and finishing or using the materials and plants for the works when the works shall be completed, or as soon thereafter as conveniently may be the SBI shall give notice in writing to the contractor to remove his surplus materials and plants and should the contractor to remove his surplus materials after receipt by him the SBI may sell the same by Public Auction and shall give credit to the contractor for the amount so realized. Any expenses or losses incurred by the contractor for the amount so realized. Any expenses or losses incurred by the SBI in getting the amount payable to the contractor by way of selling his tools and plants or due on account of work carried out by the contractor prior to engaging other contractors or against the Security Deposit.

32.0 DISPUTES/ARBITRATION:

32.1 All disputes or differences whatsoever arising between the parties out of or in connection with this contract or in discharge of any obligation arising out of the Contract (whether during the progress of work or after completion of such work and whether before or after the termination of this contract, abandonment or breach of this contract), shall be settled amicably.

32.2 If however, the parties are not able to solve them amicably, either party (SBI or Vendor), give written notice to other party clearly setting out there in specific dispute(s) and/or difference(s) and shall be referred to a sole arbitrator mutually agreed upon, and the award made in pursuance thereof shall be binding on the parties.

32.3 In the absence of consensus about the single arbitrator, the dispute may be referred to joint arbitrator; one to be nominated by each party and the said arbitrators shall nominate a presiding arbitrator, before commencing the arbitration proceedings. The arbitration shall be settled in accordance with the applicable Indian Laws. Any appeal will be subject to the exclusive jurisdiction of courts at Hyderabad.

32.4 The Vendor shall continue work under the Contract during the arbitration proceedings unless otherwise directed by the Bank or unless the matter is such that the work cannot possibly be continued until the decision of the arbitrator is obtained.

32.5 Arbitration proceeding shall be held at Mumbai, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be in English.

33. Governing Language:

All communication with respect to the Bid, clarifications, replies, contract documents etc shall be in English.

34. Safety Guidelines for the Contractor:

The Contractor should follow the following General safety Guidelines while executing the work:

34.1 Smoking is strictly prohibited at workplace.

34.2 No one is allowed to work at or more than three meters height without wearing safety belt and anchoring the lanyard of safety belt to firm support preferably at shoulder level. Chinstrap of safety helmet shall be always on and safety boot is worn.

34.3 Usage of eye protection equipment shall be ensured when workmen are engaged for grinding, chipping, welding and gas-cutting. For other jobs eye protection has to be provided as per the need.

34.4 All safety appliances like Safety shoes, Safety gloves, Safety helmet, Safety belt, Safety goggles etc. shall be arranged before starting the job.

34.5 Excavated pits for earthing, cable laying shall be barricaded till the backfilling is done. Safe approach to be ensured into every excavation.

34.6 Preferably the work shall be carried out during the daytime. However, adequate illumination at workplace shall be ensured in case any work is carried out at night.

34.7 All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded.

34.8 Ladders being used at site shall be adequately secured at bottom and top. Ladders shall not be used as work platforms.

34.9 Debris, scrap and other materials to be cleared from time to time from the workplace and at the time of closing of work everyday. Dismantled Material shall not be thrown from the height and shall be properly disposed off to prevent any injury to public/staff.

34.10 Other than electricians no one is allowed to carry out electrical connections, repairs on electrical equipment or other jobs related thereto.

34.11 All electrical connections shall be made using 3 or 5 core cables, having a earth wire.

34.12 Inserting of bare wires for tapping the power from electrical sockets is completely prohibited and plug tops of suitable capacity only shall be used.

34.13 All the unsafe conditions, unsafe acts identified by contractors, reported by SBI/SBI tobe corrected on priority basis.

34.14 No children or physically challenged persons shall be allowed to enter the workplace and shall not be utilized for any service during execution of the work.

34.15 All the Gas cutting, sharp tools, flammable materials and tackles shall be stored properly and safely when not in use.

34.16 Clamps shall be used on Return cables to ensure proper earthling for welding works.

34.17 Return cables shall be used for earthling.

34.18 All the pressure gauges used in gas cutting apparatus shall be in good working condition and in case of any leakages, the same shall not be used.

34.19 Proper eye washing facilities shall be made in areas where chemicals are handled.

34.20 Connectors and hose clamps are used for making welding hose connections.

34.21 Tapping of power by cutting electric cables in between must be avoided. Proper junction boxes must be used.

READ, UNDERSTOOD AND ACCEPTED

FORM OF SUBMISSION OF TENDER

(To be filled by the tenderer)

The Assistant General Manager,
State Bank Of India,
Premises and Estate Department,
Local Head Office, Bank Street, Kothi,
HYDERABAD – 500 195.

Dear Sir/s,

Ref: TENDER FOR _____

I/We have examined the above tender and subsequent pre-bid clarifications/ modifications / revisions, if any, furnished by SBI and I/We have inspected the site of works and have made me / us fully acquainted with the local conditions in and around the sites of works and offer to undertake Contract as detailed in this tender by submitting my/our online bids in the Bank's e-tender portal.

2. While submitting this Bid, I / We certify that:

i) The undersigned is authorized to sign on behalf of the Bidder and the necessary support document delegating this authority is uploaded along with the bid.

ii) We certify that we have not made any changes in the contents of the tender document read with its amendments/clarifications provided by M/s SBI, submitted by us in our Bid document.

iii) The rate quoted in the *price Bids are as per the tender* and subsequent pre-Bid clarifications/ modifications/ revisions furnished by the Bank, without any exception.

3. We agree to abide by all the Bid terms and conditions, contents of Agreement and the rates quoted in the bid, which shall remain binding upon us.

4. If our Bid is accepted, we undertake to enter into and execute at our cost, when called upon by the Bank to do so, a contract in the prescribed form and we shall be jointly and severally responsible for the due performance of the contract.

5. Until a formal contract is prepared and executed, this Bid, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.

6. It is further certified that the contents of our Bid are factually correct. We also accept that in the event of any information / data / particulars proving to be incorrect, SBI will have the right to disqualify us from the Bid.

7. We understand that you are not bound to accept the lowest or any Bid you may receive and you may reject all or any Bid without assigning any reason or giving any explanation whatsoever.

8. We hereby undertake that our name does not appear in any "**Caution**" list of RBI / IBA or any other regulatory body.

9. We also confirm that we have not been **blacklisted** by any Bank / PSU / State or Central Govt departments for any reasons.

10. We confirm that we do not have any **litigation / cases** pending against us in any Bank / PSU / State or Central Govt departments.

11. We confirm that we are responsible to obtain all necessary licenses, permission, NOC from all the statutory /local authorities for the smooth execution of this contract in SBI premises.

12. We hereby confirm that all the materials/components/spare parts/equipment etc. to be supplied / used as a part of this contract shall be original / new materials / components / parts / equipment only, from respective OEMs of the products and that no refurbished / duplicate / second hand materials/components /parts/ equipment shall be supplied or shall be used.

13. For any type of deviation (to any of above or subsequent instructions), it will be my/ our responsibility to obtain the written instruction of the Engineer-in-charge for the same failing which it shall be deemed that I have carried out any such deviations at my own and I shall be duty bound to replace the all deviated material/ works from the site at my/ our cost as well as I shall be liable to penalized by the SBI as deemed fit and for all such loses made thereof, I/ we shall not have any right to arbitrate in any manner.

Yours Faithfully,

Contractor's Signature_____

Name: _____

Address: _____

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TECHNICAL PARTICULARS OF SINGLE PANEL HT SWITCHGEAR EQUIPMENT

1.	Type	:	Outdoor, cubicle type
2.	Systemrated voltage	:	11 KV
3.	Systemmaximum voltage	:	12 KV
4.	Frequency	:	50 Hz
5.	Insulation Level:		
a)	1.2/50 microsecond Impulse withstand voltage		170 KV peak
b)	One minute powerfrequencywithstand voltage	:	70 KV rms
6.	Rated Current:		
a)	Continuous		
	Incoming VCB circuit breaker(1no.)	:	630 A
-	Short time current for3seconds	:	25 KA
7.	VCB Circuit Breaker:		
a)	Quantity (Incoming feeder)		1 No
b)	Rated breaking capacity symmetrical		350 MVA
c)	Total breaking time		3 cycles (maximum)
d)	Operatingsequence	:	
e)	Auxiliary voltage	:	
-	Controlcircuit	:	24V DC
-	Space heater and illuminationlamp,etc.	:	230 V, 1 Ph, 50 Hz
8.	Potential Transformers:		
a)	Quantity		One on each bus
b)	Voltage ratio		11 KV/415V
c)	Over voltage factor		As per lS-3156
d)	Accuracy class		1.0
e)	Rated burden		100 VA

9. Current Transformer (on incomer):

Circuit	Ratio	Accuracy Class	Burden
Incoming For Protection & Metering	100/1A	5P10 & Class 1.0	15 VA
Outgoing For Protection & Metering	100 /1A	5P10 & Class 1.0	15 VA

TECHNICAL PARTICULARS OF SINGLE PANEL HT SWITCHGEAR - ISOLATOR / LBS

The Isolators offered shall conform to IS: 4710/9920 as amended to date. The isolator shall be triple pole, spring assisted, hand operated, non-automatic type with quick break contacts. The operating handle shall have three positions 'ON', 'OFF' and 'EARTH' which shall be clearly marked with suitable arrangement to padlock in any position. A safety arrangement for locking shall be provided by which the isolator operation shall be prevented from 'ON' position to 'EARTH' position or viceversa.

11 kV, 630A, 25kA Air insulated Load break switch outdoor with earth switch,

230V AC shunt trip coil with manual operated spring charging mechanism with 2 NO + 2 NC contacts,

3 nos. HT HRC fuses (fuse ratings 40A or as per the kVA of the

transformer), R Y B Phase indication lamps LED based with MCB

protection,

Trip circuit with push button, ON/OFF/EARTH position indications, Space heater with ON/OFF switch with thermostat.

Incoming and outgoing cable box for bottom entry and with all other standard accessories & required control wiring to make the installation complete.

SCOPE

Thefollowing Specificationcovers the supply of transformer required for the proposed Guest House, Dwarakapuri Colony, Punjagutta.

GENERAL INFORMATION

Transformer shall be designed, manufactured and equipped with accessories In accordance with this Specification and the applicable Standards indicated below

The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance and service lift.

Transformers shall be suitable for the following ambient conditions: -

Designambient temperature : 50 °C
Maximum humidity : 40%

CODE AND STANDARDS
The transformers shall conform to the requirement of the latest revisions of the following Codes & Standards.

15:10028	:	Installation and Maintenance of Transformers, Code of Practice
15:1180	:	(Part 1): 2014 & IS: 2026-2011: Power Transformer
15:3639	:	Power Transformers, fittings and accessories
IS:335/	:	Specification for new insulating oils for transformers
15:12463	:	& Switchgear
IS:2099	:	Bushings for alternating voltage above 1000V
IS:5 - 1951	:	Colours for ready mixed paints and enamels
IS:648	:	Non-oriented electrical steel sheets for magnetic circuits
15:1866	:	Code of practice for maintenance of insulating oil
15:2166	:	Guide for insulation co-ordination
15:6600	:	Guide for loading of oil-immersed transformers

Wherever Indian Standards are not available, the Transformer shall conform to relevant InternationalStandard.

DESIGN CRITERIA

The Transformers shall be oil-filled and designed for natural cooling (ONAN).

The Transformer impedance shall be as specified to limit the fault level on the LV side. The neutral of the low voltage winding will be solidly grounded.

The Transformers with all accessories shall be capable of withstanding the thermal and mechanical effects of short-circuits at the terminals of any winding without adverse effect.

Account shall be taken of the different forms of system fault that can arise in service, such as line to earth faults and line faults associated with the relevant system and transformer earthing conditions. The short-circuit levels will be as specified in the DataSheet.

The Transformers shall be capable of continuous operation at its rated output without exceeding the temperature limits as below (50°C above ambient temperature)

In top oil byThermometer : 50°C

In winding by resistance : 55°C

Overloads shall be allowed within the conditions defined In the loading guide of the applicable Standard. Under these conditions, no limitations by terminal bushings, on load tap changers or other auxiliary equipment shallapply.

The Transformers shall be capable of continuous normal operation at It’s rated output under the following conditions: -

Voltage varying by +10%

Frequency varying by + 3 %

The Transformer shall be designed and constructed so as not to cause any undesirable interference in radio communication circuits.

Steel bolts and nuts exposed to the atmosphere shall be either galvanized or zinc-passivated.

Nuts, bolts and pins used inside the transformers and tap changer compartments shall be provided with lock washers or locknuts.

Transformer design shall take care of protection against surge voltage.

Internal design of Transformer shall ensure that air is not trapped in any location.

The neutral terminal windings shall be designed for the highest over current that can flow through this winding.

The design of Transformers shall be such as to reduce noise and vibration to the level obtained in good modern practice. The noise ratios, impedance, load losses and no-load losses subject to the Supplier's guarantees shall be within the tolerance given in applicable Standards.

TRANSFORMER TANK

The tank shall be of electrically welded construction and fabricated from sheet steel of adequate thickness. Tanks shall be hydraulically tested to ensure that they are leak-proof and subjected to vacuum test.

The tank shall have adequate strength to withstand without any deformation (1) Mechanical shock during transportation and (ii) oil filling by vacuum
The tank shall also be provided with two numbers grounding pads for earthing.
The transformer tank shall be provided with sets of bi-directional flat wheels for rolling the transformer parallel to either centre lines.
Jacking pads, lifting eyes and pulling lugs shall be provided to facilitate lifting and movement of the transformer, filled with oil. All heavy removable parts shall be provided with eye bolt for ease of handling.

The transformer top shall be provided with a detachable tank cover with a bolted flanged gasket joint. Lifting lugs shall be provided for removing the cover. If necessary, the surface of the cover shall be suitably sloped so that it does not retain rainwater.

Adequate space shall be provided at the bottom of the tank for collection of sediments.

The Transformer base shall be designed to permit skidding of the complete Transformer unit in any direction. Pulling eyes shall be provided for moving the Transformer in either direction.

The material used for gaskets shall be rubber cork sheet. Gasket joints for the tank and manhole covers bushings and other bolted attachments shall be oil-tight and so designed that the gasket will not be exposed to the weather.

Tank shall be provided with a pressure release devices which shall operate at a pressure below the test pressure for the tank and radiators. The device shall be rain-proof after blowing and shall be provided with a device visible from ground to Indicate operation. An equalizer pipe connecting the pressure relief device to the conservator shall besupplied.

Materials in contact with oil shall be such as not to contribute to the formation of acid in oil. Surface in contact with oil shall not be galvanized or Cadmium plated.

Inspection covers of manholes of sufficient size shall be provided for access to leads, windings, bottom terminals of bushings and taps.

Oil sampling taps shall be provided with valve at top and bottom to collect sample of oil from the tank for testing.

To facilitate the oil filtration by streamline filter, suitable inlet and outlet taps with valves at the bottom and at the top of the tank on diagonally opposite corners shall be provided. The valve at the bottom may be used as drain valve.

Thermometer pocket for top oil temperature measurement by liquid thermometer shall be provided. Marshalling kiosk boxes, etc. shall be weatherproof having a degree of protection to IP55.
Cooling tubes or radiators shall permit every part of the cooling surface to be cleaned by hand and shall be suitably braced to project them from mechanical shock. Each radiator bank shall be detachable type and provided with oil isolating valves at either sides.

The Transformer tank shall be fitted with a double diaphragm type of explosion relief vent at the top with equalizer pipe connection to oil conservator.

Explosion relief vent should be located on the top cover and directed in such a way that on bursting of diaphragm; the oil forced out will not fall in any of the auxiliary equipment of the transformer and the other electrical equipment in the vicinity.

CORE AND COIL

The core shall be built of high quality, low loss, non-ageing high permeability grain-oriented, cold rolled silicon steel lamination with very low magnetization losses and annealedto relieve stresses and develop excellent magneticproperties.

The core clamping frame shall be provided with lifting eyes for the purpose of taking and inspecting the core with windings mounted thereon and shall have ample strength to take the full weight of the core and winding assembly. The core assembly shall be electrically connected to the transformer tank for effective core earthing.

All insulating materials shall be of proven design. Coils shall be so insulated that voltage stresses are minimum. The windings shall be from electrolytic copper conductor of high conductivity with suitable Class "A" insulation. The windings shall be duly sectionalized. Accessible joints braced or welded and finished smooth shall connect similar coils.

Coil assembly shall be securely positioned with spacers, pressed board cylinders, barriers and shall be so arranged as to allow free circulation of the oil.

All leads from the windings shall be suitably supported to prevent damage from vibration or short-circuit stresses.

The core and coil assembly shall be rigidly braced and fixed on to the tank so that no shifting or deformation occurs during transport and installation or during short circuits.

The finally assembled core with all clamping structure shall be free from deformation and shall not vibrate during operation.

The core clamping structure shall be designed to minimize eddy current loss.

The end turns on the high voltage windings shall have reinforced Insulation to withstand any of the voltage surges likely to occur during switching or any other abnormal system condition.

INTERNAL EARTHING

All internal metal parts of the transformer, with the exception of individual laminations, core bolts and their individual clamping plates shall be earthed.

The top clamping structure shall be connected to the tank by a copper strap. The bottom clamping structure shall be also earthed.

The magnetic circuit shall be connected to the clamping structure at one point only and this shall be brought out of the top cover of the transformer tank through a suitably rated bushing.

A disconnecting link shall be provided on transformer tank to facilitate disconnections from the ground for IR measurement purpose.

TAPPINGS

On circuit taps as specified shall be provided on the high voltage winding

The Transformer shall be capable of delivering its rated output at any tap position.

The winding including the tapping arrangement shall be designed to preserve the electromagnetic balance between HV and LV winding at all voltage ratios.

INSULATINGOIL

The insulating oil shall conform to the latest revision of IS: 12463 properly inhibited for prevention ofsliding.

The necessary first filling of oil, shall be supplied for the transformer. 10% excess oil shall also be provided (to take care of wastes) in non-returnable containers suitable for outdoor storing.

TRANSFORMER BUSHING

All transformer bushings shall conform to the requirement of the latest revisions of IS: 2099 and IS: 3347.

All porcelain used in bushings shall be homogenous, nonporous uniformly glazed to brown colour and free from blisters, burns and other defects.

Stresses due to expansion and contraction in any part of the bushing, shall not lead to deterioration.

Fittings made of steel or malleable Iron, shall be galvanised. Each bushing shall be so coordinated with the transformer insulation that all flash over will occur outside the tank.

The bushings shall be located so as to provide adequate electrical clearances between the bushings and also between bushing and ground.

TERMINAL ARRANGEMENT

The HV terminals shall be brought to an air-insulated disconnecting chamber forming a weatherproof assembly.

The secondary terminations shall be brought to an air-insulated disconnecting chamber which in turn connected to cable connection as required forming a weatherproof assembly.

The cable boxes shall have all standard facilities suitable for XLPE/PILC/PVC cables/Copper/Aluminum wire/ bus duct as mentioned in the data sheet.

The disconnecting chamber shall be air-insulated. Bushings, drain breather, removable covers, shall be provided for the disconnecting chamber, Plates through which high current carrying conductors pass, shall benon-magnetic.

Phase to phase and phase to ground clearances within the camber, shall be such as to enable either the Transformer or each cable to be subjected separately to H.V. tests.

NEUTRAL TERMINAL

The size of the neutral bushings shall be as that of phase bushings. On the LT side, two bushings shall be provided for neutral, one through top side wall bushings to the LV cable box and other connection to earthing. A neutral CT of required ratio, burden and knee point voltage shall be mounted Inside the Transformer LV cable box for restricted earthfault protection. This will be a matched current transformer which will be mounted In H.T. Switchgear. Secondary of the C.T. to be brought out to a marshalling box of IP 54 suitable for connection to controlcable.

Earth portion of the Cable End Box shall be provided with 2 Nos. grounding pads suitable for Purchaser's 50 x 6 mm G.I./Copper flat.

AUTOMATIC ON LOAD TAP CHANGER (OLTC) WITH RTCC AND AVR.

The equipment shall be of high speed, transition resistance type conforming to IS: 8468 and suitable for indoor installation.

The OLTC shall employ rotary snap action switching with both selector and diverter duties combined. The OLTC shall have 16 steps of 1.25% each to give a total voltage adjustment limit of+/- 10%.

The OLTC must be suitable for mounting externally on a flange provided on transformer tank and shall have an independent oil filled chamber. The oil in the changer tank shall not mix with oil in the main tank. An oil surge relay with alarm contact shall be provided.

The OLTC operating mechanism shall be housed in a separate enclosure, which shall be totally dust and weather proof with a cable entry gland plate at the bottom.

The control equipment shall comprise the following.

- Mechanical tap position indicator.
- Handle for manual operation.
- Tap change operation counter.

Technical stopper to prevent over cranking of the mechanism beyond extreme tap position.Driving mechanism chamber locking arrangement.

Terminal boards with connector for transformer tap leads. Phase reversal protection relay.

The control equipments shall further include the following for auto operation. Incoming power supply ON-OFF TPN load break switch.

Driving motor suitable to operate on 415V, 3 phase, 50Hz, AC supply, the motor shall be of the totally enclosed, horizontal foot mounted type with class-B insulation. Over load and short circuit protections for the motor.

Contractors for 'Forward' and 'Reverse' operation along with protective. Anti-condensation heater

Selector switch for 'Lower' and 'Raise' operation.

Safety limit switches for 'Lower' and 'Raise' extreme limits. Direction sequence switch and stepping relay

One PT of suitable VA burden for sensing the degree of correction Interlock between manual and electrical operations.

Any other accessories as may be required for the satisfactory operation of the unit.

One automatic voltage sensing and tap changing relay (AVR) with adjustable time gap between tap changer.

One digital tap position indicator.

One 12 window 24 V DC alarm annunciator and auxiliary contactors for fault contact multiplication

One auto-manual selector switch and one control supply 'ON-OFF' switch.

One indicating lamp to show Tap change in progress with hooter and one lamp for tap changer failure indication, remote hooter provision to bemade.

One local / remote selector switch.

One spring return to neutral types raise / lower switch. Set of terminals for incoming and outgoing cables.

One set of control MCBs, Elmex terminals, wiring, earthing etc. The following accessories shall be provided with transformer:

- Temperature Indicator.
- Built on radiators.
- Conservator tank.
- Marshalling Box.
- Gas & oil Actuated Relay (Buchholz relay).
- Wiring for above.
- Metal treatment and painting.
- Tolerance on performance guarantees - As per IS.
- Tests.

Routine Test - As per IS to be done at factory during the inspection to be given specifically. Type Tests - Test Certificates to be furnished.

The Load loss and No Load loss of the Transformers to be furnished by the contractor along with offer and loss capitalization to be considered for evaluating the Transformer price.

SPECIFICATION FOR ERECTION, TESTING & COMMISSIONING OF DISTRIBUTION TRANSFORMER

Unloading, inspection, storage, installation, testing and commissioning of transformers shall be in accordance with IS 1886 (Latest Edition), and manufacturer's instructions.

Whenever stated, transformers will be delivered without oil, filled with inert gas and without bushings and externally mounted accessories as applicable. The contractor shall:

Assemble the transformers with all fittings such as bushings, cooler banks, radiators, conservators, valves, pipings, cables boxes, marshaling boxes, etc.

Arrange for oil filtration before filling. If necessary, the oil filtration equipment shall be arranged by the Contractor. Provide wedges/clamps to rigidly station all transformers on rails. Connect up the transformers terminals.

Lay and terminate the Owner's cables/conduits between all the accessories mounted on the transformer, marshaling Kiosk, etc.

Care shall be taken during handling of insulation oil to prevent ingress of moisture or foreign matter. In the testing, circulating, filtering or otherwise handling of oil, rubber hoses shall not be used. Circulation of filtering of oil, the heating of oil by regulated short-circuit current during drying runs and sampling and testing of oil shall be in accordance with the manufacturer's instructions and specified Code of Practice.

HANDLING

Transformers and all its accessories shall be handled carefully in its upright position as indicated in the packing case. Lifting lugs and jacking pads shall be used for lifting of the transformer. While using jacking pads utmost care shall be taken in proper application of jacks. Where transformer is dragged or pulled on sleeper or rollers, traction eyes provided at the bottom frame shall be used with suitable wire ropes and shackles.

STORAGE

Transformer shall be stored under shelter in a place free from fire and explosion hazards. Care should be taken to see that moisture will not contaminate Oil inside the tank by checking all gaskets, bolts and nuts andaccessories.

CABLING AND EARTHING

Cable shall be terminated at cable boxes only after IR value are measured and found to be in order. Neutral of the transformer shall be connected to two separate and distinct earth station through double run of earth tapes of suitable size. Where REF provided for Transformer Protection, C.T. Supplied loose shall be mounted in the transformer LV Box (Neutral) or a suitable weather proof box shall be mounted externally, as advised and the CT mounted in it. Either of the above shall be carried out as mentioned on the working drawings. The body of the transformer shall also be provided with effective earthing as per the drawings and specifications.

MOUNTING AND ERECTION

The transformer shall be lifted by lugs or shackles or by any other suitable means (such as dragging on rollers) and mounted on the concrete plinth prepared for the purpose. Care shall be taken to see that transformer is not tilted during lifting and erection of transformer. The roller shall be checked to prevent movement of the transformer after being positioned on the plinth. Adequate and necessary clearance from walls, other equipments, etc. shall be provided as indicated on the drawings.

All the accessories and parts such as conservator tank buchholz relay, breather, explosion vent, thermometer etc. should be mounted on the transformer. Tighten all bolts and nuts and check for any leakage. Leakage's If any shall be rectified.

Check the oil level and top it up if necessary with new oil. Dielectric strength of oil shall be tested as per IS/BS specifications, with an electric gap of 4 mm + or -0.02 mm polished electrodes of 12.5 mm dia using three samples of oil drawn from the oil drain valve of the transformer. The test voltage shall be raised from 5 KV to 50 KV in about 10 seconds. Atleast two samples of oil must withstand 40 KV voltages for one minute. Each drum of oil being used for topping up shall be tested before beingused.

The insulation resistance of the winding shall be measured with 5 kV/1 kV DC megger and results shall correspond to the factory test results.

If dielectric strength of oil is not as per the requirement, the drying of oil shall be done with the help of suitable streamline oil treatment plant. While drying of oil is being done, the transformer shall be provided with suitable lagging all round. The temperature of oil in the spray tank shall not exceed 80 ^{0}C during the purification process. After treatment, the oil must conform to the conditions laid down in IS Specifications.

Phasing out test with 415 Volts applied to HV winding and voltage across LV winding being checked.
Measurement of neutral and body earth resistance with earth testing megger shall be carried out. The values shall not exceed 1 to 2 ohms as required.
Functioning of buchholz relay (for alarm & trip), thermometer, oil level indicator shall be checked and adjusted, if necessary. The transformer shall be charged only after the above tests are conducted and approvals of the local authorities are obtained. The earthing of neutral and body of the transformer shall be done as per I.E. regulations and requirements of local authorities.
The contractor shall supply all the materials and labour for unloading, storing, erection and commissioning of transformers.

TESTS

The following Preliminary checks and Pre-commissioning tests shall be carried out before commissioning the transformers.

PRELIMINARY CHECKS

Compare name plates details with the specifications.

Signature of Contractor Signature of Employer

Check for any physical damage.in particular of bushings/Oil Leaks.

Check tightness of all bolts, nuts, clamps, gasketting and connecting terminals. Check cleanliness of bushings.

Check for oil leakage and oil level.

Breather condition, check whether breathing line is free, silica-gel is reactivated, oil is available at the bottom.

Check for clearances, particularly in case of bus ducts. Water tightness of terminal boxes and bus ducts.

Earthing of transformer tank and neutral bushing.

Releasing of air from bushing (very important) Buchholz Relay.

Check that the transformer is correctly installed with reference to its HV / LV Terminals.

PRECOMMISSIONING TESTS:

RATIO, POLARITY AND PHASERELATIONSHIP:

Check ratio on all taps and between all the windings, and compare with the values Indicated In the test report. Check polarity and Interfaceconnection.

RESISTANCE:

Check winding resistance's at normal tap, and for other tap positions record the readings separately.

TECHNICAL PARTICULARS FOR ON LOAD TAP CHANGER WITH RTCC & AVR FOR 11KV/433V TRANSFORMER

Design, Manufacture and supply of 3 Phase 50 Hz, copper wound, Oil Immersed, Core type Distribution transformer with OLTC, RTCC & AVR and following specifications.

Ref Standard	IS: 1180 (Part-I):2014
Installation	Outdoor
Rating	500 KVA
VoltageRatio	11000/433 Volts
VectorGroup	Dyn11
TapRange	+10% TO -10% in steps of 1.25% through OLTC
Insulationclass	A
Cooling	ONAN
Temperature rise @ 50°C ambient	

In oilby thermometer	50°C
In winding byresistance	55°C
Impedance	less than 5%
PaintShade	631 of IS 5, Enamel Light GreyShade
First filling ofoil	Conforms to IS 335 of2018
Terminal Arrangement:HV	Cable box
TerminalArrangement:LV	Cable box

THE TRANSFORMER WILL BE HOUSED IN A WELDED STEEL TANK AND BOLTED COVER CONSTRUCTION WITH THE FOLLOWING FITTINGS:-

1 . Rating & Diagram Plate	9. Jacking lugs
2. Earthing terminals	10.lnsepection cover
3. Lifting lugs	11. Oil level indicator
4. Thermometer pocket	12. Drain cum bottom filter valve
5. On load tap changer with RTCC+AVR	13. Top filter valve with plug
6. Air release hole with plug	14. Bi-directional rollers
7. Oil conservator with drain plug	15. Silica gel breather
8. Pressure relief valve.	16. Cooling Radiators

EXTRA ACCESSORIES:
Buchholz Relay with alarm and tripcontacts.
Marshalling box with OTI & WTI with alarm and trip contacts.
Magnetic oil level gauge with alarmcontacts.
Oil immersed Neutral CT

ON LOAD TAP CHANGER. 11KV-100A

(Suitable for 415V- 3 ph. 50 Hz

operation) Main fittings provided

with OLTC

1.	Single phase FHPMotor	1 No.
2.	Motor drive contractor & overloadprotection	1 Set
3.	Electrically locked forward and reversecontractors	2 Nos.
4.	Raise and lower push buttons type ofswitches	1 set.
5.	Limit switches and Mechanicalstops	1 Set
6.	Suitable devices to permit only one tap at atime	1 No.
7.	Manual operatingdevice.	1 No.
8.	Mechanical counter (maxoperations)	1 No.
9.	Tap changer indicator(mechanical)	1 No.
10.	Space heater, door, Internal light, MCB &Thermostat	1 set.
11.	Hinged door and lockingdevice.	1 Set.
12.	Terminal blocks and internalwiring	1 Set.

	Auxiliary control transformer	1 No.
13.	First filling of filtered oil. (IS335)	230 Ltrs.
14.	Tap pos. sensing devices for digital tap pos indicator	1 set.
15.	Oil filling plug	1 No.
16.	Drainplug	1 No.
17.	Inspectionchamber	1 No.
18.	Surge operated relay (with 1 set ofcontacts)	1 No.
19.	Oil compartment for OLTC in main conservator withgauge	1 No.
20.	Other necessary interlocks MCBs andwiring	1 No.

NOTE: Interconnection cables between OLTC, RTCC & Marshalling box is in scope of supplieronly.

REMOTE TAP CHANGER CONTROL PANEL (single transformer operation).

Suitable for auto/Manual operations with the following fittings:

1.	Raise & lower push buttonswitches	1 Set
2.	Digital tap positionindicator	1 No.
3.	Auto manual (maintained contact type) selectorswitch	1 set.
4.	Upper limitindicator	1 No.
5.	Lower limitindicator	1 No.
6.	Tap changer in progresslamp	1 No.
7.	Tap changer isolationswitch	1 No.
8.	Space heater, Lamp, Fuses, door switch andthermostat	1 set
9.	Potential Transformer 433V/110V (LV sensing forAVR)	
10.	Undrilled gland plate and liftingeyes.	
11.	110V DCBuzzer	
12.	All necessary terminal blocks & internalwiring.	

AUTOMATIC VOLTAGE REGULATOR (Electronic)
(Suitable for 110V AC Auxiliary supply mounted on RTCC Panel).

AUDIO VISUAL ANNUNCIATOR (Solid state 24V DC)
(Mounted on RTCC panel)

Twelve Windows labeled indications for:

1. AC/phase sequence/motorfail.
2. Spare.
3. PT over voltage
4. Top oil temp, high
5. Buchholz Relay with alarm(trf)
6. Buchholz Relay with trip(trf)
7. Surge relay trip(OLTC)
8. Low oil levelindicator
9. Winding temp, alarm

DRAWING

OLTC GA drawing shall be sent us with in a week for your approval after receipt of technically and commercially clear order at your end.

SCOPE

This specification is intended to cover the design, manufacture, assembly, testing at manufacturer's works, Wooden packed for transportation complete in all respects with all components, fittings and accessories for efficient and trouble-free operation.

GENERAL INFORMATION

The equipment's shall be designed, manufactured and equipped with accessories in accordance with this specification and the applicable codes standards indicated below. Materials and components not specifically stated in this specification but which are necessary for satisfactory and trouble free operation and maintenance of the equipment shall be supplied.

The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance and service life as specified herein.

Switchboards shall be suitable for an ambient temperature of 45 ^{0} C.

CODES AND STANDARDS

The equipment covered by this specification shall unless otherwise stated be designed, constructed and tested in accordance with the requirements of the Indian Electricity Act and Rules and latest revision of the following standards.

IS 375 : Arrangement of bus bars, main connection and auxiliary

wiring.IS 335 : Insulatingcoils.

IS 722 : AC electricitymeters.

IS 1248 : Direct acting electrical indicatinginstruments.

IS13947 : Motor starters AC, for voltage not exceeding 1000 V IS8544:

(Part-4,Sec 1) : Direct-on-line ACstarters.

IS13947 : Degree of protection provided by enclosures for low voltage (Part: -I) switchgear and controlgear

IS2419 : Dimensions of panel mounted electrical indicating and recording instruments.

IS13947 : Circuit Breakers.(Part2)

IS2607 : Air-break isolators for voltage not exceeding 1000

Volts.IS2705 : Current Transformers.

IS4201 : Application guide forCTs

IS13947 : Contractors for voltages not exceeding (part 4,sec1) 1000 V AC or 1200 VDC.

IS3072 : Installation and maintenance ofswitchgear

IS3231 : Electrical relays for power systemprotection.

IS13947 : Air-breakswitches,air-breakdis-connectorsandfuse(Part3) combination units for voltages not exceeding 1000 VAC or 1200 V DC.

IS3842 : Application guide for electrical relays for ACSystem.

IS4047 : Heavydutyairbreakswitchesandcompositeunitsofairbreak switches and fuses for voltages not exceeding 1000 V.

IS4146 : Voltage

Transformers.IS3156

IS13947 : General requirements for switchgear and control gear for (Part1) voltages not exceeding 1000Volts.

IS4483 : Preferred panel cut-out dimensions for electricalrelays.

IS5124 : Induction motor starters, AC (voltage not exceeding1000V) Installation and maintenance of code of practice.

IS5987 : Selection of switches (voltage not exceeding1000V)

IS6875 : ControlswitchesforvoltagesuptoandIncluding1000VAC& 1200 DC.

IS8588 : Code of practice for thermostatic bimetals Part-I general requirements and method of tests.

IS8623 : Factory built assemblies of switchgear and control gearfor voltages upto and Including 1000 V AC and 1200 V DC.

IS8828 : Miniature air-break circuit breakers for voltages not exceeding 1000 Volts.

SCOPE OF SUPPLY UNDER THIS SPECIFICATION / CONTRACT

As per Schedule of Quantities enclosed.

EQUIPMENT/SCOPE EXCLUDED FROM THIS SPECIFICATION / CONTRACT

All concrete foundations.

DESIGN REQUIREMENT

The switchboards shall be designed for 415 V, 3 phase, 4 wire, 50 Hz supply.

Switchboards shall be rated for minimum fault level as mentioned in data sheets / Drawings

Control power supply of the switchboards shall be 240 V, 1 Phase, 50 Hz AC supply tapped from the respective module itself.

Theswitchboards manufacturers shall apply all theratingfactors necessary to all components of the switchboards to comply with the conditions detailed in thisspecification.

The ratings of motors, control-gears, Circuit Breakers etc. furnished in the drawings are for tender purposes only. Any changes in the above will be intimated at the time of placement of purchase order or before fabrication of panels.

The panels shall be modular in construction and Draw-out type for all incoming & outgoingcompartments.

CONSTRUCTIONAL FEATURES

The switchboard shall be:

Of the totally metal enclosed, indoor, floor mounted, free standing, cubicle type with 14SWG CRCA Sheet for Base Frame and doors and 16 SWG for partition sheets for sections and non- loading members. The panel shall be compartmentalized design.

Made up of the requisite vertical sections, which when coupled together shall form continuous single front switchboards.

Provide dust and vermin proof protection, the degree of protection being not less than IP 54 for indoor as per IS 2147 and IP - 55 for outdoor Panels.

Readily extensible on both sides by the addition of vertical sections after removal of the end covers. Provided front access to the feeders, bus bars and rear access to cable termination, cable alley etc. Each vertical section shall comprise:

Framed structure of rolled / folded sheet steel channel section, of minimum 2 mm thick CRCA Sheet steel, rigidly bolted or welded together. This structure shall house

the components contributing to the major weight of the equipment, such as circuit breaker cassettes, moulded case circuit breakers, main horizontal bus bars, vertical risers and other front mountedaccessories.

The structure shall be mounted on a 75 x 40 x 5mm 'C' channel. The design shall ensure that the weight of the components is adequately supported without deformation or loss of alignment during transit or during operation.

Each compartment shall be provided with a hinged door interlocked with switch/breaker housed inside the compartment so that door cannot be opened unless the switch/breaker is in 'OFF' position.

A cable chamber of minimum width 300 mm shall be provided for the cable end connections of power/control cables. The design shall ensure generous availability of space for ease of installation and maintenance of cables and adequate safety for working in one vertical section without having accidental contact with other live parts in adjacent section.

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

Front and rear doors shall be fitted with tight neoprene gaskets with easy operating type fasteners designed to ensure proper compression of the gaskets. When covers are provided in place of doors, generous overlap shall be assured between sheet steel surfaces with closely spaced fasteners to preclude the entry of dust. The doors shall have concealed hinges. Removable screwed covers shall be provided on the rear of the cubicles.

A set of horizontal main bus bars shall be provided at the top or bottom as required. The vertical bus bars shall be housed in separate fully enclosed chamber of min. width 300 mm and accessible from front and shall be tapped off from main horizontal bus bars.

All incoming/outgoing terminals of the individual feeders shall be provided with insulted shrouds to avoid accidental contact with live parts.

The height of the panel should not be more than 2400 mm. The working height shall be limited to a maximum height of 1800 mm and a min. height of 300mm from FFL The total depth of the panel shall be adequate to cater for proper cabling space. Panels arranged side by side or in same room shall have same height and depth.

Covers and partitions shall be of minimum 16 SWG CRCA sheet steel, whereas doors and main frame shall be of min. 14 SWG CRCA sheet steel. All sheet steel work forming the exterior of switch boards shall be smoothly finished, leveled and free from flaws. The comers should be rounded.

All switches, push buttons etc. shall be operable from the front and shall be flush /semi-flush mounted. The apparatus and circuits shall be so arranged as to facilitate their operation and maintenance and at the same time to ensure the necessary of degree of safety.

Apparatus forming part of the switchboards shall have the minimum clearances as per relevant IS standards. Clearances shall be maintained during normal service conditions. Creepage distances shall comply to those specified in relevantstandards.

All Bus bar insulating material shall be of DMC/SMC to withstand the effects of high humidity, high temperature, tropical ambient service conditions etc.

Foundation bolts and nuts for each panel shall be supplied along with the respective switchboard.

The lifting eyes for each shipping section and danger notice plates shall be provided for each switch boards.

Functional units such as circuit breakers and fuse switches

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

Main bus bars and vertical risers during operation, inspection or maintenance of functional units and front mounted accessories.

Cable termination's of one functional unit, when working of those of adjacent unit/units.

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

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

METAL TREATMENT AND FINISH

All steel work used in the construction of the switchboards should undergo through seven- tank process treatment.

All surface to be painted including interior and exterior of panels, and other metal parts shall be chemically treated to remove all rust, scale, grease and other adhering foreign matters. All parts shall be coated with two coats of highly corrosion resistant primer followed by two coats of synthetic enamel paint of SIEMENS GREY (RAL 7032) shade. The finish shall be mat finish.

The complete treatment, painting, and drying with compressed air operations shall be done in dry and dust free atmosphere.

Should finished paint chip off or crinkle during transit/handling/installation, the contractor shall arrange for repainting the equipment at site at his own cost.

BUS BARS

The bus bars shall be air insulated and made of high conductivity, Aluminium Conductor, complying with the requirements of grade E91E of IS 5082 and suitable for 415 Volts, 4 wire 50 Hz system.

The bus bars and connections shall be suitably supported/ braced with non-hygroscopic DMC
/ SMC supports to provide a fault withstand capacity as specified.

High tensile bolts and spring washers shall be provided at all bus bar joints.

The bus bars shall be liberally sized and shall have uniform cross section throughout, and shall be capable of carrying the rated current at 415 V continuously. The bus bars shall be designed to withstand a temperature rise of 50 ^{0}C above the ambient. A current density of 0.8 Amps / Sq.mm. shall not be exceeded for sizing of Aluminium busbars.

All bus connections, joints and taps shall be short and as straight as possible, and applied with contact grease in the mating surface.

The main horizontal bus bars shall be run through the entire length of the panel and shall be accessible for maintenance from the front as well as rear. Bus bar chamber shall have separately screwed covers. All bus bars, links etc. shall be provided with insulating cover to prevent accidental contacts. The natural bus bars shall have a continuous rating of at least 50% of the phase busbars.

Bus bars shall be encased in colour coded heat shrunk PVC sleeves (snug fit type). An aluminium earth bus of size not less than 50 x 10 mm shall run through the length of switch boards at top or bottom as required.

AIR CIRCUIT BREAKERS

Circuit breakers shall be four pole / triple pole, air break, electrically operated horizontal draw-out type.

The breakers shall comply with the requirements of IS 13947 (Parts-II /Sec-I) - 1977- Short Circuit Performance Category P-2, and shallhave:
A short circuit breaking capacity of not less than 50 KA, RMS at 415 Volts 50 Hz AC.A short circuit making capacity of 105 KA. A short-time withstand circuit of 50 KA for 1 second. Mechanical and electrical endurance for 2000 operating cycles out of which 100 cycles should be for electrical endurance.

Electrical overload performance at 6 times the rated current, 110% of the rated voltage as recovery voltage and 0.5 power factor. Dielectric test of 2.5 KV applied for one minute on main circuits.

Test evidence from a recognized independent Laboratory / Institution shall be furnished for compliance of the breakers with the above requirements.

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

Arcing contacts shall be of hard wearing material of copper tungsten or silver tungsten and shall be readily replaceable. Main contacts shall be of pure silver of high-pressure butt type of generous cross section.

The operating mechanism shall be of robust design, with a 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 operated breakers shall have a motor wound spring charged closing mechanism. Breaker operation shall be independent of the motor, which shall be used solely for charging the closing spring.

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

Mechanical operation indicators shall be provided to show open and closed position 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 charging and closing of electrically operated breakers during emergencies.

Provision shall be available for fitting a minimum of five trip devices- three over current, a 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. For static trip device either a shunt trip or an under voltage coil shall beprovided.

Circuit breakers shall be individually housed in sheet metal cassettes provided with hinged doors. The breaker along with its operating mechanism shall be mounted on a robust carriage moving on guide rollers within the cassette. 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 breaker within its cassette.

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

a) 'Service'position : with main and auxiliary contacts connected.

b) Test'position : with power contacts fully disconnected and **control circuit contacts connected.**

c) 'Isolated'position : with both power and control circuit contactsfully **disconnected.**

It shall be possible to achieve any of the above positions with the cassette door closed. Mechanical position indicators shall be provided for the three positions of the breaker.

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

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

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

It shall not be possible to open the hinged door of the cassette unless the breaker is drawn to the isolated position.

Inadvertent withdrawal of the circuit breaker too far beyond its supports is prevented by suitable stops.

Moving portions of breakers of the same ratings shall be interchangeable.

Provision shall be available for the padlocking of the circuit access flaps in any of the three positions.

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

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 and withdrawal from the service position of the breaker. Even in the isolated position positive earthing contact should exist.

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 10Amps.

MOULDED CASE CIRCUIT BREAKERS

The MCCB shall be complying with IS: 13947 Part II.

MCCB's shall be triple pole (TP) / four pole (FP) Thermo-Magnetic / Micro Processor based releases with quick break and quick make type and shall be trip free.

Short circuit withstanding capacity shall be as indicated in the respective drawings.

The insulating case of the MCCB's shall be made of high strength heat resistant, flame retardant and thermosetting material so as to provide the following important functions;

Safety of operating

personnel. Very high

dielectric strength

High withstanding capacity against thermal and mechanical stresses.

The contact system shall be maintenance free with arc extinguishing devices &

Properties. Terminations:

The following features shall be provided for

terminals; Interchanging capability for line & load

ends

Extended terminals to connect Aluminium cables of required runs & sizes.

Copper cable termination without extended termination accessories. Visual indications: The following visual indications shall be provided for the MCCBs

"ON"

"OFF"

The MCCBs shall have adjustable/fixed thermal overload setting and adjustable/fixed magnetic setting as per the drawings or specifications.

The MCCBs shall be of Manual type as per the requirements indicated in the drawings and specifications. Minimum one No.(1 No.) NO / NC / Change Over auxiliary contact shall be available for "ON" & "OFF" positions.

For 4 pole MCCBs, the neutral contact shall make earlier than the phase but while tripping, the neutral contact shall break later than the phase for safety purposes.

Positive indication of neutral shall be available.

Accessories:

The following accessories shall be a standard feature of the MCCB:

Rotary handle operating mechanism with locking arrangement as indicated in the drawing & specifications.

INDICATING LAMPS (LED TYPE)

Filament type indicating lamps shall be provided wherever called for in the control schematic diagrams. The lamps assembly shall be complete with cluster of LED's, holders and lenses.

SPACE HEATERS

Each vertical section of the switch boards shall be provided with thermostat controlled space heaters rated for 240 Volts + or - 10%, single phase, 50 Hz. The heaters shall have individual ON-OFF switch.

Wiring of space heaters in each switchboard shall be grouped and brought out to easily accessible terminals for connection to power supply, through switch-fuse unit.

Each switchboard shall be provided with plug-socket with switch fuse for connection of hand lamp rated 240 V, 50 Hz. single phase.

FUSES

All control and power fuses shall be link type HRC fuses and they shall be provided with visible indication to show that they have operated.

CURRENT TRANSFORMERS

Current transformers shall comply with the requirements of IS 2705. They shall have ratios, outputs and accuracy's as specified / required.

Current transformers wherever required and called for In the single line diagram and/or required shall be furnished.

The CTs shall be bar primary, in epoxy-encapsulated type, rated for 415 V. The CTs shall be designed to withstand the thermal and mechanical stresses resulting from the Maximum short circuit current.

The vendor shall ensure that the VA output of the CTs are adequate for the relays, Meters and loads connecting them.

The CTs shall be provided with Class A/Class B insulation and proper polarity markings in a suitable manner.

INDICATING / INTEGRATING METERS

All indicating instruments shall be of flush mounting industrial pattern, conforming to the relevant standard.

The instruments shall have non-reflecting bezels, clearly divided and indelibly marked scales and shall be provided with respect to adjusting devices in the front.

Integrating instruments shall be of flush mounting switchboard pattern, conforming to the relevant standards. Meters shall be provided with circular 90 scale with square casing of specified size. MT instruments shall have + or - 1% accuracy on full scale. Each meter shall be magnetically screened.

CABLE TERMINATIONS

Cable entries and terminals shall be provided in the switchboard to suit the number, type and size of Aluminium / Copper conductor power cables and copper conductor control cable specified in the detailed specifications.

Switchboard shall be designed either for top or bottom or combined entries and outgoings, which consultant / Engineer-in-charge will confirm at the time of drawing approval. Generous size of cabling chambers shall be provided, with the position of cable gland and terminals such that cables can be easily and safely terminated. Removable un-drilled plates shall be furnished for fitting the cableglands.

Sufficient space shall be provided to avoid sharp bending and for easy connection. A minimum space of 300 mm from the gland plate to the nearest terminal block shall be provided.

Multi way terminal blocks complete with screws, nuts, washers and marking strips shall be furnished for terminating the internal wiring and outgoingcables.

Power and control terminals shall be washer head screw type or stud type complete with crimping type connectors. Screw type terminals with screws directly impinging on conductor are notacceptable.

Each control terminal shall be capable for connection of 2 Nos. 2.5 mm standard copper wires at eachends.

Not more than two wires shall be connected to any terminal. If necessary a number of terminals shall be jumpered together to provide wiring points.

At least 10% spare terminals shall be provided in each module.

Terminal blocks for current transformer secondary lead wires shall be provided with shorting and earthing facility.

Barriers or shrouds shall be provided to permit safe working at the terminals of one circuitwithout accidentally touching that of another live circuit.

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

CONTROL WIRING

The wiring shall be complete in all respects so as to ensure proper functioning of control, protection and interlocking scheme.

All wiring shall be completed upto terminal blocks on the side of each unit-module.

All control wiring shall be carried out with 1100/660 V grade single core PVC cable having stranded copper conductors of minimum 2.5 Sq.mm.

Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance. Wires shall not be spliced or tapped between terminal point.

Numbered ferrules at each end shall identify wires. The ferrules shall be of the ring and of non- deteriorating material. They shall be firmly located on each wire so as to prevent free movement, and shall be interlocking type.

All control circuit fuses shall be mounted in front of the panel and shall be easily accessible. All spare contacts of relays and switches shall be wired up to the terminal blocks.

Each of the DC circuit shall be provided with two fuses one in the positive and the other in the negative for 2 wire DC underground system of specifiedvoltage.

GROUND BUS

An Aluminium ground bus rated to carry maximum fault current shall be furnished along the entire length of each switchboard. Each stationary unit shall be connected directly to this ground bus by two separate and distinct connections in accordance with Indian Electricity Rules.

Grounding terminals on the ground bus shall be provided. Connectors shall be provided at either end of switch board for connection to station ground mat.

TERMINAL BLOCKS

Terminal blocks shall be of 660 Volts grade of stud type. Insulating barriers shall be provided between adjacent terminals.

Suitable provision shall be made to terminate control/power connections in the respective module.

Terminal blocks shall have a minimum current rating of 10 Amps and shall be shrouded. Provisions shall be made for label inscriptions. The wire terminations to the blocks shall be of screw type suitable for crimp type socket.

NAME PLATE

The panel as well as feeders compartments shall be provided with name plate of anodized aluminium, with white engraving on black background. They shall be properly secured with self-tapping screws at the top of the cubicles. The panel/feeder descriptions shall be as indicated in the drawings/employers. The size of the nameplates shall be proportionate to the respective equipment's.

Also individual panel number and danger plate shall be furnished at back of panel.

ACCESSORIES

The following accessories shall be furnished along with each

switchboard. One (1) no. fuse pulling handle for each switchboard.

One (1) no. winding handle for withdrawing breaker from the cubicle.

Other accessories as deemed necessary for trouble free and efficient operation of the equipment offered.

DRAWINGS AND MANUALS

The following drawings shall be supplied for each switchboard.

General arrangement drawing for each type of board showing constructional features and space required In the front for withdrawal of breaker, power and control cable entry points, location of various devices, terminal blocks, cross sectional details, bus bar supports, number of buses, etc. shall be submitted within 15 days from the date of letter of intent for approval.

Foundation plan and anchor hold details including dead load and

impact load. Drawing and data sheet for each component.

Electrical wiring diagram.

Terminal block arrangement drawing for outgoing feeders.

Complete relay technical particulars and recommended

settings.

Operation, maintenance and installation manuals, (one set to Consultants).

Technical Catalogues/Leaflets of CTs, meters, lamps, etc. shall be submitted along with Offer.

The approval of the drawing does not absolve the vendor from his obligation of ensuring Proper and correctness of functioning/operation of the system.

TESTS

ROUTINE AND TYPE TEST

Type test certificates and results as per relevant Standards (Specification) for all the equipment offered under the scope of this specification shall be furnished.

All routine tests on all major components shall be made as per relevant specification. Inspection:

Inspection of the Switchboards including inspection of wiring and electrical operational tests by the Owner/Consultant before dispatch should be arranged by the tenderer. The cost of transport and incidental expenses to be borne by the tenderer. Two weeks clear notice to be given for carrying out theinspection.

Dielectric Tests:

Insulation of the main circuit that is the insulation resistance of each pole to the earth and that between the poles shall be measured.

Each switch board will be completely assembled, wired, adjusted and tested for operation under simulated conditions to ensure correctness of wiring and proper functioning of all equipment's.

All current carrying parts and wiring shall be subjected to a high potential test.

HIGH VOLTAGE TEST

A high voltage test with 2.5 KV for one minute shall be applied between the pole and earth. Test shall be carried out on each pole in turn with the remaining poles earthed. All units racked in position and the breakers closed. Originals test certificate shall be submitted along with panel.

PACKING AND TRANSPORT

Road Transport packed in Wooden Crates shall send the switchboards to site. The packing should be of high quality to avoid any damage to the equipment's during transit. They shall be wrapped with polythene sheets before being placed in crates to prevent damage to the finish.

SCOPE

Receiving inspection, unloading Storage, installation, Testing and Commissioning of the Switchgears shall be in accordance with the specified code of practice and manufacturer's Instructions. The panels shall be aligned properly and bolted, to the flooring by atleast four bolts for each division of Transport. The cable shall be terminated into the panel through glands fixed to bottom /top plate. The panel shall be bonded to the earth by connecting leads to the panel earth bus.

HANDLING/UNLOADING

Switchgears and all its accessories shall be handled/unloaded carefully in its upright position as indicated in the packing case. Lifting lugs and jacking pads shall be used for lifting of the switchgear. While using jacking pads utmost care shall be taken in proper application of jacks. Where switchgears is dragged or pulled on sleeper or rollers of the traction eyes provided at the bottom frame shall be used with suitable wire ropes and shackles. Unloading from the lorry shall be carried out using a mobile crane or tripod with chain pulley block or rolling over to aplatform.

STORAGE

Equipment's shall be stored under shelter in a well-ventilated, dry place and covered by suitable polythene or tarpaulin covers for protection against moisture.

ERECTION

Panels shall be installed over a trench. The panels shall be aligned properly and bolted to the flooring by atleast four bolts. The cables shall be terminated into the panel through bottom plate. The panel shall be bonded to the earth by connecting earthing leads to the panel earth bus.

TESTS

The following preliminary checks and Pre-commissioning tests shall be carried out before commissioning the Switchgears in the presence of Engineer-in-charge.

PRELIMINARY CHECKS

Check nameplate details according to specification. Check for physical damage.

Check tightness of all bolts, clamps and connecting terminals. Check oil level air pressure and leakage (wherever applicable) Check earth connections.

Check the cleanliness of insulators and bushings, arc chambers. Check that all moving parts are properly cleaned and lubricated. Check if space heaters provided.

PRECOMMISSIONING CHECKS

Check alignment of breaker trucks for free movement. Check correct operation of shutters. Slow-closing/opening operation.

Check control wiring for correctness of connections, continuity and IR values. Manual operation of breakers.

Power closing/opening operation manually and electrically.Breaker closing and tripping time.

Trip free and anti pumping operation.

I.R.Values, resistance and minimum pick up voltage of coils. Contact resistance.

Simultaneous closing of all three phases.Pole discrepancy tests.

Single and three phase auto-reclose operation.

Check electrical and mechanical interlocksprovided.

Check on spring charging motor correct operation of limit switches and time of charging.

Check on C.T sectional checks with the relays, meters, Alarm Scheme, interlock as per scheme with primary injection its.

High voltage tests on Control and Power circuits (2.5 KV)

SPECIFICATION FOR SUPPLY OF H.T CABLES

Scope: This specification covers the technical requirements of design, manufacture, test and supply of 3 core HT cable complete for efficient and trouble-freeoperation.

The cables have to be procured directly from the manufacturers. Invoices for the cables shall be produced to client / consultant for conducting the QC inspection at the time of receiving.

The laying, testing and commissioning of cable at site shall be done by Electrical Contractor. The cables shall be properly packed for transportation, supply and delivery at site.

STANDARDS

The materials covered by this specification shall unless otherwise stated, as designed, constructed and tested in accordance with latest revisions of the relevant Indian Standards.

IS : 692-1973- Paper insulated sheathed cables.

IS : 8130-1976 - Conductors for Insulated Electric Cables and FlexibleCords.

IS : 3975-1979 - Mild Steel wires, strips and tapes for armouring ofCables.

IS : 3961-1967 - Recommended current rating forcables.

IS : 1255-1967 - Code of Practice for installation and maintenance of paper insulated power cables (upto and including 33KV).

IS : 7098-1973 PartII - XLPE Cables.

RATING

The conductors shall be made from E1 critical grade high conductivity aluminium wires of Stranded type to form sector shaped conductor. The conductors shall conform to IS: 8130- 1976 (amended up to date).

CURRENT RATINGS

The continues current ratings of the cables shall be based on the following

conditions:- Maximum conductor temperature- 65 ^{0}C

AmbientAirtemperature - 50 ^{0}C

GroundTemperature - 30 ^{0}C

Thermal resistivityof soil - 150 ^{0} Ccm/w

Depth of laying - 900mm

SHORT CIRCUIT RATING

The short circuit rating for one second shall be as per IS: 692 1973 (up to date) and based on the following:

Maximum conductortemperature - 65 ^{0} C under full load

condition.Maximumpermissible temperature - 160 ^{0} C of conductor

during short circuit. TESTING ANDINSPECTION

Tests shall be carried out at manufacturers works under his care and expense.

The cables shall be subjected to 'Routine Tests' i.e. conductor resistance at 20 ^{0} C and A.C voltage test as per relevant IS.

Type test certificates and results as per IS: 692 shall be furnished.

3 copies each of the above test certificates shall be submitted to the Owners.

PACKING, MARKING AND TRANSPORT

The cables shall be supplied on strong wooden drums of suitable size barrel diameter. The inner end of the cable shall protrude out from the drums flange and is fully protected against any mechanical damage and effectively sealed against increase of moisture with heat shrink end caps. The drum is overall lagged with wooden battens and steel straps.

Each cable drum is marked with particulars of cable size, voltage class, length, direction of rolling, position of outer end, gross weight ISI certification mark.

SPECIFICATION FOR INSTALLATION OF H.T CABLES

HIGH TENSION CABLES

HT cables shall be laid in trenches unless otherwise specified. Generally, laying, jointing and commissioning shall be as per regulations of local authorities.

CABLE INSTALLATION

STORING

On receipt of HT cables at site, cables shall be inspected to detect any damage. The ends of cable shall be in sealed condition. After inspection, cable shall be located in a proper place with battens of cable drums being replaced. The cable drums shall not be stored 'on flat' with flanges horizontal. Owners will inspect the cables before storing. Contractor shall take out samples from the drums as per their instructions and send them to the manufacturer to conduct the approval tests. After the receipt of the test analysis, the cable will be accepted by the client.

CABLES AND CABLE ENTRIES

Particular attention is drawn to the Contractor's responsibilities in safeguarding cables Stored
/ laidin outdoor locations and unfinished buildings. Such equipmentis particularly vulnerable to damage from water and dust penetration. The Contractor shall ensure that cables are protected in this respect while installation work is proceeding, covers temporarily removed from trenches/entries for purpose of installation shall be reassembled on completion of the work and replaced when such Work is suspended or otherwise left incomplete. Similarly, all entries shall at times be effectively sealed against ingress of water and dust, e.g. Duct entries shall be sealed by the insertion of proprietary stopper plugs or approved means.

HANDLING OF CABLES

Storage & handling of cable before and during installation shall be executed with regard to manufacturer’s recommendations. Cable drums shall be rotated only in the direction indicated on the drum, and open ends of cable shall be effectively sealed after cutting to prevent ingress of moisture, using heat shrink end caps.

CABLE PULLING

Armoured cables shall be installed with the aid of specifically manufactured rollers, in order to prevent damage to outer sheaths. Cables up to 38 mm diameter shall be installed by hand. However, larger cables, with the approval of the Company Site Representative, may be installed with the assistance of a winch. Any such winch shall be equipped with a suitable tensioning device and indicator, and operated by a competent operator. Cable shall never be installed directly from a drum mounted on a moving vehicle.

Drum jacks, cable rollers, cable winch and other equipment shall be of the correct type for the cable being installed.

BENDING

At all times utmost care shall be exercised to prevent excessive bending or twisting of cable during installation. Changes in direction in cable trenches, racks or trays shall provide for a minimum cable bending radius of twelve times the overall cable diameter.

CABLE JOINTING

Cables shall be run in continuous unbroken lengths. Any requirement for cable jointing shall be executed only with the approval of the Engineer-in-charge.

Fully trained workmen who have passed an approved course of instruction in such work for the operating voltage level concerned shall execute all cable jointing. The Contractor shall furnish written confirmation in this respect to the Engineer-in-charge.

PROTECTION FROM MOISTURE

Each cable system shall be installed either where it will not be exposed to rain, dripping water, steam, condensed water, etc., or be of a type designed to withstand suchexposure.

In damp situations and wherever they are exposed to weather, all metal sheaths and armoured of cables, metal conduit, ducts, ducting trunking clips and their fixings, shall be of corrosion- resistant material or finish, and shall not be placed in contact with other metal with which they are liable to generate electrolyticaction.

For conductors insulated with impregnated paper, exposed conductor & insulation at termination's and cable joints shall be protected from ingress of moisture by being suitably sealed

CABLE TERMINATION

Fully trained & competent workmen who have passed an approved course of instruction in such work for the operating voltage level concerned shall execute all work on the termination of cables. The Contractor shall furnish written confirmation in this respect to The Company Site Representative.

Within terminal boxes, an adequate length of cable loop shall be provided to enable each cable core to be connected to any terminal, in accordance with the approved method of termination for eachequipment.

For multi core terminal /junction boxes, an adequate length of cable loop shall be left to allow for remaking and termination of each core, i.e. a 25mm diameter loop prior to entry of cable core into each terminal.

All connections at a cable termination shall be mechanically & electrically perfect and shall be protected against mechanical damage or any vibration liable to occur. They shall not impose any appreciable mechanical strain on fixing of the connection and shall not cause any harmful mechanical damage to the cable conductor or equipment. Conductors of cables shall be terminated in a manner suitable for the terminal arrangement of the equipmentconcerned.

Prior to final connection, all cable shall be checked for continuity and insulation resistance and correct installation.

The appropriate check sheets shall be complete by the Contractor and accepted by The Company Site Representative, prior to finalconnection.

GLANDS, SEALS AND SHROUDS

The entire body of a cable shall enter a gland, & the outer sheath of a cable shall not be removed before entering the weatherproof seal. Cable shall be on a straight axis from a point immediately before entering a gland.

Cable glands shall securely retain the cable without damage to the outer sheath or armour.

Glands shall be correctly sized and of a type suitable for installation in each respective type ofenclosure.

All glands shall be correctly sized and of a type which will maintain the integrity of the equipment within into which they are to be installed. Such factors as use of insulated plastic enclosure and explosion proof type protection shall be taken into account when selecting glands.

All mechanical glands shall be of the hexagon double compression type, knurled type glands shall not be used.

Earth continuity of brass glands & terminations shall be achieved by rigid clamping of armour within each gland and intimate contact between threaded components of glands and equipment.

Brass glands terminating in unthreaded enclosures shall be provided with earth continuity by attachment of earth continuity bonds.

Termination's of mineral insulated cable shall be provided with sleeves having a temperature rating equal to that of the seals.

Cores of sheathed cables, from which the sheath has been removed, and non-sheathed cables at terminations of conduit, ducting or trunking, shall be enclosed according to the design specification.

TERMINAL CONNECTING LUGS

Cable loops of conductors of 10 Sq.mm and above shall be fitted with compression-type terminal connection lugs, using tools specially designed for use with such lugs.

At all terminal connections, cable conductors shall be fitted with correctly sized cable sockets of the crimped compression type. Soldered connections shall be employed only where their use is unavoidable. Solder used shall have a melting point of not less than 185 Deg.C, and cable lugs or thimbles shall be the correct type and size for each conductor. Packing of oversized lugs shall not be permitted.

Compression joints shall be made using proprietary sets of lugs and indent dies, correctly sized and shaped for each specified conductor concerned. Use of mixed lugs and dies of different manufacture or systems shall not be permitted.

SEALING OF CABLE TRANSITS

Openings made or provided in or through building walls, floors, etc. shall be effectively sealed.

Cable entries into trenches (in switch rooms, etc.) shall be effectively sealed after cables have been laid. Unused cable entries and cable entries in equipment also shall be effectively sealed.

Openings through roofs and external walls shall be made weatherproof, including installation of flashing and / or rain hoods to prevent the entry of driving rain, seepage of water, dust, etc.

SINGLE-CORE CABLES

Each set of single-core cables comprising a three-phase circuit shall be run close together in trefoil formation. All cable gland mounting plates for single-core cables shall be inspected to ensure they are non-magnetic material. When installed in ducts, each trefoil group shall be installed in a single duct.

CABLE SUPPORTS

Every cable and conductor used as fixed wiring shall be supported in such a way that it is not exposed to undue mechanical strain and so that there is no appreciable mechanical strain on the terminations of the conductor. Account shall be taken of the mechanical strain imposed by the supported mass of the cable orconductor.

Conduit, ducting and trunking shall be properly supported and of a type that is either suitable for any risk of mechanical damage which may be met in normal conditions of service, or adequately protected against such damage.

Installation shall take into account longitudinal expansion and contraction that may occur with variation of temperature under normal operatingconditions.

UNDERGROUND CABLES

GENERAL REQUIREMENTS

All excavation, cable protection, backfilling and surface restoration and installation of cable markers, protection tiles and warning tape shall be in accordance with the Electrical drawings.

Construction of cable trenches, their bedding and backfilling shall be executed in accordance with Electrical Drawings.

Where excavations are required near footings, foundations, concrete floors, etc. earthwork under and in the vicinity of these excavations shall not be disturbed and all backfill shall be well consolidated.

Installation shall be so arranged that all trenches are excavated and backfilled in a minimum period of time, care shall be taken to ensure that all cable's. For a particular route are made available at site, before trenches are excavated.

When planning the excavation sequence for cable trenches, the contractor shall take care to not obstruct access.

Adequate safety precautions shall be observed at all excavations by the provision of safety barriers, warning notices, shoring, etc.

Cables installed under roads shall be in accordance with the Electrical Drawings. An additional number of pipes, 3 to 5, depending on space, shall be installed at normal cable laying depth to accommodate future cables.

Cables to be installed in underground ducts, conduits or pipes, shall be of a type that incorporates a sheath and/or armour, suitably resistant to any mechanical damage likely to be caused during drawing in.

Physical separation between HV, LV, tele-communication and instrument cables laid within the same cable trench shall be in accordance with Electrical Drawings.

Underground cable routes shall avoid close proximity to pipe crossings and parallel pipe runs. Physical separation between cables and pipes shall be not less than 300 mm and cables should cross underneathpipes.

If a cable route is in close proximity to underground pipes carrying hot liquids or gases, or which are regularly steam cleaned, the pipe shall be insulated in order to limit its outside temperature to a maximum of 60 Deg.C. In these cases cables may be run above pipes.

Burned cables shall be identified with their full cable numbers, as detailed on the cable schedule, at both termination points. Cable number shall be embossed on a metallic strip and installed on cables using proprietary cable ties. Sample of which shall be approved before use.

Cable route and cable joint markers shall be installed visibly at ground surface level in accordance with the Electrical drawings.

When cable routing is not definitely indicated on a design layout drawing, the Contractor shall submit full details of his proposed routing to The Company Site Representative for approval. Routing details shall be shown clearly on the Contractor's workingdrawings.

CABLE INSTALLATION

Installation of direct burned cables shall not be commenced until the entire route has been excavated and prepared ready to receive the cable.

If cable is left exposed above ground, it shall be coiled and suitably protected against damage. Alternatively, such cable may be left on the drum, which shall be lowered from its jacks and firmlyanchored.

Laying patterns, as indicated on the layout drawings, shall be adhered to.

Unavoidable crossings shall be made either in the cable cellar directly underneath the corresponding switchgear panel, or at the branching-off point of a particular cable from the main trench. Care shall be exercised to keep the whole installation tidy in these areas.

Ends of hard-floored cable trenches, ducts or pipes shall slope down into surrounding soil, to avoid cable damage following possible settling of soil.

ABOVE GROUND

GENERALREQUIREMENTS

Cable shall be laid on racks or trays in accordance with laying patterns indicated on layoutdrawings.

All cable outlets from a duct system, all joints in a duct system, and all joints between such a system and another type of ducting or conduit shall be formed so that joints are mechanically sound. During cable pulling cables shall not be damaged.

Spacing between cable racks, trays, or cable ladders, and structures, wall or columns, shall be at least 50 mm.

Metal parts of cable racks and trays shall be bonded between each section, and connected to the common earth grid.

Cables shall be fixed to cable racks and trays by proprietary ties, straps and / or clamps where indicated on the layout drawings and as specified in the design specification. The cable ties, straps and clamps shall be capable of retaining the cables during short circuit stresses, and if nylon/plastic ties are used they shall be UV-resistant.

Where cables, conduits, ducts or trucking pass through fire-resistant structural elements such as walls and floors designated as fire barriers, openings made shall be sealed according to the appropriate degree of fire resistance. In addition, where cables, conduits or conductors are installed in channels, ducts, trunking, or shafts that pass through such elements, suitable internal fire-resistant barriers shall be provided to prevent spread of fire.

Enclosure for conductors and their joints / termination's which are subjected to dustconditions shall be protected to IP 54 (refer to IEC79)

Cables shall not be installed on exterior wall faces of buildings, ceilings or support structures without the specific approval of The Company Site Representative. Spacing between cable and structure or similar shall be at least 10 mm.

For horizontal runs of cable on structures, cables shall be adequately cleaned such that no sags occur incabling.

All cables shall be supported by saddles, cleats or other supports as indicated on the layout drawings such that no mechanical forces are imposed on cable glands.

Cable saddles shall be double-fixing. Half-section saddles shall not be used. Fixing of saddles by means of explosive tools shall not be permitted.

Cleats shall firmly clamp cable without distorting or damaging cable.

Cables sheathed with rubber, PVC or equal, may be supported by a catenary's wire, either continuously bound to supported cable or attached at intervals. For cables supported by a catenary's wire incorporated in accordance with minimum heights indicated on the layout drawings.

For spans without intermediate supports, terminal supports, terminal supports shall be arranged so that undue strain is not placed on conductors or insulation of cable. Adequate precautions shall be taken against any risk of chafing of cable sheath. Minimum specified height above ground and length of spans shall be in accordance with the layout drawings.

TESTING:

Cables shall be tested at site as follows:

Before shifting of cables drums from the yard to the site, insulation resistance shall be carried out on the cable and readings recorded in the presence of the Site Representative.

On cable being laid prior to sand bedding an I.R. shall conducted and recorded in the presence of the SiteRepresentative.

On the cable trench route being completed and compassion done an I.R shall be conducted and recorded in the presence to the SiteRepresentative.

No backfilling of trenches shall be done till the trench/sand padding/ cable's are inspected and tested. Before end termination's are made an I.R shall be conducted to ensure the cable is in order. On termination's being completed prior to connecting to the equipment. The following test shall be conducted. An I.R. done on the cable/Termination.

Cable/term subject to a pressure test for 15 minutes. The voltage to be applied shall be as per manufacturers recommendations and in co-ordination with Owners/Consultants.

An I.R. Done on completion of the above Hi pot test and compared to Item (5.1). All tests shall be done and recorded in the presence of the Site representative.

SPECIFICATIONS FOR CROSS LINKED POLYETHYLENE POWER CABLES

SCOPE

This specification covers the design, Manufacture, Testing at works, inspection and delivery at site of XLPE insulated cables.

STANDARDS

The cables by the specification shall, unless otherwise stated, be designed, manufactured and tested in accordance with the latest revision of relevant India standard.

IS3975 : Mild Steel Wires, strips and tapes for amounting of

cables.IS8130 : Conductor for Insulated electric cables and flexible

cords.IS5831 : PVC Insulation and sheath of electriccables.

IS 7098(Part-1) : Cross Linked polythyethlene insulated PVC SheathedCables.

CONDUCTOR

The conductor shall be aluminium/Copper as specified.

The conductor shall be smooth, uniform in quality and free from scale and other defects. The Aluminium conductor for 10 Sq.mm and above (6 sq.mm for copper) shall be stranded and shall be clear and reasonably uniform in size and shape. The conductor shall be circular or sector shaped.

The stranded conductor shall be compacted to reduce dimension and to give smoother profile.

SELECTION OF CABLES

Cables should be selected considering the conditions of maximum connected load, ambient temperature, grouping factor, allowance for voltage drops. However it is the responsibility of the contractor to recheck the sizes before cables is procured. He should submit the cable derating; voltage drop and length calculation to Consultant / Engineer in charge for approval before procuring cables.

CONDUCTORSCREEN

The conductor screen shall be semi conduction compound and shall be extruded in the same operation as theinsulation.

INSULATION

Insulation Shall be cross linked polyethylene and shall be gas cured for HT Cables.

INSULATION SCREEN

The semi conducting insulation shield shall be preferably be strippable and shall be triple extruded thermo set type.

CORE SCREENING

The High Voltage cable, 6.6KV and above, shall be provided with copper tape screen over cores to achieve full coverage. The number and thickness of tape shall be suitable for the short circuit rating of thecable.

INNER SHEATH

The inner sheath shall be extruded PVC Polypropylene filler shall be provided.

ARMOUR

Galvanised steel wire/ strips armour shall be provided over the inner sheath for protection against mechanical damage.

The armour coverage shall be more than 95% to achieve better mechanical protection and low armourresistance.

OUTER SHEATH

The outer sheath shall be extruded PVC and shall be resistant to termite and rodent attack. Progressive sequential marking, size marking, Voltage grade name of manufacture at every one meter shall be made on the outer sheath.

GENERAL

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

TEMPERATURE RISE

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

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

Rated continuous current

Rated 1.0 second current rating factor shall be given by bidder for the

following: Variation in ground temperature

Variation in soil thermal

resistivity Variation of Ambient

temperature

For the cables laid side by side at ID spacing and in Tier formation.

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

CABLE DRUMS

Cables shall be supplied in non-returnable drums of sturdy construction. All ferrous and other metal parts of drum shall be treated with a suitable rust preventive finish or coating to avoid rusting during transit or storage. The length of cable on each drum shall be determined by manufacturer considering the transport limitations from manufacture's work to the site.

PACKING, MARKING AND TRANSPORT

The cables shall be supplied in strong, non-returnable wooden drums of heavy construction.

Each cable drum is marked with particulars of cable size, voltage class, length, direction of rolling, position of outer gross weight, ISI certification marking etc.

STORING, LAYING, JOINTING AND TERMINATIONS STORING

All the cables shall be supplied in drums, on receipt of cables at site, the cables shall be inspected and stored in drums with flanges of the cable drum in vertical position.

Employer / Client's Engineer in charge will inspect the cables before storing. Contractor shall take out samples from the drums as per their instructions and send them to the manufacturers to conduct the approval tests. After the receipt of the test analysis, the Employer will accept the cable.

LAYING

Cables shall be laid as per the specification given below:

CABLES IN OUTDOOR TRENCHES

Cables shall be laid in outdoor trenches wherever called for. The depth of the trenches shall not be less than 75 cms. from the Formed Ground Level (FGL) which has to be ascertained from the Architects. The width of the trenches shall not be less than 50cm. A spacing of not less than the cable diameter shall be allowed between the cables. The trenches shall be cut square with vertical side walls and with uniform depth. Suitable shoring and propping may be done to avoid caving in of trench walls. The floor of the trench shall be rammed level. Cable unreeling from drums shall be done only with the help of cable drum rolling supports. The cables shall be laid in trenches over the rollers placed inside the trench. The cable drum shall be rolled in

the direction of the arrow for rolling. Wherever cables are bent, the minimum-bending radius shall not be less than 12 times the diameter of the cable. 15cm thick layer of sand cushioning to be provided full of stones and pebbles. Cable shall be taken lifted and placed over this and cushion. The cable shall then be covered with a 15cm thick sand cushion, where cable is laid in rocky situation. Extra thick cushioning of sand as may be required /decided by the Project Manager/Architects shall be done without extra charge. Over this, a course of cable protection tiles or brick shall be provided to cover the cables by 5cm on either side. Unless otherwise specified, the cable shall be protected by concrete tiles/stone slabs of minimum 25 mm thick placed on top of the trench breadth wise for the full length of thecable.Trenchshallbebackfilledwithearthandconsolidated.Cablesshallbelaidin
Hume pipes at all road crossings and in GI pipes / PVC pipes at the wall entries. Approved cable markers made of concrete blocks indicating the voltage grade and the direction of run of the cables shall be installed at regular intervals of 25 Mtrs. The depth of concrete blocks shall be at least 300 mm below ground and 50 mm aboveground.

CABLES IN INDOOR TRENCHES

Cables shall be laid in indoor trenches wherever specified. Suitable painted MS base plate clamps, saddles, GI nuts/bolts or alternatively UV resistant tie wraps shall be used for securing the cables in position at an interval not more than 450 mm. Spacing between the cables shall not be less than 15 mm center to center. Wherever specified, trenches shall be filled with fine sand and covered with steel chequered trench covers or RCC slabs.

All chases and passage if necessary for the laying of service cables at the entry or of premises shall have to be cut and made good to the satisfaction of the Project Manager/ Consultants.

All cables entries into the buildings/cable trenches/ducts, etc. shall be suitably sealed as required by the Project Manager/Consultants without extra cost.

JOINTING AND END TERMINATIONS:

Cable jointing shall be done as per the recommendations of the cable manufacturer. Qualified cable jointer under strict supervision shall do jointing. Sample crimping of different size cables shall be subjected to contact resistance and heating tests in the presence of the Consultant / Engineer - in - charge.

Each termination shall be carried out using Electroplated Brass double compression glands and copper cable sockets and approved jointing materials are to be used. Hydraulic crimping tool shall be used for making the end terminations. Cable gland shall be bonded to the earth by using suitable copper wire with earth tags. The cable armoring is to be earthed properly so that the earth continuity is maintained. All outdoor terminations shall be provided with PVC shroud's to make them water verminproof.

TESTING

Cables shall be tested at factory as per the regulations of IS: 1554 Part I. The tests shall incorporate routine tests, type tests and acceptance tests. Copy of such test certificates shall be furnished to theOwner.

ROUTINE TESTS

(To be performed on each drum length)

These shall include, among others normally performed by the manufacturer, the following:

a. Conductor D.C resistancetest.
b. Capacitance
c. Partial discharge level measurement at powerfrequency.
d. High Voltagetest

Cables shall be tested at site after installation and results shall be submitted to Consultants / Engineers. Insulation resistance between conductors and neutral and conductors and earth.

SPECIFICATION FOR CABLE TRAYS SCOPE

This specification covers the design, supply, fabrication fixing, aligning of G.I perforated cable trays and other steel frame works at site as required.

The cable trays shall be designed and fabricated out of 2mm thick CRCA sheet steel etc. and got approved by Consultants.

Before fabrication the sheet steel shall be properly cleaned to remove rust, If any.

All materials used for fabrication of cable trays shall conform to IS: 226 and fabrication shall be as per IS: 800.

After fabrication the cable trays, and accessories shall be free from sharp edges, comers, burrs and unevenness, and followed bygalvanizing.

The cable trays shall be welded to the mounting supports, which in turn are either welded to plate inserts or grouted to structural members.

Civil Contractor shall provide plate inserts for cable tray mounting supports.

Cable trays shall either run in cable trenches or run overhead and supported from available structure.

Minimum clearance between the top most tray tier and structural member shall be

300 mm. The type and size of tray to be used shall be as required.

Each continuous length of cable tray shall be earthed at minimum two places.

All hardware such as passivated bolts, nuts; washers, and other consumable required for the fabrication and erection shall be included in the rate quoted by contractor. However, if any grip/Anchor bolts or fasteners are required, the same shall be paid extra.

The cable trays, accessories, covers etc. shall be galvanized. Where any cuts or holes are made or welding is done on finished steel work, the same shall be sealed against oxidation by red oxide primer followed by finished paint.

SPECIFICATION FOR POWER AND LIGHTING DISTRIBUTION BOARDS

GENERAL

This specification Is applicable to 415 Volts, 3 phase 4 wire A.C supply and shall conform to the following Indian Standards (Latest Version).

IS-8623	Factory built assemblies of switch gear and control gear for voltages up to and including 1000 V AC and 1200 VDC.
IS-8828	Miniature circuit breakers for voltages not exceeding 1000Volts.
IS-2675	Specification for enclosed distribution fuse boards and cut outs for voltage not exceeding 1000 Volts.
IS-2208	HRC cartridge fuse links 650Volts.
IS-732	Code of practice for electrical wiringinstallation.

TYPE AND CONSTRUCTION

Distribution boards shall be made of Robust and rigid construction and of totally enclosed dead front safety type. The enclosures shall be made of MS sheet steel of not less than 16 gauges. The sheet steel shall be treated by seven-tank process treatment followed by epoxy powder coating of approved shade. The distribution boards shall comprise of MCCB's or miniature circuit breakers as incoming and required number of miniature circuit breakers as outgoing.

All the Distribution Boards are of Double Door type and with IP 40 Degree of protection.

The main switch and outgoing shall have rating as specified in the drawings and schedule. The boards shall be designed to have adequate cabling space for either top or bottom entry of both incoming and outgoingcables.

BUS BARS

Suitable colour coded bus bars made of high conductivity aluminium strips and mounted on non-hygroscopic insulating supports shall be provided. Neutral bus bars shall be of half the size of phase bus bar. The earth bus shall be also provided of material and size as required.

MINIATURE CIRCUIT BREAKERS

Miniature circuit breakers shall have a minimum breaking capacity of 10 kA. Circuit breakers shall be equipped with individual insulated, braced and protected connectors. The front face of all the breakers shall be flush with each other. The breakers shall have 'quick break trip free' mechanism with current limiting and overload and short circuit tripping characteristics. The mechanism shall be such that the circuit cannot be held closed when a fault occurs or persists.

The contacts shall be silver tungsten or other suitable material to give long contact life. Multiple units shall have an inter tripping mechanism thereby ensuring complete isolation in the circuit in the event of an overload or fault in anyone of the phases. The connectors shall be suitablyshrouded.

SAFETY & INTERLOCKS

All the live parts are shrouded such that accidental contacts with live parts are totally avoided. Distribution boards shall be provided with a front-hinged door. Distribution boards interior assembly shall be dead front with the front cover removed. Main lugs shall be shrouded. Suitable insulating barrier made of arc resistant material shall be provided for phase separation. Ends of the bus structures shall also beshrouded.

CABINET DESIGN

The distribution board cabinet shall be totally enclosed type with dust and vermin proof construction. The interior components shall be mounted on a separate sheet, which is mounted and locked on to the studs provided inside the cabinet. Over this, a cover made of acrylic door shall be provided. Cabinets shall have 25mm knock out detachable glands plates at both top and bottom and sides. Robust fasteners enabling dust protection gasket to be compressed quickly and easily should secure the door. Unless specified otherwise boards shall be flush mounted inwalls.

TERMINALS

Distribution boards shall be provided with a terminal block of adequate size to receive mains incoming cable and outgoing circuits. The location of the terminal block shall be so located that crowding of wires in the proximity of live parts is avoided. A neutral link having rating equal to that of phase bus shall be provided.

DIRECTORY

Distribution boards shall be provided with a directory indicating the description of loads served by such circuit breaker, the rating of breakers, size of conductors, etc. The directory shall be mounted in metal holder with a clear plastic sheet on inside surface of the front door. The DB's shall be provided with inscription plates. The size of letters shall be as approved and the wordings for inscription shall be given by the Architect / Engineer incharge.

INSTALLATION

Distribution boards shall be surface mounted or recessed mounted as required by the Consultants and at the locations shown on the drawings. The boards shall be fixed with suitable angle iron clamps and bolts. All the cables/conduits shall be properly terminated using glands/grips/check nuts, etc. Wiring shall be terminated

properly using crimping/lugs sockets and PVC identification ferrules. The DB's shall be installed as specified in IS: 732 and National BuildingCode.

FASTENERS

All the screws, nuts, bolts, washers, etc. used for the current carrying parts shall be of brass or other approved non-ferrous material. Other fasteners shall be made of non-corroding materials. The screws used for fixing the top plate and the washers shall be of MS with nickel-plated.

TESTING

Distribution boards shall be tested at factory as per Indian Standard. The tests shall include insulation test, high voltage test, etc. Distribution boards shall be tested for insulation resistance after the erection.

DRAWING APPROVAL

The contractor shall submit the drawings for approval.

SPECIFICATION FOR LIGHT FITTINGS AND ACCESSORIES

SCOPE

This Specification also covers the design, material specification, manufacture, testing at works, inspection and delivery at site of light fittings and their associated accessories.

STANDARDS

The light fittings and their associated accessories such as LED down lights / Linear lights, LED strip lights, reflector, housings, Drivers etc. shall comply with the latest applicable standards and codes.

GENERAL REQUIREMENTS

Fittings shall be designed for continuous trouble-free operation under hot humid atmospheric conditions, at an ambient of 45°C without reduction in Lumen output or without deterioration of materials and internal wiring. Outdoor fittings shall be weatherproof and waterproof type.

The fittings shall be designed so as to facilitate easy maintenance, including cleaning, replacement of Drivers etc.

Connectors between different components shall be made in such a way that they will not work loose by smallvibration.

For each type of light fitting, the Manufacturer/Vendor shall supply the utilization factor to indicate the proportion of the light emitted by the bare lamp, which falls on the working plane.

The fittings shall be supplied complete with lamps/drivers.

The fittings and accessories shall be designed to have low temperature rise. The temperature rise above the ambient temperature shall be as indicated in the relevant Standards.

Outdoor type fittings shall be provided with outdoor type Control gearbox.

Each fitting shall have a terminal block suitable for loop-in, loop-out T-off connection. The internal wiring shall be completed by the manufacturer by means of stranded Copper wire and terminated on the terminalblock.

All hardware used in the luminaries, shall be Cadmium plated.

EARTHING

Each light fitting shall be provided with an earthing terminal suitable for connection to the earthing conductor.

All metal or metal-enclosed parts of the housing shall be bonded to the earthing terminal so as to ensure satisfactory earth continuity throughout thefixture.

PAINTING/FINISH

All surfaces of the fittings shall be thoroughly cleaned and de-greased. The fittings shall be free from scale, sharp edges and burns.

The housing shall be stove-enameled/epoxy stove-enameled/vitreous enameled powder- coated of anodized as indicated under various types of fitting.

The finish of the fitting shall be such that no bright spots are produced either by direct light source or by reflection.

ACCESSORIES FOR LIGHT FITTINGS REFLECTORS

The reflectors shall be made of CRCA sheet steel. Aluminium / Silvered glass as indicated, for the above-mentioned fittings.

The thickness of Steel / Aluminium, shall comply with relevant Standards. Reflectors made of Steel, shall have stove-enameled/Vitreous-enameled/Epoxy-coatingfinish.

Aluminium used for reflectors, shall be anodized / Epoxy Stove-enameled/Mirror polished.

Reflectors shall be free from scratches or blisters and shall have a smooth and glossy surface having an optimum light reflecting co-efficient such as to ensure the overall light output specified by the manufacturer.

Reflectors shall be readily removable from the housing for cleaning and maintenance without disturbing the lamps and without the use of tools, they shall be securely fixed to the housing by means of positive fastening device of captive type.

LAMP/STARTER HOLDERS

Lamp Holders shall comply with relevant Standards. They shall have low contact resistance, shall be resistant to wear and shall be suitable for operation at the specified temperature without deterioration in insulation value. They shall hold the lamps in position under normal condition of shock and vibration met within normal installation and use.

Lamp Holder for the retrofit LED lamps shall be of the spring loaded bi-pin rotor type. Live parts of the lamp holder shall not be exposed during insertion or removal of the lamp or after lamp has been taken out. The lamp holder contacts shall provide adequate pressure on the lamp cap pings when in working position. All material used in the construction of the holder shall be suitable for tropical use.

DRIVERS

The Drivers shall be designed, manufactured and supplied in accordance with the relevant Standards. The Drivers shall be designed to have a long service life and low power loss.

Drivers shall be mounted using sell locking, anti vibration fixings and shall be easy to remove without de-mounting the fittings. They shall be in dust-tight, non-combustible enclosures.

The Drivers shall be of electronic, heavy-duty type, filled with thermosetting insulating, moisture-repellant, Polyester compound filled under vacuum. Drivers shall be provided with tapping to set the voltage within the range specified. End connections and taps shall be brought out in a suitable terminal block, rigidly fixed to the driver enclosure. The driver wiring shall be of Copper wire that shall be free from hum. Drivers which produce humming sound shall be replaced free of cost by the Vendor.

Low loss Silicon steel lamination, shall be wounded with super enameled Copper wire with Class "F" insulation on glass filled Nylon bobbin.

High temperature-resistant interlayer Polyester film shall be used for inter layer insulator glass-filled Polyester connector should withstand high voltage up to 5 KV.

Separate driver for each lamp shall be provided in case of multi lamp fittings. The driver for each lamp shall be provided in case of multi lamp fittings.

SPECIFICATIONS FOR STREET LIGHT POLES AND POSTS

The street light poles/pathway light poles shall be of swaged type construction conforming to IS: 1239. The dimensional and other details shall be as specified in the enclosed Standard Drawings.

The street light poles shall have M.S pipes of uniform cross section. The poles shall be treated with a rigorous rust inhibition process and the outside surface of the pole shall be painted with two coats of paint conforming to IS:2339.

Where portion of the pole is required to be embedded in concrete and below ground, the inner circle shall be treated with two coats of bituminous paint.

The poles shall be complete with base plate of minimum size 300 x 300 mm and 3 mm thick, and as indicated in the standard drawing.

The pole below the ground level shall be grouted in 1:2:4 concrete as per standard drawing. The bottom portion of foundation shall be 800 x 800 mm.

Two nos. 50 dia. G.I pipes in arc with 600 mm radius shall be embedded in concrete pedestal up to marshaling box for running of incoming and outgoing cables.

Earthing studs shall be provided on pole.

Each pole shall be provided with a junction box made of 2 mm thick sheet steel mounted on supporting clamps welded to pole at +450 mm from ground level. The box shall be of weatherproof and dust tight construction with neoprene gaskets and provided with hinged front cover/door with key operated locking device. The box shall be complete with the following: Alternatively, arrangement shall be for an integral type junction box as shown in drawing.

The rate shall include all items/works described as above and including civil works, reducers suitable size foundation bolts as per standard drawing and any other items not specified but necessary for completion of installation.

NOTE:

The Contractor shall submit the drawings of the poles based on above specification and schedule for approval before fabrication.

The civil foundation works of security and pathway lights have to be executed by the contractor including supply of all materials. The price for erection in schedule of quantities contain the cost of civil foundation.

SPECIFICATIONS FOR DISTRIBUTION SYSTEM, CONDUITS, WIRING & ACCESSORIES

GENERAL

This Specification of Medium/ Low Voltage Distribution System shall be applicable for wiring 3 phase, 4 wire 415 Volts, 50 Hz AC and single phase, 2 wire 230 Volts, 50 Hz, AC supply.

PVC CONDUITS & ACCESSORIES

The conduits shall conform to the requirements of relevant IS (latest edition) in all respects. The conduits shall have uniform wall thickness/cross section throughout. Conduits shall bear the name, trademark of the manufacturer and size of conduit on each length. The conduits shall be delivered to the site in original bundles. Conduits of less than 19 mm dia. shall not be used. The minimum wall thickness of conduits shall be as follows:

Rigid PVC Conduits : 2 mm. (Heavy Duty),FRLS

CONDUIT ACCESSORIES

Conduit accessories such as bends, tees, elbows, reducers, draw boxes, junction boxes, etc. shall be of approved makes. Boxes shall have internally tapped spouts, junction boxes/inspection boxes shall be internally tapped table covers. Necessary pull boxes of adequate sizes shall be provided wherever required at no extra cost.

All conduits shall be of ample size for easy 'draw in' and 'draw out' of all the wires in the conduits. In no case the total cross section of wires measured over all be more than forty percent of the area of the conduit.

All the conduits shall be adequately protected while stored on site prior to erection and no damaged conduit shall be used.

All conduit accessories shall be made out of 16 Gauge thick G.I enclosures.

PREPARATION OF CONDUIT

The Inside surface and ends of conduits and threads and fittings used shall be clean, smooth, cut square and free from burrs and other defects. Powdered soapstone, talc or prepared compounds shall be used as lubricants to facilitate the smooth pulling in of conductors.

ERECTION OF CONDUIT

The conduit shall be properly and tightly screwed between the various lengths and to the boxes to which it runs and terminates. No part of the conduit shall be under

mechanical stress and the whole conduit system shall be electrically and mechanically continuous throughout.

Conduits shall be installed with provision for ventilation self drainage in the event of ingress of moisture due to condensation or any other reason and prevent sweating.

A suitable drainage hole shall be drilled in the bottom of the lowest conduit box in every 9 Mts. of horizontal length.

INSTALLATION OF RECESSED CONDUIT SYSTEM

The conduits shall be installed in such a manner that running can be carried out from the fittings boxes and switch boxes only.

Conduits, which are to be taken in the ceiling slab, shall be laid on the prepared shuttering work of the ceiling slab before concrete is poured, and tied to bars at every 500 mm. The conduits shall be made water-tight by using bituminous compound at the screwed ends. The conduits in ceiling slab shall be straight as far as possible.

Conduits recessed in walls shall be secured rigidly by means of steel hooks/staples at 0.8 mts. intervals. Before conduit is concealed in the walls, all chases, grooves shall be neatly made to proper dimensions to accommodate the required number of conduits.

The outlet boxes, point control boxes, inspection and draw boxes shall be securely fixed by means of counter sunk steel screws and crawl plugs. They shall be firmly grouted in position prior to plastering fixed as and when conduit is being laid. The recessing of conduits in walls shall be so arranged as to allow at least 12 mm plaster cover on the same. All grooves, chases, etc. shall be refilled with cement mortar and finished up to the wall surface before plastering of walls Is taken up by the general contractor. The top edge of the conduit shall be at least 25 mm below the finished surface of wall. Wherever conduits terminate into point control boxes, distribution boards, etc. conduits shall be rigidly connected to the boxes, boards, etc. with check nuts on either side of the entry to ensure electricalcontinuity.

After conduits, junction boxes, outlet boxes, etc. fixed in position their outlets shall be properly plugged with PVC stoppers or with any other suitable materials so that water, mortar, vermin's or any other foreign material do not enter into the conduitsystem.

To facilitate easy drawing of wires in conduit necessary GI pull wires of 16 SWG shall be inserted into the conduit immediately after shuttering is removed.

The Electrical Contractor shall be present during the pouring of concrete to ensure that the conduits and accessories are not displaced or blocked.

The conduits shall be swabbed out by drawing dry swabs of rag through the conduit to remove all moisture prior to drawing ofwires.

Where vertical concealed conduits pass through floors or beams and horizontal concealed conduits required to pass through columns or beams, these shall be taken through rigid PVC/GI pipes to be inserted in the floors /columns/beams, etc. during casting for which no extra payment shall beentertained.

Extension collars of suitable depth shall be used as necessary to leave all boxes absolutely flush with the finished wall or ceiling surface.

Conduits shall not be buried or plastered etc. unless and until the work has been inspected by the client / consultant.

INSTALLATION OF SURFACE CONDUIT SYSTEM

Conduits shall run in square and symmetrical lines. Before the conduits are installed, the exact routes shall be marked at site and approval of the Architect / Engineer in chargeshall be obtained. Heavy gauge GI base plates, saddles, secured to suitable crawl plugs, at an interval of not more than 1 meter, shall fix conduits. Conduits shall be joined by means of screwed couplers and screwed accessories only. In long distance straight runs of conduit, inspection type couplers or running type couplers or pull boxes shall be provided.

Bends of conduit runs shall be done by pipe bending machine. Bends, which cannot be negotiated by pipe bends, shall be accompanied by introducing inspection boxes or inspection bends. Not more than three equivalent 90 C bends shall be used in a conduit run from outlet to outlet.

All the conduit openings shall be properly plugged with PVC stoppers/bushes. The conduits shall be adequately protected against rust by applying two coats of approved synthetic enamel paint after the installation is completed.

Wherever conduits terminate, conduits shall be rigidly connected to the box/board with brass hexagonal check nuts with compression washers on either side of the entry to ensure proper electrical and mechanical continuity.

The crossing of surface conduits shall not be generally permitted and to avoid such crossings, adopter boxes shall be used at junctions/crossings.

All unused conduit entries shall be blanked off in an approved and where conduits terminate in adopter boxes. All removable box covers shall be firmly secured to provide complete enclosure.

CONDUITS ABOVE FALSE CEILING

In the false ceiling area, the conduits shall be run above the false celling frame work supported by means of M.S straps secured and fixed to both conduits and structural celling, keeping the outlet box as near as possible to the fittings/fans for connections. The conduit boxes for fittings/fans are independently supported by means of separate fixing arrangements to the box and structural celling so that the box is heldrigidly.

ENCLOSURE FOR ELECTRICAL ACCESSORIES

Enclosure for electrical accessories shall conform to IS:5133-Part I. The wall thickness of MS enclosures shall be not less than 1.6 mm. The enclosure boxes shall be provided with a minimum of four fixing lugs located at the comers for fixing the covers. All fixing lugs shall have tapped holes to take machined brass screws.

Sufficient number of knockouts shall be provided for conduit entries. The enclosures shall be adequately protected against rust of corrosion both inside and outside. The enclosures shall be provided with 5 mm thick overlapped white PVC or Perspex sheet cover with rounded corners and beveled edges for mounting switches, sockets etc. Wherever different phase conductors are brought into the same enclosure, phase barriers shall beprovided.

Minimum size of the box shall be 75 x 75 x 75 mm.

Draw boxes of ample dimension shall be provided at convenient points on walls/ceilings to facilitate pulling of long runs of wire. These boxes will be as few as possible and located where found necessary and approved by the Architect / Engineer in charge at no extra cost.

Where flush conduits are required to terminate at surface mounted equipment, the conduit shall terminate at a flush box and the back of the equipment should fully cover the flush box and brass screws shall be used between the equipment and the box in addition to any other means of fixing and earthing arrangement.

The alternative arrangement to the above shall be by means of fixing a terminal extension box to the flush conduit box in which case a break joint ring shall be fitted betweenboxes.

WIRING CONDUCTORS

All wiring conductors shall be PVC insulated, copper conductors of 1100 V grade, FRLS and shall conform to IS: 694 Part II (Latest Edition).

Wiring conductors shall be supplied in Red, Blue, Yellow, Black and Green colours for easy identification of wires. The wires shall be supplied in sealed coils of 100 mtr. Length and shall have manufacturer's trademark, name, Voltage gradeetc.

INSTALLATION OF WIRING CONDUCTORS / CABLES

The wiring conductors shall not be drawn into the conduits until all the works of any nature that may cause damage to the wires are completed. The installation and termination of wires shall be carried out with due regard to the followings

While drawing the wiring conductors, care shall be taken to avoid scratches and kinks, which cause breakage of conductors. There shall be no sharp bends in the conduit system.

Strands of the wires shall not be cut for connecting to the terminals or lugs. The terminals shall have adequate cross section to take all the strands.

Oxide inhibition grease shall be applied at all terminals and

connections. Brass flat washers of large area shall be used for

bolted terminals.

Bi-metallic connectors should be used wherever aluminium conductors are tapped from copper mains or vise-versa.

Wiring for power and lighting circuits shall be carried out in separate and distinct wiring systems.

The wiring system envisaged is generally shown on the layout drawings and line diagrams. However, a brief account of the general wiring system is given below:

Sub mains wiring - Wiring from Meter boards/switch boards to the individual distribution boards, and shall consist of wires, conduits, all conduit and fixing accessories as required and specified. The sizes of conduits and number of wires shall be as specified in Schedule of Quantities. Wires shall be drawn in conduits as required without being damaged, with necessary draw boxes if required. The wire lengths must be adequate for terminating at either end and identifying ferrules shall be provided at termination. The wiring shall be colour coded. The rate shall include all materials, connections, labour etc. as specified above.

Circuit wiring - Wiring from DB's to the first point control boxes for lighting, fans, 6A sockets, call bells, etc. The scope of work shall be same as in sub-main wiring.

Power wiring - The wiring from DB's to heating supplies, 16A 3 pin socket outlets, etc. The scope of work shall be same as in sub-main wiring.

Each sub-main/circuit main/power wiring circuit shall also have its own earth continuity wire as specified.

All the wiring shall be carried out in loop-in-loop system only and phase or line conductors shall be looped at switch box and neutral conductor can be looped from light, fan or sockets.

The maximum number of various size conductors that could be drawn into various sizes of conduits shall be as per table II of IS: 732 (Latest Edition). The wiring shall be colour coded for easy identification of phases and neutral. The following colour codes shall be adopted.

Phase’s - Red, Yellow and

Blue. Neutral - Black.

Earth - Green or Bare wire asspecified.

All sub mains and circuit wiring shall be provided with printed PVC identification ferrules at either end bearing the circuit number and designation.

SWITCHES, SOCKETS AND ACCESSORIES

GENERAL REQUIREMENTS

General control switches shall be of a 6A rating and shall be of approved make/type suitable for flush mounting.

All sockets, 6A and 16A ratings shall be of flush mounting type with combined control switches of the same rating as that of the sockets. All sockets outlet shall be of 3-pin type.

The switch, plug socket or regulator boxes shall be made of GI/Sheet steel of minimum 16 SWG on all sides except in the front. Depth of boxes shall not be less than 75 mm and suitably increased where fan regulators are mounted in flush pattern. The boxes shall be provided with suitable earthing studs. Switches/fittings shall be fixed on metal strip, which in turn are welded to the box whereverrequired

Fan regulators shall be flush type and earthed with earth continuity conductor. The fan regulator shall be of electronic type.

LAMP HOLDERS, CEILING ROSES, ETC.

Accessories for light outlets such as lamp holders, ceiling roses, etc. shall be in conformity with requirements of relevant specification. Only approved make of accessories shall be supplied.

Screwed holder shall be used in brackets and pendants, light fittings shall have brass holders on T.W. round blocks.

Ceiling roses for recessed system of wiring shall be porcelain made and flush type. For surface type of wiring this shall be Bakelite.

INSTALLATION OF SWITCHES, SOCKETS AND ACCESSORIES

All the switches shall be wired on phases. Connections shall be made only after testing the wires for continuity, cross, phase etc. with the help of megger. Regulators shall be fixed on adjustable MS flat straps inside the enclosure. The arrangement of switches and sockets shall be neat and systematic. Covers for enclosures accommodating switches, sockets etc. (point control boxes) shall be of modular type and fixed to the enclosure in plumb with counter sunk head. Outlets shall be terminated into a flush type fan box for fan points. For wall plug sockets, the conductors may be terminated directly into the switches and sockets. The outlets point control boxes etc. shall be set out as shown on the drawings. Before fixing these, the contractors shall obtain clearance from the client / consultant with regard to their proper locations. The enclosures of sockets/and 3rd pin of the sockets shall be connected to the ground through an earth continuity wires, as specified.

CAPACITY OF CIRCUITS

Light points, 6A socket points, fans, and call bell points may be wired on a common circuit. Such of those circuits shall not have more than 10 nos. of Light/fan/socket points or a load of 800 W whichever is less. Not more than two numbers of 16A socket outlets shall be wired on the same circuit.

POINT WIRING

Point wiring shall commence from the first point control box/local control box for the points connected to the same circuit. Point wiring for lights, ceiling and exhaust fans, 6 A sockets, call bells etc. shall be carried out with 1100 V Grade PVC insulated FRLS wires. The point wiring shall be inclusive of conduits of not less than 19 mm size, switches, wiring along with conduit accessories such as bends, inspections bends, reducers, pull boxes, junction boxes, switch boxes, fan boxes, covers etc. together with wiring accessories such as ceiling roses, brass lamp holders, T.W Blocks, loose wires up to 1 Mtr. long at outlet end connectors point control boxes (enclosure for electrical accessories) switches, etc. Point wiring shall be provided with earth continuity wire as specified for earthing 3rd pin of sockets, luminaries and fan fixtures. Light control shall be either single, twin or multiple points controlled by a switch, asspecified.

The point wiring for Light/ 6 A sockets etc. shall include the supply and installation of allmaterials specified above. Any item not specifically included but required for satisfactory completion of the point wiring shall also be included. No separate extra price will be allowed for any item under point wiring.

A dependent socket point shall mean the combination 6A switch socket outlet/point mounted on the same switchboard as any other point/points and shall include the 6A switch and socket.

The fan point shall be complete with fan hook box flush mounted in slab, control switch mounted in switch box and electronic regulator, complete with cover. The measurement will be numbers of each kind of point and as specified in Schedule of Quantities.

FIXTURES -

LIGHTFITTINGS

Light fittings shall be generally fixed as directed by client / Architect, unless otherwise specified.

Fittings such as wall brackets shall be fixed at 2200 mm from FFL or as stated

in Dwgs. All LED Luminaries shall be fixed on false ceiling as shown in

drawings.

The LED fittings shall be fixed in such a manner that the wiring conductors shall not terminated in a ceiling rose but in a junction box 300 mm away from the center of the fitting along the length of the fitting so that no exposed wiring is seen from outside.

One sample installation to be get approved by Client / Architect.

TESTING OF ELECTRICAL INSTALLATION

TESTING OF INSTALLATION SHALL BE AS PER IS 732-1982

The Insulation resistance shall be measured by applying between earth and whole system of conductors of any section thereof with all fuses in place and all switches closed and except in earthed concentric wiring all lamps in position or both poles of the installation otherwise electrically connected together, where a direct current pressure of not less than twice the working pressure provided that it need not exceed 500 Volts for medium voltage circuits. Where the supply is derived from the three wires (A.C or D.C) or a poly phase system, the neutral pole of which is connected to earth either direct or through added resistance, the working pressure shall be deemed to be that which is maintained between the outer or phase conductor and neutral.

The insulation resistance measured as above shall not be less than 50 mega-ohms divided by the number or points on the circuits provided that the whole installation shall be required to have an insulation resistance greater than one mega-ohm.

Control rheostats, heating and power appliances and electric signs may, if required be disconnected from the circuit during the test but in the event of the insulation resistance between the case or frame work and all live parts of each rheostat appliances and all live parts of each rheostat and sign shall be less than that specified in the relevant Indian Standard Specification or where there is no such specification shall not be less than half a mega-ohm.

The insulation resistance shall also be measured between all conductors connected to one pole or phase conductor of the supply and all the conductors connected to the middle wire or the neutral or to the other pole or phase conductors of the supply and its value shall not be less than specified in sub-clause17.1.2.

TESTING OF EARTH CONTINUITY PATH

The earth continuity conductor including metal conduits and metallic envelopes in all cases shall be tested for electrical continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit breaker measured from the connection with the earth electrodes to any point in the earth continuity conductor in the completed installation shall not exceed one ohm. For checking the efficiency of earthing, the earth resistance of each earth electrode shall also be measured. This test shall preferably be done during summermonths.

TESTING OF POLARITY OF NON-LINKED SINGLE POLE SWITCHES

In a two-wire installation, a test shall be made to verify that all non-linked, single pole switches have been fitted in the same conductor throughout and that such conductor has been connected to an outer or phase conductor or to the non-earthed conductor of the supply.

The contractor shall be responsible for providing the necessary instruments and subsidiary earth for carrying out the tests. The earth coordinating tests shall comply with the IS specifications as may be applicable. Should the above tests not complete with the limits laid down, the contractors shall do the necessary rectification of the fault till the required results are obtained.

SPECIFICATION FOR BATTERY AND BATTERY CHARGER

BATTERY

GENERAL

The battery shall be lead acid type with Planate or Tubular positive plates.

The plates shall be designed for maximum durability during all service including high rate of discharge and rapid fluctuation of load.

CONSTRUCTION

Each cell shall be assembled in the heat resistant, shock absorbing, robust, clear glass or hard rubber container with float type level indicator.

Electrolyte level shall be marked on the clear glass container or level indicators as applicable. The markings shall be for upper and lower limits.

The cells shall be supported on porcelain insulator fixed on the rack with adequate clearance between adjacent cells.

The cell terminals posts shall be provided with connector bolts and nuts effectively coated with lead to prevent corrosion.

Separator between plates shall permit free flow of electrolyte. Separator shall be wood or other acid resisting materials. Proper arrangement to keep the end plates in position shall be furnished.

Sufficient sediment space shall be provided so that the cells will not have to be cleaned out during normal life. Lead or lead coated copper connectors shall be furnished to connect up cells of battery set. Positive and negative terminal posts shall be clearly and indelibly marked for easy identification.

Lead coated bent copper plate, tubular copper lugs, clamp, bolts, nuts, washers, etc. shall be furnished for connection of outgoing copper / aluminium conductor cables.

The battery shall be shipped uncharged with the electrolyte furnished in a separate non- returnable container. 10% extra electrolyte shall be furnished to cover spillage during transit or erection.

RACKS

The racks for supporting battery cells shall be constructed of best quality MS paint with at least three (3) coats of anti acid paint of approved shade.

Racks shall be free standing type, mounted on the porcelain insulators. Numbering tags for each cell shall be attached on the racks.

FITTINGS AND ACCESSORIES

Each battery shall be furnished complete with the following:- First charge of electrolyte plus 10% extra.

MS racks with 3 coats of anti acid paints. Stand insulators 5% extra.

Cell Insulators plus 5% extra.

Cell Inter connectors and end take-off.

Lead-coated connection hardware plus extra.Cell numbering tag with fixing arrangements. Cable clamps with hardware.

Two (2) extra cell.

One (1) Inter connector bolt wrench. One (1) hydrometer Syringe.

One thermometer with specific gravity correction scale, One (1) Cell testing Voltmeter with leads.

BATTERY CHARGER

GENERAL

The charger shall be natural air cooled, solid-state type with full wave, fully controlled, bridgeconfigurations.

The charger shall be provided with automatic voltage regulation, current limiting circuitry, smoothing filter circuits and soft start feature.

Voltage shall be step less, smooth and continuous.

The charger shall be self-protecting against all A-C and D-C transients and steady state abnormal currents and voltages.

Voltage setters shall be provided for setting the output of the float boost charge. Setting shall be independent of each other so that setting of one voltage shall not require resetting the other.

There shall be separate transformers for float and boost charger.

Charger A-C input and D-C output shall be electrically isolated from each other and alsoform panelground.

CONSTRUCTION

The charger shall be free-standing. Floor mounted with sheet steel enclosure with all access from the front.

The panel shall conform to the degree of protection IP 42. minimum thickness of the sheet metal used shall be 2 mm.

Access doors shall be with concealed hinges and neoprene gaskets. Ventilating louvres shall be covered with fine wire mesh.

All equipment with in the panels shall be arranged in the modular units and laid out with sufficient space for easy maintenance.

Switches, meters, relays etc. shall be flush mounted on the front of the panels. Nameplates of the approved size and type shall be provided for all circuits and devices.

CHARGER EQUIPMENT

All power diodes and control rectifiers shall be silicon type. Rectifier transformer shall be dry type, double wound, with copper conductor and class B insulation.

Blocking diodes shall be fully rated and redundant so that failure of a single diode shall not incapacitate the system in any way.

Isolating switches shall be heavy-duty, load break type, operated by external handle with provision for padlocking in ON or OFF position.

Change over switch shall be 3 position, 4 pole, load break type with 2 No+ 2 NC auxiliary contacts. Contactor shall be air-break type with thermal overload relays being in built single- phase preventer.

Fuses shall be HRC type and arranged for easy replacement. Semi conducting device fuses shall be fast actin Indicating lights shall be low-watt filament type with series resistor. Both lamps and lens shall be replaceable from the front.

Meters shall be 96 x 96 mm switchboard type, 250 deg. scale, antiglare glass, + 2% accuracy with zero adjuster on the front.

ALARMS

One (1) ten-point alarm facial shall be provided on charger panel, complete with proper actuating devices, circuitry and legends.

The arrangement shall be such that, on occurrence of a fault the corresponding window will light up and stays lighted until the fault is cleared and reset button is pressed.

Each time a window lights up, a master relay will get energized to provide group alarm signals for remote panel. Following minimum annunciation shall be provided:

A.C. supply failure *

D.C. voltage low*

D.C. voltage high*

D.C. system

ground* Charger

overload* SCR

fuse blown Filter

fuse blown

D.C. output fuse blown

Alarmpointsmarkedwithanasterisk()shallhaveelectrically separate set of contacts wired up to the terminalblock.

Alarm contacts shall be rated 1A at 110V D.C. and 5A at 240V A.C

OUTGOING FEEDERS

Each outgoing feeders shall be provided with double pole switch and with HRC fuses.

Outgoing feeders shall be located in separate module forming part of charger panel with separate cable alley for terminating outgoing cables.

Lamp/Space heaters/Receptacles.

The charger panels shall be provided with:

Internal Illumination lamp with door switch Space heater with thermostat

control Lamp, heater circuits shall have individual switch fuse units.

REQUIREMENTS

	A) BATTERY		
i)	Type		Lead acid
ii)	Nos. of cells per Battery		55
iii)	Battery nominal voltage		24 Volts.
iv)	Ten hour rating to 1.85 Volt/cell at 27 deg.c		100Ah.
v)	Proposed method of working :		
	a) Float charging (normal)		2.15 Volts per cell.
	b) Boost charging		
	(After complete discharge)		2.75 Volts per cell (Maximum)
vi)	Intermediate tapping		42nd cell.
viii)	Mounting		MS racks.
	B) BATTERY CHARGER		
i)	Charger		Float & Boost
ii)	Float charging current		25A.
iii)	Type		Solid state
iv)	A.C. Input supply		415V, 3 phase, 50Hz, 4wire.
v)	Ripple content in charger dc output		1%

vi)	Outgoing feeder 10 Nos		Each consisting of double pole switch fuse of 32A

SPECIFICATION FOR EARTHING SYSTEM

This specification covers the requirements of supply, installation, testing and commissioning of earthing systems. The work shall be carried out in accordance with relevant layout drawings, typical drawings and installation notes etc. All metal conduits, cable sheathes, switchgear, Distribution boards, light fixtures, fan and all other metal parts forming part of the work shall be bonded together and connected by two separate and distinct conductors to earthelectrodes.

CODES AND STANDARDS

The earthing systems shall comply with all currently applicable standards, regulations and safety codes of the locality where the installation is to be carried out. Nothing in this specification shall be construed to relieve the Contractor of this responsibility.

The installation work shall conform to the latest applicable Electricity Rules, Relevant Indian Standards and Codes of Practices as follows:

IS 3043 - Code of Practice for

Earthing. IS 732 - Electrical_Wiring

installation. IS 3975 - Galvanized

round steelwire.

Indian Electricity Rules 32, 61, 67 and 68 of IER 1956.

EARTHING ELECTRODES

Earthing electrodes shall be designed as per the requirements of IS 3043. The resistance of earth electrodes shall be as low as possible, the maximum allowable value being one Ohm.

Earth electrodes shall be as far as possible embedded below permanent moisture level. Earth pits shall be further treated with salt and charcoal to improve the soil resistivity. In rocky areas where the required earth resistance cannot be attained using the standard earth electrode. Configuration then application of deep well earth pits should beexamined.

PLATE ELECTRODE

Plate electrodes shall be made of copper plate of 3.15 mm thick and 600 x 600 mm size. The plate shall be buried vertically in ground at a depth of not less than 2.5 Mtrs. to the top of the plate, the plate being encased in powdered charcoal to a thickness of 15 Cms. alround. Salt and river sand shall not be used. Earth leads to the electrode shall be laid in a medium grade GI pipe and connected to the plate electrode with brass bolts, nuts and washers. The GI pipe of 19 mm dia. shall be placed vertically over the plate and terminated in a funnel of 5 Cms above the ground. The funnel shall be enclosed in masonry precast chamber. The chamber shall be provided with Cl frame and Cl cover. The earth station shall also be provided with a suitable permanent identification label/tag.

PIPE ELECTRODE

Pipe electrode shall comprise of 50 mm dia. GI pipe with wall thickness 3.65 mm and not lessthan3.0mtrslongburiedverticallyinapitof350x350mmsizeandfilledwithalternate layers of charcoal, salt and river sand and connected at the top to a medium grade GI pipe of 19 mm dia, 1 mtr long with a funnel at the other end, clamped to the pipe electrode with brass bolts, nuts and washers. GI pipe electrodes shall be cut tapered at the bottom and provided with holes of 12 mm dia. drilled not less than 75mm from each other upto 2 Mtrs., length from bottom. The top end of the pipe shall be threaded and provided with G.I cap. A hole shall be provided at 100 mm from the top end to receive a 13 mm bolt with double nuts and washers. The funnel and the earth lead connections shall be enclosed in a masonry precast chamber/inspection pit. The chamber shall be provided with C.I frame and C.I cover. A proper permanent identification tag/label/earth cable marker shall be provided for each electrode.

SAFE EARTHING ELECTRODE (S.E.E)

Safe Earthing electrode Type-19 shall comprise of a GI pipe with outer dia. of 50 mm and inner dia. of 25mm. The electrode is manufactured from GI pipe with adequate galvanization (i.e., more than 80 - 100u) to ensure maximum conductivity. The electrode shall not be less than 3.0 mtrs long buried vertically in a pit of 450x450 mm

size and filled with back fill compound and connected at the top to a medium grade GI pipe of 19 mm dia, clamped to the pipe electrode with brass bolts, nuts and washers. The top end of the pipe shall be threaded and provided with G.I cap. A hole shall be provided at 100 mm from the top end to receive a 13 mm bolt with double nuts and washers. The funnel and the earth lead connections shall be enclosed in a masonry precast chamber / inspection pit. The chamber shall be provided with C.I frame and C.I cover. A proper permanent identification tag/label/earth cable marker shall be provided for each electrode.

CI PIPE ELECTRODE

Pipe electrode shall comprise of 100 mm dia. CI pipe with wall thickness 12.5 mm and not less than 3.0 mtrs long buried vertically in a pit of 350x350 mm size and filled with alternate layers of charcoal, salt and river sand and clamped to the CI pipe electrode with brass bolts, nuts and washers. A hole shall be provided at 100 mm from the top end to receive a 13 mm bolt with double nuts and washers. The earth lead connections shall be enclosed in a masonry precast chamber/inspection pit. The chamber shall be provided with C.I frame and C.I cover. A proper permanent identification tag/label/earth cable marker shall be provided for each electrode.

EARTHING SYSTEM GENERAL

Each installation shall have one common earth grid connected to at least two groups of earth electrodes.

The earth grid shall extend throughout the installation in the form of a ring circuit withbranch connections to the equipment and structures to beearthed.

EARTHING CABLES AND CONNECTIONS

Earth systems shall be of solid copper/galvanized flats type, of cross-section specified on the relevant design earth layout drawing.

Connections between earth electrodes and main ring earth conductors shall be executed in accordance with Electrical Drawings and in such a way as to facilitate the inspection and testing the earth resistance of each individual earth electrode group without disconnection of the earth system main ring.

All un insulated parts of earth conductors shall be suitably protected against direct contact with the soil to prevent electrolytic corrosion. This may be achieved by lap wrapping bared sections with green PVC adhesive tape.

All earthing terminations shall be made with compression type cable lugs. Interconnections shall be directly clamped with compression type branch connectors as detailed in Electrical Drawings.

Execution of earth cable branch connection by means of exothermic welding shall require the approval of Engineer in charge, who will take into account the suitability of the welding equipment and the previous experience of the Contractor's personnel.

The resistance between each earth electrode configuration and the general mass of earth shall not exceed 5 ohms when isolated from the main earth grid.

Location of earth electrodes, earth conductor's connections and earth cable routes shown on the installation earth layout drawing shall be considered as diagramatic only, and site inspection shall be necessary to determine earth connection onto equipment's locations and conductor routes prior to installation.

Within buildings, strips of high conductivity copper/GI, sized in accordance with the layout earthing design drawing, should be utilized.

Where copper tape or cable is fixed to building structure it shall be by means of purpose made saddles. Fixings shall be made using purpose made lugs andclamps.

Fixings requiring drilling of holes through stripes shall be used, considering the effective cross-section of the particular run is within relevant regulations.

Where tape or cable is run in the ground or fixed externally, and is liable to corrosion, it shall be wrapped with corrosion-resistant material. Alternatively, PVC wrapped tape or cable may be used.

Joints in copper tape shall be tinned before assembly, riveted with a minimum of two rivets, and sweated solid.

Where holes are drilled in the earth tape for connection to items of equipment, effective cross-sectional area of connections shall be not less than required to comply with the relevant Regulations.

Bolts, nuts and washers for any fixings of earth tape shall be of high-tensile grade.

ELECTRICAL EQUIPMENT

Metallic enclosures of all electrical equipment shall be earthed at two ends by connection to the common earth grid.

Cross-sectional area of the equipment earth connections shall be in accordance with the earth layout design drawing.

NON-ELECTRICAL EQUIPMENT

All metallic equipment used for storage, processing, transportation or pumping flammable liquids, vapours or gases, and their associated supporting structure or skid, shall be electrically bonded to the installation main earthring.

Electrical bonding of associated metal work, in handrails, walkways, etc. is not necessary if it is demonstrated by testing that they are electrically continuous with the structure. However, the same shall be bonded to earth at one point.

Piping which is not in electrical contact with its associated tank or vessel, such as an open discharge line into a tank, shall be bonded to the tank.

In installations that do not contain electrical equipment, the resistance between each earth electrode configuration and the general mass of earth shall not exceed 5 ohms when isolated from the main earth grid.

BONDING

Metal sheaths and armoured of all cables operating at low voltage, metal conduits, ducting, trunking, and protective conductors associated with such cables, which might otherwise come into contact with adjacent fixed metalwork, shall be effectively either segregated from, or bonded to, adjacent metal work.

Metallic sheaths and / or non-magnetic armoured of all single-core cables in the same circuit normally shall be bonded together at one and end only have their run (solid bonding) unless specified otherwise.

All interior metal, water and gas piping shall be bonded together and made electrically continuous. Non-conductive coatings (such as paint, lacquer and enamel) on equipment to be earthed shall be removed from threads and other contact surfaces to ensure good electrical continuity.

SPECIFICATION FOR LIGHTNING PROTECTION SYSTEM

The lightning protection system should be in full compliance with standard NF C 17-102. To ensure an effective system and satisfactory long-term performance, all fittings need to be mechanically sound and provide good corrosion resistance in conditions of 50° C and 95%relative humidity. All materials used should be suitable for lightning protection installations.

AIR TERMINAL

The air terminal should be of the Early Streamer Emission (E.S.E) type, which is equipped with a lower series of energy collecting electrodes and an upper series of spark-generating electrodes. The triggering device of the E.S.E air terminal is sealed in a stainless-steel housing fixed at the center of its central rod. The air terminal should be fixed at the top of a steel elevation pole so as to be at least 4.5 Meter above the structure to be protected. Its height above roof level would be dependent on the level of protection and the protection radii required.

Should an aerial mast be located on the roof of the building, the E.S.E air terminal should be installed at least 2 Meter above its tip. Where this aerial mast is located within 10 Meter of the E.S.E air terminal elevation pole, these 2 masts must be interconnected at roof level with a solid copper conductor of the same cross-sectional area as the down conductor. An aerial mast diverter should also beinstalled.

The elevation pole should be firmly attached to the wall or roof, or on any protruding part of the building. Guy wires may be used in order to ensure the stability of the installation. In this case, the bottom-end of each guy wire should be connected to the down conductor. If the protection of the building requires the installation of two or more E.S.E air terminals, the base of the elevation poles should be interconnected at roof level by a solid copper conductor of the same cross-sectional area as the down conductors of theinstallation.

DOWN CONDUCTOR

Each E.S.E air terminal should be equipped with at least one down conductor. Two conductors should be installed on opposite sides of the building if the protected structure is higher than 28 Meter or if the horizontal length of the down conductor is greater than its vertical length.

The down conductors) should be high conductivity round or flat solid bare or tinned copper conductor with a minimum size of 50 mm2. They should be fixed to the structure by means of 3 fasteners per metre. The down conductors should be connected to the air terminal by means of a metallic adapter located on the E.S.E air terminal. It should then run down the elevation pole and take the shortest direct route down the outside of the building to the earth termination network, avoiding any sharp comers, thereby providing a low impedance path from the air terminal to its earth terminationsystem.

Any metallic object located less than 1 meter from the down conductor should be connected to the latter. A test clamp should be installed 2 Meter above ground level so that the down conductor may be disconnected from the earth termination system for regular checks of the earth termination resistance value. This test clamp should be housed within a concrete or PVCinspectionpitifthebuildingiscoveredwithmetalcladding.Thebaseofthedown

conductor should be protected from accidental knocks and other damage by means of a 2- meter galvanized-steel guard fixed to the building.

EARTH TERMINATION SYSTEM

The resistance value of each earth termination system should be 5 Ohms or less. Each earth conductor and rod connection should be housed in a proprietary concrete or P.V.C pit in order to facilitate inspection. The pit should be complete with a lid and the assembly should be installed flush with ground level. The lightning conductor(s) earth termination system(s) should then be connected to the earth of the site in order to achieve an equipotential earth network. This connection should be equipped with a disconnecting clamp housed in a concrete or P.V.C inspectionpit.

PRE-ASSUMABLE TO SCHEDULE OF QUANTITIES

All items of work mentioned in the Schedule of Quantities shall be read and executed strictly in accordance with the description of the item in the Schedule of Quantities, equipment schedule/ Data sheet, drawing and standard specifications read in conjunction with the appropriate IS and conditions of contract.

The rate for each item of work included in the bill of quantities shall unless otherwise stated includes cost of

All materials, fixing materials, accessories, hardware, operations, tools, equipment, consumables, civil works wherever involved and incidentals required in preparations for in the full and entire execution and completion of the work called for the item and as per specifications and drawingscompletely.

Wastage on materials and labour.

All taxes, duties including GST, transit insurance, packing and forwarding charges, loading, transportation, unloading handling, hoisting to all levels, setting and fixing in position, disposal of debris and all other labour necessary in accordance with contract documents.

Liabilities, obligations and risks arising out of conditions of

contract. Liaison service charges

All requirements of system whether such of them are mentioned in the item or not in the specifications and drawings are to be read and execute to complete the work up to full operating condition.

In the event of conflict between the bill of quantities and other documents, the most stringent shall apply and interpretations of the Consultant shall be final and binding.

The installation price of switchboards, metering panels, DB's or any other items shall include supply and fixing of supporting steel structures /MS channels grouting of the same civilworks etc. asrequired.

No change in unit rate shall be allowed for any change in quantity or for any other reason whatsoever.

Supply of materials shall mean supply of materials at site. The rate for supply shall include all taxes, insurance, packing and forwarding charges and transportation, unloading atsite.

The successful contractors shall submit the Schematic diagrams, fabrication drawings with details of equipment wiring diagrams etc. to consultants for approval prior to supply / commencement of such works. The approval of these drawings will be general and will not absolve to contractor of the responsibility of the correctness of these drawings. At least four copies of the approved drawings supplied to client for their distribution to various agencies at site at no cost to owner.

The tenderers must see the site conditions such as type of soil, locations etc. and take all factors into consideration while quoting the rates as no extra cost will be allowed on any ground arising out or relating to the site conditions.

Any error in description or in quantity or omission of items from the contact shall not vitiate this contract but shall be corrected and deemed to be a variation required by the consultant / client.

All testing and calibration charges for the meters shall be included in the installation price of the Meter Board.

The tender shall take into account The expenses of pre-commissioning tests to be conducted as per specification of the complete installation by licensed agencies.

TECHNICAL PARTICULARS TO BE FURNISHED BY BIDDERS FOR 11KV HT BREAKERS.

Nameof Manufacturer :

Type of Breaker offered :

Number of poles :

Service voltage :

Normal current rating	:
IEC conditions	:
Site conditions	:
Frequency	:
Making capacity in peak kA	:
Breaking capacity	:
Symmetrical in kA&MVA	:
At ratedbreaking current	:
Opening time	
With no current	:
At rated breaking current	:
Arching time	:
Total break time	:
Make time	:
Short time current for1sec	:
Impulse withstand voltage	:
Short circuit type test report	:
Amplitude factor at 10%, 70%&100% duty	:
Frequency 10%, 70% &100% duty	:
Number of breakers in series per pole	:
Total length of break per pole	:
Type of main contacts	:
Minimum clearance in air	:
Between poles	:
Between pole& earth	:
Method of closing	:

Weather hand or power :

Weather the circuit breaker is designed to close and latch on making or is fitted making Current release. :

Whether the breaker is fixed Trip or trip free rated supply Voltage of closing mechanism :

Power required at rated voltage to close the circuit breaker. :

Normal voltage of shunt trip coils :

Power required at normal Voltage per shunt trip coils :

Number and type of spare auxiliary switches. Whether suitable for reclosing time dead time between trippingand reclosing :

Maximum over voltage developed while breaking magnetizing current Of transformers. :

Maximum line charging current (capacitive current) the Breaker Can break. :

Whether the breaker is capable of being updated later on if 0 to what value :

Panel outline drawing (GA) :

Each breaker vertical with relay / Metering compartment. :

Height :
Depth :

Width :
Breaker drawout dimension :

Complete panel	:
Height	:
Depth	:
Width	:
Shipping sections	:
Panel bus bar phase/earth sizing	:
With calculations	:
Weight of shipping panel	:
Weight of complete panel	:
Make of components being offered	
Relays	:
Meters	:
Fuse / fuse base	:
PT's &CT's	:
Indicating lamps	:

NOTE: On order being placed GA drawing of panel board with floor fixing dimensions / arrangement shall be furnished within 15 days.

TECHNICAL PARTICULARS TO BE FURNISHED BY BIDDERS FOR TRANSFORMERS

Sl.No.	DESCRIPTION	315 KVA, 11 KV/433V
1	NameofManufacturer :	
2	RatedKVA :	
3	Type ofCooling :	
4	VectorGroup Reference :	
5	No load voltage ratio onalltapes :	
6	Power factor onexistingcurrent at 100% 100% voltage at 50 CPS :	
7	Iron losses at 50 Hz and 100% rated voltage. :	
8	Copper losses (at 75 Deg.C) at rated full load :	
9	Resistance voltage (KVAat 75 Deg.C in %) :	
10	Reactance voltage (KVAat 75 Deg.C in %). :	
11	Impedance voltage (KVA at 75 Deg.C in %) :	
12	Zero phasesequenceImpedance :	
13	Resistance of windings75Deg.C :	

a) HV per phase
b) LV perphase

14 Regulation % at
a) Full load :Unity PF :
0.8 PF(Lag) :
b) 3/4 Load :Unity PF :
0.8 PF(Lag) :
c) 1/2 Load :Unity PF :
0.8 PF(Lag) :

15 Efficiency at 75 Deg C

FullLoad
a) UnityPF :
b) 0.8 PF(Lag) :

3/4 Load
a) UnityPF :
b) 0.8 PF(Lag) :

1/2 Load
a) UnityPF :

	b) 0.8 PF(Lag)	:
16	Magnetizing in rush currentpeak at instant of switching	:
17	Symmetrical shortcircuitcurrent (assume infinite source)	:
18	Time of withstandwithout any damage under symmetrical short circuitconditions	:
19	Thermaltime constant	:
20	Max. flux density in coreof100% rated voltage	:
21	Current density at ratedload a) HV winding b) LVwinding	: :
22	Insulation level of windings HV/LV a) Impulse fullwave b) Separate source voltagetest c) Induced voltage overtest	:
23	Maximum noiselevel	:
24	Temperature rise above50Deg.C ambient temp. a) In oil bythermometer b) In winding byresistance	:
25	TAP CHANGER a. Type and make of Tap changer b. Tap voltage range as of rated voltage c. Number oftaps d. Time required for one tap change of OLTCGear e. Whether OLTC operated conforms to specification complete f. Dimension of OLTC control panel(LxWxH)	:
26	WIRING: a. Details of wiring between various equipments of OLTC Gear/ Control panel	:

27	WEIGHTS :	:
	a. Weight of core &windings b. Tank withfittings c. Oil d. TotalWeight e. Quantity of oil for complete filling 1. ForTransformer 2. For OLTCChamber f. Total dimension of TransformerLxBxH	
28	Whether transformer confirms to specification and data sheet, if not, list out thedeviations	
29	Whether accessories tools and: spares as specified included, if not please specifydeviations	
30	Whether all technical catalogues furnished	

TECHNICAL PARTICULARS FOR ON LOAD TAP CHANGER WITH RTCC & AVR FOR 11KV/433V TRANSFORMER

Design, Manufacture and supply of 3 Phase 50 Hz, copper wound, Oil Immersed, Core type Distribution transformer with OLTC, RTCC & AVR and following specifications.

RefStandard	IS: 1180 (Part-1):2014
Installation	Outdoor
Rating	500 kVA
VoltageRatio	11000/433 Volts
VectorGroup	Dyn11
+10% TO -10% in steps of 1.25% through OLTC.	
Insulationclass	A
Cooling	ONAN
Temperature rise @ 50°C ambient	

In oilby thermometer		50°C
In winding byresistance		55°C
Impedance		Less than 5%
PaintShade		631 of IS 5
First filling ofoil		Conforms to IS 335 of2018
TerminalArrangement:	HV	Cable box
TerminalArrangement:	LV	Cable box
Quantity		1 No.

THE TRANSFORMER WILL BE HOUSED IN A WELDED STEEL TANK AND BOLTED COVER CONSTRUCTION WITH THE FOLLOWING FITTINGS

1 . Rating & Diagram Plate	9. Jacking lugs
2. Earthing terminals	10. Inspection cover
3. Lifting lugs	11. Oil level indicator
4. Thermometer pocket	12. Drain cum bottom filter valve
5. On load tap changer with RTCC+AVR	13. Top filter valve with plug
6. Air release hole with plug	14. Bi-directional rollers
7. Oil conservator with drain plug	15. Silica gel breather
8. Pressure relief valve.	16. Cooling Radiators

EXTRA ACCESSORIES

Buchholz Relay with alarm and tripcontacts.

Marshalling box with OTI & WTI with alarm and trip contacts.

Magnetic oil level gauge with alarmcontacts.

Oil immersed Neutral CT

ON LOAD TAP CHANGER, 11KV-100A

(Suitable for 415V- 3 ph. 50 Hz operation) Main

fittings provided with OLTC

Single phaseFHP Motor	1 No.
Motor drive contractor &overloadprotection	1 Set
Electrically locked forward andreverse contractors	Nos.
Raise and lower push buttons typeofswitches	1set.
Limit switches andMechanicalstops	1 Set
Suitable devices to permit only one tap atatime	No.
Manualoperatingdevice.	No.
Mechanical counter(maxoperations)	1 No.
Tap changerindicator (mechanical)	No. Space
heater, door, switch, Internal light, MCB&Thermostat	set. Hinged
door andlockingdevice.	1Set.
Terminal blocks andinternal wiring	Set.
Auxiliarycontroltransformer	1 No.
First filling of filtered oil.(IS 335)	30 Ltrs.
Tap pos. sensing devices for digital tappos indicator	1 set.
Oil filling plug	1No.
Drain plug	No.
Inspectionchamber	No.
Surge operated relay (with 1 setofcontacts)	1 No. Oil
compartment for OLTC in main conservatorwith gauge	
No. Other necessary interlocks MCBsand wiring	No.

NOTE: Inter connection cables between OLTC, RTCC & Marshalling box is in your scope of supply.

REMOTE TAP CHANGER CONTROL PANEL (Single transformer operation).

Suitable for auto/manual operations with the following fittings:	
Raise & lower pushbutton switches	Set
Digital tappositionindicator	No.
Auto manual (maintained contact type) selector switch 1 set.	
Upperlimit indicator	No.
Lowerlimit indicator	No.
Tap changer inprogress lamp	No.
Tap changerisolationswitch	No.
Space heater, Lamp, Fuses, door switchandthermostat	set Potential
Transformer 433V/110V (LV sensing forAVR)	
Undrilled gland plate and lifting eyes. 24V	
DC Buzzer	
All necessary terminal blocks & internal wiring.	

AUTOMATIC VOLTAGE REGULATOR (Electronic)

(Suitable for 110V AC Auxiliary supply mounted on RTCC Panel).

AUDIO VISUAL ANNUNCIATOR (Solid state 24V DC)

(Mounted on RTCC panel)

NINE Window labeled indications for:

AC/phase sequence/motor fail. Spare.
PT over voltage Top oil temp, high
Buchholz Relay with alarm (trf)
Buchholz Relay with trip (trf) Surge relay trip (OLTC)
Low oil level indicator Winding temp, alarm

DRAWING

OLTC GA drawing shall be sent us with in a week for your approval after receipt of technically and commercially clear order at your end.

TECHNICAL PARTICULARS OF LOW TENSION CABLES

(To be Furnished by BIDDER)

1.0	Name ofthe Manufacturer	:	
2.0	Conductor	:	
3.0	Form	:	Circular / Segmented
4.0	Nominal Diameter in mm	:	
5.0	Effective cross sectional areain Sq.mm	:	
6.0	Whether Incremental runninglengths marked on thecable.	:	Yes / No
7.0	Continuous Current Ratings of Cables		
	a) InGround	:	
	b) InAir	:	
	c) InCableDucts	:	
8.0	Star Impedence per km		
9.0	Max. electrostatic capacitanceperkm	:	
10.0	Max. charging current per conductorperkm	:	
11.0	Loss Tangent at normal frequency and rated voltage	:	
12.0	Max. dielectric loss of cablesperkm	:	
13.0	Short Circuit Current carrying capacity for 1 Sec.:		
14.0	Max. dielectric stress atcore screen	:	
15.0	Test certificates from Institutions for the following standards of		
	a) ASTM - D-3863	:	
	b) ASTM - D-2943	:	
	c) IEC332-1	:	
	d) IEC331-1	:	

LIST OF I.S.CODES FOR INTERNAL ELECTRIFICATION INSTALLATIONS

1.	**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

APPROVED MAKES OF MATERIALS- EXTERNAL ELECTRICAL WORKS		
Sl.No.	**Description**	**Makes**
I	**HT Items**	
1	VCB	ABB / Schneider / Siemens
2	LBS	Megawin / ABB / Schneider / Siemens
3	Transformer	VoltAmp / Kirloskar / CG/ Esennar
4	DG Sets	Cummins / Kirloskar / Caterpillar
5	AB Switch	TSSPDCL approved / Navin / Bharat
6	H.G Fuses	TSSPDCL approved / Navin / Bharat
7	Lightning Arrestor	TSSPDCL approved / Oblum
8	Pin / Disc insulators	TSSPDCL approved / Oblum / VCPL (Vikram Ceramics pvt. ltd)
9	Overhead Conductor	Transco Approved / Galada Castings
II	**Cables**	
10	HT / LT - Al / Cu Armoured Cables	KEI / Havells / Polycab
11	HT Cable Termination Kits	Raychem / 3M
12	Straight through jointing Kits	Raychem / 3M
13	Compression glands (brass) chrome-plated	Comet / Braco / HMI
14	Crimping / Soldering Lugs	Dowells Heavy Duty / HMI / Braco
III	**415V, Switchgear**	
15	ACB (Microprocessor Based)	L&T C-Power / Schneider MVS / Legrand DMX^3 / Seimens
16	MCCB (250A and above) (Microprocessor Based)	L&T (d-sine) / Schneider CVS / Legrand DPX^3 / Seimens
17	MCCB (below 250A) (Termal-magnetic)	L&T (d-sine) / Schneider CVS / Legrand DRX^{TM} / Seimens
18	MCB, RCCB, RCBO, Isolator	Legrand / Schneider / Seimens
19	MPCB	L&T / Schneider / Legrand / Seimens
20	Contactors	L&T / Schneider / GE / Seimens / ABB / C&S
21	Meters	Elmeasure / L&T / Schneider
22	Pilot Lamps	Teknic / L&T / Schneider
23	Selector Switches	L&T / GE / Schneider
24	Surge protection devices (SPD)	OBO Bettermann / Legrand / LEPS
25	Capacitors	Epcos / L&T
26	APFC Relay	L&T / Beluk
27	Terminal Blocks	Elmex / Connectwell / Wago
28	HRC Fuses	L&T / GE / Teknic
29	Voltage / Current Transformers	Precise / Kappa / Kalpa
30	Cable Ducts	L&T / GE / Legrand
31	Push Button Stations	L&T / Schneider / GE

32	Multistrand copper flexible cables and wires - FRLS	R R Kabel / Lapp Kabel / Finolex / Havells
33	Insulation tapes	Steelgrip Bhor / Miracle
IV	**Others**	
34	M.S Steel sections	Tisco / Sail / Abishek
35	Galvanised cable Trays	Patny / Indiana / Enrun
36	C.I Pipe	Kapilansh / Bharath Metal / Hitec Metal Casting
37	G.I Pipe	Tata / Jindal / Swastik TT / Zenith Birla / Surya

PRICE BID:

ESTIMATIONS AND SPECIFICATION OF EXTERNAL ELECTRICAL WORKS FOR PROPOSED DWARAKAPURI COLONY BRANCH AND TOP EXECUTIVE GUEST HOUSE AT DWARAKAPURI COLONY, PUNJAGUTTA, HYDERABAD.					
Sl No	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total Amount**
1	**11 KV Single Pole Disconnect Structure:**				
	Supply, installation, testing and commissioning only of 11 kV Single pole disconnect structure with 2 nos x 175 x 85mm R.S Joist of 10m long as a box section located at transformers comprising of :- 1 set of 3 nos 11 kV 200 Amps AB switch (vertical type) fixed to a suitable 4" x 2" channel cross arm complete with 1 no operating rod handle at ground level. 2 sets of (3 nos each) 11 kV disc insulators fixed to 4" x 2" channel cross arm. 2 sets of (3 nos each) 11 kV pin insulators fixed to a 4" x 2" single channel cross arm for fixing the jumpers. 1 set of 3 nos 11 kV dropout HG fuse (vertical type) fixed suitably on the structure. Fixing the jumpers with all suitable interconnections with No.0 SWG HDBC jumpers to connect up to dropout fuse.				
	All necessary civil works like excavation of pit. Concreting and making holes, painting with 2 coats of aluminium paint over 1 coat of red oxide etc. Cost should include the supply of galvanized channel to support 11 kV 3C x 185 sq.mm XLPE cable upto AB Switch as per site condition to make the installation complete with all necessary supports, accessories as per the drawings as required. The entire arrangement should be as per drawings enclosed complete in all respects and as per the requirements of Elect dept.	No	1		
2	Supplying and erection of 11 kV AAA conductor of size 55 sq.mm to make the loops from cable to insulators, AB switch, HG fuse etc. including all required hardware etc. to complete with all necessary supports, accessories as per the drawings as required.	rmt	10		
3	Supply, Installation, Testing and Commissioning of 11KV 1 way, 3Pole HT Panel with one incomer and out outgoing incomer with 630A, 350MVA air break HT SFU with HRC Fuses and outgoings with 630A,350MVA air break HT SFU with HRC fuses and heating elecment with thermostart control (Outdoor type panel with double doors), with all interlocking and Protections. The scope of work includes supply of two sets of spare semi conductor HRC fuses. Make: Magawin/ CG/ Pentagon/ABB	no	1		

4	TRANSFORMER Supply, installation, testing and commissioning only of 11 kV/433V, 50Hz, **315 kVA**, Delta/Star, Dyn11, ONAN, 17 positions OLTC (± 10% in steps of 1.25%), outdoorTransformer with **AVR & 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 & 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 supply and fixing of new metering cubicle as per TSSPDCL standards.	No	1		
5	"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 Aluminium busbar (at the rating of 1.0A/ 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 mentioed as below. The panel shall be got fabricated with CPRI test certificate and OEM or their channel partners 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. The scope of work includes transportation, loading, unloading of the panel and removal of old cables, panels 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 inerlocked. Complete the work as directed by the Bank.Note:ELECTRICAL +MECHANICAL INTERLOCKING WITH PLC PROGRAMMING for ACBs.All ACBs and MCCB should have RS485 ports for communicationOperation: with attendant and without attendant operation . the panels should be auto mains failure cum auto change over.				

5.1	OUTDOOR TYPE PANEL (IP65 floor mounting, dust and vermin proof) supply and installation of 600A 4P 36KA Micro processor based MCCB with vary deep extendable handle-1no input 400A 36KA 4P MCCB with very deep handle-1no 200A 36KA 4P MCCB with vary deep handle-1no in a fabricated outdoor type enclosure. The scope of work includes supply & fixing of (1)MFM LCD meter Cl 0.5S with RS485-1no (2)3Ph LED Voltmeter Cl 0.5-1no (3)3Ph LED Ammeter Cl 0.5 -1no (3) LCD KWH meter- 2no (4) R,Y,B, ON, OFF, TRIP INDICATING LAMPS with protection MCBs- 1 set complete the work as directed by the Bank.	no	1		
5.2	AMFInput: (i) 400A, 4P,36KA, ACB(EDO type)- 2no for EB & DG (iii)400A,4P, COS-3no and suitable surge protectionOutput: (A) following MCCB should with vary deep handle i) 100A, 36KA, 4P MCCb-7no -(to AC ODU-2, LDB-1,AC IDU-1,pump panel-1,Spare-2)ii)160,36KA 4P MCCB-2no -(to common panel)iII) 63A 4P MCB-6no(elevator, SWH, SPP)Iv) 250A,36A, 4PMCCB-1no APFCMetering:(1)MFM LCD meter Cl 0.5S with RS485-2no(2)3Ph LED Voltmeter Cl 0.5-1no(3)3Ph LED Ammeter Cl 0.5 -1no(4) Digital LCD KWH meter-12noIndicating Lamps:R,Y,B- 5 setON, OFF, TRIP -for all MCCBsindicating lamps for COS on & off - 2 setsProtection:1) Surge Protection with suitable MCCB and Suitable surge protection device2)UV, OV,SC,EFAdditional scope-in Auto Changeover Panel, AMF logic to be incorporated. Panel should be fabricated with attendant and without attendant.	No	1		

5.3	**AC DB, LDB & Common panel 3 phase 6 way VTPN IP43-IK09 MCCB INPUT for DX³ MCCB, with metal Double door:-** (1) 100A, 4P, MCB-1 no (input from AMF) (2) 32A,3P, MCB- 04 NO TO FLOOR DB (4) 6-32A SP MCb-6 No (spare).	No	3		
5.4	APFC PANEL: 80KVAR Input: (i) 200A, 4P, 50KA, MCCB)- 1no with vary deep handle and indicating lamps Output: (A) ALl MCCB with with vary deep handle and indications(ON, OFF, Trip) 1) 63A,25KA TP+NL MCCB with15KVAR heavy duty Contactor and 15KVAR MPP 440V Delta connected heavy duty Capacitors-2set 2) 32A,25KA TP MCB with10KVAR heavy duty Contactor and 10KVAR MPP 440V Delta connected heavy duty Capacitors-5set (3) 8-STAGE APFCR RELAY along with all accessories. (4) push button for manual operation for each CB on & Off (5) selector switch Metering: (1)MFM LCD meter Cl 0.5S with RS485-1no (2)3Ph LED Voltmeter Cl 0.5-1no (3)3Ph LED Ammeter Cl 0.5 -1no Indicating lamps R,Y,B- 1 set On, off, Trip for all Capacitor banks	No	1		
5.5	PUMP Panel:Input: 100A 4P 36KA MCCB with very deep handle.Out put: 12.5 HP star Delta Starter-1 no FIRE PANEL : 7.5 HP star Delta Starter-1 no BOOSTER PUMP :7.5HP Star deltaStarter :1 no for bore well :5HP Dol Starter :1no for sump pump	No	1		
6	Stranded Compact Circular **Aluminium Conductor**, Conductor Screen With Extruded Semi Conducting Compound, XLPE Insulated, Insulation Screening with extruded Semi Conducting Compound in combination with Copper Tape, cores laid up, innersheath of PVC tape, galvanised flat steel strip armoured and overall PVC Sheathed Cable conforming to IS 7098 / (PART-II) 1985 with latest amendments. The scope of work includes excavation of loose soil, cutting of hard rock and filling with sand and covering the cables with bricks etc.				
6.1	supply and laying of 3core 95 sqmm HT armoured cable	Rmt	270		

7	ARMOURED CABLES Supply,Laying, Testing and commissioning of 1.1 KV grade XLPE insulated armoured alluminium/copper conductor cable of the following size including laying in trenches, cable trays, on wall including claming and including civil works etc complete as per IS 7098 - Part 1 - 1983. The scope of work includes supply & laying of 2 runs of 8 SWG GI wire along with the cable				
7.1	Supply & laying of 3.5C x185 sqm Aluminium ar cable	Rmt	180		
7.2	Supply & laying of 3.5Cx70 sqm al ar cable	Rmt	25		
8	HT termination				
8.1	HT out door kits	NO	5		
8.2	HT indoor kits	No	3		
9	**TERMINATIONS:** Termination of the following cables with **double compression(DC) cable glands** and also with suitable size alluminiumn/copper lugs including supply and fixing of Lugs.				
9.1	Supply & laying of 3.5C x185 sqm al ar cable	No	10		
9.2	Supply & laying of 3.5Cx70 sqm al ar cable	No	15		
10	Providing and erecting of minimum 1.8 metre length MS welded mesh fencing wire supported on M.S.Angles (50 mm x 50 mm x 6mm) at 2.5 Metres, center to center including excavating pits for foundation, fixing post in cement concrete 1:4:8 of size 45 x 45 x 45 cm . fastening the wire and painting the M.S.Angles with one coat of red lead primer and two coats of painting etc. complete	Rmt	25		
11	Providing and fixing mild steel grill gate with angle iron frame 65 mm x 65 mm x 10 mm with iron bars at 150mm.C/C and diagonal flats as per the standards including hinges, pivot blocks locking arrangement, welding riveting and oil painting of three coats of approved shade. Weight of gate 35 Kg/smt. the scope of work includes earthing of gate.	sqm	4		
12	Supply & laying of 40mm stone metal and the bed thickness should be 150mm. The scope of work includes spreading of metal uniformly.	sqm	100		
13	**Special Lightning Protection System**				
13.1	Supply, installation, testing & commissioning only of Advanced Lightning Protection rod with stainless steel body, working on the principal of Early Streamer Emission (ESE) technology, having a coverage radius of **79 metres** when mounted at a height of 5 mtrs under LEVEL-I Protection and anticipation emission time of 72 micro seconds, complying to NF C 17-102.	nos	1		
13.2	Supply, installation, testing & commissioning only of suitable Mast (4.5 mtrs) for mounting Lightning Protection rod.	nos	1		
13.3	Supply, installation, testing & commissioning only of electro-mechanical Counter.	nos	1		

13.4	Supply, installation, testing & commissioning only of readymade earth electrode of low carbon rod of 17.2mm dia, coated with 250 microns thick copper of 3 metre long with clamps and all required excavation or bore drilling, Eco safe back fill compound, and providing masonry enclosure with 18"x18" cast iron cover having locking arrangement and watering pipe etc. as required.	nos	2		
13.5	Supplying and laying only of down conductor for earthing with 1 core x 70 sq.mm 1.1 kV grade, PVC insulated multistrand copper conductor flexible cable (YY) in suitable size FRLS grade PVC conduit with all installation materials including end termination.	m	40		
13.6	Supplying and laying only of 25 x 3mm HDBC strip for interconnection between the electrodes and run horizontally upto the duct where the down conductor terminates to the earth bus with porcelain based insulator at every 1 mtr for fixing the tape to the walls and structures.	m	40		
14	Earthing Supply, installation, testing & commissioning only of standard Cast Iron Pipe earth stations as per IS:3043, 1987 with 100mm ID 12.5mm thick cast iron pipe with flange of 10ft long and 12mm dia holes made at 250mm centre to centre along, 3/4" G.I Pipe one foot long reducer and funnel mesh, spreading a homogeneous mixture of salt, charcoal around the pipe etc., 18"x18" cast iron cover including all necessary civil works, complete with all necessary supports, accessories as per the drawings as required.	no	9		
15	COPPER EARTHING: Providing independent earthing for sophisticated electronic equipment with 600 mm x 600 mm x 3.5 mm thick copper plate rigidly fixed to 40 mm dia G.I. pipe of 3 mtr length connected with reducer providing .GI. funnel with wiremesh as per national electric code including C.C. Chamber of size 400 mm x 400 mm x 400 mm covered with RCC slab filling with salt and charcoal giving earth connection from electrode copper strip 2 runs of 50 mm x 6 mm x 3000 mm length with all accessories and labour charges complete, as per IS specifications 732/1982 (Part II) & IS:3043,1987	no	6		
16	Supply and laying 50X 6mm hot dipGI flat, the scope of work includes two coats of red oxide paint and one coat of green colour paint	Rmt	300		
17	Supply and laying 50X 6mm CU flat, the scope of work includes covering of flat with black sleeve	Rmt	110		
18	sand filling Supply & filling with river sand sand in the substation area	Cum	273		

19	preparation of drawings, co.ordination and getting approvals from CEA, TSSPDCL, CPCB, TSPCB and all other statutory bodies . The scope of work includes getting approvals for temporary DG sets and solar power plants ,etc.	Job	1		
20	**ELECTRICAL SAFETY & INDICATION ITEMS**				
20.1	"Supply & laying of ISI marked Electrical Insulating dotted floor mat of dimension 2000 x 600mm 12mm thick in Electrical / UPS room -IS 15652:2006"	No	3		
20.2	"Supply & installation of Laminated Electrical Shock Treatment Chart (50x75cm) in UPS / Electrical Room."	No	2		
20.3	Danger Boards (English, Telugu & Hindi languages) in metal sheet at entrance of electrical room.	Each	2		
20.4	Danger boards sticker on DBs	each	8		
20.5	First Aid kit with complete set of medicines	Each	1		
20.6	Sand buckets with stand	no	4		
				Total	
				Above (%)/ At par/ Below	
				Grand Total	