Engineering Department,
East Central Zonal Office,
Jeevan Deep, Exhibition Road,
Patna-800001

Tender No- LICI/ECZ/ENGG/2026-27/10

E-Tender for Electrical Installation work at various SOs under Different Division* for SITC of AC *in Bihar and Jharkhand

Date of downloading of e-tender from: 12.06.2026
Last Date for Submission of EMD VIA NEFT: 23.06.2026 up to 23.59Hrs
Last Date for Submission of Tender online: 24.06.2026 up to 15.00 Hrs
Date of Opening of Tender: 24.06.2026 at 15.30 Hrs

Tender Issued To: ----------

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E-Tender for electrical installation work at various SOs under different Division for SITC of AC in Bihar and Jharkhand

INSTRUCTION REGARDING SUBMISSION OFTENDER FEE AND EMD (BID – I)

E-Tender for Electrical installation work at various SOs under different DO for SITC of AC in Bihar & Jharkhand.

BID – I: Tender Processing Fees and EMD as per amount mentioned below shall be remitted to LIC of India, East Central Zonal Office, Patna through NEFT/ RTGS/ Demand Draft drawn in favour of LIC of India, payable at Patna / MR (obtained by depositing cash on cash counters of East Central Zonal Office, Patna) in this Bid. The proof of remittance of above shall be uploaded in BID – I of e-tender.

(1) **Tender processing fees: Rs.500/-** + GST (RUPEES FIVE HUNDRED Only GST Extra). Tender processing fees is non-refundable.

(2) **EMD:** Earnest Money Deposit of Rs. 23,000/- (Rupees twenty threeThousand Only)

(3) Electrical License: The work will be awarded to the contractor having valid electrical license issued by the Electrical Safety Department.

Account Details for Tender Fee & EMD payment through Electronic Transfer in form of NEFT/ RTGS –Transfer in form of NEFT/ RTGS -

Name of Account Holder	LIC of India, East Central Zonal Office Patna
Type of Account	Current
Account Number	**142010200012704**
Bank Name	Axis Bank Ltd.
Bank Address	**Main Branch, Patna**
IFSC Code	**UTIB0000142**

Note:

(i) A scan copy of the Demand Draft / MR is to be uploaded in the e –tender portal and originalcopy of Demand Draft / MR is to be submitted to the following address on or before 24.06..2026 up to 15:00 hrs.

Address: ChiefEngineer, LIC of India, East Central ZonalOffice, Patna

(ii) In case of NEFT/ RTGS Payment the Receipt of NEFT/ RTGS having UTR No. is to be uploaded. The Payment of EMD and Tender fee can be made together through NEFT/ RTGS.

REFUND OF EMD:

1. The earnest money of all bidders except lowest bidder shall be refunded after opening of financial/ price bid. However, being ARC if the tender other than lowest are willing to execute the work at the rate of lowest tenderer, the EMD shall be retained as part of SD and balance SD shall be deposited by the tenderer.
2. If lowest bidder withdraws his tender before expiry of validity period or before the issue of acceptance of bid, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, in such case the EMD will be forfeited by the department.

3. In case of forfeiture of EMD as prescribed in para 1 and 2 above, the bidder shall not be allowed to participate in the re-tendering process of the work.

The Tenderer has to submit the Bids as under:

(1) BID I (EMD, Tender Processing Fee) & BID II (Price Bid): EMD, Tender Processing Fees & Price Bid for said work will be opened on 24.06.2026**on 15.30 Hrs.**

(a) Tender form processing fee of Rs.500/-+GST (non-refundable) separately to be paid through NEFT/ RTGS/ Demand Draft drawn in favour of LIC of India, Payable at Patna / MR (Obtained by deposition cash at cash counter of East Central Zonal Office, Patna). In case of tender fee payment through Demand Draft/ MR, Original Demand Draft/ MR to be submitted at Life Insurance Corporation of India, East Central ZonalOffice, Engineering Department,Exhibition Road Patna on before 24.06.2026**up to 15:00 hrs.**

(b) Earnest Money Deposit of **Rs.23,0000/- (Rupees Twenty three Thousand Only)**separately to be paid throughNEFT/ RTGS/Demand Draft drawn in favour of LIC of India, Payable at Patna / MR (Obtained by deposition cash at cash counter of East Central Zonal Office, Patna). In case of EMD payment through Demand Draft/ MR, Original Demand Draft/ MR to be submitted at Life Insurance Corporation of India, East Central ZonalOffice, Engineering Department,Exhibition Road, Patnaon before 24.06.2026**up to 15:00 hrs**i.e the last date of submission of tender.

Note: Original Demand Draft / MR to be submitted to above mentioned address on or before 24.06.2026up to 15.00 hrs. Scan copy of Demand Draft/ MR/ Receipt of NEFT/ RTGS having UTR No.shall be uploaded on e-Tender Portal in BID I.

Note: - If Tender Fees and EMD amount submitted through NEFT/RTGS mode on or before 23.06.2026 up to 23:59Hrs.

LETTER TO CONTRACTOR FROM CHIEF ENGINEER

REF: Engg / Dated: / /2026

To,

M/s----------

Dear Sir/Sirs,

***Re:* E-Tender for Electrical installation work at various SOs under different Division for SITC of AC in Bihar & Jharkhand.**

*We hereby publish the TENDER on e-Tendering Portal (Website) through www.tenderwizard.com/lic**Electronic Mode** hereinafter referred as "**e Tendering**".*

1) Please note that copy of above e-Tender can be downloaded from above portal (website) and should be mandatorily submitted in **Online Electronic Mode** hereinafter referred as "**Online Offer"**. The submission of Online offer duly Encrypted & Digitally Signed on above portal should be in prescribed Electronic Forms (Online) available on above portal for respective tender in Online Envelope(s) on or before **As per the Key Dates mentioned in the tender document and online portal for above tender.**

2) Tender Processing Fees amount **Rs.500/-** + GST and EMD amount **Rs.23,000/-** shall be remitted to the LIC of India, Patna through NEFT/ RTGS/ Demand Draft / MR (Obtained by deposition cash at cash counter of East Central Zonal Office, Patna) in this Bid. **The proof of remittance of above shall be uploaded in BID – I of e-tender as per the Key Dates** and the e Tenders will be opened at **Asper the Key Dates**in the presence of contractors or accredited representatives, who wish to attend the online Tender Opening Process. Thebidders can view the Tender Opening details through their respective Login IDs on the abovementioned e-Tender portal (Website).

The Tenderer should ensure that their tender is received **Online Electronically** on or before the due date and time as specified in **"Key Dates"** in the Tender Document and above mentioned Portal (website).

Please note that above e-Tendering System is an automatically time locked system which will be locked immediately as soon as due date and time is over and will not accept any offer after that. So, the tenderers are strictly advised to do their process well before the due date and time to avoid any such instances.

3) Instructions In regard to Submission of tenders on Electronic Tendering System (ETS) is attached in the Tender document. The tenderers are advised to carefully read the above document for understanding of e Tendering System. The above instructions will supersede all the terms & conditions mentioned for submission of tender in document.

4) The Life Insurance Corporation of India does not bind itself to accept the lowest or any tender.

Yours sincerely,

Chief Engineer

LETTER FROM CONTRACTOR TO CHIEF ENGINEER

The Chief Engineer
Life Insurance Corporation of India,
East Central Zonal Office, Patna.

Dear Sir/Sirs,

RE:E-Tender for Electrical installation work at various SOs under different DO for SITC of AC in Bihar &jharkhand

1. Having examined the Specifications, conditions of tender, form of Percentage rate contract, Schedule of Quantities relating to the above work of the tender and the drawings and having visited and examined the site of the proposed works and having inquired the requisite information relating thereto as affecting the tender invited by you on behalf of the Life Insurance Corporation of India, I/We, the undersigned hereby offer to construct, execute, complete and maintain the proposed works on Percentage rate basis in strict accordance with the contract conditions and specifications for the sum as mentioned in the General Summary as may be ascertained in accordance with the said conditions.
2. I / We undertake to complete and deliver the whole of the work within a period as specified in Appendix to the Conditions of Contract from the date of issue of intimation from you that the tender has been accepted and upon receiving possession of the site. I/We shall be under the obligation to pay the sum of as stated in the Appendix to the Conditions of Contract for every day that the works shall remain incomplete, damages as compensation subject to the conditions of contract relating to an extension of time.

3. I/We submit herewith my/our tender along with Earnest Money remittance of, Rs.23,000.00 **(Rupees Twenty three Thousand only).** I/ we hereby agree this sum shall be forfeited by the Life Insurance Corporation of India in the event of my/our tender being accepted and I/We fail to execute the contract when called upon to do so.

I/We note that earnest money remittance in form other than **NEFT/ RTGS/ Demand Draft/ MR (obtained through depositing cash on cash counters of East Central Zonal Office, Patna) payment** shall not be accepted. In case tenderer failed to submit original Demand Draft/ MR to the Concerned Office, before specified date **AS per Key Dates,** the tender will be considered as non bonafied tender.

4. In the event of the tender being accepted, the E.M.D shall be retained as part of security deposit. The contractor has to deposit additional Security Deposit with LICI for an amount of **Rs.23,000.00** (EMD shall be converted in to SD). The total security deposit is @5% of total work value. No interest will be paid on SD. The Security Deposit will be released after successful completion of contract period including extension if any and plus Defect Liability Period of one year w;e;f handing over the site after successful completion of work.

5. I / We note that the Earnest Money deposited by me/us would be refunded to me/us.

a. On expiry of the validity of the tender or

b. Earlier at the discretion of Chief Engineerin case my/our tender is not accepted.

Yours faithfully,

SIGNATURE OF THE CONTRACTOR

Name of the Partner of the Firm or Name of person having Power of Attorney to sign the contract. (Certified True Copy of the Power of Attorney should be attached).

APPENDIX TO CONDITIONS OF CONTRACT

FINANCIAL YEAR		**2026-27**
EARNEST MONEY DEPOSIT		**Rs.23,000/-**
TYPE OF TENDER		**Percentage Rate Tender**
Sr. No.	**PARTICULARS**	**DESCRIPTION**
1	Earnest Money Deposit	Earnest Money Deposit of**Rs.23,000/- (Rupees Twenty three Thousand Only)** throughDemand Draft/ MR / Electronic Online Transfer (NEFT/ RTGS) to be paid.
2	Duration of contract	The rate contract is valid for one year and may be extended subsequently after mutual consent. As deem fit by the Competent Authority of LICI.
3	Defects liability period	1) **Twelve months** from the date of completion of work.
4	Security Deposit	In case of tender is accepted EMD shall be converted in to SD. The contractor has to deposit additional Security Deposit of amount Rs.**23,000.00**. The total security deposit will @5% of total, value of work done at site. No interest will be paid on SD. The Security Deposit will be released after successful completion of contract period including extension if any and plus Defect Liability Period as applicable for last awarded work under said contract.
5	Validity	Tender submitted shall remain open for acceptance up to three months from the last date of the submission of the tender.
6	Insurance Policies	Contractors All Risk (CAR) Policy will be for the Contract Value i.e. Rs 5.0 Lacs &Third-Party Liability will be 7.5% of the contract valueand Workmen Compensation policy for minimum 2 labours. (one skilled one unskilled) or as per mutual agreement.
7	Recovery for non-Extension of insurance Policies (Workman's ensation & Contractor's All Risk inclusive of Third Party Liability)	The date of renewed insurance policy, if any, will be 15 working days prior to the last date of expiry of the existing policy, failing which LICI may insure/renew insurance and apply penal cost on the contractor i.e. Premium Charges plus Rs. 10,000/- as Admin Charges and Rs.25,000/- as penalty.
8	Liquidated Damages	At the rate of 1.00% of value of work on accepted rate for individual work order per week subject to max of 10% of accepted amount for each individual work order.
9	Contract labour act	Contractor to obtain labour license before commencement of work if applicable.
10	Water & Electricity Charges (if provided and used by the	The required electricity for the Charges will be deducted from each bill @ **0.5% of gross value of work.**

	contractor)	
11	Interim certificate	As per payment terms
12	Period of honouring Interim Certificate	20 (Twenty) Days
13	Periodof honouring Final	90 days from the date of submission of final measurements with details.
14	Valid electrical License	The work will be awarded to the contractor having valid electrical license issued by the Electrical Safety Department.

SPECIAL CONDITIONS OF CONTRACT

1. The contractor shall be responsible to pay all statutory levies imposed by the State and Central Government such as Income Tax etc. GST will be paid separately along with the bills as per applicable rates/ prevailing rates.

2. ***The Electrical works carried out as per schedule mentioned in the tender*. The lowest contractor will be issued work order and the contractor will be responsible to arrange to complete the work as per scheduled date. If the response of the contractor will not be as per time requirement, the work will be assigned to another contractor with their rates & cost. No correspondence in this regard will be entertained thereafter.**

3. The Construction Associate shall submit the bill having GST Number clearly printed and showing the taxes separately.

4. If the rate quoted by the contractor is found abnormally low then additional security deposit of Rs 2 Lac may be deposited as per discretion of competent authority.

Contractor shall also be responsible to seek permission from local authorities/ administration before starting the work & during the work in progress for unloading/keeping materials there or after completion of work, if required. if any.

The above will supersede all provisions given in the tender elsewhere.

Chief Engineer

(TO BE GIVEN ON CONTRACTOR'S LETTERHEAD)

NO CLAIM CERTIFICATE CUM STAMPED RECEIPT

Received Rs. (Rupees only) being the amount against my/ours final bill dated _____ for _____ (Name of work) in full and final settlement of bill.

I/We have no further claim for any amount on above work.

(Signature of Contractor on Revenue stamp)

Rubber Stamp / Seal of the Contractor /Company

E-TenderingProgrammeSystem Tender No. LICI/ECZ/ENGG/2026-27/10

E-Tender for Electrical installation work at various SOs under different DO in Bihar & Jharkhand.

1. Onlinebidsareherebyinvitedfor the worksmentioned below through online e-Tendering System portal www.tenderwizard.com/lic**from the intended contractors.**

Sr. No.	Name of Work	Estimated Cost	Earnest Money Deposit (EMD)	Tender Document Fee
1.	As mentioned above	Rs.11,48,302.00	Rs.23,000.00	Rs.500.00 + GST

2. PossessionofDigitalSignatureCertificate (DSC)andregistrationofthecontractorsontheportal i.e. **http://**www.tenderwizard.com/licisaprerequisitefore-Tendering.

3. For Digital Certificate issuance you may please contact our Service provider **Antares Systems Limited, E-tender helpdesk, 24, Sudha Complex, III Stage, IVth Block, Basaveshwara Nagar, Bangalore-560079,**

   Help Desk Contact details:
   Tel: 080-40482000 / 121 / 133 / 140
   Mob:- 9686115304 / 9686115323
   Email:-lokesh.hr@antaressystems.comand raghuprashanth@antaressystems.com

4. LastDates ofvariousactivitiesby bidder:

DownloadingofTendersDocuments : As per Key Dates
Bid Preparation and Submission : As per Key Dates

For furtherdetailsande-tendering schedule (Key Dates), please visit website above mentioned portal (website)

E-Tender for Electrical installation work at various SOs under different DO in Bihar & Jharkhand.

KEY DATES

Sr. No.	Department Stage	Date
1	Uploading of Tender document	12.06.2026
2	Downloading of Tender Document	Up to 23;59Hrs on 24.06.2026
3	Closing of Tender	At 15.00 Hrs on 24.06.2026
4	Deposit of Tender fee & EMD throu Neft/RTGS.	At 23.59hrs on 23.06.2026
5	In case of Demand draft/MR (in seal envelope)	Up to 24.06.2026 at 15.00 Hrs
6	Opening of EMD, Tender Fees and Price Bid	On 24.06.2026 at 15.30 Hrs

Note: Key Dates mentioned here in above table are final and these supersede any discrepancy in the dates mentioned elsewhere in the tender.

E-Tender for Electrical installation work at various SOs under different DO for SITC of AC in Bihar & Jharkhand

INSTRUCTIONS TO CONTRACTORS REGARDING SUBMISSION OF E-TENDERS

1. All the Contractors intending to participate in the tenders processed online, are required to get registered for the Electronic Tendering System on the Portal **http://www.tenderwizard.com/LIC**

2. Tender Document can be down loaded as per key dates.

3. The Last Date of Submission on- line Bid as per key dates.

4. **Obtaining a Digital Certificate:**

   The Bids submitted online should be encrypted and signed electronically with a Digital Certificate to establish the identity of the bidder bidding online. Digital signature certificate has two keys i.e. Public Key and Private Key. Public Key is used to encrypt the data and Private Key is used to decrypt the data. Encryption means conversion of normal text into coded language whereas decryption means conversion of coded language into normal text. These Digital Certificates are issued by an approved certifying authority, by the controller of Certifying Authorities, Government of India.

5. The contractors may also obtain Class III digital certificate from any Certifying Authority or Sub-certifying Authority authorized by the Controller of Certifying Authorities on the portal http://cca.gov.in. or may obtain information and application format and documents required for issue of digital certificate from our service provider to Electronic Tendering System (ETS)

M/s Antares Systems Limited
E tender Help Desk
#24, Sudha Complex
03rd Stage, 04th Block
Basaveshwaranagara, Bangalore- 560079

Help Desk Contact details
Tel: 080-40482000/121/133/140
Mobile: 9686115304/9686115323

Email: lokesh.hr@antaressystems.com
raghuprashanth@antaressystems.com

6. In case of online tendering, if the digital certificate issued to the authorized user of a firm is used for signing and submitting a bid, it will be considered equivalent to a no-objection certificate/power of attorney to that User. The firm has to authorize a specific individual via

an authorization certificate signed by all partners to use the digital certificate as per Indian Information Technology Act 2000. Unless the certificates are revoked, it will be assumed to represent adequate authority of the user to bid on behalf of agency for LIC of India, East Central Zonal Office, Patna as per Information Technology Act 2000. The digital signature of this authorized user will be binding on the firm. It shall be the responsibility of management / partners of the registered firms to inform the certifying authority or Sub Certifying Authority, in case of change of authorized user and that a fresh digital certificate is procured and issued an 'authorization certificate' for the new user. The procedure for application of a digital certificate will remain the same for the new user.

The same procedure holds true for the authorized users in a private/Public limited company. In this case, the authorization certificate will have to be signed by the directors of the company.

7. Online Viewing of Scheduled date of e-tendering Programme :

The contractors can view the e-tendering Programme and the time schedule (Key Dates) for all the tenders floated using the electronic tendering system on the website **http://www.tenderwizard.com/LIC**

8. Submission of Earnest Money Deposit:

Tenderers have to deposit Earnest Money Deposit of amount **Rs.23,000/-** (Rupees Twenty three thousand only) through Demand Draft/ MR / Electronic Online Transfer (NEFT/ RTGS) to account mentioned on Page 3 of this part, before **last date of submission as per Key Dates.** Any tender, which is not accompanied by Tender Fee & Earnest Money Deposit, shall be summarily rejected. No interest will be paid for the period during which the earnest money lies in deposit with the Employer.

Refund of Earnest Money Deposit to the unsuccessful bidders will be made through RTGS/NEFT only.

It is mandatory to upload the scanned copy of receipt / UTR against EMD while Bid preparation stage on eTender Portal

9. Submission of Tender Document Processing Fees:

Tenderers have to pay Nonrefundable Tender Document Processing Fee of **Rs.500.00 (Rupees Five Hundred Only) +GST** through Demand Draft/ MR/ Electronic Online Transfer (NEFT/ RTGS/ IMPS), in favour of **"Life Insurance Corporation of India"** at Patna.

A scanned copy of the receipt / UTR of Tender document processing fees should be uploaded on e-Tender Portal while Bid Preparation Stage, otherwise Technical/Commercial bid will not be opened. Further, Original Demand Draft / MR to be submitted in office before last date as per Key Dates.

If the tenders are cancelled or recalled on any grounds, the tender document processing fees will not be refunded to the agency.

10. Download of Tender Documents

Download of Tender Documents: The tender documents can only be downloaded from the Electronic Tendering System on the Portal **http://www.tenderwizard.com/LIC**

11. Submission of Online Bids:

The Tenderers need to download the Bids Documents including the Blank Templates/ Formats / Forms etc of Technical & Price Bids. The Technical Bid and Price Bids to be filled without making any changes in the format of the files and the completely filled flies of Technical Bid/Price Bid shall be uploaded on the e-Tender Portal at appropriate Bids using DSC within the time and last date specified for submission of Bids As per Key Dates.
The Scanned copies of self attested supporting documents (If any) of Bid I & Bid II (Price Bids) to be uploaded while submission of Bids.

The bidder should ensure that the status of a particular stage should be shown as "Submitted" before the expiry date and time of that particular stage and he should possess a copy of receipt of completion of each stage to be performed from his end. It will be the sole responsibility of the bidder if the status of a particular stage is "Pending" till the expiry date and time of that stage and he is not able to proceed further in the e-tendering process.

13 Other Information:

13.1 The intending bidders shall fill the **Percentage Rate** in the templates of the Price Bid. The Price Bid has to be submitted mandatory online. Tender processing fee and EMD should be uploaded mandatory while "Bid Preparation Stage". ~~The Prequalification documents along with following papers to be submitted before last date as mentioned in Key dates -~~

~~i. A list of all documents.~~

~~ii. Duly accepted power of Attorney in original along with its two certified copies in the name of bidder or authorized representative to act on behalf of the agency.~~

Deleted

14. Price Bid envelope has to be submitted mandatory online and shall not be accepted physically under any circumstances. In case any bidder does not comply with procedure given above, it will be presumed that he is not interested in the work and they will be disqualified from the bidding.

15. ~~Performa of Articles of Agreement (Annexure – 'A') should not be filled in by the tenderer. While the contract shall be deemed to have come into existence on issue of letter of acceptance to the successful tende~~ Deleted ~~greement shall be signed thereafter with the successful tenderer on non-judicial stamp paper of requisite value as per the Performa of Articles of Agreement~~

16. Contractors are warned that Cash, or Encashable Cheque, or Bank or Insurance Guarantee, or Fixed Deposit receipt in lieu of the aforementioned form of Earnest Money remittance will not be accepted.

17. Tenders containing errors are liable to be considered non-bonafide at the discretion of the Dy. Chief Engineer (I/C).

18. Tenderer should note that tender shall remain open for consideration for a minimum period of **THREE MONTHS** from the date of online submission of tenders.

19 Tenderer should fill in all the relevant blanks on the relevant places as indicated below such as:

a. Letter from Contractor to Chief Engineer (I/C).

20 No alterations are to be made by the tenderer to the text or the Schedule of these tender papers. Any tenderer, which proposes any alterations or amendments to any of the condition/s laid down or which proposes any other conditions of any description whatsoever is liable to be rejected.

21 The tenderer is required to check the numbers of the pages and if any page be found missing or in duplicate, or the figure or writing indistinct, he must inform the Chief Engineer at once and have the same rectified. If the tenderer be in doubt about the precise meaning of any item or figure, for any reason whatsoever, he must inform Chief Engineer in order that the correct meaning may be decided upon before the date for the submission of the tender. Similarly, if there is/are any ambiguities noticed in any of the tender clauses /Item specifications etc. given at different places in tender document, the Tenderer should bring all such ambiguities to the notice of Chief Engineer before submission of tender for necessary rectification.

No liability whatsoever will be admitted nor claim allowed in respect of errors in the submitted tender due to missing / duplicate pages, indistinct writing or any other error in the tender documents which should have been rectified in the manner described above.

22 ~~*In the event no rate has been quoted for any item(s), leaving space both in figure(s), words(s) , it will be presumed that the c has included the cost of this item/ these item(s) in other item(s) and the rate for s s) will be considered as zero and work will required to be executed accordingly.*~~ Deleted

23 If any corrupt documents(s)/Files(s) are received by LIC on opening of Bids, the Tenderers will be solely responsible if their Bids becomes Non-Bonafied due to corrupt file.

24 Deleted
25 Deleted
26 Deleted

27 The tender shall be accompanied by a certified true copy of Power of Attorney in favour of the signatory to the tender documents. If the tender is submitted on behalf of a firm, it must be signed either by all partners or person holding a valid power of attorney from all partners constituting the firm. The person signing the tender on behalf of another partner(s) or on behalf of a firm or Company shall attach with the Tender a proper Power of Attorney duly executed in his favour by such other person(s) or by all the partners in accordance with the Constitution of the Company / Articles of Association, stating that he has the authority to sign on behalf of such other person(s) of the firm or the Company as the case may be, in all matters pertaining to the contract including the Arbitration Clause. Scanned copy of the Power of Attorney shall be uploaded on the eTender Portal.

28 The Life Insurance Corporation of India reserves the right to accept any tender or to accept tenders in part; to reject any or all tenders without assigning reasons thereof.

Note: - Bidders participating in e-tendering shall check his/her validity of Digital Signature Certificate before bidding in the specific work floated online at the website http://www.tenderwizard.com/LIC. Also, the bidder will be held liable solely, in case, while bidding in particular stage - Date & Time expired as per the key dates available on the tender document. Key dates are subject to change in case of any amendment in schedule due to any reason stated by the Department.

General terms and conditions of contract

1. This rate contract is meant for undertaking electrical installation work at various SOs under different DO in Bihar &Jhatkhand irrespective of its/ their quantity.

2. The contractors are requested to quote their rate on percentage rate basis i.e Above/Below/At par in attached schedule of rates in words and figure, otherwise tender will not be entertained or will be considered as non bonafide. In case rates written in figure are not tallying with rate written in words, the rate quoted by contractor in words shall be taken for consideration.

3. **SITE**: The word "Site" wherever referred is of the "Premises" where the work has to be carried out is attached with this tender.

4. Work can be carried out by the contractor shall cover for all such events in his quoted rates. Also, shifting the working office/ home furniture, cupboards, etc. and rearranging the same so as to not to disturb the functioning of office may also be involved. In such an event, contractor shall comply with instructions of Engineer-in-charge. Rates quoted for various items of work shall cover for all such events and no separate payment will be made.

5. The details of Security Deposit, Completion period,Defect LiabilityPeriod, Insurance Policies, Liquidated Damages etc., are as per enclosed Appendix to the conditions of contract. No interest shall be payable over the security deposits like Initial Security Deposit, Retention Money etc., lying in deposit with LIC of India.

6. **EARNEST MONEY DEPOSIT: The**amount ofEMD is to be remitted online as instructed on page no 3 to 4 in favour of**"LIC of India".** The amount of EMD shall be **Rs.23,000/-(Rupees Twenty three Thousand only)** as detailed in Appendix to the Conditions of Contract. No interest shall be payable on Earnest Money deposit lying with LIC of India.

7. **SECURITY DEPOSIT:** The EMD of Rs.**23,000/-(Rupees Twenty three Thousand only)** at Condition No.6 above, shall be converted as Security deposit **for successful Tenderer** and further @5% will be deducted from the bill to make total Security Deposit as per total work value carried out at site**.**

   The balance EMDs submitted by other tenderers shall be refunded after finalization of Contracts. The contractors are requested to put their firm's endorsement on each page of the tender document in token of acceptance.

8. **WATER AND ELECTRICITY CHARGES**: Not withstanding what is mentioned elsewhere in the tender, water and electricity (supply at one point), if provided by LIC, deduction will bemade,from the value of work @ **0.5% of Gross value of work and shall be recovered from the bills of the contractor.**

9. The contractor is to fully indemnify the LIC of India against any type of loss/ accident caused due to the negligence of contractor and the contractor should take all precautions for smooth execution of the work.

10. **CONTRACT LABOUR ACT:** The contractor shall pay his labour as per the Contract Labour Act and observe hours of work and conditions of employment according to the existing rules under contract labour act. Further it shall be contractor's responsibility to ensure that regular payments to his workers are made. The contractor shall fully indemnify LIC of India from any claim under Contract Labour Act. Labour license to be obtained from Central Labour Commissioner if applicable.
11. **WORKMEN'S COMPENSATION ACT**: The contractor shall fully indemnify the LIC of India from all claims for any injury caused to any person whether a workmen or not and LIC of India shall not be bound to defend any claim made under the Workmen's Compensation Act. All Contractors have to obtain **Workmen Compensation Policy** in the joint name of LIC of India and the contractor for thevalue as directed, **which shall remain in force till the completion of the work.**

12. **CONTRACRTOR'S ALL RISK POLICY INCLUSIVE OF THIRD PARTY LIABILITY: The** contractor shall be responsible for all injuries / damages tohis men, material and property etc , which may arise from the work , for negligence of himself and / or his workers and shall fully indemnify the LIC of India, for such expenses which shall be solely to the contractor's own account. All Contractors have to obtain **Contractor's All Risk Policy inclusive of Third-PartyLiability** in the joint name of LIC of India and the contractorfor thevalue as directed, **which shall remain in force till the completion period of work.**

13. Tenderers should note that their rates quoted shall be firm during the currency of the contract irrespective of the quantity executed and no escalation shall be permissible. The currency of contract shall be inclusive of extensions if granted.

14. No alterations or additions are to be made by the contractors to the text of Schedule of Rates and other tender papers. Violation of this instruction entails rejection of the tender at the discretion of theChief Engineer.

15. Any tender which proposes any alterations to any of the condition laid down or which proposes any other condition of any description whatsoever is liable to be rejected at the discretion of the Chief Engineer.

16. The contractor is required to check the numbers of pages and if any page be found missing or in duplicate, or the figure or writing indistinct, he must inform the Chief Engineerin order that the correct meaning may be decided upon before the date for the submission of the tender.

17. If contractor is in doubt about the precise meaning of any item or figure, for any reason whatsoever, he must inform the Chief Engineerin order that the correct meaning may be decided upon before the date for the submission of the tender. No liability whatsoever will be admitted nor claim allowed in respect of errors in tender due to mistake in the Schedule of Quantities which should have been rectified in the manner described above.

18. All measurements of concealed items shall be got recorded before they are covered up / concealed.

19. Contractors will have to submit their bills in triplicate. The bill must be submitted in the first week of next month along with all the work certificates and documents of previous month work. After that we will not entertained the bills if it is not submitted in said duration.

20. Contractors to note that the quoted rates shall be firm throughout the currency of the contract. Any price variation towards Materials, Labour, Steel, Cement etc., is not allowed and will not be paid. Rates to be quoted taking the current market rates of materials into account. Rates quoted to be applicable for work at all levels. The use of lifts for taking materials shall not be permitted. The rates quoted shall include all taxes; octroi etc. and nothing extra shall be paid on any account.

21. The rates quoted shall cover for all material, labour, tools, plants, scaffolding, shuttering, curing etc. and any kind of taxes, fee, duties etc. that are payable. It also includes everything necessary for proper execution of work to the entire satisfaction of the department.

22. The screws, nails, iron oxidized hinges, necessary fasteners, holdfast etc. required for fixing doors, partitions, panels etc shall be included in the quoted rates of the respective items. No separate payments shall be made for this purpose.

23. **EXTRA ITEMS**: Extra Items if any shall be settled on the basis of cash memos for purchase of material and actual labour employed. Contractor shall be allowed 15% over the above to cover for, supervision, overheads and profit. Wherever applicable analysis of rates shall be on the pattern of C.P.W.D. analysis of rates. The decision of Chief Engineer shall be binding and final.
No extra / deviated items will be settled in absence of supporting documents. LIC of India does not bound itself to accept the rates mention in vouchers/ purchase bills and may settle the rate on basis of prevailing rates in market.

24. All materials used in the work shall be from list of approved makes enclosed and specification of work must be such as to comply with LICI standard specification unless otherwise mentioned it should be as per I.S. / C.P.W.D. specifications or as per quality specified in the tender and approved by the competent authority.

25. The contractor shall be responsible for all the damages and shall replace or make good at his own expense any material lost or damaged or quality not approved.

26. It may be noted that Time is essence of contract and the schedule time for completion has to be followed strictly. The work must be completed in all respect within specified time mentioned in work order. If the work is likely to be delayed due to any reason beyond the control of contractor, the contractor shall in advance seek the extension in time limit before the expiry of time.

27. In case of replacement of spares, it shall be certified by the occupants or Corporations Engineer.

28. LIC of India reserves the right to supply any material/ spares at its sole discretion.

29. No advance shall be payable for the commencement of any job.

30. All works shall be carried out as per local by-laws with respect to stocking of material, supplying of labour etc. Electrical work shall be carried out througha Licensed electrician, as per IE rules, local electricity authority rules, LIC material specifications and general conditions of contract and to the entire satisfaction of LIC Engineer. Alternate arrangement for restoring the supply shall be made without any extra charges.

31. The quantities given in estimate prepared on approved annual rates shall be approximate and may vary and payment will be made only as per theactual work executed at site as ascertained by joint measurements.

32. **MEASUREMENT:** The actual authorized quantities shall be measured jointly for payments on basis of rates quoted. The quantities are to be read in conjunction with specification and condition of contract and the rates quoted shall be for doing all the works as per specification complete, whether the same are reiterated or not.

33. The final bill of the work should be submitted within 30 days of completion of work failing which LIC shall finalize the bill, which shall be binding on the contractor.

34. In case of dispute the decision of the Chief Engineer, LIC of India shall be conclusive and binding on the contractor.

35. Contractors to please note that the work is to be carried out in co-ordination with other agencies / occupants with least disturbance as directed. The Contractor should observe that his work shall not cause any nuisance to the public in general and to the neighboring occupants in particular.

36. **MALBA:** After completion of the work, the site should be cleared thoroughly of any mulba, debris etc., at the contractors own expenses and the rates quoted shall include the same.

37. **TESTING OF MATERIAL**: The contractor to account in his quoted rates, for the cost of required samples taken jointly for carrying out the tests and payments for testing charges. The testing charges only shall be reimbursed to contractor if the material conforms to specifications.

38. **VALIDITY:** The tender shall be valid for acceptance for a period of **3 months** from the last date of receipt of tender.

39. The Corporation Engineer may due to adequate reason as he thinks fit from time to time, terminate the contract by giving one month's notice. The contractor should then leave the buildings or the place of work in a decent and workable condition, failing which the LICI reserves the right to take any action as deemed fit against the contractor.

40. **Minimum Wages Act:** The Contractor shall pay rates of Wages and observe hours of work and conditions of employment according to existing rules under Minimum Wages Act. Further, it shall be contractor's responsibility to ensure that he pay his workmen wages which

are not lower than the minimum prescribed by the Union Government and State Government. In which area this contract is being operated.

41. **LIC reserves the right to accept any tender or to accept the tenders in part or to reject any or all the tenders without assigning any reason thereof.**

42. Contractor please note that to carry out the said work permission if required from local authorities etc will be obtained by them including liasioning with them. No extra payment shall be made on this account. The contractor shall quote the rates on considering the same.

43. The rate contract is valid for one year and may be extended for two subsequent years with suitable escalation over previous year's rates. This may be done by inviting fresh quotations from the eligible Contractors for only increase/decrease/at par over the previous year's rates.

44. **Work shall be given to lowest tenderer. However, in case lowest tenderer is not available for any reasons or not doing the work, then the work may be offered to other tenderer i.e.; L2, L3, L4…etc at the lowest approved rates if they give their consent to carry out the work on the lowest approved rates. This clause shall be valid throughout the currency of the contract.**

TECHNICAL SPECIFICATION FOR ELECTRICAL WORKS

(A) GENERAL

1. The installations shall generally be carried out in conformity with the Code of Practice for electrical wiring installation. The system voltage not exceeding 650 V. viz I.S. 730. 1963 or the latest revision thereof.

2. Definition:

As given in I.S. Code of Practice shall apply.

3. Pressure and frequency of supply :

All current consuming devices shall be suitable for 415 V., 3phase, 50cycle A.C. supply.

4. System of wiring:

i) The wiring shall be carried out as per schedule. Power wiring must be in separate FRLS conduit and shall be kept separate and distinct from lighting wiring. All wiring must be done on the distribution system with main and branch distribution board at convenient centers. All conductors shall run as far as possible along the walls and ceilings so as to be easily accessible and capable of being thoroughly inspected. The contractor shall arrange balancing of circuits before hand over the electrical installation in consultation with Electrical Engineer of L.I.C.I.

ii) Within one month of taking over of the installation, the contractor shall submit to L.I.C.I. 3sets of completion drawings of the Electrical Installation in corporating all modifications made from time to time including cable & conduit lay-outs to the satisfaction of the Electrical Engineer of L.I.C.I. & the wiring plans shall be deemed to be "Drawings" within the meaning of the term as used in the general conditions of contract.

5. Conductor:

The conductors shall be of copper or otherwise stated in tender and shall be either FRLS insulated or FRLS insulated FRLS sheathed. The minimum sections of conductors used for wring of light and plug points shall be 1.5 sq mm. Single core wires shall only be used.

6. Cables:

i) All cables including flexible cables used shall be ISI approved and confirming the ISI specifications.

ii) Twin flexible cable shall be of minimum section area of 14/0.0076 and PVC insulated.

iii) Wires as per specification of materials.

7. Fall of Potential:

The cross sectional area of all conductors inside buildings shall be so proportioned to their lengths that the drop in pressure between the main fuses and their furthest point shall not exceed two percent, with all the consuming devices in use.

8. Rating of Lamps and Fans:

As per the power rating of the equipment's as mentioned in Schedule of quantity.

9. Test:

The installation with fittings complete shall before current is switched on satisfactorily pass the following tests:

The whole of the lamps and appliance having been connected to the conductors and all switches and fuses being 'on', a pressure not less than twice the intended working pressure subject to a limit of 500 volts shall be applied and the insulation resistance of the whole or any part of the installation to earth must not be less in Mega ohms than 25 divided by the number of points as defined above. With all lamps and appliance removed from the circuits a similar test between poles may be demanded, provided that during the rainy season half the above test value will be accepted. Where any appliance referred to is a motor larger than one-half B.H.P. the insulation resistance of that particular circuit must be greater than one Meg ohm.

10. Joints and Looping Back :

No joints shall be allowed in conductors. Neutral shall be looped from point to point whereas the live wires shall be looped in the switch board only from switch to switch.

11. Switches:

i) All main switches (other than those of iron clad pattern) carrying over ten amperes shall be fitted for back connections.

ii) All switches and circuit breakers shall be constructed in accordance with the I.E.E. 'wiring rules' 8th, edition no 67, or its latest version, provided also that springs shall be either of phosphor bronze, or if of steel, shall be copper or nickel plated; & that handles shall be so fastened that do not tend to unscrew or become loose (see clause 16)

iii)

12. Control at point of Entry of Supply:

There shall be one MCB for each main circuit (other than the neutral conductor of a 3-wire circuit) at the point of entry of the supply.

13. Distribution Boards:

i) Main distribution board shall be metal clad and shall be provided with an iron clad switch and fuse on each pole of the circuit (MCCB / Switches).

ii) Branch distribution board shall be provided with one fuse/ MCB for each circuit and one common neutral bar. Maximum number of points to be wired on each circuit shall be 6.

iii) Switches and fuses of opposite polarity shall be mounted on separate bases with a shield of non-ignitable insulating material between the bases when placed one above the other.

iv) In wiring a branch distribution board the total number of points shall be divided as far as possible evenly between the numbers of ways of the board. A spare circuit shall be left for future extensions.

v) MCB / Fuses shall be of approved materials and each circuit shall be clearly numbered from left to right in conspicuous figures to correspond with the wiring plans.

vi) Two spare fuse carriers / MCB per main branch board shall be supplied for replacements.

14. Passing through the walls

I) Except as laid down in clause 87 where conductors pass the walls, one of the following alternative methods shall be used.

A hole of suitable area shall be made in the wall through which the casing or conductor shall be carried so as to allow of an air-space of not less than one inch on three sides of the casing or conductors as the case may be or the conductors shall be carried in approved heavy gauge solid drown or lap welded conduit tube on porcelain ducts. Where the supply is alternating current, the conductors of the circuit must be bunched.

ii) Where a wall tube passes outside a building so as to be exposed to the weather, the outer end shall be bell mounted and turned downwards.

15. Branch Switches (see clause – 11)

In installation supplied from a three-wire system, all branch switches shall be placed on the outer wires, switches (Other than those for multiple control) controlling not more than 10 amperes shall be of the Modular type switches shall be 'ON' when knob is down. Where the specified position of branch switches is altered, any such alterations of position after fixing will be paid for.

16. Ceiling Rose and Wall Sockets

Three pins Ceiling roses, and wall sockets shall not contain fuse terminals. Wall sockets shall comply with the requirements of the Bureau of Indian Standards.

17. Fittings.

Where conductors are required to be threaded through tubes or channels formed in the metal work of fittings, these must be free from sharp angles or projecting edges and of such a size as will enable them to be wired with the conductors used for the final sub-circuits without removing the braiding taping or outer covering. As far as possible all tubes or channels should be for sufficient size to permit of 'looking back'. Where with approval of the Electrical Engineer of L.I.C. 'Electrolytic copper' wire is used for wiring fittings. The sub-circuit leads must terminate in a ceiling rose or connector from which this wire will be carried into the fittings. Flexible wire must not be used for wiring fittings, except portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas fitted lamps shall be adequately ventilated.

18. External and Road lamps;

External and Road Lamps shall have weather proof fittings of approved design so as to effectually prevent the admission of moisture. An insulating distance piece of moisture proof materials must be inserted between the lamp holder nipple and that of the fitting. Flexible cord conductors and cord grip lamp holders must not be used where exposed to the weather. In verandahs and similar exposed situations rod pendants or ceiling plates shall be used.

19. Fans and Regulators

(I) (a) All ceiling fans shall be suspended from a hook or shackle and insulated from the same. All joints in the suspension rod shall be screwed and all joints or bolts in connection therewith shall be additionally secured by means of split pins.

(b) The canopy and wood block at the top of the suspension rod shall effectually hide the suspension.

(c) The leading in wire shall be not smaller than 3/22 S.W. G. and shall be protected from being cut.

(d) All fans shall be free from sparking, noise oil throwing and excessive heating.

(ii) (a) All fans shall be hung nine and half feet above the floor or as directed by the Engineer Incharge.

(b) All fans shall be capable of running at full speed for one month without additional oiling and shall not overheat after eight hours continuous run at full speed.

(c) Each fan shall have a speed regulator of Electronic type.

B. CONDUIT SYSTEM

1) Conduit to be continuous

Conduit shall be of approved pattern and manufacture and in accordance with the specification of the Bureau of Indian Standards & relevant IE rules.

2) Bunching of Wires

The wires of a circuit may be bunched together in a conduit, and if the supply is alternating current, they must be bunched.

3) Junction in Conduit

The lengths of conduit shall be joined by means of push fit joints or other approved joints. The greatest care shall be taken in preparing the conduit that no sharp edges or burrs are left which could damage the Insulation. The Elec. Engineer with a view to ensuring that the above provision has been carried out, may require (if he should consider if necessary) that the separate lengths of conduit etc. after they have been prepared shall be submitted for inspection before being fixed.

4) Fixing of Conduit

The FRLS conduit shall be fixed to the surface of walls, secured to plugs, arranged as in clause 15 by saddles and round-headed screws. No conduit shall be buried beneath the surface of the masonry unless so specified or approved by the Electrical Engineer, L.I.C.

5) **Bends of Conduit**

The conduits shall be brought round the angles of walls by means of bends or elbows as may be directed.

6) **Outlets**

All outlets for fittings, switches, etc. shall be equipped with an approved outlet box.

7) **Conductors**

All conductors used in conduit wiring shall be stranded

8) **Erection and Earthing of conduit**

The whole system of conduit shall be erected and completed before the conductors are drawn in. In conduit system, the pipe must be continuous when passing through walls or floors, and no other form of insulating or protecting tube is required.

Section-I

Specifications for LT (1.1 KV Grade) Cables

1 **Scope:**

This specification covers supply, testing at works, supply at site, installation, termination, jointing, connection, testing at site, commissioning and handing over of 1.1 KV grade Cables.

2 **System:**

The 1.1 KV grade cables are to be used in underground distribution system with normal system voltage of 415 V, 50 Hz, 3 phases, 4 wire systems.

3 **Applicable standards:**

Cables to be supplied under this specification shall be with Copper or Aluminum conductor as specified, in drawings or Bill of Quantities, PVC insulated and PVC sheathed, armored and with an outer PVC protective sheath, heavy duty type and shall confirm to,

IS 1554 (Part I) 1976: PVC insulated electric cables.

IS 1753: Aluminum conductors for insulated cables.

IS 3961: Recommended current ratings for cables.

4 General requirements:

4.1 All cables shall be new without any kinks or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on surface of the cable at distance not exceeding 1 M.

4.2 Procurement of cables shall be on the basis of the actual site measurements and the quantities given shall be regarded as a guide. Before procurement of the cables, the contractor shall submit the detailed measurement sheet, based on site measurement showing the various cable lengths and after approval of the same place orders for the cables.

4.3 Cables shall be tested at factory as per IS requirement. The tests shall incorporate routine tests, type tests and acceptance test. The Contractor shall produce the certificate for type test.

4.4 The cables shall be of one of the makes mentioned in the list of approved materials and with ISI mark.

4.5 The cables shall be supplied and delivered at site in original cable drums with manufacturer's name, cable size, type and length all clearly indicated on each drum.

4.6 The unit rate shall include loading, unloading, transport, storage, handling, unwinding the cable from cable drums and laying in the cable trench or erected on cable trays etc.

4.7 The cables shall be laid by skilled and experienced labour.

4.8 Where the cable route intersects roads, streets or pathways, RCC spun pipes shall be laid in the trenches to serve as cable ducts. The pipes shall be joined by RCC spun collars. The RCC pipes shall project at least 150 mm on either side of road crossing.

4.9 The cable loops shall be kept at both ends of the cable length. Minimum 3 meters long loop shall be provided.

4.10 The contractor shall take care to see that the cables received at site are apportioned to various locations to ensure maximum utilization and cable joints are avoided. This apportioning shall be got approved before the cables are cut to lengths. Straight joints are permitted only under exceptional circumstances.

5 Storage and loading, unloading of cables. :

5.1 Cable drums shall not be stored one above the other. Sufficient space between cable drums shall be left for air circulation and the drums shall stand on battens placed directly under the flanges.

5.2 Cable drums shall be stored preferably on a plain ground without having any hard stones or any other sharp materials projecting above the ground surface. The drums shall be stored preferably in the shed or otherwise they shall be covered by tarpaulin.

5.3 Drums shall be stored and kept in such a way that bottom cable end does not get damaged.

5.4 Drums shall be rotated only in the direction marked on the drum.

5.5 Loading and unloading shall be done with material handling equipments only.

6 Erection and laying of cables:

6.1 General:

6.1.1 All cables shall be adequately protected against any risk of mechanical damage to which they may be liable in normal conditions of service.

6.1.2 When cables pass through holes in metal work, precautions shall be taken to prevent abrasion of the cables on any sharp edge. Cables passing through walls, ceiling or floor shall run through sleeves of Hume pipes of adequate dia. & after pulling of the cables both ends of the sleeve shall be sealed with fire resistance material to prevent spread of fire.

6.1.3 In every vertical channel, duct, trucking or cable trench, containing cables and exceeding three meters in length, internal barriers shall be provided so as to avoid heating of the air at the top of the unit.

6.1.4 In every vertical cable shaft, cable trench or any passage of cable through wall, ceiling, floor etc. Barriers against spread of fire and smoke shall be provided.

6.1.5 In fire hazard areas extra care shall be taken to prevent spreading of fire in case of cable failure. Cables in these areas shall be covered by glass wool or embedded in sand in appropriate trenches. The cabling in such areas shall be done as per FIA approval and IEE regulations.

6.1.6 Communication cables should be laid away from the power cables to avoid electromagnetic interference. Minimum clearance of 300 mm shall be maintained.

6.1.7 Control and power cables shall be laid on separate trays.

6.1.8 The maximum number of power cables on a tray should be limited to six.

6.1.9 Every cable shall be installed where it will not be exposed to direct sunlight, rain, dripping water, oil or any corrosive substance.

6.1.10 The cables shall be erected and laid by either of the following methods and as specified in Bill of Quantities or specifications or drawings.

6.2 <u>Cables laid in excavated trenches</u>:

6.2.1 The cables for external electrification work shall be laid in specially prepared cable trenches as specified under the section for cable trenches.

6.2.2 While laying cable in the trench the cable end shall be pulled with pulling eye only after mounting the drum on the jacks.

6.2.3 Care shall be taken in laying cables to avoid forming kinks. The drums shall be unrolled and cables run over wooden rollers, placed at intervals not exceeding 2 Mts.

6.2.4 High voltage cables are to be laid separately from other cables. HV, MV cables shall not be laid in the same trench and /or alongside of water main.

6.2.5 The cables shall not be laid directly in such soil, which is corrosive, and having components, which react with the insulating layer or amount of the cable. In such case it should be laid in pipes or concrete trenches.

6.3 <u>Cables laid in built-up trenches:</u>

6.3.1 For the cable route passing through the area which is proposed to be covered with concrete/tiles etc. the cables shall be laid in the R.C.C./brick masonry cable trenches as specified in the items. This arrangement shall be generally inside the building.

6.3.2 For the area outside the building but covered with concrete /tiles etc. the cables shall be laid through R.C.C. pipes laid in ground with brick chambers at both ends. The chambers shall be covered with C.I. heavy-duty covers if the area is prone for vehicular traffic otherwise medium duty C.I. covers should be provided.

6.3.3 Cables laid in the built-up cable trenches within the building shall be raised so as not to lay at the trench bottom. Cables shall be either secured to the wall by saddles or laid on hot dip galvanized angle iron brackets or cable trays, ladder, rack, trough etc.

6.3.4 Where cables are clamped to the wall a minimum clearance of 100 mm shall be maintained between wall and cable and minimum 150 mm vertical clearance shall be maintained between two cables. Where cables are laid on cable brackets, the brackets shall not be fixed more than 500 mm apart to avoid sag in the cables. Where cables are laid on cable tray /ladder /troughs /racks, minimum 300 mm distance shall be observed between adjacent tier of tray/ladder /troughs /racks, and cable shall be fixed minimum 25 mm away from wall and minimum 150 mm distance shall be observed between two adjacent cables. Cable shall be properly fixed with the tray /ladder /troughs /racks with cable tie or saddles.

6.3.5 The dimensions of the trenches shall be determined depending upon the maximum number of cables that is expected to be accommodated. Wherever specified, trenches shall be filled with fine sand and covered with RCC or steel chequered trench covers.

6.3.6 Where cables are to be installed under floors or above suspended ceilings or below ceiling, they shall be laid on a cable tray and shall be run in such positions that they are not liable to be damaged by contact with the floor or the ceiling or their fixture. The cable tray shall be properly fixed with tie rod to the ceiling. The concrete inserts for fixing the tie rod shall be put in place while casting the slab. The cable tray route shall be co-coordinated with other services. While laying the cables on the tray minimum 150 mm distance shall be observed between two adjacent cables. At least 25 % space shall be kept spare for any future installation.

6.3.7 The cable reaching for the motors in the mechanical room or plant room or machine room or service area shall be laid on cable tray. The cable reaching to motors shall be protected by rigid galvanized conduits up to a height of 300 mm above the floor. Above that height, the cable shall be protected by means of oil tight flexible metallic conduits fixed to the terminal box of the motor. The connection between the rigid conduit and the flexible conduit shall be done by a screwed coupling of an approved type. The flexible conduit shall be properly fixed with the terminal box of the motor by means of double hexagonal check nut.

6.4 Duct System:

Wherever specified cables shall be laid in underground ducts. The duct system shall consist of a required number of reinforced Hume pipes with simplex joints. Wherever asbestos cement pipes are used, the pipes shall be encased in concrete of 75 mm thick. The ducts shall be properly anchored to prevent any movement. The top surface of the cable ducts shall not be less than 60 cm below the ground level. The duct shall be at a gradient of at least 1:300.

The ducts shall be provided with inspection manholes at all direction changes and at required regular intervals for drawing the cables. The manholes shall be of reinforced concrete either cast-in-situ or precast. The manhole covers shall be cast iron and machine finished to ensure a perfect joint. The manhole covers shall be installed flush with the ground or paved surface. The ducts shall be properly plugged at the ends to prevent entry of water, rodents etc. Suitable duct markers shall be placed along the run of the cable ducts. The duct markers shall at least be 15 cm square embedded in concrete, indicating the voltage, number of ducts and the direction of run of the cable duct. Suitable cable

supports made of angle iron shall be provided in the manholes for supporting the cables. Proper identification tags shall be provided for each cable in the manholes.

6.5 Cables on Trays / Racks:

6.5.1 Cable shall be laid on cable trays/racks wherever specified. Cable racks/trays shall be of ladder, trough or channel design suitable for the purpose. The nominal depth of the trays/racks shall be 150 mm. The width of the trays shall be as per the design shown on drawing.

The cable trays shall be made of steel or Aluminum as specified. The trays/racks shall be completed with end plates, tees, elbows, risers, and all necessary hardware. Steel trays shall be hot dip galvanized. Cable trays shall be erected properly to present a neat and clean appearance. Suitable cleats or saddles made of Aluminum strips with PVC covering shall be used for securing the cables to the cable trays. The cable trays shall comply with the following requirements.

a. The tray shall have suitable strength and rigidity to provide adequate support for all contained cables.
b. It shall not present sharp edges, burrs or projections injurious to the insulation of the wiring/cables.
c. If made of metal, it shall be adequately protected against corrosion or shall be made of corrosion resistant material.
d. It shall have side rails or equivalent structural members.
e. It shall include fittings or other suitable means for changes in direction and elevation of runs.

6.5.2 Installation of cable trays/racks:

a. Cable trays shall be installed as a complete system. Trays shall be supported properly from the building structure. The entire cable tray system shall be rigid.
b. Each run of the cable tray shall be completed before the installation of cables.
c. In portions where additional protection is required, non-combustible enclosures to be used.
d. Cable trays shall be exposed and accessible.
e. Where cables of different system are installed on the same cable tray, non-combustible, solid barriers shall be used for segregating the cables.

f. Cable trays shall be grounded by two nos. earth continuity wires. Cable trays shall not be used as equipment grounding conductors.

7 Cable trenches (excavated):

7.1 The cable trenches shall be excavated 60 cms below the finished ground level and shall have a minimum width of 300 mm for laying of single cable. When more than one cable are laid in the same trench, the width of the trench shall be increased such that the spacing between the cables is 200 mm and the end cables are at minimum 100 mm from the side of the trench. At the turning of the cable route the trench shall be dug with radius equal to 15 times the cable diameter.

7.2 The trenches shall be cut square with vertical sidewalls 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 and leveled. The bottom of the cable trench shall be prepared with 100 mm sand bed for laying the cables.

7.3 The cables shall be laid in trenches over the rollers. After the cable is laid and straightened it shall be covered with sand, and bricks shall be placed on top and at the side of the cable.

7.4 Wherever specified, half round RCC pipes shall be placed above the cables.

7.5 The cable trench then shall be refilled with excavated materials after removing the stones and other sharp materials and the refilled materials shall be compacted with light ramming.

7.6 Approved Cable markers made of Aluminum or CI with 15 cms crown shall be provided along the route of cables at a spacing of 25 - 30 meters and also at both ends of crossings or at the cable turning point. The class, type, No. of cables shall be indicated on markers.

7.7 Cable shall be laid in Hume pipes at all road crossings and in GI pipes at the wall entries or at the crossing of the drains/gutters.

8. Cable jointing:

8.1 The straight joint in cable shall be avoided as far as possible by correctly apportioning the cable lengths. If unavoidable following precautions shall be taken while jointing.

8.2 Cable jointing shall be done as per the recommendations of the cable manufacturer. Jointing shall be done by qualified cable jointer. The location of the cable joint shall not be where the cable takes a bend also where the soil is loose and shows signs of subsidence.

8.3 Cable jointing boxes shall be of appropriate size suitable for PVC insulated cables of particular voltage ratings and shall be of approved make.

8.4 Jointing of cables in the joint boxes and the filling of the compound shall be done in accordance with the manufacturer instructions and in an approved manner. All straight or T joints shall be done in epoxy mould boxes. All terminal leads of conductors shall be heavily soldered up to at least 50 mm length.

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

8.6 Joints shall be made by means of suitable solder for conductor, the conductors being firmly bolted into the connections or ferrule and the whole end soldered with proper solder and flux or resin. Conductors shall be properly insulated with high voltage insulating tape and by using separators of approved size and pattern. The joints shall be completely filled with epoxy compound (with necessary tapping) to ensure proper filling of the box.

8.7 Epoxy compound shall be prepared as per manufacturer instructions. Oil, water or any other liquid shall not be added to the mixture and which shall be used within 30 minutes of mixing. The surface on which epoxy is to be used shall be free from dust, rust, oil, grease and shall be dry. Joint shall not be moved or disturbed until the epoxy has completely hardened.

9 Cable Termination.:

9.1 All cable terminations for conductors' upto 4 sq.mm may be insertion type and all higher sizes shall have tinned copper compression lugs.

9.2 Cable termination shall be done in cable end box or in terminal box or in pillars etc. The end terminations shall be insulated with a minimum of six half lapped layers of PVC tape.

9.3 Cable terminations are to be made with flange type brass cable glands so as to grip inner and outer PVC sheaths and also the cable amour. Cable gland shall be bonded to earth.

9.4 The cable conductor ends are to be connected by crimping tinned heavy-duty copper lugs. Hydraulic crimping tool shall be used.

9.5 Every connection at a cable termination shall be mechanically and electrically sound and protected against mechanical damage and any vibration liable to occur shall not impose any harmful mechanical damage to the cable conductor

10 <u>Testing of cable before laying and commissioning</u>:

All tests shall be carried out in accordance with relevant IS codes of practice, IE rules and specifications.

10.1 100% cable drums shall be checked for continuity and cross continuity tests to ensure that there is no internal damage to the cable during transportation.

10.2 Prior to burying of cables, insulation resistance shall be measured with 500 V megger between the cores and all the cores to earth (amour) and results shall be recorded.

10.3 On completion of cable laying work, all the tests such as insulation resistance test, continuity test, sheathing continuity test, earth test etc. shall be conducted in the presence of the Architects.

10.4 After the cables are installed, before commissioning it shall be tested for high DC voltage test. The recommended volts and duration of the test between each core and metallic amour (earth) at 3 KV DC is for 5 minutes. During high voltage test all electrical equipments related to the cable installation must be earthed and adequate clearance shall be maintained from the other equipments and from work to prevent flash over.

SECTION – II

Specifications for Earthing and Lightning Protection

1 Scope:

This specification covers supply of necessary materials, and erection at site, of complete earthling system including earth pits at the locations indicated, earth conductors from earth pit to the respective equipments, switchgears, pillars etc. and making connections, testing at site, commissioning and handing over.

2 Applicable standards:

The entire work of earthing system, shall confirm to IS 3043, Indian Electricity Act and Rules and relevant regulations. The work of Lightning protection shall conform to IS 2309.

3 General requirements:

3.1 The earthing shall generally be carried out in accordance with the requirements of Indian Electricity Rules 1956 as amended from time to time and relevant regulations. Following IE rules are particularly applicable. IE Rule Nos. 32, 51, 61, 62, 67, 69, 88(2) & 90.

3.2 All earth connections shall be carefully made, visible for inspection, and the testing of individual earth electrode shall be possible.

3.3 All materials, fittings etc. used in earthing shall conform to IS specifications and in the absence of which the approval of competent authority shall be obtained.

3.4 The earthing electrode shall be at a minimum distance of 2 metres away from the outer face of the building wall. A minimum clearance of twice the depth of the electrode shall be maintained between two earthing stations.

3.5 A brick masonry chamber to facilitate easy identification and for carrying out periodical tests and inspection shall be constructed on top of the earth pit.

3.6 All metal conduits, trunkings, cable sheaths, HT and MV switchgears, Transformers, distribution boards, meters, light fixtures, fans, and all other metal parts forming part of the work shall be bonded together and connected to earthing network as specified.

3.7 Earthing system shall be mechanically robust and the joints shall be capable of retaining low resistance even after passage of fault currents.

3.8 Joints shall be soldered, tinned and double riveted. All the joints shall be mechanically, electrically continuous and effective. Joints shall be provided against corrosion.

4 Earth Electrodes:

4.1 The materials of earth electrode and earth conductors shall be galvanized iron unless specified otherwise in Bill of Quantities, specifications or drawings.

4.2 The earth electrodes shall be free from paint, enamel, grease etc.

4.3 The earth electrode shall be embedded as far as practicable in a moist soil and below permanent moist level.

4.4 The earth electrode shall not be installed in the proximity of a metal fence.

5 Types of earth electrodes:

The earth electrodes shall be either a pipe electrode or plate electrode, the details of which are as given in the following sections of specifications, drawings and BOQ.

6 Pipe electrodes:

6.1 Pipe electrode shall consist of 2.5-meter-long single piece G.I. pipe of min. 40 mm dia. as specified and shall be cut tapered at the bottom. 12 mm dia. holes shall be drilled with 75 mm spacing between the holes and in a staggered manner as indicated in IS 3043.

6.2 The electrode shall be buried vertically in a specially prepared earth pit of size 35 cm x 35 cm and the earth pit shall be filled with alternate layers of charcoal, salt and fine washed sand for a minimum thickness of 150 mm. A funnel with wire mesh inside shall be fixed to the top of the GI pipe for watering purpose.

6.3 The earth conductor of 25 x 3 mm GI strip shall be connected to the electrode just below the funnel with proper terminal lugs and check nuts and the other end of earth conductor shall be connected to the equipotential bus of the equipments.

6.4 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of the masonry shall be constructed on top of the GI pipe to house the

funnel and the earth connection. The approximate size of the chamber shall be 300 mm x 300 mm and 300 mm deep.

6.5. The earth conductor from electrode shall be taken out of the masonry chamber through a protecting pipe embedded in the masonry.

6.6 The top of the masonry chamber shall be 50 mm above the finished ground level.

7 Plate Electrode:

7.1 The plate electrode shall consist of either copper plate of size 60cm x 60 cm x 3.15 mm or GI plate of size 60 cm x 60 cm x 6.3 mm, and as specified in the BOQ or drawings.

7.2 The electrode shall be buried vertically in a specially prepared earth pit, which shall be dug up to required depth, from the ground level. The earth plate shall be placed in the earth pit with its face vertical and embedded in the alternate layers of coal and salt for a minimum thickness of 15 cms.

7.3 The earth conductor shall of same material as of the earth electrode. For copper earth electrode copper strips shall be provided as conductor and for GI earth electrode GI strips shall be used as earth conductor. The size and material of the earth conductor shall be as specified separately in the Bill of Quantities or drawings. The earth conductors shall be connected to the earth electrode (plate) with G.I. nut bolts, check nuts and washers and welded at the edges and shall be brought up in the masonry chamber at the ground level.

7.4 The earth conductor shall be extended via the earth link provided in the masonry chamber. This link shall be connected to earth conductors from the earth plate and earth conductor going to equipments with two Nos. of nut bolts, check nuts and washers (all of GI) to make secured connections. This link can be removed for testing the earthing.

7.5 A 20 mm dia. G.I. pipe shall be provided from the masonry chamber to the top of the earth plate for watering purpose. The G.I. pipe shall be provided with a funnel at the top with wire mesh inside.

7.6 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of masonry shall be constructed on top of GI pipe to house the funnel & the earth connection. The approx. size of the chamber shall be 300mmx300mmx300mm deep.

7.7 The earth conductor from electrode shall be taken out of the masonry chamber through a protecting pipe embedded in the masonry.

7.8 The top of the masonry chamber shall be 50 mm above the finished ground level.

8 Earth conductors:

All earthing conductors shall be of high conductivity copper and or GI as specified and shall be protected against mechanical injury or corrosion. The connection of earth continuity conductors of earth bus and earth electrodes shall be strong and sound and shall be rigidly fixed to the walls, cable trenches, cable trays or conduits and cables by using suitable clamps made of nonferrous metals.

8.1 The cross-sectional area of earthing conductor shall not be smaller than half that of the largest current carrying conductor, subject to the minimum size being not less than 1.5 sq.mm for copper and 2.5 sq.mm for Aluminium conductors and the upper limit being 70 sq.mm for copper and 120 sq.mm for Aluminium. The size of the galvanized iron earth continuity conductors may be equal to the size of the current carrying conductors with which they are to be used.

8.2 As a guideline the following sizes of earth continuity conductors shall be used for earthing installation

8.2.1 Size of earth conductors for lighting and power circuits.

Cross sectional area of current carrying Cu conductor	cross sectional area of earth continuity Cu conductor
Size in sq.mm	Size in Sq.mm
1.5	1.5
2.5	2.5
4.0	4.0
6.0	6.0

8.2.2 Size of earth conductors from main switchboard to sub main switches or distribution boards.

Cross sectional area of current carrying conductor Copper/Alum.	Cross sectional area of earth continuity conductor Copper/Alum.
Size in sq.mm	Size in sq.mm
4	4.0
6	6.0
10	6.0
16	10.0
25	16.0
35	16 .0
50	25.0
70	35.0
95	50.0
120	70.0

The size of an earth continuity conductor contained in a flexible cable or flexible cord shall be equal to that of the current carrying conductor.

9 Earth connection:

9.1 All metal clad switches and other equipment carrying single-phase current shall be connected to earth by a single connection. All metal clad switches carrying three-phase medium voltage and high voltage shall be connected with earth by two separate and distinct connections.

9.2 The earthing conductors inside the building, wherever exposed shall be properly protected from mechanical injury by running the same in G.I. pipe of adequate size. Earthing conductors outside the building shall be laid 600 mm below the finished ground level.

9.3 The over lapping of strips at joints where required shall be minimum 75 mm. The joints shall be revetted in an approved manner. Lugs of adequate capacity and size shall be used for all termination of wires above 6 sq.mm size and bare copper wire above 2.5 mm dia. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other oily substance and properly tinned.

10 Connection of earthing conductor:

The earthing conductors are broadly divided in the following categories:

10.1 Main earthing conductor shall be taken from the earth electrode to the earth bus/connection at the main switchboard.

10.2 Sub-main earthing conductor shall run from the main switchboard to the sub-distribution boards.

10.3 Final earthing conductor shall run from the sub distribution boards to the final distribution boards.

10.4 Circuit earthing conductor shall run from the final distribution board to the exposed metal of the equipment to be earthed. This may run directly from final distribution boards or through earth leakage circuit breaker.

10.5 Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switch boards at which they originate or at the commencement of the run by an earthing conductor.

10.6 Earthing conductor enclosed with the current carrying conductors within the flexible cord shall be used only in case of equipments connected by flexible cord.

10.7 Lighting fittings, switches and accessories shall also be provided with an earthing conductor even though they may be rigidly secured / fixed with metallic conduit.

10.8 The electrical resistance of earthing conductors shall be low enough to permit passage of fault current necessary to operate a fuse, protective device or a circuit breaker.

11 Prohibited Connection:

Use of following as earth conductor is not recommended, and strictly prohibited for earthing an installation or even as a link in an earthing system. Neutral conductor, sprinkler pipes or pipes conveying gas, water or inflammable liquid, structural steel work, metallic enclosures or amour of cables and conductors, metallic conduits and lightning protection system conductors are all prohibited to be used as earth conductor.

12 Earth Resistance:

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

13 Testing:

On completion of the entire installation, the earthing network shall be tested for their resistance to earth in accordance with IS 3043. The contractor shall provide all meters, instruments &labour required for the test. The test results shall be submitted in triplicate to the Architects for approval. The following tests shall be conducted.

a. Earth resistance of electrodes
b. Impedance of earth continuity conductors.
c. Effectiveness of earthing.

14 Lightning Protection:

Lightning protection network shall be provided for the specified buildings and locations for protection against lightning strikes. The network shall essentially consist of Air-termination units, down conductors, roof conductors, test terminals and earth electrodes etc. The entire system shall conform to IS requirements.

14.1 Air-terminations:

a) An air-termination shall consist of a 1200 mm long, 25 mm dia 14 SWG Cu tube with 100 mm dia Cu sphere fixed at the top of the tube. The Cu sphere shall be fixed with 5 nos. 125 mm long and 12.5 mm dia threaded Cu spikes.

b) The complete assembly shall be fixed at a highest possible location and shall project at least 1500 mm above the network on which it is fixed.

c) All air termination shall be effectively secured against overturning by means of rod brackets and additional supports as required, which shall be permanently and rightly

attached to the building. The method and nature of fixing should be simple, solid and permanent.

14.2 Down Conductors and Roof Conductors:

a) GI strip of specified size shall be used as down / roof conductors and the conductors shall be without sharp bends, upturns and kinks.

b) As far as possible, the joints shall be avoided in down/roof conductors. In down conductor below ground level there shall be no joint. However, in a total system where joints are unavoidable, the jointing shall be with approved method only. The joints shall be mechanically and electrically effective. The joints may be clamped, screwed, bolted, but preferably welded. The length of overlap at the joints shall not be less than 200 mm. Contact surface at joint shall be cleaned and then inhibited from oxidation with suitable non-corrosive compound.

c) The conductors shall be adequately protected against mechanical damage but for which metal pipes shall not be used.

14.3 Test Links and Testing:

Each down conductor will be provided with a testing point in a position convenient for testing but inaccessible for interference. No connection other than one direct to an earth electrode shall be made below a testing point. Testing points shall be with Copper. The ohmic resistance of the lightning protective system with air termination but without earth connection shall be measured and should be a fraction of an ohm. Earth resistance shall be measured in accordance with IS: 3043.

14.4 Earth Terminations and Electrodes:

Each down conductor shall have an independent earth termination. It should be capable of isolation for testing purposes. Earth electrodes shall be constructed and installed in accordance with IS: 3043.

SECTION – III

Specifications for MCB DB, MCB, RCCB, Panel Boards and other electrical works

1 Miniature Circuit Breaker Distribution boards:

1.1 Miniature circuit breaker distribution boards shall conform to IS 2675, IS 8623 and shall be suitable for operation on three phase, 4 wire, 415 V, 50 Hz, AC supply or single phase, 2 wire, 230 V, 50 Hz, AC supply.

1.2 The MCB distribution board shall be in sheet steel enclosures with removable type cover with additional door for protecting accidental operation.

1.3 Enclosure and door shall be made out of 16 SWG CRCA sheet steel and powder coated and of approved shade. The interior shall be off white finish. The DB shall be totally enclosed with dust and vermin proof construction and shall be of double door type. The DB boxes shall be as supplied by the original manufacturer.

1.4 Where distribution boards are specified to be complete with an isolator as incomer, the isolator shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.

1.5 Where distribution boards are specified to be complete with MCB + ELCB as incomer, the MCB + ELCB shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.

1.6 Bus bars shall be tinned copper. The internal connections in the DB shall be by using stranded copper conductor, FRLS insulated wire with copper lugs crimped at both ends. Neutral busbar and earth busbars shall also be provided in the enclosure. Neutral busbar shall have equal rating of phase busbars.

1.7 Distribution boards shall be provided with circuit identification by means of directory on the front cover. Upon completion of the works, the contractor shall provide and fix accurate framed circuit lists for all distribution boards. These shall consist of perspex envelopes, fixed securely by an approved method on the inside face of each distribution board front cover into which shall be inserted a neatly typed list of circuits, indicating the number of circuits,

phase, cable, size, number of points connected, circuit rating and the loading. The contractor, shall also provide and fix by means of brass screws tapped into the D.B. cover, labels, with black letter on a white background for all distribution boards, MCB + ELCB, Isolators etc. The engraving on the labels and the inscription on the circuit lists shall be approved by the Architects before the work is carried out.

1.8 All incoming terminals shall be fully shrouded.

1.9 The conduit entry plates shall be removable type and shall be provided at top and bottom. All the conduits shall be properly terminated using glands, grips, checkouts, female adapters with bush etc.

1.10 Wiring shall be terminated properly using crimping type copper lugs/sockets. Identification ferrules shall be provided on all wires. Each circuit shall have an independent neutral.

1.11 Two No. Earth terminals shall be provided on each Distribution Board.

1.12 Distribution boards shall be installed surface mounted or recessed mounted as specified and erected at the locations shown.

Surface mounted DB shall be mounted on a suitable size frame made out of GI ZED section. The hole fasts of the frame shall be grouted in the wall with cement mortar and the frame shall be painted with two coats of red oxide and two coats of enamel paint of approved shade. The DB shall be mounted on this frame with proper size nut bolts.

Recessed mounted DB shall be erected in the chase/cut portion of the wall. The cutting of the walls shall be done while constructing the wall and shall be of adequate size to comfortably accommodate the DB. The cut portion shall be smoothened and made plain and shall be fine finished. The DB shall be fixed in this chased portion with suitable clamps and bolts. The top cover of the DB cabinet shall be projecting out of the wall surface and free from any obstruction so as to open the same smoothly.

2 <u>Miniature Circuit Breakers:</u>

2.1 MCB's shall be manufactured in accordance with IS 8828 having a short circuit breaking capacity category 10 kA at both 240 volts 50 Hz. and 240/415 V, 50 Hz and complying with

the test requirements for both reference calibration temperatures of 20 degree C and 40 degree C.

2.2 All miniature circuit breakers shall be rated to withstand the fault currents of the circuits they protect without causing any interference in any other protective device associated with the distribution system. At the same time the design of the circuit breakers shall be such that, it will protect the circuit for which it is intended and not cause or allow other protective devices to operate when fault conditions apply.

2.3 Miniature circuit breakers shall be capable of carrying its full rated current continuously without tripping out.

2.4 All the miniature circuit breakers shall be fitted with a magnetic undelayed tripping mechanism. These shall have overload and short circuit elements.

2.5 Time current characteristic of the MCB shall match with that of HRC fuses.

3 Residual current operated circuit breakers (RCCB)

3.1 RCCB's shall be manufactured in accordance with IS 12640 and IS 8828 having a short circuit breaking and earth fault protection up to 9 KA at both 240 Volts 50 Hz and 240/415 V, 50 Hz and complying with the test requirements as per IS 2640.

3.2 RCCB shall be designed to interrupt the circuit during an earth fault, overload or short circuit. All RCCB shall be high sensitive and calibrated to trip the power supply when the residual current is more than 50 % of its calibrated rating. This means that a 30 mA sensitivity RCCB should trip when the residual current is in the range of 15 to 30 mA and a 300 mA RCCB should trip when the residual current is in the range of 150 to 300 mA.

3.3 The RCCB's shall be truly current operated, which means that it shall be totally independent of the main voltage for tripping. RCCB must operate for nominal voltage well below the maximum safe value of 10 volts. RCCB shall interrupt the circuit within 30 milisec at a leakage current of 30 mA.

3.4 RCCB shall be provided with a neutral advance mechanism. RCCB shall be functioning even in the event of failure of neutral and/or any one or two of phase supply conductor. RCCB shall be provided with trip free mechanism ensuring that the device cannot be

reclosed / reset if the fault persists. RCCB shall be functioning even in the case of interchange of load and supply side connections.

3.5 Test button shall be provided to check he correct operation of the unit.

3.6 RCCB shall be designed for a very long life of a minimum of 20,000 operations and shall be capable of withstanding inrush current of 4 to 8 times the rated current. For the proper functioning the RCCB should not require any connection of earthing on the device.

3.7 The device should have high tripping accuracy of less than 5% of rated tripping current. The RCCB shall be provided with clear indication to show whether the tripping is due to current leakage or overload/short circuit.

3.8 The MCB section of RCCB shall be provided with arc chambers and vents are also to be provided to release the arcing products in the atmosphere, so as to increase contact lift and to prevent damage to the insulation. The self-extinguishing thermoset plastic material shall be used for body and shall have a modular construction. The device should be vibration proof.

4 Moulded Case Circuit Breakers (MCCB)

MCCB's used shall be suitable for 440 V, AC, 50 Hz supply and shall be capable of withstanding electrical and mechanical stress due to short circuit capacity as specified for individual requirement. The MCCB shall be compact in size, dust and vermin proof with quick make and break operating mechanism. The construction shall be such as to ensure maintenance and current setting adjustment without removing the MCCB from the panel. The MCCB shall be suitable for interlock with panel door on which it is mounted

SECTION - IV

Specifications for Medium Voltage Distribution Panel Boards

1 Scope:

This section shall cover supply, assembly, installation, connection, testing and commissioning of medium voltage distribution panel boards as described in this specifications, drawings and schedule of quantities.

2 System:

All the medium voltage distribution panel boards shall be suitable for operation on three phase, 4 wire or single phase, 2 wire with normal system voltage of 415/240 volts, 50 Hz, A.C. supply with solidly grounded neutral system.

3 Weather condition at site:

The panel boards shall be suitable for continuous operation and designed to withstand heaviest conditions at site.

a) Temperature range: 40 to 45 ^{0} C

b) Relative humidity: 50 to 80 %

c) Weather: Dusty

4 Applicable IS Standards:

The panel boards to be supplied under this specification shall confirm to latest editions of relevant Indian Standards and Indian Electricity rules and regulations. The following Indian Standards shall be complied with.

IS 4237: General requirements for switch gear and control gear for voltage not exceeding 1000 V.

IS 2208: HRC cartridge fuse links upto 610 V.

IS 2705: Current transformers

IS 1248: Electrical Indicating Instruments.

IS 375: Switch gear bus-bars, main connection and auxiliary wiring, marking and arrangement for.

IS 2147: Degree of protection provided by enclosures for low voltage switchgear and control gear.

IS 2675: Enclosed distribution fuse boards and cutouts.

IS 2557: Danger notice plates.

IS 1567/4047: Specifications for switch fuse units.

IS 3072 (I): Installation and maintenance of switchgears.

TECHNICAL CONDITIONS ELECTRICAL

5 General:

5.1 **Shop drawing:**

Prior to fabrication of the panel boards, the contractor shall submit for the approval of Engineer In-charge, the shop / vendor drawing and design calculations indicating type, size, short circuit rating of all the electrical components used, busbar size, internal wiring size, panel board dimension, colour, mounting detail etc. The contractor shall submit manufacturer's catalogues of the electrical components installed in the panel boards.

5.2 **Inspection:**

At all reasonable times during production and prior to transport of the panel boards to site, the contractor shall arrange and provide all the facilities at manufacturer's plant for inspection and testing and any stage inspection agreed upon.

5.3 **Test certificates:**

Testing of panel boards shall be carried out at factory or at site as specified in Indian Standards in the presence of LIC Representative. The test results shall be recorded on prescribed forms. The test certificates for the test carried out at factory or at site shall be submitted in duplicate to the Engineer-Incharge for approval.

6 Cubical type Panel boards:

6.1 Construction:

6.1.1 **Structure**

The panel board shall be metal enclosed sheet cubical, compartmentalized suitable for indoor or outdoor installation having dead front, floor mounting type. All M.S. sheets used in the construction of panel boards shall be 16 SWG (1.6 mm) thick unless specified otherwise in the item and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel shall be seam welded, all welding slag ground off and welding pits wiped smooth with plumber metal.

The panel boards shall be totally enclosed, completely dust and vermin proof. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof. All doors and covers shall be lockable and fully gasketed with foam rubber or neoprene rubber strips.

All panels and covers shall be properly fitted and secured with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with bolt and nuts. Self-threading screws shall not be used in the construction of panel boards. Suitable base channels (min size 75 mm x 75 mm x 5 mm thick) shall be provided at the bottom. A Clearance of 300 mm between the floor of the panel board and the bottom of the lower most units shall be provision Panel boards, if necessary shall be preferably arranged in multitier formation. The panel boards shall be of adequate size with a provision of spare space (as jointly decided with the Architect) to accommodate possible future additional switchgear. The size of the panel boards shall be designed in such a way that the internal space is sufficient for hot air movement, and the electrical component does not attain temperature more than 40 degree Celsius. Opening for natural ventilation shall be provided and shall have screens or grills made of brass or stainless steel wire mesh.

The panel boards shall be provided with removable sheet steel plates at top and bottom with knockout holes of appropriate size and number in conformity with the number, and size of incoming and outgoing conduits /cables.

The panel boards shall be designed to ensure maximum safety during operation, inspection, connection of cables, maintenance and repairs etc. with bus bar system energized. Means shall be provided to prevent shorting of power and /or control terminals due to accidental drop of maintenance tools etc. inside the panel board. Partitions between feeder compartments, busbar chamber, cable alleys, vertical panels etc. shall be provided to take care of this aspect. The panel boards shall be sufficiently rigid to support the equipment without distortion under normal and short circuit condition; they shall be suitably braced for short circuit duty.

For buses and cables, access shall be limited from front and top only. All other equipment shall be mounted on the front side, (unless specified otherwise for any specific panel) and

shall be accessible from the front. All joints and connections shall be made by cadmium plated high tensile steel bolts, nuts and washers secured against loosening.

It shall be possible to insert any new cable and to connect all load side wiring with the bus bar energized, without any special precautions. Opening of the bus bar chamber shall be possible with special tools only.

6.1.2 **Protection clause:**

All the outdoor panel boards shall have protection clause of IP 55. The complete board shall be double jacketed with insulation material to withstand outdoor temperature. All the indoor panel boards shall have protection clause IP 52.

6.1.3 **Powder coating**:

All sheet steel work shall undergo a seven tank process of degreasing pickling in acid, cold rinsing, phosphatising, passivating and then treated with powder coating treatment. The finishing shall be of shade as approved by the Architect. The interior surface shall have similar finish.

6.1.4 **Circuit compartments:**

Each switch fuse units and meters shall be housed in a separate compartment and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duly inter locked with the breaker/switch fuse units in "ON" and "OFF" position. However, it shall be possible to bypass this interlock for inspection purpose.

6.1.5 **Instrument compartment:**

Separate and adequate compartment shall be provided for accommodating instruments, indicating lamps, control contactors /relays, and control fuses etc. These components shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker/switch fuse units bus bar and connections.

6.1.6 **Bus bars and wiring**:

The bus bars shall be of three-phase four wire system with separate neutral and earth bar. The bus bar and interconnection between bus bars and various components shall be with high conductivity, hard drawn, electrolytic copper strips.

The bus bar shall be of rectangular cross section designed to withstand full load current for phase bus bars and full rated current for neutral bus bars and shall be extensible on either side. The bus bar shall have uniform cross-section throughout the length. The rating of the bus bars shall be as specified in BOQ and/or drawings.

The bus bars and interconnections shall be insulated with color coded insulation tapes/covers. The bus bars shall be supported on unbreakable, non-hygroscopic insulated supports at sufficiently close intervals to prevent sagging and shall effectively withstand electromagnetic stresses in the event of short circuit. The bus bars shall be housed in a separate compartment. The busbar shall be isolated with 3 mm thick hylum sheet to avoid any accidental contact. All bus bars connection shall be done by drilling holes in busbars & connecting by chromium plated brass bolt and nuts. Additional cross section of bus bars shall be provided in all distribution boards to cover up the holes drilled in the bus bars. Spring and flat washers shall be used for tightening the bolts. All interconnections between bus bars and circuit breakers/switches and between circuit breakers/switches and cable terminals shall be through solid copper strips of proper size to carry full rated current. These strips shall be insulated with insulating tapes/covers.

All interconnections in the panel shall be with Cu busbars for switchgears of ratings 63 A and above. For switch gears below 63 A, flameproof Cu wires to be used with lugs crimped at both ends.

All busbars shall be tinned copper strips of the given cross section. Unless otherwise specified all bus bars are to be designed taking maximum current density of 800 Amp per sq inch.

All bus bars are to be covered with heat shrinkable PVC sleeves of red, yellow, blue and black colours to indicate various phases and neutral bar clearly.

6.1.7 **Terminals:**

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the terminal blocks. No direct connection of incoming or outgoing cables to internal components of the panel board is permitted. Only one conductor may be connected in one terminal. Adequate no of spare terminals of required size shall be left in each compartment.

6.1.8 **Wire ways:**

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

6.1.9 **Cable compartments:**

Cable compartments of adequate size shall be provided for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate proper supports shall be provided in the cable compartments to support cables. All outgoing and incoming feeder terminals shall be brought out to terminal blocks in the cable compartment.

6.1.10 **Earthing:**

Tinned copper earth bars of suitable size shall be provided for the entire length of the panel. Provision shall be made for connection from this horizontal earth bar to the earth pit on both side of panel board. The earth continuity conductor of each incoming and outgoing feeder shall be connected to the vertical earth bar.

All non-current carrying parts and the framework of panel board shall be connected to this earth bar. All doors and movable parts shall be connected to earth bus with flexible copper connections. Armour of the cable shall be properly connected with earthing clamp, and the clamp shall be bonded with the earth bar.

6.1.11 **Name plate, labels and directory:**

A nameplate with switchgear designation shall be fixed at the top of the panel board. A separate nameplate giving feeder details shall be provided for each panel.Engraved nameplates shall be of 3-ply (red-white-red or black-white-black) lamicoid sheets. Size of the letters shall be 5 mm. Nameplates shall be fastened by screws and not by adhesive. Size of letter for Main nameplate shall not be less than 20 mm.

Engraved PVC labels shall be provided on all incoming and outgoing feeders. Single line circuit diagram showing the arrangements of circuit inside the panel board shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet. PVC labels shall be provided for spare circuits also.

Panel boards shall be provided with a directory indicating the area or loads served by each 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.

6.1.12 **Danger notice plates:**

Danger notice plates with symbol as per IS shall be provided on panel boards.

6.1.13 **Internal components:**

The panel boards shall be equipped complete with all type of required number of circuit breakers, switch fuse units, contactors, relays, fuses, meters, instruments, indicating lamps, push buttons, equipment, fittings, busbars, cable boxes, cable glands etc., and all the necessary internal connections/wiring as required and as indicated on relevant drawings.

Components necessary for proper complete functioning of the panel boards, but not indicated on the drawings and specifications shall be supplied and installed.

All part of the panel board carrying current including the components, connections, joints and instruments shall be capable of carrying their specified rated current continuously, without temperature rise exceeding the acceptable values of the relevant specifications at any part of the panel boards.

The de rating of the different items resulting from the prevailing conditions like room temperature shall be allowed for while selecting the components.

All units of the same rating and specifications shall be fully interchangeable.

1. Switches:

Switches shall be air break type as per IS 4047. The switch operating handle shall be front mounted and interlocked with the door when the switch is in ON position. The live parts shall be shrouded with suitable insulating barrier so as to prevent accidental contact with the live parts after opening the cubicle front door.

3. Control switches:

Ammeter selector switches shall have made before break feature on its contacts. The selector switches shall generally have four positions for reading three phase currents and neutral. The voltmeter selector switch shall also have four positions and the fourth shall be OFF position. Remote trip /off selector switch shall be lockable in OFF position.

4. Indicating lamps:

The indicating lamps shall be LED type.

5. Measuring and Indicating instruments:

All measuring and indicating instruments shall be Digital type, in square pattern moving from 90 deg. scale, 96mm x 96mm, flush mounting type. Instrument shall be of accuracy clause 1 as per IS 1248. Ammeters for motor and other feeders shall be graduated for full load current of motor with a compressed scale at the end for at least 6 times full load current. The KW meter and PF meter shall be suitable to measure unbalanced loads on 3-phase 4 wire system. PF meter shall be in 0.5 - 1 - 0.5 range. CT's shall be resin cast, with class 1 accuracy and 15 VA burden. The energy meters shall be CT operated electrolytic type.

6. Push buttons:

Push buttons shall be suitable for panel mounting type and comprise of a contact element and an actuator. The contacts shall be of silver alloy and of 10 A continuous current rating. Each push button shall be provided with 1 NO + 1 NC contacts, but if required 2 NO + 2 NC contacts be provided. Colour of the knob shall be as per IS.

7. Packing and transport:

The bigger size panel boards shall be shipped to site in wooden crates. They shall be wrapped with polythene sheets before being placed in crates to prevent damage to the finish. Crates shall have skid bottoms for handling. All panels shall have one set of two silica gel bags, which shall be checked periodically both while in storage and while in service. The smaller size panel boards shall be transported to site with polythene sheets wrapped all along and wooden frame to cover the same.

8 Storage at site:

The panels shall be stored in a well ventilated, dry place and suitable polythene covers shall be provided for necessary protection against moisture.

9 Installation:

The panel boards shall be installed at the location as indicated in the drawings. The contractor shall submit for approval a shop drawing indicating room size, panel size and method of installation prior to installation. The cubicle type panel board shall be installed on suitable foundation. Foundation shall be as per the dimensions supplied by the panel

manufacturer. The foundation shall be flat and level. Suitable grouting holes shall be provided in the foundation. Suitable MS base channel shall be embedded in foundation on which the panel can be directly installed. If the panel is provided with an angle iron pedestal or base plate the same shall be grouted firmly in the floor. The panel boards shall be properly aligned and erected in plumb and bolted to the foundation by bolt parallel to the walls.

After installation of the panel boards, various components of the boards shall be checked and be put in working order. The cables laid through cable trench or on cable trays/racks etc. shall be terminated on the bottom plate or top plate as the case may be, by using siemens type brass compression glands. The individual cables shall then be led through the panels to the required feeder compartments for necessary terminations. The cables shall be clamped to the supporting arrangement. The switchboard earth bus shall be connected to the local earth grid. Connection of cables shall be by crimping type Cu lugs using hand operated or hydraulic crimping tool as per cable sizes.

10 Testing:

1) Testing at factory:

Panel boards shall be inspected at factory at pre-assembly stage and any modifications or changes as suggested shall be incorporated. The panel boards shall be again inspected and tested at the factory after assembly of all components and completion of all inter-connections and wiring. The tests shall include all routine and type tests as per relevant ISS.

2) **Testing and pre-commissioning checks at site:**

Panels shall be commissioned only after the successful completion of the following tests. The tests shall be carried out in the presence of the Architect.

2.1 Pre-commissioning checks:

1) Check all panels are aligned in line and properly erected in plumb.
2) All withdrawals portions shall be capable of smooth extraction and isolation.
3) All main and auxiliary bus bar connections shall be checked and tightened.
4) All wiring terminations and bus bar joints shall be checked and tightened.
5) Wiring shall be checked to ensure that it is according to the drawing.

6) Before fitting the covers, all chambers, compartments, cable alleys etc. shall be checked for complete cleanliness and removal of foreign matter if any, particularly the tools used for erection, cut pieces of cable armour etc. Covers shall be properly fixed with all fixing screws in places.

7) All mechanical interlocks shall be checked and all fuses and links shall be inserted.

8) Earthing connections shall be checked.

9) Operational checks on all circuit breakers or switchgear shall be carried out, both mechanically and electrically to check that correct indications are provided for closed and open positions.

10) The panels shall be checked to ensure that moisture ingress has not taken place during transit and storage.

2.2 <u>Testing at site:</u>

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

2) All wiring shall be tested for insulation resistance by a 1000 volts megger.

3) All relays and protective devices shall be tested for correctness of settings and operation by introducing a current generator and an ammeter in the circuit.

4) Insulation test shall be carried out both before and after high voltage test.

A high voltage test with 2.5 KV for one minute shall be applied between the poles 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. Original test certificate shall be submitted along with panel

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LIST OF PRINCIPAL MAKES / AGENCIES / BRANDS OF VARIOUS MATERIALS

SR. NO.	MATERIAL		MAKES		
1	**COPPER CONDUCTOR PVC INSULATED FR / FRLS GRADE WIRES**		(a) Finolex (b) Havells (c)V Guard (d) R R Cable (e) KEI (f) Svarn (g) Rallison (h) Polycab (i) Delton		
2	**PVC INSULATED ARMOURED CABLES (LT/HT)**		(a) Finolex (b) Fort Gloster (c) CCI (d) R R Cable (e) Delton (f) KEI (g) Havells (h) Svarn (i) Rallison (j) Polycab		
3	**MAIN SWITCH WITH HRC FUSES**		(a) L & T	(b)SIEMENS	(c) Havells
4	**MAIN SWITCHES WITH REWIRABLE FUSE**		(a) L & T	(b) CROMPTON	(c) HAVELLS
5	**MCCB**		(a) SIEMENS	(b) L & T	(c) SCHNIED-ER MJ
			(d) LEGRAND	(e)Havells	
6	**MCB / ELCB / ELMCB / DB**		(a) LEGRAND	(b) SIEMENS	(c SCHNEIDER MJ
			(d) L&T	(e)Havells	
7	**CHANGE OVER SWITCH / SWITCH FUSE UNIT UPTO 100 AMP**		(a) HPL	(b) L & T	(c) HAVELLS
			(e) SIEMENS		
8	**CHANGE OVER SWITCH / SWITCH FUSE UNIT ABOVE 100 AMP**		(a) HPL	(b) L & T	(c) SIEMENS
			(e) HAVELLS		
9	**RISING MAINS**		(a) GEC (d) Siemens	(b) SCHNIEDER-MJ (e) Legrand	(c) L&T
10	**PVC CONDUIT (ISI MARK)**		(a) PRECISION	(b) AVON PLAST	(c) ESSARKE
			(d) SUDHAKAR	(e) KALINGA	(f) AKG
			(g) Finolex		
11	**PVC CASING CAPING**		(a) PRECISION	(b) KALINGA	(c) AKG
			(d) SUDHAKAR	(e) Diamond	(f) Modi
12	**M.S. CONDUIT**		(a) SUPREME	(b) BEC	(c) NIC
			(d) AKG		
13	**FLOOR TRUNKING SYSTEM**		(a) LEGRAND	(b) Honey Well	(c) PRECISION

			(d) MODI		
14	**G.I. PIPE**		(a) JINDAL	(b) SENITH	(c) PRAKASH
			(d) TATA	(e) GST	(f) APOLLO
15	**MODULAR SWITCHES, ACCESSORIES & ELECTRONIC REGULATOR**		(a) ANCHOR ROMA	(b) SSK	(c) LEADER
			(d) Havells	(e) Honey Well	(f) L & T
16	**NON MODULAR SWITCHES, ACCESSORIES & ELECTRONIC REGULATOR**		(a) ANCHOR	(b) LEADER	(c) SSK
			(d) CPL	(e) Havells	(f) L & T
17	**INDUSTRIAL PLUG & SOCKET**		(a) LEGRAND	(b) HAVELLS	(c) CROMPTON
			(d) L & T	(e) Anchor	(f) Honey Well
18(i)	**CEILING / EXHAUST / WALL FAN**		(a) USHA	(b) CROMPTON	(c) ORIENT
			(d) BAJAJ	(e) ALMONARD	(f) Havelles
			(g) Rallison		
18(ii)	**BLDC FANS**		(a) USHA	(b) CROMPTON	(c) ORIENT
			(d) BAJAJ	(e) ALMONARD	(f) Havelles
			(g) Rallison	(h) Atomberg	
19	**INDOOR LIGHT FITTINGS**		(a) PHILIPS	(b) WIPRO	(c) CROMPTON
			(d) GE	(e) Havells	(f) Osram
			(g)Bajaj	(h)Elenserve	(i)Jaquare
			(j) Banburry		
20	**OUTDOOR LIGHT FITTINGS**		(a) PHILIPS	(b) WIPRO	(c) CROMPTON
			(d) GE	(e) Havells	(f) Osram
			(g)Bajaj	(h) K- LITE	(i)Elenserve
			(j)Jaquare	(k) Banburry	
SR. NO.	**MATERIAL**		**MAKES**		
21	**CABLE GLANDS**		(a) COMET	(b) DOWELLS	(c) BRACO
			(d) SIEMENS		
22	**LUGS**		(a) DOWELLS	(b) COMET	(c)Braco
23	**CONNECTORS**		(a) ELMEX	(b) CONNECTWELL	(c) PHOENEX

			(d) Wago		
24	**MOTOR STARTER**		(a) SIEMENS	(b) L & T	(c) CROMPTON
			(d) Kriloskar	(e) Texmo	(f) Sugana
			(g) KSB	(h)Sharp	(i) Mahindra
			(j) Decon		
25	**MONOBLOCK PUMP**		(a) KIRLOSKAR	(b) CROMPTON	(c) CRI
			(d)Wilo	(e)Grundfos	(f)Texmo
			(g)Suguna	(h)KSB	(i)Sharp
			(j) Mahindra	(k) Decon	
26	**LIGHTENING ARRESTOR**		(a) PACTIL	(b) HECO	(c) ATLAS
			(d) G.K. ELECTRICALS		
27	**TRANSFORMER**		(a) PACTIL	(b) EMCO	(c) CROMPTON
			(d) KIRLOSKAR	(e) GEC	(f) TESLA
			(g) Voltamp	(h) BHEL	(i) Areva
28	**A.B. SWITCH & D.O. FUSE**		(a) PACTIL	(b) JENCO	(c) CROMPTON
			(d) ATLAS		
29	**SELECTOR SWITCH**		(a) KAYCEE	(b) SIEMENS	(c) C & S
			(d)AE	(e) L&T	
30	**INDICATING LAMPS**		(a) VAISHNO	(b) ESSEN	(c) PHILIPS
			(d) L&T	(e) GE	
31	**CONTACTORS**		(a) SIEMENS	(b) L & T	(c) ABB
			(d) Schnieder-MJ		
32	**MEASURING INSTRUMENTS**		(a) AMP	(b) MECO	(c) AE
			(d) ENERCON	(e) PROK-DV's	(f) L & T
33	**PF IMPROVEMENT CAPACITOR & APFC PANEL**		(a) EPCOS	(b) NEPTUNE	(c) L & T
			(d) CROMPTON	(e) Havells	
34	**RELAY FOR AUTOMATIC PF IMPROVEMENT**		(a) EPCOS	(b) CONZERVE	(c) L & T
			(d) Havells		
35	**CURRENT TRANSFORMER**		(a) AE	(b) RISHABH	(c) KUPPA
			(d) L & T		
36	**DATA CABLES &FACTORY MADE PATCH CHORDS**		(a) LEGRAND	(b) D LINK	(c) FINOLEX
			(d) MOLEX	(e) AMP	(f)KEI

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				(g) Poly Cab	
37	**INFORMATION OUTLET / RJ 45 CONNECTORS / RJ – 11 SOCKETS**		(a) D LINK	(b) LEGRAND	(c) MOLEX
			(d) SYSTEMAX	(e) AMP	
38	**TELEPHONE WIRES**		(a) FINOLEX	(b) DELTON	(c) HAVELLS
			(d) RR KABLE	(e) KEI	(f)Poly Cab
				(g) Rallison	
39	**RG 6 CABLE FOR TV**		(a) FINOLEX	(b) DELTON	(c) NATIONAL
				(d)KEI	(e)Poly Cab
40	**JACK PANEL**		(a) D LINK	(b) LEGRAND	(c) MOLEX
			(d) SYSTEMAX	(e) VALRACK	(f) AMP
41	**RACK**		(a) VALRACK	(b) DIGITRON	(c) HCL
			(d) A LINK	(e) D-Link	
42	**FIRE ALARM PANEL**		(a) Honeywell/System Sensor	(b)Notifier	(c) Mircom/ Secutron
			(e)Ravel	(f) Agni	
43	**SMOKE/HEAT DETECTOR**		a)Apollo	b)Morleyias	c)Edward
			d)System sensor/ Honey well	e)Mircom/secutron	f) Notifier
			g) Ravel	h) Agni	
44	**MANUAL CALL POINT/HOOTER/RESPONSE INDICATOR**		a)Honeywell/System Sensor	b) Notifier	c) Simplex
			d)Mircom/ secutron	e)Morleyias	f) Ravel
			g) Agni		

Note:

All Switch-gear and the Distribution Boards should be clearly marked with Red. Yellow, Blue and Black colour for phases and neutral. All busbar enclosures Angle iron frame and switch-gears should be painted with battleship grey oil paint. Danger and caution boards at appropriate places on main boards and Distribution Boards should be fixed. All controlling main switches on main boards and distribution boards should clearly indicate with white oil paint lettering the floor and section controlled by it. All equivalent alternative materials used on the job will have to be approved by Engineer In-charge of LICI before it is actually used. If any item is installed without prior approval, the contractor will be asked to dismantle the installation and use materials as specified. The insulated wire used for concealed wiring shall be with Red, Yellow, Blue colour for respective phases, Black for neutral & Green for earth wires.

e-Tender for Electrical installation work at various SOs under different DO for SITC of AC in Bihar & Jharkhand

Details location of work.

ANNEXURE (A)

Sl. No.	Name of DO	Name of Bos/SOs	Amount	DO total
1	Begusarai	Birpur SO	85059.40	
		Barhiya SO	70882.84	
		Balia SO	85059.40	241001.64
2	Jamshedpur	Japla SO	85059.40	85059.40
3	Muzaffarpur	Benipur SO	85059.40	
		Sheohar SO	85059.40	
		Areraj SO	85059.40	
		Narkatiaganj	85059.40	340237.60
4	Bhagalpur	Barsoi	85059.40	
		Mahagama	85059.40	
		Punsia	70882.84	241001.64
5	Patna-2	Sonepur SO	85059.40	
		Mohania SO	70882.84	
		CLIA Siwan	85059.40	241001.72
			Total	1148302.00

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RE:E-Tender for Electrical installation work at various SOs under different DO for SITC of AC in Bihar &jharkhand

Schedule of work:

1	**LT PANEL &ELECTRICAL INSTALLATION WORKS**				
1.01	**ELECTRICAL CUBICLE PANNEL**	**Quantity**	**Unit**	**Rate**	**Amount**
	Supply, installation, testing and commissioning of adequate size (to accomadate bus bars, change over switches & additional switch gears) meter panel fabricated with suitable size angle iron frame work, MS channel mounting base and 16SWG CRCA sheet steel, cubical type wall/floor mounted, vermin & dust proof including providing detachable type doors. The panel shall be painted with 2 coats of synthetic enamel paint of approved shade both inside & outside. The control panel shall be compartmentalized separately for MCCBS, change over, bus-bars & MCB's etc.. The panel doors should have knobs for opening & closing. The panel shall comprise of the following bus bars, indicating lamp, ameter& voltmeter, and switch gears as under :-	14	Set	53765.00	752710.00
a)	25 mm. x 5mm. X 4 mm nos. Copper Busbars of suitable length - 01 Set				
b)	LED Indicator Lamps for Phase Indication - 03 nos				
c)	Voltmeter, Ammeter digital type with selector switch along with accessories. -1SET		Set		
d)	63, 415V, 4P, MCCB of 25kA B.C with switched neutral, with adjustable thermal magnetic release - 1NO		No.		
e)	63 Amp, 415V, 4P change-over switch		No.		
f)	63 Amp, 415V, 4P, MCB, 'C' series with 10 ka B.C -1 NOS		No.		
g)	63 Amp, DP, MCB, 'C' series with 10 ka B.C -2 NOS		No.		
h)	32Amp, 230V, DP MCB, 'C' series (10kA B.C.) -7 NOS		No.		
1.02	supply & fixing of following size XLPE insulated aluminiumconductotarmoured cable 1100 volt grade along with 2 runs of GI wire as earth wire as mentioned against each item on the surface of the wall or underground as the case may be with the help of GI saddles on the surface of the wall or ceiling with spacers including termination on either end with required size of aluminium sockets .Rate is inclusive of suitable size cable glands etc.				
(a)	3.5 Core 35 sq mm.+ 2 x 12 SWG, GI wire as continuous earth	125	RM	449.00	56125.00

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(b)	3.5 Core 50 sq mm.+ 2 x 12 SWG, GI wire as continuous earth	15	RM	518.00	7770.00
©	3.5 Core 25 sq mm.+ 2 x 12 SWG, GI wire as continuous earth	20	RM	313.00	6260.00
(d)	4 core 16 sqmm_+ 2x12 GI WIRE AS CONTINUOUS EARTH	10	RM	271.00	2710.00
1.03	supply & laying of following size XLPE insulated Copper conductotrarmoured cable 1100 volt grade along with 2 runs of HDBC wire as earth wire as mentioned against each item on the surface of the wall or underground as the case may be with the help of GI saddles on the surface of the wall or ceiling with spacers including termination on either end with required size of aluminiumsockets. Rate is inclusive of suitable size cable glands.				
(a)	2 core 6 sqmm Cu+ 1 run 14 SWG G.I wire	50	RM	186.00	9300.00
(b)	2 core 4 sqmm Cu+ 1 run 14 SWG G.I wire	125	RM	146.00	18,250.00
1.04	Supplying and fixing of following way, single pole and neutral, sheet steel, company made MCB distribution board, 240 volts, on surface/ recess/Concealed(as directed), complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator)				
(a)	8 way, Double door .	14	Set	1806.00	25284.00
(b)	12 way, Double door	14	Set	2106.00	29484.00
1.05	Supplying and fixing of following ways horizantal type surface/ recess mounting, 415 volts, company made TPN MCB distribution board , complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator)	1	Set	3587.00	3587.00
(a)	4 way (4 + 12), Double door				
1.06	Supplying and fixing 5 amps to 32 amps rating, 240 / 415 volts, "C" curve, 10KA miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.				

(a)	Single Pole	2	No.	224.00	448.00
(b)	Double Pole	90	No.	575.00	51750.00
1.07	Supplying and fixing following 415 volts, "C" curve, 10KA miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.				
(a)	63 Amp FP MCB(C-SERIES)	1	No.	2302.00	2302.00
1.08	Supply & installation of following capacity MCB along with factory made enclosure of same make with the following configuration:				
(a)	63 Amp FP MCB(C-SERIES)	1	Set	3497.00	3497.00
(b)	32 Amp DP MCB(C-SERIES)	2	Set	1749.00	3498.00
©	63 Amp.DP MCB(C-SERIES)	1	No.	2774.00	2774.00
1.09	**WIRING**				
	Wiring alongwith earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface/ recessed medium class FRLS conduit as required				
(a)	4 X 6 sq. mm + 2 X 6 sq. mm earth wire	30	RM	673.00	20190.00
(b)	2 X 4 sq. mm + 1 X 4 sq. mm earth wire	150	RM	298.00	44700.00
©	2 X 2.5 sq. mm + 1 X 2.5 sq. mm earth wire	25	RM	263.00	6575.00
1.10	Supply & fixing of Compact power unit of North-west Make CAT No-ACPU6MBT(j/g/k) or its equivalent with starter,32 A " C " series DP MCB,Plug socket with matching plug top, metal Box in concealed/recess manner including necessary connection &earthing(for split AC)	81	No.	1248.00	101088.00
					1148302.00

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Note: The work is to be carried out at offices of location as per property List at page no-66.

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