TRIPURA STATE ELECTRICITY CORPORATION LIMITED

(A Govt. of Tripura Enterprise)

E-NIT

Office of the Deputy General Manager,

Electrical Division Amarpur

NIT No : - DGM/ ED-AMP/ 2022-23/03 dated 03.08.2022(e tendering)

Name of Work : - Extension of HT / LT line in/c sub station for providing service connection to sevaral DTW schemes under jurisdiction of ESD-Amarpur ,Ompi,Jatanbari & Karbook of Electrical Sub-Division Amarpur (Partial Turnkey Basis)

.

Estimated Cost: - Rs.79,33,724.00

Earnest Money: - Rs.1,58,674.00

Cost of Bid Document: - Rs 10000.00

Time for Completion: - 60(sixty) Days.

The document contains **238 (Two Hundred thirty eight)** pages excluding Cover Pages.

Deputy General Manager
Electrical Division Amarpur
TSECL, Amarpur. Gomatit Tripura.

TRIPURA STATE ELECTRICITY CORPORATION LIMITED

(A Govt. of Tripura Enterprise)

NOTICE INVITING e-TENDER

Dy.General Manager, Capital Complex Electrical Division on behalf of TSECL, Agartala invites the tenders from the resourceful experienced Bidders for appointment of Executing Agency for Work: **Extension of HT / LT line in/c sub station for providing service connection to sevaral DTW schemes under jurisdiction of ESD-Amarpur ,Ompi,Jatanbari & Karbook of Electrical Sub-Division Amarpur (Partial Turnkey Basis).** The bids are invited for the route site survey, designing, supply, loading, transportation, unloading, insurance, delivery at site, handling, storage, installation, testing, commissioning and documentation of all items/material required to complete the under-grounding line through **electronic tendering (e-tendering).**

TABLE-1

1	DNIT No & Date	DGM/EDCC/202-23/02 Dated.02/08/2022
2	NIT No & Date	**DGM/ ED-AMP/ 2022-23/03 dated 03.08.2022 (e tendering)**
3	Estimated Cost (In Rs.)	**Rs.79,33,724.00**
4	Earnest Money Amount	**Rs.1,58,674.00**
5	Cost of E-Bid Documents	**Rs 10000.00(Non-refundable)**

1. This NIT for the above work will appear in Local Newspapers. This shall also be available on Tripura State Electricity Corporation Limited website at **www.tsecl.in** from 03./08/2022.to 09/08/2022 The complete Bidding Documents shall be available at Government e-procurement portal **http://tripuratenders.gov.in** from 03./08/2022 up to 09/08/2022. Interested bidders can download the Bidding Documents and commence preparation of bids.

2. Eligible bidders shall participate in tender online through the government e-procurement portal at **http://tripuratenders.gov.in.** There is no provision to drop tenders physically (Hard copy).

Tender shall be uploaded/submitted in a two-bid system:

(a) Bid Envelop-I (Preliminary Qualification and Techno-commercial bid)

(b) Bid Envelop-II (Price/Financial bid)

3. Bidders willing to take part in the process of e-tendering are required to obtain a valid Class 2/Class 3 Digital Signature certificate (DSC), from any of the of the certifying authorities, enlisted by Controller of Certifying Authorities (CCA) at **http://cca.gov.in**. After obtaining the Class 2/3 Digital Signature Certificate (DSC) from the approved CA, Bidders shall Enroll themselves in the Tripura Government e-procurement web site at '**http://tripuratenders.gov.in'** and obtain User ID and Password for the purpose of bidding.

TABLE-2

4. **Critical Dates**:

1.	Completion period:	2(two) Months
2.	Date of Publishing of tender:	03/08/2022
3.	Period of downloading of Bidding Documents at tripuratenders.gov.in:	From 03/08/2022, 3PM
		To 09/08/2022, 5PM
4.	Period of Seeking clarification:	From 05./08/2022 working hrs (TSECL)
		To 06/08/2022 working hrs(TSECL)
5.	Time and date of Pre-Bid Meeting:	05//08/2022, at 11:00hrs
6.	Place of Pre-Bid Meeting:	Office of the Dy. General Manager, Electrical Division Amarpur ,TSECL,
7.	Deadline for online Bidding:	10./08/2022, 2PM
8.	Time and Date of Opening Technical Bid/Bids:	10./08/2022, 4PM (If possible)
9.	Time and Date of Opening Price/Financial Bid/Bids:	To be notified after Technical Evaluation
10.	Place of Opening Bids:	Office of the Dy. General Manager, Electrical Division Amarpur ,TSECL, Gomati Tripura.

11.	Bid Validity:	6 (six) calendar months after the date of bid **opening**
12.	Officer inviting Bids (Employer):	Office of the Dy. General Manager, Electrical Division Amarpur ,TSECL

5. Bidding will be conducted through the domestic competitive bidding procedures as per the provisions of ITB/BDS and the contract shall be executed as per the provisions of the Contract.
6. The detailed Qualifying Requirements (QR) is given in the Standard Bidding Documents (SBDs).
7. The acceptance of Price bid / financial bid shall be subjected to acceptance of Tender fee.
8. **Earnest Money Deposit amounting to 2% (Two Percent) of the estimated cost put to tender.**
9. Tender Fee and EMD are to be paid electronically using the Online Payment Facility provided in the Portal. For online payment of Tender Fee and EMD, please follow the following process-
    - After initiating the Bid Submission Process from "My Tender" option, an "Online Payment" page will appear which will display the total Tender Fee & EMD amount.
    - On submission of TF & EMD payment option, System will redirect to the SBI Bank MOPS window.
    - SBI MOPS will have two option for Net Banking- "SBI" & "Other Banks". Bidder can choose any of the options as desired and can complete the Online Payment process.
10. The EMD amount shall be refunded to all the bidders including L1 (Selected) bidder in their respective Bank Account, after the Award of Contract (AoC) event is completed in the Tripura e-Procurement Portal, on receipt of Performance Bank Guarantee from the selected bidder.
11. EMD of the bidder may be forfeited if in any case found to have made in false Declaration or Claims.
12. Bidders exempted under specific Government order/ rules from submitting EMD have to furnish Scan copy of the related Governments order/rules in English language, along with the tender in support of their claim exemption.
13. Tender Fee & Earnest Money Deposit in any other form or amount will not be accepted.
14. Tender submitted without any one of this EMD & Tender Fee shall render the tender for summarily rejection.
15. The Bidding Documents are meant for the exclusive purpose of bidding against this specification and shall not be transferred to any other party or reproduced or used otherwise for any purpose other than for which they are specifically issued.
16. Downloaded NIT, Bid Document (DNIT/SBD) are to be uploaded back and digitally signed as a part of technical bid, and as a proof of acceptance of all terms and conditions in NIT and Bid Document.

17. No Interest would be payable on Earnest Money deposited with the Client.
18. The date and time of opening of Financial-Bids shall be notified on Web Site **http://tripuratenders.gov.in**. This will be conveyed to the qualified bidders automatically through an e-mail message on their e-mail address. The Financial-bids shall be opened accordingly online on the same Web Site at the Office of tendering authority**.**
19. The e-Bids will be electronically opened in the presence of bidder's representatives, who choose to attend at the venue, date and time mentioned in the above table or any subsequent day to the convenience of the Tender Opening Committee. An authority letter of bidder's/OEM representative will be required to be produced.
20. The Client reserves the right to cancel any or all the e-Bids/ the e-Bid process without assigning any reason thereof. The decision of client will be final and binding.
21. In the event of date specified for e-Bids opening being declared a holiday for client's office then the due date for opening of e-Bids shall be the following working day at the appointed time and place.
22. All the required documents excluding Price Schedule/BOQ should be uploaded by the e-Bidder electronically in the PDF format, whereas Price Schedule/BOQ should be uploaded electronically in the same BOQ sheet provided with the SBD.
23. The Quoted rates shall be **FIRM**, **inclusive of GST** and all other taxes and duties, freight, transportation, insurance, travel, stay, out of pocket expenses, cost of producing documents etc. as the work is a turnkey job. The rates shall include costs, if any, attracted towards mandatory inspection/testing by designated agencies and the department will not be required to pay and/or reimburse anything over and above the price quoted.
24. To participate in e-Bidding process, bidders have to get 'Digital Signature Certificate (DSC)' as per Information Technology Act-2000, to participate in online bidding.
25. **Mandatory provision regarding blacklisting/debarment of tainted tenders**

    (i) The bidders/tenderer shall not be eligible to participate in the bidding process, if any debarment and/or Blacklisting continue against them on the date of bidding.

    (ii) Declaration shall be made by the bidder as per FORM-XIII (Section-5) available in the documents.
26. Other details can be seen in the bid/DNIT document"
27. For any clarification related to NIT/Bid Document/e-procurement, bidder(s) are requested to contact:

Dy. General Manager,
Electrical Division Amarpur
Amarpur, Gomati Tripura

E-mail: dgm.amarpurl@gmail.com

28. **Addendum/amendments/corrigendum:**

Before the last date for submission of Tenders, the TSECL may modify any of the Contents of the Tender Notice, Tender documents by issuing amendment / Addendum/corrigendum.

Any addendum/ amendments/ corrigendum issued by the TSECL shall be part of the tender Document and it shall be published in the e-procurement portal at **http://www.tripuratenders.gov.in.** Registered Bidders shall be notified of the related Corrigendum(s) by e-mail. However, TSECL shall bear no responsibility or liability arising out of non-receipt of the same in time or otherwise. Bidders are requested to visit the site frequently to check whether there is any related Corrigendum(s) or not.

29. **TSECL reserves the right to cancel/withdraw this invitation for bids without assigning any reason and shall bear no liability whatsoever consequent upon such a decision.**

Dy. General Manager,
Electrical Division Amarpur

SECTION 1: INSTRUCTIONS TO BIDDERS

1.1 Introduction

This part, Instruction to Bidders (ITB), Section-1 of the Bidding Documents provides the information necessary for bidders to prepare responsive bids for "**Extension of HT / LT line in/c sub station for providing service connection to sevaral DTW schemes under jurisdiction of ESD-Amarpur ,Ompi,Jatanbari & Karbook of Electrical Sub-Division Amarpur (Partial Turnkey Basis)**".

Scheme / Location :Dalak Jamatia Para,No.1 Sukanta Colony,Pashim Para,Dakshin Mailak,Ranjit Colony,New Kasco,Dalak Bazar of ESD Amarpur, West Checua,Gamaku Bari,Baramohi Para,Dalacherra,Sonkhala,Ramkanta Para,Khajur Bari of ESD Ompi ,Lowgang (Khunya Para),Purba Manikya Dewan (Amaresh Para), Uttar Chellagang (Sukai Das Para),Khedarnal (Khamar Para) of ESD Jatanbari, Krishna Choudhury Para,Nabajoy Para,Barabandu Para of ESD Karbook

.It also provides information on bid submission, opening and evaluation and on contract award. ITB contains provisions that are to be used unchanged unless part Special Condition of Contract, which consists of provisions that supplement, amend, or specify in detail, information or requirements included in ITB and that are specific to each procurement, states otherwise. If there is a conflict between the provisions of ITB & Special Condition of Contract, the provisions of Special Condition of Contract shall prevail.

However, provisions governing the performance of the Contractor, payments under the contract or matters affecting the risks, rights and obligations of the parties under the contract are not included in this section but instead under Section -6: General Conditions of Contract and/or Special Conditions of Contract.

The TRIPURA STATE ELECTRICITY CORPORATION LIMITED (TSECL)/TSECL hereinafter called 'Owner' will receive bids in respect of equipment to be furnished and erected as set-forth in the accompanying Specifications. All bids shall be prepared and submitted by bidders in accordance with these instructions.

1.2 General Instructions

i) The interested bidder can download the bidding document from the website **http://tripuratenders.gov.in.**

ii) Bidders are advised to download bid submission manual for the help of Bid Submission process from the "Downloads" option as well as from "Bidders Manual Kit" on website **http://tripuratenders.gov.in**.

iii) To participate in bidding process, bidders have to get 'Digital Signature Certificate (DSC)' Class 2/Class 3 as per Information Technology Act-2000, to participate in online bidding.

The bidders have to submit their bids online in electronic format with digital Signature. This certificate will be required for digital signing the bid. Bidders can get above mention digital certificate from any approved vendors. The Bidders, who already possess valid Digital Certificates, need not to procure new Digital Certificate. The bids proposed without digital signature will not be accepted. No proposal will be accepted in physical form.

iv) Bids will be opened online as per time schedule mentioned in the NIT Document.

v) Before submission of online bids, bidders must ensure that scanned copy of all the necessary documents have been attached with bid.

(**Note:** Scan all the documents on 100 dpi with black and white option).

vi) The Owner will not be responsible for delay in online submission due to any reasons.

vii) All the required information for bid must be filled and submitted online up to ……/08/2022, 14:00hrs.

viii) The Quoted rates shall be "**FIRM"** inclusive of all taxes and duties, freight, transportation, insurance etc. as the work is a turnkey job. The rates shall include costs, if any, attracted towards mandatory inspection/testing by designated agencies and the department will not be required to pay and/or reimburse anything over and above the price quoted. The estimated cost (Table -1 of NIT) is purely tentative.

ix) The details of cost of documents, EMD specified in the SBD should be the same as deposited online otherwise tender will summarily be rejected.

x) Bidders are advised not to make any change in BOQ (Bill of Quantities) contents or its name. In no case they should attempt to create similar BOQ manually, otherwise the bid will be rejected automatically. The BOQ downloaded should be used for filling the rates as per columns mentioned in BOQ and it should be saved with the same name as it contains.

xi) Bidders are advised to use "My Document" area in their user on **http://tripuratenders.gov.in'**

E-Tendering portal to store important documents which are used in all SBD's like Tax Clearance Certificate, Contractor license, Experience certificate etc. and attach these certificates as Non-Statutory documents while submitting their bids.

xii) The guidelines regarding submission of bid online can be downloaded from website http://tripuratenders.gov.in.

1.3 Eligibility of Bidder

This Invitation for Bids, issued by Owner is open to all firms, Government Owned Enterprises registered and incorporated in India as per Company Act, 1956 barring Government department as

well as foreign bidders/MNCs not registered and incorporated in India and those bidders with whom business is banned by any Power Utility- central or state/DISCOMS/any other authority shall not be allowed for bidding.

The documentary evidence of the Bidder's qualifications to perform the contract, if its bid is accepted, shall establish to the Owner's satisfaction that the Bidder has the financial, technical, production, procurement, shipping, installation and other capabilities necessary to perform the contract, and, in particular, meets the experience and other criteria outlined in Section – 2 and shall also include the complete annual reports together with Audited statement of accounts of the company for last Three years of its own (separate) immediately preceding the date of submission of bid.

1.4 Eligible Plant: Equipment and Services

For the purposes of these Bidding Documents, the words "facilities," "plant and equipment," "installation services," etc., shall be construed in accordance with the respective definitions given to them in the General Conditions of Contract.

All plant and equipment to be supplied and installed and services carried out under the contract shall have their origin in India only.

1.5 Cost of Bidding

The Bidder shall bear all costs and expenses associated with preparation and submission of e-bid including post-bid discussions, technical and other presentations etc., and Owner will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

1.6 E-Bid Document

1.6.1 Cost of Bidding Document:

The bidder shall bear all costs associated with the preparation and submission of its e-Bid and Tripura State Electricity Corporation Limited, Owner hereinafter referred to as “Owner”, will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the e-Bid process

This SBD is available on the web site **http://tripuratenders.gov.in** to enable the bidders to view, download the e-Bid document and submit e-Bids online up to the last date and time mentioned in e-Tender notice/e-tender document against this e- Tender. The bidders shall have to pay the e-Bid document fee of **Rs. 10000.00 (Rupees ten thousand Only)** through electronically using the Online Payment Facility provided in the Portal. This e-tender document fee will be non- refundable.

1.6.2 Contents of Standard E-Bidding Document:

The e-Bid document includes submission of following documents in stages:

Stage-1: Preliminary Qualification and Techno commercial Details:

(a) **Copy of GST Registration and Clearance certificate of GST for last Quarter**

(b) **Copy of PAN Card**

(c) **Copy of Labour License**

(d) **Copy of Experience/Completion Certificate**

(e) **Copy of Electrical Contractor License**

(f) **Copy of Annual Turnover for last 3 years**

(g) **Copy of Company Registration**

(h) **Electrical Enlistment**

(i) **Blacklisted or Debarred declaration**

(j) **Technical Data Sheet/GTPs and drawings for major items specified in the Bid Document in PDF**

** Successful Experience / completion certificate shall be issued by LOA issuing authority / Agreement signing authority as per Form in the SBD (Clause 5.4 Form-IV) along with supporting photocopies of work order / LOA of the work executed in last 7 financial years.

*** Photocopies of all documents shall be furnished self-authenticated and duly stamped.

Stage-2: Techno-Commercial Details:

(a) Section 1: Instruction to bidders (ITB);

(b) Section 2: Pre-Qualification Criteria;

(c) Section 3: General Conditions of Contract;

(d) Section 4: Special Conditions of Contract;

(e) Section 5: Standard Bidding Format;

(f) Section 6: Erection Conditions of Contract;

(g) Section 7: Payment Terms;

(h) Section 8: Price adjustment;

(i) Section 9: Scope of Work;

(j) Section 10: Detailed Technical Specification with GTP;

**** Bidders are requested not to upload any irrelevant documents other than specified in bid documents.**

Stage-3: Price Schedule

NOTE: The financial e-bid shall be submitted online only and the hard copy of the same shall not be considered in any case.

1.6.3 Understanding of bid documents:

A prospective Bidder is expected to examine all instructions, forms, terms, technical specifications, tender drawings and scope of works in the e-Bid documents and fully inform himself as to all the conditions and matters which may in any way affect the scope of work or the cost thereof. Failure to furnish all information required in the e-Bid document or submission of a e-Bid not responsive to the e-Bid document in every respect will be at the Bidder's risk and may result in the rejection of the said e- Bid.

1.6.4 Clarifications on E-Bid Documents; and Pre-Bid Meeting:

If the prospective Bidder finds discrepancies or omissions, in specifications and document or is in doubt as to the true meaning of any part, he shall at once make a request, in writing, for an interpretation/clarification, to Owner at his mailing address indicated in E-Bidding Documents. Similarly, if a Bidder feels that any important provisions in the documents, such as Governing laws, Taxes and Duties, Defect Liability, Limitation of Liability, Settlement of Disputes, Arbitration, Form of Contact Agreement, Price Adjustment, Bid Guarantees, Contract Performance Guarantee, Compensation for Delay, Payments Terms, Schedule of Execution/Completion of works, will be unacceptable, such an issue should be raised as above. Owner, then, will issue interpretation(s) and clarification(s) as he may think fit in writing or modification of the Bidding Documents that it receives no later than Three (03) days prior to date of Pre-bid meeting. The Owner shall not be obliged to respond to any request for clarification received later than the above period. Further, mere request for clarification received from the Bidder shall not be a ground for seeking extension in the deadline for submission of e-Bid. Written copies of Owner's response (including an explanation of the query but not identification of its source) will be sent to all prospective bidders. Verbal clarification and information given by Owner or his employee(s) or his representative(s) shall not in any way be binding on Owner.

1.6.5 Local Conditions:

It will be imperative on each Bidder to fully inform himself of all local conditions and factors, which may have any effect on the execution of the Contract covered under these documents and specifications. Owner shall not entertain any request for clarifications from the Bidders, regarding such local conditions. It must be understood and agreed that such factors have properly been investigated and considered while submitting the Proposals. No claim for financial adjustment to the Contract, awarded under these specifications and documents, will be entertained by Owner. Neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Owner, which are based on the lack of such clear information or its effect on the cost of the Works to the Bidder.

The bidder's designated representative(s) is / are invited to attend a pre-bid meeting, which, when convened, will take place at the venue and time specified in the e-Biding Documents. The purpose of the meeting shall be to clarify any issue regarding the e-Biding Documents in general and the Technical Specifications in particular. The Bidder is requested, as for as possible to submit any question in writing, to reach the Owner not later than Three (03) days before the meeting. Minutes of the Meeting, including the text of the questions raised (without identifying the name of the bidders) and the responses given, together with any responses prepared after the meeting, will be uploaded on the website **http://tripuratenders.gov.in** through corrigendum and shall form an integral part of e-Bid document.

Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

1.6.6 Amendment to e-Bid Document:

At any time prior to the deadline for submission of e-Bid, the Owner may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the e-Bid Document by amendments. Such amendments shall be uploaded on the website **"http://tripuratenders.gov.in"** through corrigendum and shall form an integral part of e-Bid document. The relevant clauses of the e- Bid document shall be treated as amended accordingly.

It shall be the sole responsibility of the prospective bidders to check the web site "**http://tripuratenders.gov.in"** from time to time for any amendment in the e-tender document. In case of failure to get the amendments, if any, the Owner shall not be responsible for it.

In order to allow prospective e-Bidders a reasonable time to take the amendment into account in preparing their e-Bids, the Owner, at his discretion, may extend the deadline for the submission of e-Bids. Such extensions shall be uploaded on the e-Procurement website **"http://tripuratenders.gov.in.**

1.7 Taxes and Duties

1.7.1 All applicable taxes, transportation, freights & insurance and other levies shall be paid by the bidder(s) in respect of the procurements of tendered items between the bidder(s) and their vendor(s)/sub-supplier(s) while procuring any components, sub-assemblies, raw materials and equipment which shall be included in the bid prices and no separate claim(s) on this behalf shall be entertained by TSECL.

1.7.2 Bidder shall indicate Bid prices in Indian Rupees only. Any statutory increase in GST, beyond the prevailing rates at the time of opening of tenders shall be paid on production of documentary evidence(s) during the contractual delivery period. Benefit of statutory decrease in the rates of GST below the prevailing rates at the time of opening of tenders shall be passed on to TSECL.

1.8 Preparation of e-Bid

1.8.1 Language of e-Bid

The e-Bid prepared by the bidder, as well as all correspondence and documents relating to the e-Bid exchanged by the bidder and the Owner shall be written in English language.

Only English numerals shall be used in the e-Bid.

1.8.2 e-Bid Prices:

Unless otherwise specified in the Technical Specifications, bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the Bidding Documents in respect of the Survey, Design, manufacture, including procurement, delivery, construction, installation and completion of the facilities including supply of mandatory spares (if any). ***Surplus materials shall be return to the Owner before final measurement.*** This includes all requirements under the Contractor's responsibilities for testing, pre commissioning and commissioning of the facilities and, where so required by the Bidding Documents, the acquisition of all permits, approvals and licenses, etc.; the operation, maintenance and training services and such other items and services as may be specified in the Bidding Documents, all in accordance with the requirements of the General Conditions of Contract. Items against which no price is entered by the Bidder will not be paid for by the Owner when executed and shall be deemed to be covered by the prices for other items.

Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the Bidding Documents. If a Bidder wishes to make a deviation, such deviation shall be listed in the prescribed format in section – 5 of the e-bid. The Bidder is required to provide the cost of withdrawal for such deviations.

Bidders shall quote the offer for complete job of Route survey, Designing, supply, erection, testing, commissioning including all the allied civil works required including applicable taxes at Tripura, Local transportation, insurance and other Services incidental to delivery of the Plant and Equipment including mandatory spares to be supplied (if any), plant and equipment required for loading-unloading of equipment, etc. The bidder shall submit an **Indemnity bond** to keep Owner harmless from any liability, before release of material to the bidder by Owner.

1.8.3 e-Bid Currencies:

The rate price must be quoted in Indian currency alone and any mistakes in converting foreign exchange component into Indian currency will not justify the claim whatsoever of Contractor for increase in prices. Foreign exchange component if any shall have to be arranged by the bidder.

1.8.4 e-Bid Security / Earnest Money Deposit (EMD):

i) The Bidder shall furnish, as part of its bid, a bid security in the amount and currency as stipulated in the Bid Documents through electronically using the Online Payment Facility provided in the Portal.

ii) Bids which are not deposited with required amount of earnest money will be rejected and declared as **INFORMAL**. The bid security of a joint venture must be in the name of all the partners in the joint venture submitting the bid.

iii) Bid security (EMD) shall remain valid for a period of thirty (30) days beyond the original bid validity period, and beyond with subsequent extension of the same.

iv) The bid securities (EMD) of unsuccessful bidders will be returned as promptly as possible, but not later than thirty (30) days after the expiration of the bid validity period.

v) The successful Bidder shall be required to keep its bid security valid for a sufficient period till the Bidder has signed the Contract Agreement and submit the performance security (ies) to the entire satisfaction of the Owner.

vi) No claim shall be laid against the Owner either in respect of interest or depreciation in value for the amount of earnest money.

vii) The earnest money of the bidder(s) shall be forfeited;

If the bidder withdraws / modifies its bid during the period of bid validity specified by the bidder in the tender; or If the bidder does not accept the corrections to arithmetical errors identified during preliminary evaluation of his bid; or in case of a successful bidder, if the Bidder fails to sign the contract; or if the Bidder fails to furnish the performance guarantee.

1.8.5 Period of Validity of Bid:

Bids shall remain valid for the period of 180 days after the scheduled date of opening of Techno - Commercial Part. A bid valid for a shorter period shall be rejected by the Owner as being non-responsive.

In exceptional circumstance, the Owner may solicit the Bidder's consent to an extension of the bid validity period. The request and responses thereto shall be made in writing or by e-mail. If a Bidder accepts to prolong the period of validity, the bid security shall also be suitably extended. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request will not be required or permitted to modify its bid.

1.8.6 Format and Signing of e-Bid:

i) The bidder shall prepare one electronic copy each of the Commercial e-bid & Technical e-Bid and Financial e-Bid separately.

ii) The e-Bid document shall be digitally signed, at the time of uploading, by the bidder or a person or persons duly authorized to bind the bidder to the Contract. The authorization shall be indicated by a scanned copy of written power-of- attorney accompanying the e-Bid. All the pages/ documents of the e-Bid that are to be uploaded shall be digitally signed by the person authorized to sign the e-Bid.

1.8.7 Submission of e-Bid:

The bid Submission module of website **http://tripuratenders.gov.in'** enables the bidders to submit the e-Bid online in response to this e-tender published by the Owner. Bid Submission can be done only from the Bid Submission start date and time till the Bid Submission end date and time given in the e-tender. Bidders should start the Bid Submission process well in advance so that they can submit their e-Bid in time. The bidders should submit their e-Bid considering the server time displayed in the website. This server time is the time by which the e-Bid submission activity will be allowed till the permissible time on the last/end date of submission indicated in the e-tender schedule. Once the e-Bid submission date and time is over, the bidders cannot submit their e-Bid. For delay in submission of e-Bid due to any reasons, the bidders shall only be held responsible. The bidders have to follow the following instructions for submission of their e-Bid:

a) To participate in bidding process, bidders have to get 'Digital Signature Certificate (DSC)' Class 2 / Class 3 as per Information Technology Act-2000.

b) After login to their account, the bidder has to fill up the e-bid document fee detail and the EMD details. Next the bidder should upload the documents as prescribed in Clause 1.6. The components of e-tender fee and EMD should be same as filled by the bidder previously and any deviation from those result in right rejection of the tender. During the above process, the e-Bid documents are digitally signed using the DSC of the bidder.

c) Owner reserves the right to cancel any or all e-Bids without assigning any reason.

d) The SBD (Standard Bidding document) must be complete in all respects. All the terms and conditions of SBD including technical specifications should be carefully studied for the sake of submitting complete and comprehensive SBD. Failure to comply with any of the SBD conditions may lead to rejection even if otherwise it is competitive offer.

Bidders shall specially take note of all the addendum/corrigendum related to the tender and upload the latest documents as part of the tender.

The Technical Bid/Bid Envelop-I should contain scanned copies and/or declarations in the following standardized formats.

A. My Document (Non-Statutory):

All the below-mentioned documents/certificates are to be uploaded with digital signature in the '**My Document**' folder option available after login in the e-procurement portal **http://tripuratenders.gov.in**.

Bidders are requested to scan the necessary documents in **100 dpi** resolution into PDF. 'My Document' shall be populated prior to real time biding and during real time bidding, uploaded documents/certificates in the 'My Document' are to be appropriately included (Checked) for incorporation in the Bid.

An indicative organization of 'My Document' folder and the related documents are indicated here under.

Sl. No.	Folder Name	Documents to be uploaded
1	**Electrical Contractor License**	Copy of Electrical Contractor License issued by appropriate licensing authority.
2	**Enlistment**	Copy of Electrical Enlistment
3	**Labour License**	Copy of Labour License
4	**Experience / Completion Certificate**	LOA issuing authority / Agreement signing authority
5	**NIT Documents**	All forms / Corrigendum, / Amendments / Formats with supporting documents / certificates if published.
6	**Tax related Document & Others**	i) IT clearance certificate from issuing authority. i) Copies of PAN and GSTIN Registration Certificates and Clearance certificate of GST for last Quarter by self-attested.
7	**Financial details**	i. Audited Balance Sheets of last three financial years (i.e. 2018-19, 2019-20 and 2020-21) with auditor's certificate regarding annual turnover from contracting business in each year
8	Misc. document	Any other documents found necessary.
9	**Blacklisted or Debarred**	***To be executed on Rs.100/- Stamp paper & attested***

		by Public Notary/Executive Magistrate by the bidder

NB: All forms/Amendments/Formats with supporting documents/certificates other than mentioned in My Document in single PDF.

B. Statutory Documents:

After uploading the above mentioned non-statutory documents/certificates, Bidders shall submit the following, during real time bidding

1. NIT

2. Bid Document

3. Technical Data Sheet/GTPs and drawings for major items specified in the Bid Document in PDF.

Note-1: Failure of submission of any one of the above-mentioned documents will render the tender for rejection.

Note-2: If the company was set up less than five years ago, audited balance sheet for the no of years since inception is to be submitted.

Note-3: Bidders are requested to scan the necessary documents/certificates in **100 dpi** resolution into PDF.

Bid Envelop-II (Financial Bid):

Documents to be submitted in the Financial Bid are:

BOQ (Priced Bill of quantity/Price schedule).

Note:

1. Bill of Quantity (BOQ) i.e. Price schedule, which is the Rate quoting sheet in MS-Excel shall be downloaded, filled up properly and uploaded in the financial bid after digital signing. The Bidder shall always open the BOQ sheet with Macros Enabled. The Bidder shall quote rates in figures only, for all items in the Bill of Quantity (BOQ).
2. **Bidders are requested to quote rates all of item in BOQ. No item rate shall leave blank or 0(Zero) quote, otherwise the BOQ will be declared as nonresponsive and summarily rejected.**

1.8.8 Deadline for Submission of e-Bid:

a) e-Bid (Commercial, Technical and Financial) must be submitted by the bidders at website **http://tripuratenders.gov.in'** not later than the time as prescribed in the table above (as per the server time displayed on the website).

b) The Owner may, at its discretion, extend this deadline for submission of e-Bid by amending the e-Bid document, in which case all rights and obligations of the Owner and bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

1.8.9 Late e-Bid:

The server time indicated in the window on the website **http://tripuratenders.gov.in'** will be the time by which the e-Bid submission activity will be allowed till the permissible date and time scheduled in the e-tender. Once the e-Bid submission date and time is over, the bidder cannot submit his / her e-Bid. Bidder has to start the Bid Submission well in advance so that the submission process passes off smoothly. The bidder will only be held responsible if his/her e-Bid is not submitted in time due to any of his/her problems/faults, for whatsoever reason, during e-Bid submission process.

1.9 OPENING AND EVALUATION OF e-BID:

1.9.1 Opening of Commercial & Technical e-Bid by the Owner

1.9.1.1 The Owner will open all commercial & technical e-Bids, in the presence of bidders who choose to attend at time specified in the table above at The Office of **Dy. General Manager, Amarpur Electrical Division ,Gomati Tripura.** In the event of the specified date of e-Bid opening being declared a holiday for the Owner, the e-Bids shall be opened at the appointed time and place on the next working day.

1.9.1.2 The bidder's names and the presence or absence of requisite e-Bid. EMD and such other details as the Owner at its discretion may consider appropriate, will be announced at the opening. The name of such bidders not meeting the Commercial, Technical qualification requirement shall be notified subsequently.

1.9.2 Opening of Financial e-Bid:

After evaluation of Technical e-Bid, the Owner shall notify those bidders whose Commercial & Technical e-Bids were considered non-responsive to the Conditions of the Contract and not meeting the technical and commercial Qualification Requirements indicating that their financial e-Bids will not be opened. The Owner will simultaneously notify the bidders, whose technical e-Bids were considered qualified with reference to fulfilling the pre-qualification criteria of section 4 by the bidder.

The financial e-Bids of technically & commercially qualified bidders shall be opened in the presence of bidders who choose to attend, and date for opening of financial bids will be communicated to the Commercially & Technically Qualified Bidders subsequently after completion of technical bids evaluation. The name of bidders, Price quoted will be announced at the meeting.

The bidders shall quote their prices / rates in the same BOQ as uploaded on the website otherwise **the SBD is liable to be rejected.**

1.9.3 Clarification of e-Bid:

During evaluation of e-Bid, the Owner may, at its discretion, ask the bidder for a clarification of his/her e-Bid. The request for clarification and the response shall be in writing.

1.9.4 Evaluation of Commercial & Technical e-Bid:

The Owner will examine the e-Bid to determine whether they are complete, whether they meet all the conditions of the Contract, whether required e-tender fee, e-Bid EMD and other required documents have been furnished, whether the documents have been properly digitally signed, and whether the e-Bids are generally in order. Any e-Bid or e-Bids not fulfilling these requirements shall be rejected.

The bidders shall submit the scanned copies as prescribed in Section -2 of commercial and technical details as documentary proof for evaluation of their commercial and technical e-Bids.

It shall be the discretion of the Owner to decide as to whether an e-Bid fulfils the evaluation criterion mentioned in this e-tender or not.

The bidders are advised not to mix financial e-bid documents with the PDF documents submitted for commercial and technical e-bid. The e-Bids of the bidders having financial bid document in the technical bid will out rightly are rejected.

The technical eligibility will be decided upon evaluation of following documents:

(i) The Firm's past experience as Turn Key contractual agency for development of infrastructure of power Distribution and Sub Transmission network.

(ii) The Firm's past experience relevant to the Underground power distribution assignment supported by the **copy of Agreement/LOA and completion certificate** from the Owner in support of successful completion of the same.

(iii) Qualification and Experience of key personnel.

(iv) Overall Company profile, execution of works with Power Discoms /PSUs/CPSUs and reputed developers (excluding Real estate developers) and completion certificate of the same.

1.9.5 Financial Evaluation and Comparison of e-Bid:

The Owner will evaluate and compare the financial rates quoted in the price schedule/BOQ of e-Bids of those bidders whose commercial and technical e- Bids are found responsive as per the conditions of the e-tender.

No additional payments shall be made for completion of any contractual obligation beyond the quoted prices. If the Bidder does not accept the correction of errors if any, its e-Bid shall be rejected and its e-Bid security may be forfeited.

1.9.6 Arithmetical errors will be rectified on the following basis:

If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity specified by the Owner, or between subtotals and the total price, the unit or subtotal price shall prevail, and the quantity and the total price shall be corrected. However, in case of items quoted without indicating any quantity or the items for which the quantities are to be estimated by the Bidder, the total price quoted against such items shall prevail. **If there is a discrepancy between words and figures, the amount in words will prevail**.

The prices of all such item(s) against which the Bidder has not quoted rates/amount (viz., items left blank or against which is indicated) in the Price Schedules will be deemed to have been included in other item(s).

The subtotal, total price or the total bid price to be identified in Bid Form for this purpose, irrespective of the discrepancy between the amounts for the same indicated in words or figures shall be rectified in line with the procedure explained above.

If the Bidder does not accept the correction of errors as per this clause, its bid will be rejected and the amount of Bid Security forfeited.

The Bidder should ensure that the prices furnished in various price schedules are consistent with each other. In case of any inconsistency in the prices furnished in the specified price schedules to be identified in Bid Form for this purpose, the Owner shall be entitled to consider the highest price for the purpose of evaluation and for the purpose of award of the Contract use the lowest of the prices in these schedules.

1.9.7 Contacting the Owner:

No bidder shall contact the Owner on any matter relating to his / her e-Bid, from the time of the e-Bid opening to the time the Contract is awarded. If the bidder wishes to bring additional information to the notice of the Owner, he / she can do so in writing.

Any effort by a bidder to influence the Owner in its decisions on e-Bid evaluation, e-Bid comparison or contract award may result in rejection of the bidder's e-Bid.

1.10 Award of Contract:

Subject to selection criteria in Clause 1.3, the Owner will award the contract to the successful Bidder (also referred to as the L1 Bidder) whose bid is evaluated as the best bid to perform the work with standard engineering practices and to be the lowest evaluated bid to perform the contract satisfactorily.

The Owner shall not be bound to accept the lowest or any tender and reserves to itself the right of accepting the whole or a portion of any of the tender as it may deem fit, without assigning any reason thereof. The Owner reserves the right to accept or reject any bid, and to annul the bidding process

and reject all bids at any time prior to award of contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Owner's action.

Any approach / canvassing etc. official or otherwise by the bidder or his / their representative / agent to influence the consideration of their tender shall render the tender liable to summary rejection.

In the case of there being a number of bidders quoting same rates thereby forming a cartel to jack up the prices, the SBD's of such bidders shall be summarily rejected.

In order to avoid delay caused by postal correspondence after submission of SBD and to expedite the process of technical/commercial clarifications the Owner may require the successful bidder to depute his/their authorized representative along with necessary documents to the **Dy. General Manager, Amarpur Electrical Division, , Amarpur ,Gomati Tripura** for sorting out the connected matters thus enabling speedy issue of formal award of contract. The representative thus deputed shall have to be competent enough to hold technical and commercial negotiations and convey the decision / acceptance on behalf of the bidder.

The Owner reserves the right to vary the quantity of any of the spares and/or delete any items of spares altogether at the time of Award of Contract.

1.11 Notification of Award

Prior to the expiration of the period of bid validity, the Owner will notify the successful Bidder in writing, that its bid has been accepted. The notification of award will constitute the formation of the contract.

The Owner shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with above, requests in writing the grounds on which its bid was not selected.

1.12 Signing the Contract Agreement

At the same time as the Owner notifies the successful Bidder that its bid has been accepted, the Bidder will prepare the Contract Agreement provided in the Bidding Documents, incorporating all agreements between the parties.

The Contract Agreement shall be prepared within Fifteen (15) days of the Notification of Award and submission of performance Bank Guarantee, the successful Bidder and the Owner shall sign and date the Contract Agreement immediately thereafter.

1.13 Performance Guarantee.

Within 15 days of receipt of Letter of Award (LOA) from the Owner, the successful Bidder shall furnish to the Owner a Performance Guarantee in the form stipulated in the Standard Bidding Format. Performance Guarantee shall be deposited in the form of Bank Guarantee.

A) Within 15 days of receipt of Letter of Award (LOA) from the Owner, the successful bidder shall furnish to the Owner a Performance Guarantee in the form of Bank Guarantee from any Nationalized Bank of an amount equal to **@10%** of Contract value as indicated in the Letter of Award. The performance guarantee shall be applicable for entire project duration including the additional **180 days from the date of commissioning entire project**.

B) Additional Contract Performance Guarantee:

For bids up to 15% less than the estimated value of work, no additional security deposit is required. But for bids less than 15% of the estimated value of work, the difference between the bided amount and 85% of the estimated value of work, shall be paid by the successful bidder at the time of concluding agreement as an additional security to fulfil the contract through a Bank Guarantee or Demand Draft on a Nationalized Bank / Scheduled Bank in the prescribe Format valid till the completion of the work in all respects.

C) Failure of the successful Bidder to comply with the requirements of Clause 1.11 and Clause 1.12 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security (EMD), in which event the Owner may make the award to the next lowest evaluated Bidder or call for new bids.

D) **The successful bidder may be engaged for additional 50% scheme with the rate as quoted by TSECL The bidder shall have to carryout the work on the stipulated time as offerred to him by TSECL**

•The Contract Performance Guarantee shall be forfeited: -

i) **If the contractor fails to start the work as per approved BAR CHART for reasons solely rest on him.**

ii) **If the contractor left / suspends the work without prior written intimation to the owner's Engineer in charge of the work stating the reasons for such suspension of work.**

iii) **If the contractor left / suspends the work for reasons which are not acceptable to TSECL.**

1.14 Fraud and Corruption

It is the Owner's policy that requires the Bidders, suppliers and contractors and their sub-contractors under the contracts to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Owner:

a) Defines, for the purpose of this provision, the terms set forth below as follows: (i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

b) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

c) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

d) "Coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

e) "Obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede an Owner's investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and / or threatening, harassing or

Intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(bb) Acts intended to materially impede the exercise of the Owner's inspection and audit rights.

f) Will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

g) Will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, a contract; and

h) Will have the right to require that the provision be included in Bidding Documents and in contracts, requiring Bidders, suppliers, and contractors and their sub-contractors to permit the Owner to inspect their accounts and records and other documents relating to bid submission and contract performance and to have them audited by auditors appointed by the Owner.

SECTION 2: PRE-QUALIFICATION CRITERIA

1 PRE-QUALIFYING CRITERIA

Qualification of bidder will be based on meeting the criteria as specified in Pre-qualifying criteria as demonstrated by the Bidder's responses in the corresponding Bid Schedules. No Subcontract is to be entertained all activities shall be carried out by the Main Contractor. Subcontractors' technical experience and financial resources shall not be taken into account in determining the Bidder's compliance with the qualifying criteria. The bid can be submitted by an Indian individual firm only or by Joint Venture firm having Indian partner firms only. Notwithstanding anything stated herein above, TSECL reserves the right to assess the capacity and capability of the bidder, should the circumstances warrant such assessment in an overall interest of the TSECL. TSECL reserves the right to waive minor deviations if they do not materially affect the capability of the Bidder to perform the contract.

Technical e-Bid shall contain the following documents digital signature by the bidder in the scanned form and pdf format only:

a. Covering Letter.

b. Signed Copy of Bid Documents.

c. Power of Attorney / Board Resolution in favour of signatory of the bid.

d. Copies of original documents defining the constitution or legal status, place of registration and principal place of business

e. Qualification details as stipulated in the bid document.

f. Details of Past experience as mentioned in qualification criteria.

g. Annual Turnover of the bidder for the last three years must be submitted in the shape of audited balanced sheet by CA.

h. Certificate of incorporation in case of company along with copies of Articles of Association (AOA) and Memorandum of Association (MOA).

i. Filled Forms as given in Section 5 – Standard Bidding Format, as applicable.

j. Other details as called for in the bid documents or which the bidder may like to highlight.The e-Bids of the bidders not submitting certified copies of documents in scanned form mentioned above from (a) to (j) shall liable to be rejected.

Pre-qualification criteria

1.1 Part-A: Technical:

i. The bidder must have successfully Supply, erected, tested & commissioned of **11 KV or voltage level**(as the case may be in bid) in a single contract as on the date of bid submission, having installation of at least **0.5 km** of length of HT line & LT line so created must be in satisfactory operation for at least three (3) year as on date of submission of bid.

OR

ii. The bidder must have successfully erected, tested & commissioned of underground cabling system of **11 KV or above voltage level** (as the case may be in bid) in a single contract as on the date of bid submission, having installation of at least **2.00km**of length of underground cable so created must be in satisfactory operation for at least one (1) year as on date of submission of bid.

OR

iii. The bidder must have successfully Supply, erected, tested & commissioned of one no **11kv Power Sub-Station or above voltage** along with underground cabling system of **11 KV or above voltage level** (as the case may be in bid) in a single turnkey contract as on the date of bid submission, having supply, installation& commissioning of at least **1.0km**of length of underground cable so created must be in satisfactory operation for at least one (1) year as on date of submission of bid.

1.2 The bidder should possess Electrical Contractor license issued by the Electrical Inspectorate of Govt. of Tripura.

1.3 Work experiences of the bidder as per above shall be considered only if the works have been executed under Govt. power distribution company / state electricity board in India.

1.2 Part-B: COMMERCIAL:

For the purpose of this particular bid, bidder shall meet the following minimum commercial criteria prior to bid submission:

1.3 Net Worth for the each of the last Three Financial Years should be positive. Net worth means the sum total of the paid up capital and free reserves (excluding reserves created out of revaluation) reduced by aggregate value of accumulated loses (including debit balance in profit and loss account for current year) and intangible assets.

Minimum Average Annual Turnover (MAAT) for three years financial years of the bidder should not be less than **30% of the project cost**.

1.4 Litigation History:

The bidder should provide detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder may result in rejection of Bid.

1.5 Assessment of capability:

Notwithstanding anything stated above the Owner reserves the right to assess capability and capacity of the bidder to successfully execute the work covered within stipulated completion period. This assessment shall inter-alia include (i) document verification: (ii) details of works executed, works in hand, anticipated in future in addition to the works involved in present bid, (iii) details of manpower and financial resources; (iv) Manpower Details for the project (v) past experience and performance; (vi) customer feedback; (vii) banker's feedback etc. The bidder shall also furnish pre-qualifying information along with documentary evidence in support of the qualifying requirements stipulated as above. Bid of those bidders who do not submit the pre-qualifying information shall not be entertained and shall be rejected.

SECTION 3: GENERAL CONDITIOS OF CONTRACT:

This part, The Section-3 of the Bidding Documents is named as General Conditions of Contract (GCC) and provides all the rights and obligations of the parties under the Contract. This Section contains provisions which are to be used unchanged unless Section -4 named as Special Conditions of Contract (SCC) states otherwise as any changes in GCC or any complementary information that may be needed has been shown in SCC. If there is a conflict between the provisions of Section -3 & Section -4, the provisions of Section -4shall prevail.

3.1 DEFINITIONS AND INTERPRETATIONS:

3.1.1 Definitions:

In the contract (as hereinafter defined) the following words and expressions shall, have the meanings hereby assigned to them except where the contract otherwise requires

a) "Owner" shall mean shall mean **TRIPURA STATE ELECTRICITY CORPORATIONLIMITED**(TSECL) and shall include their legal representatives, successors and assigns

b) "Engineer-in-Charge/ Engineer" shall mean Deputy General Manager (Technical) / or any authorized persons by Owner.

c) “Project Management Consultancy/ PMC Team” means the person(s) or firm(s) engaged by the Owner and notified as such to the Contractors who will be authorized to monitor project supervision and conduct independent inspections on the Plant/Equipment to be supplied by the Contractor for incorporation into the Works, either at the place of manufacture or fabrication or at the Site, as applicable.

d) ‘Contractor’ or ‘Manufacturer’ shall mean the Bidder whose bid shall be accepted byTSECL for award of the Works and shall include such successful Bidder’s legal representatives, successors and permitted assigns.

e) 'The Contract' means the agreement entered into between Tripura State ElectricityCorporation Limited and Contractor as per the Contract Agreement signed by the parties, including the conditions, the specifications, the drawings, the bill of quantities, the bid, the letter of award/ acceptance, the contract agreement and such further documents as may be expressly incorporated in the letter of acceptance or contract agreement and appendices thereto and all documents incorporated by reference therein.

f) "Date of Commencement" is the date when LOA placed by the Owner.

g) 'Site' shall mean and include the land and other places on, into or through which the works and the related facilities are to be erected or installed and any adjacent land, paths, street and thereof which may be allocated or used by TSECL or Contractor in the performance of the Contract

h) 'Specification' shall mean collectively all the terms and stipulations Contained in those portions of the 'Contract' known as General Conditions of Contract, the Specifications and such Amendments, Revisions, Deletions or Additions, as may be made in the Agreement and all written Agreements made or to be made pertaining to the method and manner of performing the 'Work' or to the quantities and qualities of the materials to be furnished under this 'Contract'

i) "Drawings" means all drawings, calculations and technical information provided by the Engineer-In-Charge to the contractor under the contract and all drawings, calculations, samples, patterns, models, operations and maintenance manuals and other technical information of a like nature submitted by the contractor- and approved by the Owners/Engineer-In-Charge.

j) "Tender/Bid" means the contractor's offer to the Ownerfor the execution and completion of the works and remedying of any defects therein, in accordance with the provisions of the contract, as accepted by the letter of acceptance. The word tender is synonymous with 'Bid' and the words "tender documents" with "Bidding Documents".

h) 'MANUFACTURER' refers to a person or firm who is the producer and furnisher of material or designer and fabricator of equipment to either the OWNER/ PURCHASER or the VENDOR/CONTRACTOR or both under the 'Contract'.

i) 'SUB-VENDOR/SUB-CONTRACTOR/SUB-FABRICATOR' shall mean the person named in the 'Contract' undertaking a part of the work or any person to whom a part of the 'Contract' has been sublet with the consent in writing of the principal OWNER/ PURCHASER and shall include his heirs, legal representatives, successors and permitted assigns.

j) 'Plant' or 'Equipment' and 'Work' or 'Works' shall mean respectively the goods to be supplied and/or services to be provided including those for electrical works by the VENDOR/CONTRACTOR/FABRICATOR under the 'Purchase Order' or 'Contract'.

k) 'Commissioning' shall mean integrated activity covered under 'Pre-commissioning Operation', 'Initial Operation', 'Trial. Operation' and carrying out 'Performance Tests'.

l) 'Trial Operation' shall mean the integrated operation of the plant/system/ equipment covered under the 'Contract' for a specified period at specified Load for providing trouble-free operation of the plant/system/equipment covered under the 'Contract'.

m) 'Performance Tests' shall mean such tests as are prescribed in the 'Specification', to be done by the CONTRACTOR before the plant is taken over under guarantee by the Owner to the satisfaction of the ENGINEER.

p) 'Commercial Use' shall mean that use of the equipment or work, which the 'Contract' contemplates or that for which equipment or work is commercially capable.

q) 'Codes and Standards' shall mean all the applicablecodes and standards as Indicated In the 'Specification' and shall include, but not limited to, the following:

(a) Various Regulations of Tripura Electricity Regulatory Commission.

(b) Relevant publications of Bureau of Indian Standards and MORT&H.

(c) Any other internationally approved standard and/or Rules and regulations relevant to the subject matter of the Contract.

r) "Works" means the permanent works and the temporary works or either of them as appropriate.

s) "Letter of acceptance" shall mean intimation by a letter/fax of intent that the tender has been accepted in accordance with the provisions contained in the said letter/fax.

t) "Letter to proceed with work" means the formal acceptance by the Owner.

u) "Contract Price" means the sum stated in the Letter of acceptance as payable to the contractor for execution and completion of the works and remedying of any defects therein in accordance with the provision of the contract.

v) "Cost" means all expenditure properly incurred or to be incurred, whether on or off the site including overhead and other charges properly allowable thereon but does not include any allowance for profit.

w) "Day" means a day of 24 hrs. from midnight to midnight irrespective of the number of hours worked in that day.

x) "Working day" means any day, which is not declared to be holiday or rest day by the Owner.

y) "Week" means a period of any consecutive seven days.

aa)"Writing" means any hand written or printed/typed communication, including fax.

ab)“Corrupt practice” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.

ac)“Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Owner, and includes collusive practice among

bidders (prior to or after bid submission) designed to establish bid price at artificial non-competitive levels and to deprive the Ownerof the benefits of free and open completions.

ad)Terms and expressions not herein defined shall have the same meaning as are assigned to them in the Indian Sale of Goods Act (1930), Indian Contract Act (1972) and General Clauses Act (1987).

ae)'Latent Defects' shall mean such defects caused by faulty designs, material or work man ship which cannot be detected during inspection, testing etc., based on the technology available for carrying out such tests.

af)"Test on Completion" shall mean such tests as prescribed in the Contract to be performed by the Contractor before the work is Taken Over by TSECL.

ag)'Start Up' shall mean the time period required to bring the equipment covered under the contract from an inactive condition, when construction is essentially complete, to the state ready for trial operation. The start-up period shall include preliminary inspection and checkout of equipment and supporting sub-system, initial operation of the complete equipment covered under the Contract to obtain necessary pre-trial operation data, perform calibration and corrective action, shut down, inspection and adjustment prior to the trial operation period.

ah)"Initial Operation" shall mean the first integral operation of the complete equipment covered under the Contract with the sub-system and supporting equipment in service or available for service.

ai)'Trial Operation', Reliability Test', 'Trial Run', 'Completion Test' shall mean the extended period of time after the start-up period. During this trial operation period, the unit shall be operated over the full load range. The length of Trial Operation shall be as determined by the Engineer of TSECL unless otherwise specified elsewhere in the Contract.

aj)'Performance and Guarantee Test' shall mean all operational checks and tests required to determine and demonstrate capacity, efficiency and operating characteristics as specified in the Contract Documents.

ak)The term 'Final Acceptance / Taking Over' shall mean written acceptance of the Works performed under the Contract by TSECL, after successful commissioning/completion of Performance and Guarantee Tests, as specified in the accompanying Technical Specification or otherwise agreed in the Contract.

3.1.2 Heading and Marginal Notes:

The headings and marginal notes in these conditions are indicative only and shall not be deemed part thereof or be taken into consideration in the interpretation or construction or of the contract.

3.1.3 Interpretation:

Words importing persons or parties shall include firms and corporations and any organization having legal capacity.

3.1.4 Singular and Plural:

Words importing the singular only also include the plural and vice versa where the context so require.

3.1.5 Notice, consents, approvals, certificates and determinations:

Wherever in the contract provision is made for giving or issue of any notice consent, certificate or determination by any persons, unless otherwise specified such notice, consent, approval, certificate or determination shall be in writing and the words 'notify' certify or determine shall be constructed accordingly.

3.1.6 Vendor/Contractor to Inform Himself Fully:

The VENDOR/CONTRACTOR shall be deemed to have carefully examined all Contract Documents to his entire satisfaction. If he shall have any doubt as to the meaning of any portion of the Contract/bid Documents, he shall, before accepting / signing the 'Contract' set forth the particulars thereof, and submit them to the Owner in writing, in order that such doubt may be removed. The Ownerwill provide such clarifications as may be necessary in writing to the CONTRACTOR. Any information otherwise obtained from the Owneror the ENGINEER shall not in any way relieve the VENDOR/ CONTRACTOR of his responsibility to fulfil his obligations under the 'Contract'.

3.2 ENGINEER-IN-CHARGE'S REPRESENTATIVE:

3.2.1 Engineer-in-charge's duties and authority:

i) The Ownerwill appoint any of his officers or any agency as the case may be as engineer-in-charge to deal with all the matters related to the execution and operation of contract.

ii) However, the Owner/Owner's representatives reserve the right in checking/tests checking of the operation of the contract in respect of quality, testing, and measurement of works either directly or through a separate agency or both.

3.2.2 Engineer-in-charge's representative:

The engineer-in-charge's representative shall be appointed by and be responsible to the Engineer-in-Charge and shall carry out such duties and exercise such authority as may be delegated to him by the engineer-in-charge under sub clause 3.2.3.

3.2.3 Engineer-in-charge's authority to delegate:

The engineer-in-charge may from time to time delegate to his representative any of the duties and authorities vested in the Engineer-in-charge and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the contractor.

Any communication given by the Engineer-in-charges representative to the contractor in accordance with such delegation shall have the same effect as if, it had been given by the Engineer-in-charge, provided that

(a) Any failure of the Engineer-in-charge's representatives to disapprove any work, materials or plant shall not prejudice the authority of the Engineer-in-charge to disapprove such work, materials or plant and to give instructions for the rectification thereof, and

(b) If the contractor questions any communication of the Engineer-in-charge's representative, he may refer the matter to the Engineer-in-charge who shall confirm, reverse or vary the contents of such communication.

3.2.4 Appointment of Assistant:

The Engineer-in-charges representative may appoint any number of persons to assist the Engineer-in-Charges Representative in carrying out of his duties. He shall notify to the contractor the names, duties and the scope of authority of such persons. Such assistants shall have no authority to issue any instructions to the contractor save in so far as such instructions may be necessary to enable them to carry out their duties and to `secure their acceptance of materials plants or workmanship as being in accordancewith the contractor, and any instructions given by any of them for those purpose shall be deemed to have been given by the Engineer-in-charge's Representative.

3.2.5 Instructions in Writing:

Instructions given by the Engineer-in-charge shall be in writing, provided that if for any reason the Engineer-in-charge considers it necessary to give any such instructions orally, the contractor shall comply with such instructions. Confirmation in writing of such oral instructions given by the Engineer-in-charge, whether before or after carrying out of the instructions, shall deemed to be an instruction within the meaning of this sub clause. Provided further that if the contractor, within 7 days, confirms in writing to the Engineer-in-charge any oral instruction of the Engineer-incharge and such confirmation is not contradicted in writing within 7 days by the Engineer-in-charge, it shall be deemed to be an instruction of the Engineer-in-charge.

The provisions of this sub clause shall equally apply to instructions given by the Engineer-in-charge's Representative and any assistant of the Engineer-in-Charge or the Engineer-in-charge's Representative appointed pursuant to sub clause 3.2.4.

3.3 CONTRACT DOCUMENTS

3.3.1 Language and Law

(a) The language in which the contract documents shall be drawn up is English.

(b) As this contract hasbeen constructed in India, so Indian laws in addition to Laws in force in Tripura shall apply to this contract.

3.3.2 Priority of Contract Documents

The several documents formingthe contract are to be taken as mutuallyexplanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer-in-charge who shall thereupon issue to the contractor instructions thereon and in suchevent, unless otherwise provided in thecontract, the priority of the documents forming the contract shall be as follows:

i. The contract agreement

ii. The letter of acceptance

iii. Letter to proceed with work

iv. Owners requirements and technical specifications

v. Special conditions

vi. The tender.

vii. Bill of Quantities

viii. Specifications

ix. General Conditions

x. Drawings

xi. Any other documents forming part of the contract/contractor's proposals if any.

3.3.3 Custody and supply of drawings and documents

The drawings shall remain in the sole custody of the Engineer-in-charge, but two copies thereof shall be provided to the contractor free of charge. The contractor shall make at his own cost any further copies required by him. Unless it is strictly necessary for the purpose of the contract, the drawings, specifications and other documents provided by the Owneror the engineer-in-charge shall not, without the consent of the engineer-in-charge, be used or communicated to a third party by the contractor. Upon issue of

Defect Liabilities Completion Certificate, the contractor shall return to the Engineer-in-Charge all drawings, specifications, and other documents provided under the contract.

One copy of the Drawings, provided to or supplied by the contractor shall be kept by the contractor on the site and the same shall at all reasonable times be available for inspection and use by the Engineer-in-Charge and any other person authorized by the Engineer-in-Charge in Writing.

3.3.4 Disruption of Progress

The contractor shall give notice to the Engineer-in-charge, whenever planning or execution of the works is likely to be delayed or disrupted unless any further drawing or instruction is issued by

Engineer-in-charge within a reasonable time. The notice shall include details of the drawings or instructions required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

If, by reason of any failure or inability of the Engineer-in-charge to issue, within a time reasonable under the circumstances any drawings or instruction for which notice has been given by the contractor in accordance with this sub clause, the contractor suffers delay, then the Engineer-in-charge shall, after due consultation with the contractor and approval of the Owner, determine any extension of time to which the contractor is entitled.

If the failure or inability of the Engineer-in-charge to issue any drawing or instructions is caused in whole or in part of the failure of the contractor to submit drawings, specifications or other documents which he is required to submit under the contract, the Engineer-in-charge shall take such failure by the contractor into account when making his determination for extension of time.

3.3.5 Supplementary Drawings and Instructions

The Engineer-in-charge shall have the authority to issue to the contractor from time to time, such supplementary drawings in the form of GFC (Good for Construction) drawings and instructions as shall be necessary for the purpose of properand adequate execution and completion of the work and remedying of any defects therein. The contractor shall carry out and be bound by the same.

3.4 GENERAL OBLIGATIONS

3.4.1 Contractor's general responsibilities

The contractor shall with due care and diligence (to the extent provided in the contract) execute and complete the work and remedy any defects therein in accordance with the provisions of the contract. The contractor' shall provide all supervisory, labour,materials, plant, construction equipment and all other things, whether of temporary or permanent nature, required in and for such design, execution, completion and remedying of any defects, so far as the necessity for providing the same is specified in oris reasonably to be inferred from the contract. The contractor shall provide the same in specified form which is reasonably to be inferred from the contract. The contractor shall promptly notify the Owner and the Engineer-in-charge of any effort, omission, fault or any other defect in the design or specifications for the work which he discovers when reviewing the contract documents or in the process of execution of the works.

The contractor shall take the full responsibility for the adequacy, stability andsafety of all site operations and methods of construction, provided that the contract shall not be responsible (except as stated hereunder or as may be otherwise agreed) for the design or specification of works, not prepared by the contractor. Whereas this contract expressly provides that all of the components of this work shall be designed by the contractor, he shall be fully responsible for all the works, notwithstanding any approval by the Engineer-in-charge.

3.4.2 Contract agreement

The contract agreement shall be prepared and completed in the form provided in section –5to these conditions with such modifications as may be necessary.

3.4.3 Inspection of site

The contractor shall deem to have inspected the site and examined itssurroundings and collected information available in connection therewith and to have satisfied himself (so far as is practicable, having regard to considerations of cost and time, at his own responsibility and expense) before submitting his bid, as to:

(a) Theform and nature thereof, including the sub surface conditions

(b) the hydrological and climatic conditions

(c) the extent and nature of work, labour and materials necessary for speedy execution of the works, their availability and other related matters and remedying of any defects therein, and

(d) The means of access to the site and accommodation he may require. And in general, shall be deemed to have obtained all necessary information as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his bid.

3.4.4 Sufficiency of tender

The contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the tender and of the rates and prices stated in the bill of quantities all of which shall except in so far as it is otherwise provided in the contract, cover all his obligations under the contract (including those in respect of the supply of good, materials, plant or services) and all matters and things necessary for the proper execution and completionof the works and remedying of any defects therein.

The rate quoted against each item or work shall be for the complete finished item of work and shall be inclusive of all taxes duties and all cost and expenses which may be required in and for execution and full protection of the work as described together with all general risks/liabilities and obligations set forth or implied in the documents on which the tender is based.

The rates quoted against each item in the schedule of quantities shall be deemed to cater for all minor constructional details which are not specifically mentioned, but are fairly and obviously intended and are essential for the full and final completion of works and the contractor is not entitled to make any extra claim on this account.

3.4.5 Work to be in accordance with contract

Unless it is legally or physically impossible, the contractor shall execute and complete the works and remedy any defects therein in strict accordance with the contract to the satisfaction of the Engineer-in-charge. The contractor shall comply with and adhere strictly to the Engineer-in-charge's instruction

on any matter, whether mentioned in the contract or not, touching or concerning the work. The contractor shall take instructions only from the Engineer-in-Charge orfrom the Engineer-in-charges representative.

3.4.6 Program to be submitted

The contractor shall, within the time of 15 days from the date of letter of award, submit to the Engineer-in-charge for his consent, a program in such form and details as the Engineer-in-charge shall reasonably prescribe, for the execution of the works. The contractor shall whenever requireby the Engineer-in-Charge, also provide in writing for his information a general description of the arrangements and methods which the contractor proposes to adopt for the execution of the works.

If at any time it should appear to the Engineer-in-charge that the actual progress of the works does not confirm to the program to which consent has been given, the contractor shall produce at the request of the Engineer-in-charge, revised program showing the modifications to such program necessary to ensure completion of the works.

3.4.7 Engineer-in-charge at Liberty to Object

The Engineer-in-charge shall be at liberty to object to and require the contractor to remove forthwith from the works any persons provided by the contractor who, in the opinion of the Owner/ Engineer-in-charge, misconducts himself or is incompetent or negligent in the proper performance of his duties, or whose presence on siteis otherwise considered by the Engineer-in-charge to be undesirable, and such persons shall not be again allowed upon the works without the consent of the Engineer-in-charge. Any person so removed from the works shall be replaced as soon as possible.

3.4.8 Setting out

The contractor shall be responsible for:

(a) The accurate setting out of the works in relation to original points, lines and levels, of reference given by the Engineer-in-charge in writingbased on approved DGPS survey data.

(b) The correctness of the position, levels, dimensions and alignments of all part of the works.

(c) The provision of all necessary instruments, appliances and labour in connection with the forgoing responsibilities, if, at any time during the execution of the works any error appears in the position, levels, dimensions or alignment of any part of the works the contractor on being required to do so by the Engineer-in-Charge, shall at his own cost rectify such error to the satisfaction of Engineer-in-Charge, unless such error is based on incorrect data supplied in writing by the Engineer-in-Charge.

(d) The checking of any setting -out or of any Line or level by the Engineer-in-Charge shall not in any way relieve the contractor of his responsibility for the accuracy thereof and the contractor shall

carefully protect and preserve all bench marks sight -rails, pegs and other things used in setting out of the works.

3.4.9 Safety, Security and Protection of the Environment

The contractor shall throughout the execution and completion of the works and the remedying of any defects therein;

(a) Have full regard for the safety of all persons entitled to be upon the site and keep the site (so far as the same is under his control) and the works (the same are not completed or occupied by the Owner) in an orderly state appropriate to the avoidance of danger to such persons.

(b) Provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer-in-Charge or by any duly constituted authority, for the protection of the works or for the safety and convenience of the public or others.

(c) Take all reasonable stepsto protect the environment on and off the site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods or operation.

In case of the failure on the part of the contractor on above accounts, the consequences ofthesame shall be borne by the contractor. Alternatively, the Engineer-in-Charge may takereasonable steps to comply with the above at the risk and cost of the contractor.

3.4.10 Care of works

The contractor shall take full responsibility for the care of the works and materials and plant for incorporation therein from the commencement date until the date of issue of the taking over certificate for the whole of the works,when the responsibility for the said care shall subject to pass to the Ownerprovided that;

(a) If the Engineer-in-Charge issues a taking over certificate for any section or part of the works, the contractor shall cease to be liable for the care of that section or part from the date of issuing of the taking over certificate, when the responsibility for the care of that section shall pass to the Owner, and

(b) The contractor shall take full responsibility for the care of any outstanding works and materials and plant for incorporation therein he undertakes to or is otherwise required to finish during the defect's liabilities period along with the defects if any until such outstanding works have been completed.

3.4.11 Responsibility to Rectify or Damage

If any loss or damage happens to the works or any part thereof, or materials or plant for incorporation therein, during the period for which the contractor is responsible for the care thereof, from any cause whatsoever, other than the risks defined in sub clause 3.4.12, the contractor shall at his own cost,

rectify such toss or damage so that the works confirm in every respect with the provision of the contract to the satisfaction of the Engineer-in-Charge. The contractor shall also be liable for any loss or damage to the works occasioned by him in the course of any operation carried out by him for the purpose of complying with his obligations under clause 3.3.8 and 3.3.9.

3.4.12 Owner's Risks

(a)The Owner's risks are;

1) War, hostilities (whether war be declared or not) invasion act of foreign enemies.
2) Rebellion, revolution, insurrection or military or usurped power or civil war.
3) Pressure waves caused by aircraft or other Arial devices traveling at sonic or supersonic speeds.

(b)Loss or damage due to the use or occupation by the Ownerof any section of part of the works except as may be provided for the contract.

(c)Any operation of the forces of nature (insofar as it occurs on the site) such as earthquakes, tornado, lightening and unprecedented floods etc. against which an experienced contractor could not reasonably have been expected to take precautions.

3.4.13 Fossils

All fossils, coins, articles of value or antiquities and structures and other remains or things of geological or archaeological interest discovered on the site of the works shall be deemed to be absolute property of the Ownerand the contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal, acquaint the Engineer-in-Charge or Engineer-in-Charge's representative of such discovery and carry out the Engineer-in-Charge instructions for dealing with the same.

3.4.14 Underground works

During excavation if existing underground network are noticed and the same is needed to be removed/ relocated, the cost of removal/ relocation shall be determined by the Engineer-in-Charge and reimbursed to the contractor after getting approval of the Owner.

Other than power utility, Engineer –in –Charge shall inform concerned stakeholders for relocating the same.

3.4.15 Taking Over

Upon successful Trial –Operation of the Facilities or any part thereof, pursuant to GCC Sub-Clause 3.4.15, the Ownershall issue to the Contractor a Taking Over Certificate as a proof of the acceptance of the Facilities or any part thereof. Such certificate shall not relieve the Contractor of any of his

obligations which otherwise survive, by the terms and conditions of Contract after issue of such certificate.

If within twenty-one(21) days after receipt of the Contractor's notice, the Ownerfails to issue the Taking Over Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Ownerhas not issued the Taking Over Certificate, the Facilities or the relevant part thereof shall be deemed to have been Taken Over as at the date of the Contractor's said notice.

Upon Taking Over of the Facilities or any part thereof, the Ownershall be responsible for the care and custody of the Facilities or the relevant part thereof, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof.

- **Operational Acceptance**

- **Guarantee Test**

The Guarantee Test (and repeats thereof), if any specified in the SCC and/or the Technical Specification, shall be conducted by the Contractor after successful Trial – Operation of the Facilities or the relevant part thereof to ascertain whether the Facilities or the relevant part can attain the Functional Guarantees specified in the Contract Documents or if otherwise required as per the Technical Specifications. The Contractor's and Engineer in charge authorized personnel may witness the Guarantee Test. The Contractor shall promptly provide the Ownerwith such information as the Ownermay reasonably require in relation to the conduct and results of the Guarantee Test (and any repeats thereof).

If for reasons not attributable to the Contractor, the Guarantee Test of the Facilities or the relevant part thereof cannot be successfully completed within the time stipulated in the Technical Specifications the period for completing the same shall be as agreed upon by the Owner and the Contractor.

- **Operational Acceptance**

Operational Acceptance shall occur in respect of the Facilities or any part thereof as mentioned below:

(I) In case no Functional Guarantees are applicable, Operational Acceptance shall occur when the Facilities or part thereof have been successfully Commissioned and Trial –Operation for the specified period have been successfully completed

(II) In case Functional Guarantees are applicable, Operational Acceptance shall occur when the Functional Guarantees are met or the Contractor has paid liquidated damages specified in GCC Sub-Clause 3.7.8 hereof;

The Engineer in charge shall within twenty-one (21) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate asa proof of the final acceptance of the Plant and

Equipment. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of Contract after issue of such certificate.

- **Partial Acceptance**

If the Contract specifies that Commissioning shall be carried out in respect of parts of the Facilities, the provisions relating to Commissioning including the Trial –Operation and Guarantee Test shall apply to each such part of the Facilities individually, and the Operational Acceptance Certificate shall be issued accordingly for each such part of the Facilities.

3.4.16 Quantity Variation/Deviation

I. During execution of the Contract, TSECL reserves the right to increase or decrease the quantities of items under the Contract but without any change in unit price or other terms & conditions. Such variations shall not be subjected to any limitation for the individual items but the total variations in all such items including items not covered under the Contract shall be limited **to ±25%.**

II. The Contract price shall accordingly be adjusted based on the unit rates available in the Contract for the change in quantities as above. The base unit rates, as identified in the Contract shall however remain constant during the currency of the Contract. In case, the unit rates are not available in the contract, the same shall be worked out as below: -

i) If the rates for the additional, altered or substituted work are specified in the contract, the contractor is bound to carry the additional, altered or substituted work at the same rates as are specified in the contract.

ii) If the rates for the additional, altered or substituted work are not specifically provided in the contract, the rates will be derived from a similar class of work as are specified in the contract.

iii) If the rates for the additional, altered or substituted work includes any work for which no rate is specified in the contract / cannot be derived from the similar class of work in the contract, then such work shall be carried out at the rates which will be determined on the basis of current schedule of rate of TSECL above minus / plus the percentage which the total contract amount bears to the estimated cost put to tender. Provided always if the rate for particular part or parts of the item is not available in the schedule of rates, the rate of such part or parts will be determined by TSECL of the work on the basis of the prevailing market rate when the work was done.

iv) If the rates for the additional, altered or substituted work cannot be determined in the manner specified in sub-clause i, ii & iii above, then the contractor shall within 7(Seven) days of receipt of order to carry out the order, inform the owner's Engineer in charge of the work of rate which it is his intention to charge for such class of work, supported by analysis of rate or rates claimed, and TSECL shall determine the rate or rates claimed with mutual settlement with the contractor.

v) The deviation limit referred to above is the net effect (**algebraically sum**) of all additions and deductions ordered.

vi) Time for the completion for the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract of the work and the certificate of the owner's Engineer in charge **(Deputy General Manager / Senior Manager)**of the **work shall be conclusive for approval of the time extension by TSECL.**

3.4.17 Functional Guarantees

The Contractor guarantees that the Facilities and all parts thereof shall attain the Functional Guarantees specified in the Technical Specifications, subject to and upon the conditions therein specified.

If, for reasons attributable to the Contractor, the minimum level of the Functional Guarantees specified in the Technical Specifications are not met either in whole or in part, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the Plant or any part thereof as may be necessary to meet at least the minimum level of such Guarantees. The Contractor shall notify the Owner upon completion of the necessary changes, modifications and / or additions, and shall request the Owner to repeat the Guarantee Test until the minimum level of the Guarantees has been met. If the Contractor eventually fails to meet the minimum level of Functional Guarantees, the Owner may consider termination of the Contract and recover the payments already made to the Contractor.

3.4.18 Equipment Performance Guarantees

The Contractor guarantees that the Equipment, named in the **SCC**, shall attain the rating and performance requirements specified to the Contract Agreement, subject to and upon the conditions therein specified.

If the guarantees specified to the Contract Agreement are not established, then the Owner shall reject the equipment.

In case the Owner rejects the equipment, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the equipment or any part thereof as may be necessary to meet the specified guarantees. The Contractor shall notify the Owner upon completion of the necessary changes, modifications and/or additions, and shall request the Owner to repeat the Test until the level of the specified guarantee has been met.

The guarantee period for equipment other than cable shall be min. 18months from the date of delivery or 12months from the date of erection& commissioning, whichever is later.

3.4.19 Patent Rights

The contractor shallindemnify the Owneragainst all claims and proceedings for or on account of infringement of any patent right, design, trademark or name or other protected right in respect of any contractor's equipment, materials or plant used for or in connection with or for incorporation in the works and from and against all damages, costs, charges and expenses whatsoever in respect or in relation thereto, except where such infringement result from the compliance with the design or specification provided by the Engineer-in-Charge.

3.4.20 Royalties

Except where otherwise stated the contractor shall pay all tonnage and other royalties, rent feesand other payments Like royalty or compensation (if any) for getting stone, sand, gravel, clay or other materials required for the works or any of them.

3.4.21 Contractor to keep site clear

During the execution of the works the contractor shall keep the site reasonably free from all unnecessaryobstructions and shall dispose-off any contractor's equipmentand surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required.

3.4.22 Clearance of site on Completion

Before the issue of any Taking Over Certificate, the contractor shall clear away and remove from that part of the site to which such taking over certificate relates all contractor's equipment surplus material rubbish and temporary works of every kind and leave such part of the site and works clean and in workmanlike condition to the satisfaction of the Owner/ Engineer-in-Charge, provided that the contractor shall be entitled to retain on site, until the end of the defects liabilities period, such materials, contractor's equipment, and temporary works as are required by him for the purpose of fulfilling his obligations during the defectsLiabilities period.

3.4.23 Staff and Labour

(a) Minimum technical/non-technical/supervisory staff shall be posted as per details provided in pre-qualificationbid documents. Same staff shall not be changed/ replaced without prior approval of the Owner. In rare emergency cases, with proper justification, replacement of staff shall be permitted by the Owner, if person of similar and equivalent qualifications and experience is proposed as replacement of originally proposed employees in S.B.D document.

(b) **Labour**

The contactor shall make his own arrangements for engagement of all labour local or other. The contractor shall, if required, by the Engineer-in-Charge, deliver to the Engineer-in-Charge's representative, or at his office, a return, in detail, in such form and such intervals as the engineer in charge may prescribe showing supervisory staff and the number of the several classes of labour from

time to time employed by the contractor on the site and such information regarding constructional plant as the Engineer-in-Charge's representatives may require. The contractor shall file all labour returns in detail to the respective authorities/statutory bodies as prescribed under law applicable at the work site and inform the Owner/ Engineer-in-Charge with copies of such returns directly filed.

The contractor shall abide by the local laws and regulations governing Labour applicable from time totime. During continuance of the contract, the contractor shall at all times abide by all existing Labourenactments and rules made there under, regulations, notifications and bye laws of state or Central Government or local authority and any other Labour law (including rules) regulations, bye laws that may be passed or notification under any labour law in future either by the state or the central government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given hereinafter. The contractor shall keep the Ownerindemnified in case any action is taken against the Ownerby the competent authority on account of the contravention of any of the provisions of any Act of rules made there underregulations or notifications including amendments. If the Owner is caused to pay or reimburse such amounts, as may be necessary to cause or observe or for non-observance of the provisions stipulated in the notifications in the amendments/ bye/Laws/acts/rules/regulations/including amendments if any on the part of contractor, the Engineer-in-Charge shall have the right to deduct such amounts from any money due to the contractor. The Engineer-in-Charge shall also have right to recover from the contractor any sum required or estimated to be required for making good the loss or damage suffered by the Owner.

The employees of the contractor and the sub-contractors in no case shall be treated as the employees of the Owner at any point of time.

Salient features of some of major labour laws applicable to establishments engaged in building and other construction works are as given below;

(c) **Workmen Compensation Act, 1923**

The Act provides for compensation in case of injury by accident arising out of land during the course of employment.

(d) **Payment of Gratuity Act, 1972**

Gratuity is payable to the employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days'wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

(e) **Employees P.F. and Miscellaneous Provision Act, 1952**

The Act provides for monthly contributions by the Owner plus worker @ 10% or 8.33% or as amended from time to time.

The benefits payable under the Act are:

i. Pension or family pension on retirement or death as the case may be.

ii. Deposit linked insurance on the death in harness of the worker.

iii. Payment of P.F, accumulation on retirement/deathetc.

(f) **Maternity Benefit Act, 1951**

The Act provides for leave and some other benefits to women employee's in case of confinement or miscarriage etc.

(g) **Contract Labour (Regulation and Abolition) Act, 1970**

The Act provides for certain welfare measures to be provided by the contractor to contract labour and in case the contractor fails to provide, the same are required to be provided by the Principal Ownerby Law. The Principal Owneris required to take certificate of registration and the contractor is required to take a license from the designated officer. The Act is applicable to the establishments or contractor of Principal Ownerif the Owneremploys 20 or more contract labour.

(h) **Minimum Wages Act, 1948**

The Owneris supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provision of the Act if the employment is a scheduled employment.

(i) **Payment of Wages Act, 1936**

It lies down as to by what date the wages are to be paid, when it will be paid, and what deductions can be made from the wages of the workers.

(j) **Equal Remuneration Act, 1979**

The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against female employees in the matters of transfers, training and promotions etc.

(k) **Payment of Bonus Act, 1965**

The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payment of annual bonus subject to a minimum of 8.33% of the wages and maximum of 20% of wages to employees drawing Rs.3500/-P.M. or less. The bonus to be paid to employees getting Rs.2500/-P.M. or above upto Rs.3500/-P.M. shall be worked out by taking wages as Rs.2500/-per month only. The Updated amendments of act shall apply completely.

(l) **Industrial Disputes Act, 1947**

The Act Lays down the machinery and procedure for resolution of industrial dispute, in what situations a strike or lockout becomes illegal and what are the requirements for Laying off or retrenching the employees orclosing down the establishment.

(m) **Industrial Employment (Standing Orders) Act, 1946**

It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the states and Central Government to 50) The act provides for layingdown rules governing the conditions of employment by the Owneron matters provided in the Act and get the same certified by the designated authority.

(n) **Trade Unions Act, 1926**

The Act lays down the procedure for registration of trade unions of workmen and Owners. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(o) **Child Labour (Prohibition & Regulation) Act, 1986**

The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and process, employment of Child Labour is prohibited in Building and Construction Industry.

(p) **Inter State Migrant Workmen's (Regulation of Employment & Condition of Service) Act, 1979**

The Act is applicable to an establishment which have 5 employs or more interstate migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment in another state) The interstate migrant workmen in an establishment to which this act becomes applicable are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back etc.

(q) **The building and other Construction Workers (Regulation of Employment and Condition of Service) Act, 1996 and the Cess Act, 1996**

All establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be notified by the Government. The Ownerof the establishment is required to provide safety Measures at the building or construction work and other welfare measures, such asCanteens, First Aid Facilities, Ambulance, Housing accommodation for workers etc. The Ownerto whom the Act applies has to obtain a registration certificate from the Registering officer appointed by the Government.

However, the contractor shall follow all the various acts with latest amendments.

3.4.24 Indemnity Bond

For the equipment/material, it will be the responsibility of the Contractor to take delivery, unload and store the materials at Site and execute an Indemnity Bond and obtain authorization letter from Owneras per pro forma enclosed at Section-5-'Form for Indemnity Bond to be executed by the Contractor', in favour of the Owneragainst loss, damage and any risks involved for the full value of the materials. This Indemnity Bond shall be furnished by the Contractor before commencement of the supplies and shall be valid till the scheduled date of Taking Over of the equipment by the Owner.

3.4.25 Income taxes on staff

The contractor's staff, personnel and labour shall be Liable to pay personnel income taxes in the Owner's country of such of their salaries and wages, as are chargeable under thelaws and regulations from the time being in force and the contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

3.4.26 Details to be Confidential

The contractor shall treat the details of the contract as private and confidential; save in so-far as may be necessary for the purposes thereof and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the prior consent in writing of the Engineer-in-Charge. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the contract the same shall, be referred to the decision of the Ownerwhose award shall be final.

3.4.27 Drawing and Photographs of the Works

The contractor shall not disclose details of drawings furnished to him, drawings submitted by him and approved by the engineer-in-Charge and Works on which he is engaged without the prior approval of the Engineer-in-Charge in writing to anyone. No photographs of the works or any part thereof or plant employed thereon shall be taken or permitted by the contractor to be taken by any of his employees without the prior approval of the Engineer-in-Charge in writing and no such photographs shall be published or otherwise circulated without the approval of the Engineer-in-Charge in writing.

The Apprentices Act, 1961

The contractor shall duly comply with the provisions of the latest apprentices Act, the rules made there under and the orders that may be issued from time to time under the said act and the said rules and on his failure or neglect to do so, he shall be subject to all liabilities and penalties provided by the said Act and said rules.

3.4.28 Engineer-in-Charge's Authority to Correct Errors

The Engineer-in-Charge shall at the request of the contractor or at his own initiative subject to the provisions of this clause and with retrospective effect from the date of this contract have authority to

make a determination correcting any manifest error (including for the avoidance of doubt and without prejudiceof the Engineer-in-charge's authority in this regard any error of spelling grammar or punctuation and any omission inclusion or misplacement of text) in any of this contract provided always that;

(a) The Engineer-in-Charge before making such determination shall by notice to contractor provide him with a draft thereof and give him reasonable time in which to comment on the draft.

(b) The Engineer-in-Charge shall in making such determination take into consideration the presumed intentions of the parties the wording of any provision of the conditions of the contract for use and any comments received by the contractor on the draft determination provided to him under para (a) of this sub clause.

(c) The Engineer-in-Charge shall provide the contractor with a copy of the determination made by him.

3.5 MATERIALS, PLANT AND WORKMANSHIP

3.5.1 Quality of Materials, plant, Machinery and workmanship

All materials, plant and workmanship shall be:

(a) Of the respective kind described in the contract and in accordance with the Engineer-in-Charge's instructions and

(b) Subjected from time to time, to such tests as the Engineer-in-charge may require at the place of manufacturer, fabrication or preparation or on the site or at such other places as may bespecified in the contract as decided by the Engineer-in-Charge.

The contractor shall provide such assistance, labour, electricity, fuels, stores, tools and tackles apparatus and instruments as are normally required for examining, measuring and testing any materials or plant and shall supply samples or materials before incorporation in the works for testing as may be selected and required by the Engineer-in-Charge.

3.5.2 a) Field test laboratory

The contractual agency will maintain a full-fledged field laboratory, where all equipment to conduct tests for quality control of materials/works executed shall be kept, so that all field tests of all the components of this contract can be carried out without any hindrance. Proper records of all tests shall be maintained. Copies of all tests conducted in field laboratory shall be given to Engineer-in-Charge. The staff of Owner will have access to this laboratory and will have power to conduct/supervise field tests of various material /equipment any time in their presence. The total cost of establishing/maintenance and conducting field tests shall be borne by the contractor.

(b) Cost of samples

All samples shall be prepared and supplied by the contractor at his own cost.

3.5.3 Testing from outside laboratory

(a) The Owner reserve its right to get material/ works tested from some reputed outside field laboratory such as NIT/Tripura, CPRI/ ERADA/NABL accredited Lab and contractual agency will have no objections for same whatsoever. The cost of making such test samples and its transportation to such tests laboratory etc. shall be borne by contractor including**, the fees of laboratory for such tests.**

(b) TSECL reserves its right to get any material tested from outside reputed test house as referred above for testing, to ensure quality of all material. But in case of failure of any lot of material, all the work executed with that lot of material shall be rejected.

(c) Sampling of work in progress shall be carried out by representative of Engineer-in-Charge, and shall be got tested from reputed test house as referred above for quality control.

3.5.4 Inspection facilities

(a) The Engineer-in-Charge and any person authorized by him shall at all reasonable times have access to the site and to all workshop and places where materials or plant are being manufactured fabricated or prepared for the works and the contractor shall afford every facility for and every assistance in obtaining the right to such access.

(b) **Inspection and Testing**

The Engineer-in-Charge shall be entitled during manufacture, fabrication or preparation of inspection and test the materials and plant to be supplied under the contract. If materials or plant are being manufactured, fabricated or prepared in workshop of places other than those of the contactor, the contractor shall obtain permission for the Engineer-in-Charge to carry out such inspection and testing in those workshops or places, such inspection or testing shall not release the contractor from any obligations under the contract.

(c) **Dates for inspection and testing**

The contractor shall agree with the Engineer-in-Charge on the time and place for the inspection of testing of any materials or plant as provided in the contract. The Engineer-in-Charge shall give the contractor not less than 24 hours' notice of his intention to carry out the inspection or to attend the tests. If the Engineer-in-Charge, or his duly authorized representative does not attend on the date agreed, the contractor may unless otherwise instructed by the Engineer-in-Charge proceed with the tests, which shall be deemed to have been made in the presence of the Engineer-in-Charge. **Inspection may be waived if successful bidder pray for waiving the same , but , 3% cost of each materials will be deducted from the agreement value**.

(d) **Rejection**

If at the time and place agreed in accordance with the sub clause 3.5.4.C, the materials or plant are not ready for inspection or testing or if as a result of inspection or testing referred to in this clause the Engineer-in-Charge determines that the materials or plant are defective or otherwise not in accordance with the contract he may reject the materials or plant and shall notify the contractor thereof immediately. The notice shall state the Engineer-in-Charges objection with reasons. The contractor shall then promptly make good the defect or ensure that rejected materials or plant comply with the contract.

3.5.5 Examination of work before covering up

No part of the works shall be covered up or put out of view, without the prior approval of the Engineer-in-Charge and the contractor shall afford full opportunity for the Engineer-in-Charge to examine and measure any such part of works which is about to be covered up or put out of view and to examine before any part of the works is placed thereon. The contractor shall give notice to the Engineer-in-Charge whenever any such part of the works is ready or about to be ready for examination and the Engineer-in-Charge shall unless he considers it is unnecessary to examine such part of the works.

3.6 SUSPENSION OF WORK

3.6.1 SUSPENSION OF WORK

The contractor shall on the instructions of Engineer-in-charge suspend the progress of the works or any part thereof for such time and in such manner as the Engineer-in-Charge may consider necessary and shall, during such suspension properly protect and secure the works or such part thereof so far as is necessary in the opinion of the Engineer-in-Charge. Unless such suspension is:

(a) otherwise provided for in the contract or

(b) necessary by reason of some default of or breach of contract by the contractor for which he is responsible or

(c) Necessary for the proper execution of the works or for the safety of the works or any part thereof save to the extent that such necessity arises from any act or default by the Engineer-in-Charge or the Owneror from any of the risks defined in sub clause 3.4.12shall apply.

3.6.2 Engineer-in-Charge'sDetermination Following Suspension

Where, pursuant of sub clause 6.6.1 this sub clause applies that the Engineer-in-Charge shall determine any extension of time for which the contractor is entitled under the contract, determine any extension of time for which the contractor is entitled under sub clause 3.7.4

3.6.3 Suspension lasting more than 90 days

If the progress of the works or any part thereof is suspended on the instructions of the Engineer-in-Charge and if permission to resume work is not given by the Engineer-in-Charge within a period of

90days from the date of suspension then unless such suspension is within paragraph (a), (b) or (c) of sub clause 3.6, the contractor may give notice to the Engineer-in-Charge requiring permission within 30days from the receipt thereof to proceed with the works or that part thereof in regard to which progress is suspended, if within the said time, such permission is not granted, the contractor may, but is not bound to, treat the suspension where it effects part only of the works as an omission of such part under clause 3.10.0 by giving a further notice to the Engineer-in-Charge to that effect or where it effect the whole of the works treat the suspension as an event of default by the Ownerand terminate his employment under the contract in accordance with the provisions of sub clause 3.21.1 whereupon the provisions of sub clause 3.21.2 and 3.21.3 shall apply.

3.7 COMMENCEMENT AND DELAYS

3.7.1 COMMENCEMENT OF WORK

The contractor shall commence the works within the period specified in the tender after the receipt by him of an order in writing to this effect from the Engineer-in-Charge and shall proceed with the works due expedition and without delay except as may be expressly sanctioned or ordered by the Engineer-in-Charge or be wholly beyond the contractor's control.

3.7.2 Possession of site

The Engineer-in-Charge will issue a written order to commence the works, give to the contractor possession of so much of the site as may be required to enable the contractor to commence and proceed with the construction of the works in accordance withthe program if any, and otherwise in accordance with such reasonable proposals, of the contractor as he shall by giving notice in writing to the Engineer-in-Charge. The Engineer-in-Charge will from time to time,as the works proceed,give to the contractor possession of such further portions of the site as may be required to enable the contractor to proceed with the execution of the works, in accordance with the said program or proposals as the case may be.

If the contractor suffers from failure on the part of the Ownerto give possession in accordance with the terms of this clause, the Engineer-in-Charge shall on the request of the contractor grant an extension of time for the completion of the works.

3.7.3 Time for completion

The whole of the works and, if applicable any section required to be completed within a particular time as stated in the bid shall be completed in accordance with the provision specified in section 12within the time stated for completion of the whole of the works or the section calculated from the commencement date or such extended time as may be allowed under sub clause 3.7.4.

3.7.4 Extension of Time

TSECL may consider granting**time extension**for completion of the work if it is felt absolutely essential on fulfilment of following conditions by the Contractor: -

a) The contractor must apply to the Engineer-In-charge in writing for extension of time so required justifying the necessity.

b) Such application must state **the grounds**which hindered the contractor in the execution of the work within the time as stipulated in the contract document.

c) Such application must be made within **07days**of the date on which suchhindrance had arisen.

d) The **Engineer-in charge**must be of the opinion that the grounds shown for the extension of time are reasonable and without extension of such time completion of the work is practically impossible.

e) **The Engineer-In-Charge** will have full powers, but the orders on the application of the Contractor accepted by the Authorities higher than the Engineer-In-Charge shall be issued by him only after written approval from the concerned authority higher than Engineer-In-Charge.

f) The opinion of the**Engineer-in-charge**, whether the grounds shown for the **time are or are not reasonable is final. If the Engineer-in-charge is of the**opinion that the grounds shown by the supplier/ contractor are not reasonable and declines to grant extension to time, the supplier/contractor cannot challenge.

3.7.5 Interim Determination of Extension

Provided also that where an event has a continuing effect such that it is not practicable for the contractor to submit detailed particulars within the period of 30days referred to in sub clause 6.7.4he shall nevertheless be entitled to an extension of time provided that he has submitted to the Engineer-in-Charge interim particulars at intervals of not more than 30days and final particulars within 30days of the end of the effect resulting from the event. On receipt of such interim particular, the Engineer-in-Charge shall without undue delay make an interim determination of extension of time and on receipt of final particulars of the Engineer-in-Charge shall review all the circumstances and shall determine an overall extension of time in regard to the event, in both such cases the Engineer-in-Charge shall make his determination and shall notify the contractor of the determination.

3.7.6 Restriction of working hours

Subject to any provisions contrary to that contained in the contract, none of the works shall save as hereinafter provided be carried on during the night or on Locally recognized days of rest without the prior consent of the Engineer-in-Charge except when work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the works in which case the contractor shall immediately advise the Engineer-in-Charge provided that the provisions of this sub clause shall not be applicable in the case of any work which is customary to carry out by multiple shifts.

3.7.7 Rate of Progress

If for any reason, which does not entitle the contractor to an extension of time, the rate of progress of the works or any section, is at any time in the opinion of the Engineer-in-Charge too slow to comply with the time for completion, the Engineer-in-Charge shall so notify the contractor who shall thereupon take such steps as are necessary subject to the consent of Engineer-in-Charge to expedite progress so as to comply with the time for completion. The contractor shall not be entitled to any additional payment for the taking such steps. If as a result of any notice given by the Engineer-in-Charge under this sub clause the contractor considers that it is necessary to do any work at night or on locally recognized days of rest he shall be entitled to seek the consent of the Engineer-in-Charge to do so. Provided that if any steps, taken by the contractor in meeting his obligation under this clause, involves the Owneradditional supervision costs shall after due, consultation with the contractor by the Owner, may be deducted by the Owners from any money due or to become due to contractor by the Engineer-in-Charge. The Engineer-in-Charge shall notify the contractor accordingly. The Engineer-in-Charge also reserves the rights to withhold/levy liquidated damages at the discretion of the Owner, at any stage of execution of work, if the desired progress is not achieved as per the schedule at the rate **of 1% per week subject to a maximum of 5% of the Contract price.**

3.7.8 Liquidated Damages for Delay

If the Contractor fails to comply with the Time for Completion, in accordance with Sub-Clause 3.7.7, then the Contractor shall pay at the rate **of 1% per week subject to a maximum of 10% of the Contract price.** to the Ownerthe relevant sum stated in the Bid as liquidated damages for such default for every week or part thereof which shall elapse between the relevant Time for Completion and the date stated in a Taking-Over Certificate of the whole of the works or the relevant section, subject to the applicable limit stated in the bid. The Ownermay, without prejudice to any other method of recovery, deduct the amount towards such damages from any moneydue or to become due to the Contractor. The payment or deduction of such damages shall not relieve the contractor from his obligations to complete the works, or from any other of his obligation and liabilities under the contract.

3.7.9 Taking over / Completion Certificate

When the whole work has been substantially completed and have satisfactorily passed any tests on completion prescribed by the contract, the contractor may give a notice to that effect to the Engineer-in-Charge, accompanied by a written undertaking stating the remaining of the works to be completed within the specified time. Such notice and undertaking shall be deemed to be a request by the contractor for the Engineer-in-Charge to issue a Taking over Certificate in respect of the completion of whole works. The Engineer-in-Charge shall within 21 days of the date of delivery of such notice, with a copy to the Owner, issue to the contractor, either a provisional taking over certificate specifying the list of outstanding work ("Punch List") required to be completed along with specified for completion of the same or list specifying all the work which in the Engineer-in-Charge's opinion is

required to be done by the contractor before the issue of such certificate. The Engineer-in-Charge shall also notify the contractor of any defects in the works affecting substantial completion that may appear after such instructions and before completion of the works specified therein. Otherwise, the contractor shall be entitled to receive such taking over Certificate within 21 days of completion of whole of works to the satisfaction of the Engineer-in-Charge of the works so specified andremedying any defects so notified.

In the event of the contractor completing the whole of the works, or any section before the stipulated time, the right to take over the same shall lie with the Owneronly.

Contractor shall have no claim whatsoever on this account.

3.8 DEFECT LIABILITIES

The expression of defect liability period shall mean the defects liability period to be calculated from the date of issuance of Taking over Certificate on completion of whole of the work and not from the provisional Taking over Certificate/Completion Certificate issued by Engineer-in-Charge in between period i.e. before completion of whole work.

3.8.1 DEFECT LIABILITIES PERIOD

The defect liability period will be One year (12 months) from the date successful commissioning or from the date of issuance of Taking over Certificate on completion of whole of the work. The contractor is required to maintain the minimum work force at site to execute this work during liabilities period, as determined by the Engineer in charge.

3.8.2 Cost of Remedying Defects

All works shall be executed by the contractor at his own cost if the necessity. Thereof is in the opinion of the Engineer-in-Charge, due to;

(a) the use of materials, plant or workmanship not in accordance with the contract, or

(b) where the contractor is responsible for the design of part of the works any fault in such design or

(c) The neglect, failure on the part of the contractor to comply with any obligation, expressed or implied on the contractor's part under the contract.

3.8.3 Contractor's Failure to Carry out Instructions

In case of default on the part of the contractor in carrying out such instructions within a reasonable time, the Ownershall be entitled to employ and pay other persons to carry out the same and if such work is in the opinion of the Engineer-in-Charge, the contractor was liable to do at his own cost under the contract, then, all costs consequent thereupon or incidental thereto shall be determined by the Engineer-in-Charge and shall be recoverable from the contractor by the Ownerand may be deducted

by the Ownerfrom any money due or to become due to the contractor and the Engineer-in-Charge shall notify the contactor accordingly.

3.10 ALTERATIONS, ADDITIONS AND OMISSIONS

3.10.1 Variations

The Engineer-in-Charge shall have power:

(a) To makealteration in, omissions from, additions to or substitutions fromthe original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and

(b) To omit a part of the works in case of non-availability of a site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions or substituted work which the contractor may be directed to do in the manner specified above on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided.

(c) The contractor shall be bound to carry out in accordance any instructions, which may be given to him in writing by the Engineer-in-Charge and such alterations, omission, additions and substitutions shall not invalidate the contract.

(d) The time for completion of work shall in the event of any deviations resulting in additionalcost over the tendered value sum being ordered, be extended, if requested by the contractor, inproportion, which the additional cost of the altered, additional or substituted work, bears to the original tendered value.

3.10.2 Valuations of Variations

Rate for such altered, additional or substituted work shall be determined by the Engineer-in-Charge as follows:

(a) If the rate for which altered, additional or substituted item or work is specified in the bill of quantities, the contractor shall carry out the altered, additional or substituted items at the same rate. In the case of composite tenders when two or more bills of quantities may form part of the contract the applicable rate shall be taken from the bill of quantities of that particular part in which the deviation is involved, failing that at lowest applicable rate for the same item of work in the other bill of quantities.

(b) If the rate for any altered, additional or substituted item of work cannot be determined in the manner specified in sub paras (a)&(b) above, the contractor shall within 15 days of the date of receipt of the order to carry out the said work, inform the Engineer-in-Charge of the rate which he proposes to claim for such item of work, supported by analysis of the rate claimed and the Engineer-in-Charge shall within three months thereafter, after giving due consideration to the rates claimed by the

contractor, determine the rate on the basis of market rate(s). In the event of the contractor failing to inform the Engineer-in-Charge within the stipulated period of time, the rate which he proposes to claim the rate for such item shall be determined by the Engineer-in-Charge on the basis of special condition of contract.

3.10.3 Valuations of Variations

(a) Quoted rates for all items shall be firm, fixed and binding on the contractor irrespective of any variations (on plus or minus side) of quantities of individual items stated in Bill of Quantities.

3.11 PROCEDURE FOR CLAIMS

3.11.1 Notice to claims

Notwithstanding any other provision of the contract, if the contractor intends to claim any additional payment pursuant to any clause of these conditions or otherwise, he shall give notice of his intention to the Engineer-in-Charge, within 14 days after the event giving rise to the claim has first arisen.

3.11.2 Contemporary Records

Upon the happening of the event referred to in sub clause 3.11.1, the contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make. Without necessary admitting the Owner's liability, the Engineer-in-Charge shall on receipt of a notice under sub clause 3.11.1, inspect such contemporary records and may instruct the contractor to keep any further contemporary records as are reasonable and may be material to the claims of which notice has been given. The contractor shall permit the Engineer-in-charge to inspect all the records kept pursuant to this sub clause and shall supply him with copies thereof as and when the Engineer-in-Charge so instructs.

3.11.3 Substantiation of Claims

Within 14 days, or such other reasonable time as may be agreed to by the Engineer-in-Charge of giving notice under sub clause 3.11.1, the contractor shall send to the Engineer-in-Charge an account giving detailed particulars of the amount claimed and the grounds upon which the claim is based. Where the event giving rise to the claim has a continuing effect, such account shall be considered to be an interim account and the contractor shall, at such intervals as the Engineer-in-Charge may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Engineer-in-Charge, the contractor shall send a final account within 14 days of the endof the effect resulting from the event. The contractor shall, if required by the Engineer-in-Charge to do so, send copy of all accounts to the Engineer-in-Charge pursuant to this sub clause.

3.11.4 Failure to Comply

If the contractor fails to comply with any of the provisions of this clause in respect of any claim which he seeks to make, his entitlement to payment in respect thereof shall not exceed such amount as the Engineer-in-Charge or any arbitrators appointed pursuant to sub clause 3.19.3 assessing the claims, considers to be verified by the contemporary records (whether or not such records were brought to the Engineer-in-Charge's notice).

3.11.5 Payments of claims

The contractor shall be entitled to have included in any interim payment certified by the Engineer-in-charge pursuant to clause 3.15.0 such amount in respect of any claim as the Engineer-in-charge, may consider due to the contractor provided that the contractor has supplied sufficient particulars to enable the Engineer-in-Charge to determine the amount due. If such particulars are insufficient to substantiate the whole of the claim, the contractor shall be entitled to payment in respect of such part of the claim as such particulars may substantiate to the satisfaction of the Engineer-in-Charge. The Engineer-in-Charge shall notify the contractor of any determination made under this sub clause.

3.12 CONTRACTOR'S EQUIPMENTS, TEMPORARY WORKS AND MATERIALS

3.12.1 Contractor's equipment, Temporary Works and Materials use for the Works

All contractor's equipment, temporary works and materials provided by the contractor shall, when brought on to the site, be needed to be exclusively indented for the execution of the works and the contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the site to another, without the consent ofthe Engineer-in-Charge. Provided that consent shall not be required for vehicles engaged in transporting any staff,labour, contractor's equipment, temporary works, plant or materials to or from thesite.

3.12.3 Owner Not Liable for Damage

The Ownershall not at any time be liable, as mentioned in clause 3.4.10 and 3.17.0, for the loss or of damage to any of the said contractor' equipment, temporary works or materials.

3.13 MEASUREMENTS

3.13.1 Measurements of work executed

The contractor shall, without extra charges, provide all assistance with every appliance, labour and other things necessary for measurements and recording levels.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provisions inthe relevant Indian Standard Methodof Measurement or any general or local custom. In the case of items which are not covered by specifications, measurement shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of

Indian Standards and if for any item no such standard is available then a mutually agreed method shall be followed.

The contractor shall give not less than seven days' notice to the Engineer-in-Charge or his authorized representatives in charge of work before covering up or otherwise placing beyond the reach of measurement. Any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of any work without consent in writing of the Engineer-in-Charge or his authorized representative in charge of the work who shall within the aforesaid period of seven days inspect, the work, and if any work shall be covered up or placed beyond the reach of measurement without such notice having been given or the Engineer-in-Charge consent not being obtained in writing, the same shall be uncovered at the contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Engineer-in-Charge or his authorized representative may cause either themselves or through another officer of the TSECLto check the measurements recorded jointly or otherwise as aforesaid and all provisions stipulated herein above shall be applicable to such checking of measurement orlevels.

It is also a term of this contract that recording of measurement of any item of work in the measurement book and/or its payment of the interim, on account or final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over measurement or defects noticed till completion of the Defects Liabilities Period.

3.14 SUB –CONTRACTING

3.14.1 SUB –CONTRACTING

That the contractor shall not assign or sublet any partof the work to a sub-contractor, without the prior written consent of the Owner. Such written consent/ permission to appoint sub-contractor, however, shall not relieve the contractor from any of his responsibilities, obligations and liabilities under the contract. The contractor shall be responsible for acts, defaults and neglect of all sub-contractors and their agents and workmen. Any permission to sub contract parts of the work shall not relieve the contractor from any of his responsibilities, obligations and Liabilities under this contract Agreement.

That in the event of appointment of a sub-contractor by the contractor without prior consent all in case such appointment of sub-contractor, is not approved by the Owneror there is breach of any other obligations of the contract, the Ownershall have a right to initiate the appropriate proceedings including blacklisting the contractor.

However, the contactor may sub-let the work to the extent of 50% of the total contract value with the prior approval of the Owner. However, the eligibility of the sub-contractor will be assessed on the

same eligibility criteria as is prescribed for the main contract on pro-rata basis. Details of Sub-contractors to be submitted during bid submission.

3.14.2 Design requirement to be expressly stated

If in connection with any provisional sum the services to be provided include any matter of design or specification of any part of the works or of any plant to be incorporated therein, such requirement shall be expressly stated in the contract and shall be included in any nominated sub contract. The nominated sub contract shall specify that the nominated sub-contractor providing such services shall be best of engineering practices without any deviation or compromise in respect of project outcome and indemnify the contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities.

3.15 CERTIFICATES AND PAYMENT

3.15.1 Monthly Statements

The contractor shall submit a statement in 3 copies to the Engineer-in-Charge by 7thday of each month for the work executed up to the end of previous month in a tabulated form approved by the Engineer-in-Charge, showing the outstanding amounts in Indian Rupees to which the Contractor Considers himself to be entitled.

3.15.2 Monthly Payments

The said statement shall be approved or amended by the Engineer-in-Charge in such a way that in his opinion, it reflects the amount due to the contractor in accordance with the contract, after deduction, of any sums which may have become due and payable by the contactor to the Owner. In case where there is difference of opinion as to the value of any item the Engineer-in-Charge's view shall prevail. Within the 14th day of the month following the receipt of the monthly statement, the Engineer-in-Charge shall determine the outstanding amounts due to the contractor and shall issue to the contractor a certificate called "Interim Payment Certificate" certifying the amount due to the contractor. However, the Engineer-in-Charge may recommend advance payment against on account of bills when there is likely to be delay in authorizing payments for some special reasons which should be recorded.

3.15.3 Correction of Certificates

In any Latest Interim Payment Certificate,the Engineer-in-Charge may make any correction or modifications in any previous interim payment certificate which shall have been issued by him and shall have the authority, if any work is not being carried out to his satisfaction, to omit or reduce the value of such work while determining the outstanding amounts for latest Interim Payment Certificate.

3.15.4 Statement at completion

Not later than 90days after the issue of the Taking Over Certificate in respect of the whole of the works, the contractor shall submit to the Engineer-in-Charge 3 copies of a statement at completion with supporting documents showing in details, in the form approved by the Engineer-in-Charge:

(a) The final value of all work done in accordance with the contract upto the date stated in such Taking over Certificate.

(b) Any further sums which the contractors considerto be due.

(c) A set of completion drawings of all works executed at site.

3.15.5 Final statement

Not later than 60days after the issue of the no defect liability certificate, the contractor shall submit to the Engineer-in-Charge for consideration 3 copies of a draft final statement with supporting documents showing in detail, in the form approved by the Engineer-in-Charge:

(a) The value of all work done in accordance with the contract, and

(b) Any further sums which the contractor considers to be due to him under the contract or otherwise.

(c) A set of detailed completion drawings after incorporating defects so removed by him, of all works executed under the contract.

If the Engineer-in-Charge disagrees with or cannot verify any part of the draft final statement, the contractor shall submit further information as the Engineer-in-Charge may reasonably require and shall make such changes in the draft as may be agreed between them. The contractor shall then prepare and submit to the Engineer-in-Charge the final statement as agreed (for the purpose of these conditions referred to as the 'Final Statement')

If following, discussions between the Engineer-in-Charge and the contractor, and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer-in-Charge shall deliver to the Owner an Interim Payment Certificate of those parts of the draft final statement, if any, which are not in dispute. The dispute may then be settled in accordance with clause 3.19.0. The final statement shall be agreed upon settlement of the dispute.

3.15.6 Discharge

Upon submission of the final statement, the contractor shall give to the Owner, with a copy to the Engineer-in-Charge, a written discharge confirming that the total of the final statement represents full and final settlement of all money due to the contractor arising out of or in respect of the contract.

3.15.7 Final Payment Certificate

Within two months, after the receipt of the final statement, and the written discharge, the Engineer-in-Charge shall issue to the Owner(with a copy to the contractor) a final payment certificate stating;

(a) The outstanding amount which, in the opinion of the Engineer-in-Charge, is finally due under the contract, and

(b) After giving credit to the Ownerfor all amounts previously, paid by the Ownerand for all sums to which theOwneris entitled under the contract other than under sub clause 3.7.8 the balance, if any, due from the Ownerto the contractor or from the contractor to the Owneras the case may be.

3.15.8 Cessation of Owner's Liability

The Ownershall not be liable to the contractor for any matter or thing arising out of or in connection with the contract or execution of the works, unless the contractor shall have included a claim in respect thereof in his final statement.

3.15.9 Time for payment

The amount due to the contractor under any interim payment certificate issued by the Engineer-in-Charge pursuant to this clause, or to any other terms of the contract, shall, subject to clause 3.7.8, be paid by the Ownerto the contractorshall be referredunder **Section-7(Payment terms).**

3.15.9 Defects Liability Period Completion Certificate

The contract shall not be considered as completed until a Defects Liability Period completion certificate shall have been signed by the Engineer-in-Charge and delivered to the Ownerwith a copy to the contractor, stating the date on which the contractor shall have completed his obligations to execute and complete the works and remedy any defects therein to the entire satisfaction of the Engineer-in-Charge.

The defects Liabilities certificate shall be given by the Engineer-in-Charge within 28 days after the expiration of the Defect Liabilities Period, or, if different defect liability period shall become applicable to different sections of parts of the works, the expiration of the latest such period.

3.15.9 Unfulfilled Obligations

Notwithstanding the issue of Defect Liability Period Completion Certificate the contractor and the Ownershall remain liable for the fulfilment of any obligation incurred under the provisions of the contract prior to the issue of the Defect Liability Period Completion Certificate which remains unperformed at the time such defects Liability Certificate is issued and for the purpose of determining the nature and extent of any such obligation, the contract shall be deemed to remain in force between the parties to the contract.

3.16 REMEDIES

3.16.1 Default of contractor

If the contractor is deemed by law unable to pay his debts as they fall due, or enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purpose of amalgamation or reconstruction), or becomes insolvent, or makes an arrangement with, or assignment in favour of his creditors or agrees to carry out the contract under a committee of inspection of his creditors, or if a receiver administrator, trustee or liquidator is appointed over any substantial part of his assets, or if under any law or regulation relating to reorganization arrangement or readjustment of debts, proceedings are commenced against the contractor or resolutions passed in connection with dissolution or liquidation or if any steps are taken to enforce any security interest over a substantial part of the assets of the contractor, or if any act is done or event occurs with respect to the contractor or his assets which, under any applicable law has a substantially similar effect to any of the foregoing acts or events, or has an execution levied on his goods, or if the, Engineer-in-charge certifies that in his opinion, the Contractor

(a) Has repudiated the contract, or

(b) Without reasonable excuse has failed

i. To commence the worksin accordance with sub clause 3.7.1 or

ii. To proceed with the works, or any section thereof, within 28 days after, receiving notice pursuant to sub clause 3.7.7 or

(c) Has failed to comply with a noticeissued or an instruction issued for removal of improper work, materials or plant within 28 days after having received it, or

(d) Despite of previous warning from the Engineer-in-Charge, in writing, is otherwise persistently or flagrantly neglecting to comply with any obligations under the contract.

Then the Ownermay, after giving 14 days' notice, to the contractor, enter upon the site and works and terminate the employment of the contractor without thereby avoiding the contract or releasing the contractor from any of his obligations or liabilities under the contract, or affecting the rights and authorities conferred on the Owneror the Engineer-in-Charge by the contract, and may himself complete the works or may employ any other contractor to complete the work. The Owneror such other contractor may use for such completion so much of the contractor'sequipment, Temporary works and materials as he or they may think proper and the Ownermay, at any time, sell any of the said contractor's equipment, temporary works and unused plant and materials and apply the proceeds of sale in or towards the satisfaction of any sums due or which may become due to contractor from the construction under the contract.

In case the work is left by the contractor in between the contract period, the Ownerhas full right to forfeit his security deposit/performance guarantee and his all other due payments. The balance work shall be got done at the risk and cost of the contractor.

3.16.2 Valuation at Date of Termination

The Engineer-in-Charge shall, as soon as may be practicable after any such entry and termination by the Ownerfix and determine ex-party, or by or after reference to the parties or after such investigation or enquiries as he may think fit to make or institute, and shall certify:

(a) What amount (if any) had, at the time of such entry and termination, been reasonably earned by or would reasonably accrue to the contractor in respect of the work already done by him under the contract, and

(b) The value of any of the said unused or partially used materials, any contractor's equipmentand any temporary works.

(c) The valuation of balance works still remains to be executed.

3.16.3 Payment after Termination

If the Ownerterminates the contractor's employment under this clause of remedies, he shall not be liable to pay the contractor any further. amount (including damages) in respect of the contract until the expiration of the Defects Liabilities Period and thereafter until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Ownerhave been ascertained and the amount thereof certified by the Engineer-in-charge. The contractor shall then he entitled to receive only such sum (if any) as the Engineer-in-Charge may certify would have been payable to him upon due completion by him after deducting the said amount.

If Such amount exceeds the sum which would have been payable to the contractor on due completion by him, then the contractor shall, upon demand pay to the Ownerthe amount of such excess and it shall be deemed a debtdue by the contractor to the Ownerand shall be recoverable accordingly.

3.16.4 Assignment of Benefit of Agreement

Unless prohibited by law, the contractor shall, if so instructed by the Engineer-in-Charge within 14 days of such entry and termination referred toin sub clause 3.16.1 assign to the Ownerthe benefit or any agreement for the supply of any goods or materials or services and/or for the execution of any work for the purpose of the contract, which the contractor may have entered into.

3.16.5 Urgent Remedial Work

If, by reason of any accident, or failure, or other event occurring to, or in connection with the works, or any part thereof, either during the works, or during the execution of the works, or during the defects

liability period, any remedial or other work is, in the opinion of the Engineer-in-Charge, urgently necessary for the safety or progress of the works and the contractor is unable or unwilling at once to do such work, the Ownershall be entitled to, employ and pay other person to carry out such work as the Engineer-in-Charge may consider necessary. If the work or repair so done by the Owneris work which, in the opinion of the Engineer-in-Charge the contractor was liable to do at his own cost under the contract, then all costs consequent thereupon or incidental thereto shall determine the cost and shall be recoverable from the contractor accordingly.

3.17 SPECIAL RISKS

3.17.1 Outbreak of war

If, during the currency of the contract, there is an outbreak of war, whether war is declared or not, materially affects the execution of the works, the contractor shall unless and until the contract is terminated under the provision of this-clause, continue to use his best endeavours to complete the execution of the works, provided that the Ownershall be entitled, at any time after such outbreak of war, to terminate the contract by giving a notice to the contractor and, upon such notice being given, the contract shall, except as to the rights of the parties under this clause and clause 3.19.0, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

3.17.2 Removal of contractor's Equipment on termination

If the contract is terminated under the provisions of sub clause 3.17.1, the contractor shall with all reasonable dispatch, remove from the site of all equipment of the contractor.

3.17.3 Payment if contract terminated

If the contract is terminated as aforesaid, the contractor shall be paid by the Owner insofar as such amounts of items have not already been covered by the payments on account made to the contractor for all works executed prior to the date of termination at the rates and prices provided in the contract and in addition, the following shall also be considered for payment.

(a)The amount payable in respect of any preliminary items referred to in the bill of quantities, so far as the work or service comprised therein has been carried out or performed, and a proper proportion of any such items which have been partially carried out on performed.

(b)The costs of materials, plants or goods reasonably ordered for the works which have been delivered to the contractor or of which the contractor is legally liable to accept delivery, such materials, plant or goods becoming the property of the Ownerupon such payments made by him.

Provided that against any payment due from the Ownerunder this sub clause, the Owner shall be entitled to be credited with any outstanding balances due from the contractor for advances in respect of contractor's equipment, materials and plant and other sums which, at the date of termination, were

recoverable by the Ownerfrom the contractor under the terms of the contract. Any sums payable under this sub clause shall be determined by the Engineer-in-Charge who shall notify the contractor accordingly.

3.18 RELEASE FROM PERFORMANCE

Payment in event of Release from Performance.

If any circumstance, outside the control of both parties, arises after the issue of the letter of acceptance which renders it impossible or unlawful for either party to fulfil his contractual obligations, or under the law governing the contract the parties are released from further performances, then the sum payable by the Ownerto the contractor in respect of the work executed shall be the same as that which would have been payable under clause 3.17.0, if the contract had been terminated under the provisions of clause 3.17.0

3.19 SETTLEMENT OF DISPUTES

3.19.1 Decision of Engineer-in-Charge

If dispute of any kind whatsoever arises between the Ownerand the contractor in connection with, or arising out of the contract or the execution of work, whether during the execution of the works or after their completion and whether before or after repudiation or other termination of the contract, including anydispute as to any opinion, instruction, determination, certificate or valuation of the engineer in charge, the matter of dispute shall, in the first place, be referred in writing to the engineer-in-charge, such reference shall state that it is made in pursuant to this clause. Not later than the 90th day after the day on which he received such reference, the Engineer-in-Charge shall give his decision to the contractor. Unless the contract has already been repudiated or terminated, the contractor shall, in every case, continue to proceed with the works, with all diligence. The contractor shall give effect forth with to every such decision of the Engineer-in-Charge, unless and until the same shall be revised, as here in after provided in an amicable settlementor an arbitral award.

If the contractor be dissatisfied with any decision of the Engineer-in-Charge or the Engineer-in-Charge fails to give his decision on or before 90th day after the day on which he received the reference, then the contractor may, on or before the 60th day after the day on which the said period of 90th day expired, as the case may be, give notice to the other party, his intensions to commence arbitration as herein provided -as-to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as herein after provided, as to such dispute and, no arbitration in respect thereof may becommenced unless such notice is given.

If the Engineer-in-Charge has given his decision as to a matter of dispute to the contractor and no notice of intention to commence arbitration as to such dispute has been given by the contractor to the Owneron or before 60th day after the day on which contractor received copy of decision from Engineer-in-Charge, the said decision shall become final and binding upon both the parties.

3.19.2 Amicable Settlement

Where notice of intention to commence arbitration, as to a dispute, has been given in accordance with sub clause 6.19.1, the parties shall attempt to settle such disputes amicably before the commencement of arbitration. Provided that, unless the parties otherwise agree, arbitration may be commenced on or after the 56th day, after the day on which notice of intention to commence arbitration of such disputes was given, even, if no attempt at amicable settlement thereof has been made.

3.19.3 Arbitration

a) All disputes or differences in respect of which the decision, if any, of the Engineer has not become final or binding as aforesaid shall be settled by arbitration in the manner hereinafter provided.

b) The arbitration shall be conducted by an arbitrator, to be nominated by TSECL and he will be the sole arbitrator to conduct the arbitration.

c) The arbitration shall be conducted in accordance with the provisions of the Indian Arbitration & Reconciliation Act, 1996 or any statutory modification thereof. The venue of arbitration shall be at **Agartala.**

d) The arbitrators may, from time to time with the consent of all the parties enlarge the time for makingthe award.

e) The arbitrator shall have full powers to review and/or revise any, decision, opinion, direction, certification or valuation of the Engineer in accordance with the Contract,and neither party shall be limited in the proceedings before such arbitrators to the condense or arguments out before the Engineer for the purpose of obtaining the said decision.

f) During settlement of disputes and arbitration proceedings, both parties shall be obliged to carry out their respective obligations under the Contract.

b. Failure to comply with Engineer-in-Charge decision

Where neither the Owner or the contractor has given notice of intention to commence arbitration of a dispute within the period stated in sub clause 3.19.1 and the related decision has become final and binding, either party may, if the other party fails to comply with such decision, and without prejudice to any other rights, it may have, refer the failure to arbitration in accordance with sub clause 3.19.3. The provision of sub clause 3.19.1 and 3.19.2shall not apply to any such reference.

c. Appointment of Arbitrator

In order to resolve the disputes or differences, which remain unresolved, the Owner will offer a panel of minimum 3 names for appointment as sole arbitrator and the contractor will have an option to select one and convey his option to the Owner and sole arbitrator so selected by the contractor

will be acceptable to the Owner. However, if work is not completed so far, it will continue during the process and pendency of such arbitration.

3.20 NOTICES

3.20.1 Notice to Contractor

All the certificates, notice or instructions to be given to the contractor by the Owner or the Engineer-in-Charge under terms of the contract shall be sent by post or facsimile transmission to or left at the contractor's principal place of business or such other address as the contractor shall nominate for that purpose.

3.20.2 Notices to Owner and Engineer-in-Charge

Any notice to be given to the Owner or to the Engineer-in-Charge under the terms of the contract shall be sent by post or facsimile transmission to or left at the respective address nominated for that.

3.20.3 Change of address

Either party may change a nominated address to another address in the country where the works are being executed by prior notice to the other party, with a copy to the Engineer-in-Charge and the Engineer-in-Charge may do so by prior notice to both parties.

3.21 DEFAULT OF OWNER

3.21.1 Default of Owner

In the event of the Owner:

a) Becoming bankrupt or, going into liquidation, other than for the purpose of a scheme of reconstruction or amalgamation, or

b) Giving notice to the contractor that for unforeseen reasons due to economic dislocation it is impossible for him to continue to meet his contractual obligations.

The contractor shall be entitled to terminate his employment under the contract by giving notice to the Owner, with a copy to the Engineer-in-Charge. Such termination shall take effect 28 days after the giving of the notice.

3.21.2 Default of Owner

Upon the expiry of the 28 days' notice period referred to in sub clause 3.21.1, the contractor shall, notwithstanding the provisions of sub clause 3.12.1, with all, reasonable dispatch;remove from the site all contractors'equipmentbrought by him thereon.

3.21.3 Payment on termination

In the event of such termination, the Owner shall be under the same obligations to the contractor in regard to payment as if the contract has been terminated under the provisions of clause 3.17.0.

3.21.4 Contractors Entitlement to Suspend Work

Without prejudice to the Contractor's Entitlement to interest under sub clause 3.15.9, and to terminate under sub clause 3.21.1, the contractor may, if the Ownerfails topay the contractor the amount due under any certificate of the Engineer-in-Charge within 28 days after the expiry of the time stated in sub clause 3.15.9, within which payment is to be made, subject to any deduction that the Owner is entitled to make under the contract, after giving 28 days prior notice to the Owner, with a copy to the Engineer-in-Charge, suspend work or reduce the rate of work.

If the contractor suspends work or reduces the rate of work in accordance with the provisions of this sub clauseand thereby suffers delay, the Engineer-in-Charge shall, determine any extension of time to which the contractor is entitled under sub clause

3.7.4 and shall notify the contactor accordingly.

3.21.5 Resumption of work

Where the contractor suspends work or reduces the rate of work, having given notice in accordance with sub clause 3.21.4, and the Ownersubsequently pays the amount due, including interest pursuant to sub clause 3.15.9, the contractor's entitlement under the sub clause 3.21.1, shall, if notice of termination has not been given, lapse and the contractor shall resume normal working as soon as is reasonably possible.

3.22 CHANGES IN COST AND LEGISLATION/TAXATION

3.22.1 Increase or Decrease of Taxes

For the purpose of the Contract, it is agreed that the Contract Price as specified in Contract Price and Terms of Payment of the Contract Agreement is based on the taxes, duties, levies and charges prevailing at the date seven (07) days prior to the last date of bid submission (hereinafter called “Tax” in this GCC). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of the Contract, which was or will be assessed on the Contractor in connection with performance of the Contract, an equitable adjustment of the Contract price shall be made to fully take into account any such change by addition to the Contract priceor deduction therefrom, as the case may be, in accordance with GCC Clause 3.25(Changes in Laws and Regulations) hereof. However, these adjustments would be restricted to direct transactions between the Owner and the Contractor for which the taxes and duties are reimbursable by the Owner as per the Contract. These adjustments shall not be applicable on procurement of raw materials, intermediary components etc. by the Contractor and also not applicable on the bought-out items dispatched directly from sub vendor’s works to site.

In respect of raw materials, intermediary components etc and bought out items, neither the Owner or the Contractor shall be entitled to any claim arising due to increase or decrease in the rate of Tax,

introduction of a new Tax or abolition of an existing Tax in the course of the performance of the Contract.

3.22.2 Other changes in Cost

To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingencyof such other rise or fall in cost. No increase in the cost of materialor any account required for completion of works under the contract shall be paid over and above, as described in the price adjustment **section 8.**

3.23 HEALTH AND SANITARY ARRANGEMENT FOR WORKERS

3.23.1 General

In respect of all labour directly or indirectly employed in the works for the performance of the contractor's part of this agreement, the contractor shall comply with or cause to be complied with all the rules and regulations of the local sanitary and other authorities or as framed by the Owner from time to time for the protection of health and sanitary arrangement for all workers. The contractor shall provide in the labour colony all amenities such as electricity, water and other sanitary and health arrangements. The contractor shall also provide necessary surface transportation to the place of work and back to the colony, for theirpersonnel accommodated in the labour colony.

3.23.2 Creche

The contractor shall at his own cost provide his labour at every work place at which 50 or more women workers are ordinarily employed, two huts for the use of children under the age of 6 years; belongingto such women. One hut shall be used for infant's games, play and the other as bedroom. The huts shall not be constructed on a Lower standard than the following:

i) Thatched roofs; ii) Brick floor and walls; iii) Planks spread over the brick floor and covered with matting; arrangements for heating during winter months; iv) Suitable nos. of toilets, baths and arrangements for drinking water.

The huts shall be provided with suitable and sufficient opening for light and ventilation.
There shall be adequate provision of sweepers to keep the places clean.
There shall be two attendants at any time including during the extended working hours. Sanitary utensils shall be provided to the satisfaction of the Health Officer of thearea concerned. The use of the hut shall be restricted to only children, their attendants and mothers of the children.
Where the number of women workers is more than 25 and less than 50, the contractor shall provide at least one hut and one attendant to look after the children of women workers. The size of crècheshall vary according to the number of women workers. The same be properly maintained and toys etc. shall be provided. The arrangement has to be approved by the Engineer-in-Charge.

3.24 SAFETY CODE

3.24.1 General

Contractor shall adhere to the safe construction practice and guard against hazardous and unsafe working conditions and shall comply with Owner's safety rules as set forth herein.

3.24.2 Safety Regulation

(a) In respect of all labour, directly or indirectly employed in the work for the performance of contractor's part of this agreement, the contractor shall at his own expenses arrange for all the safety provisions as per safety code of Indian Standards Institution, the Electricity Act and such other acts as applicable.

(b) The contractor shall observe and abide by all fire and safety regulations.

3.24.3 First Aid

(a) Contractor shall maintain adequate first aid facilities for its employees and labour, an MBBS doctor with assisting nurses and helpers should be available throughout the pendency of the contract.

(b) Contractor shall make outside arrangements for Ambulance service and for the treatment of injuries. Names of those providing these services shall be furnished to the Owner and their telephone numbers shall be prominently posted in contractor's field office.

(c) All critical industrial injuries shall be reported promptly to the Owner, and a copy of the contractor's report covering each personal injury requiring the attention of a physician shall be furnished to the Owner.

3.24.4 Contractor's Barricades and lighting Arrangement

Contractor shall erect and maintain barricades required in connection with his operations to guard the excavations and Hoisting Areas.These should be properly lighted during the night.

3.24.5 Excavation and Trenches

All trenches 1.2meters or more in depth shall at all times be supplied with at least one ladder for each 50 meters Length or fraction thereof.

Ladder shall be extended from bottom of the trench to at least one meter above the surface of the ground. The sides of the trenches, which are 1.5 meters in depth, shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides to collapse. The excavated materials shall not be placed within 1.5 meters of the edge of the trench or half of the trench width whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or under cutting shall be done.

3.24.6 General Safety

All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the persons employed on the site and maintained in condition suitable for immediate use, and the contractor shall take adequatesteps to ensure proper use of equipment by those concerned. Upon the award of work to the contractor, he will submit to the Engineer-in-Charge, two copies of a construction safety manual to cover onsite safety control for approval and agreement prior to use.

3.24.7 Cares in Handling Inflammable Gas

The contractor has to ensure all precautionary measures and exercise utmost care in handling the inflammable gas cylinders/ inflammable Liquids/paints etc. as required under the law and/ or as advised by the Fire Authorities.

3.24.8 Preservation of Peace

The contractor shall take requisite precautions and use his best endeavours to prevent any riotous or unlawful behaviour by or amongst his workmen and others employed on the works and for the preservation of peace and protectionof the inhabitants and security of property in the neighbourhood of the work in the event of the Ownerrequiring the maintenance of a special police force at or in the vicinity of the site during the tenure of works, the expenses thereof shall be borne by the contractor and if paid by the Owner, shall be recoverable from the contractor.

3.24.9 Outbreak of Infectious Disease

The contractor shall remove from his camp such labour and their families who refuse to protective inoculation and vaccination when called uponto do so by the Engineer-in-Charges representative. Should Cholera, Plague or other infectious diseases break out, the contractor shall burn the huts, beddings, clothes and other belonging used by the infected parties and promptly erect new huts on healthy sites as required by the Engineer-in-Charge failing which, within the time specified in the Engineer-in-Charge's requisition, the work may be done by the Owner and the cost thereof recovered from the contractor.

3.24.10 Use of intoxicants

The unauthorized sale of spirits or other intoxicating beverages upon the work in any of the buildings, encampments or tenements owned, occupied, by or within the control of the contractor, is prohibited and the contractor shall exercise his influence and authority to the utmost extent to secure strict compliance with this condition.

3.25 Change in Laws and Regulations

If, after the date seven (07) days prior to the date of Bid Opening, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed in India (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the

Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. However, these adjustments would be restricted to direct transactions between the Owner and the Contractor and not on procurement of raw materials, intermediary components etc. by the Contractor for which the Owner shall be the sole judge. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable.

SECTION-IV

ERECTION CONDITIONS OF CONTRACT

1.0 GENERAL

1.1 The following shall supplement the conditions already contained in the other parts of these specifications and document and shall govern the portion of the work of this Contract to be performed at Site.

1.2 The Contractor upon signing of the Contract shall, in addition to a Project Coordinator, nominate another responsible officer as his representative at Site suitably designated for the purpose of overall responsibility and co-ordination of the works to be performed at Site. Such person shall function from the Site Office of the Contractor.

2.0 REGULATION OF LOCAL AUTHORITIES

2.1 The Contractor shall comply with all the rules and regulations of local authorities during the performance of his field activities. He shall also comply with the Minimum Wages Act, 1948 and the Payment of Wages Act (both of the Government of India) and the rules made there-under in respect of any employee or workman employed or engaged by him or his Sub-Contractor.

2.2 All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully payable under any statutory laws and its amendments from time to time during erection in respect of the equipment ultimately to be owned by the Owner, shall be to the account of TSECL. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor or his Sub-Contractor, the additional fees to such inspection and/or registration shall be borne by the Contractor.

3.0 OWNER'S LIEN ON EQUIPMENT

TSECL shall have a lien on all equipment including those of the Contractor brought to the Site for the purpose of erection, testing and commissioning of the equipment to be supplied & erected under the Contract. TSECL shall continue to hold the lien on all such equipment

throughout the period of Contract. No material brought to the Site shall be removed from the Site by the Contractor and/or his Sub-Contractors without the prior written approval of the Engineer.

4.0 INSPECTION, TESTING AND INSPECTION CERTIFICATES

The provisions of the clause entitled Inspection, Testing and Inspection Certificates under Technical Specification, General Terms & Conditions (GTC) shall also be applicable to the erection portion of the Works. The Deputy General Manager in charge of the work shall have the right to re-inspect any equipment though previously inspected at the Contractor's works, before and after the same are erected at Site. If by the above inspection, the Deputy General Manager in charge of the work rejects any equipment, the Contractor shall make good for such rejections either by replacement or modification / repairs as may be necessary to the satisfaction of TSECL. Such replacements shall also include the replacements or re-execution of such of those works of other Contractors and/or agencies, which might have got damaged or affected by the replacements or re-work done to the Contractor's work.

5.0 ACCESS TO SITE AND WORKS ON SITE

5.1 Suitable access to the Site shall be afforded to the Contractor by TSECL in reasonable time.

5.2 In the execution of the works, no person other than the Contractor or his duly appointed representative, Sub-Contractor and workmen, shall be allowed to do work on the Site, except by the special permission, in writing of the site Engineer of TSECL or his representative.

6.0 CONTRACTOR'S SITE OFFICE ESTABLISHMENT

The Contractor shall establish a Site Office at the Site and keep posted an authorized representative for the purpose of the Contract. Any written order or instruction of the Executive Engineer in charge of the work or his duly authorized representative shall be communicated to the said authorized resident representative of the Contractor and the same shall be deemed to have been communicated to the Contractor at his legal address.

7.0 CO-OPERATION WITH OTHER CONTRACTORS

7.1 The Contractor shall co-operate with all other Contractors or tradesmen of TSECL, who may be performing other works on behalf of TSECL and the workmen who may be employed by TSECL and doing work in the vicinity of the Works under the Contract. The Contractor shall also so arrange to perform his work as to minimize, to the maximum extent possible, interference with the work of other Contractors and their workmen. Any injury or damage that may be sustained by the employees of the other Contractors and TSECL, due to the Contractor's work shall promptly be made good at the Contractor's own expense. The site Engineer of TSECL shall determine the resolution of any difference or conflict that may arise between the Contractor and other Contractors or between the Contractor and the workmen of TSECL in regard to their work. If the work of the Contractor is delayed because of any acts of omission of another Contractor, the Contractor shall have no claim against TSECL on that account other than an extension of time for completing his Works.

7.2 The Site Engineer of TSECL shall be notified promptly by the Contractor of any defects in the other Contractor's works that could affect the Contractor's Works. The Engineer shall determine the corrective measures if any required rectifying this situation after inspection of the works and such decisions by the Engineer shall be binding on the Contractor.

8.0 DISCIPLINE OF WORKMEN

The Contractor shall adhere to the disciplinary procedure set by the site Engineer of TSECL in respect of his employees and workmen at Site. The Engineer shall be at liberty to object to the presence of any representative or employee of the Contractor at the Site, if in the opinion of the Engineer such employee has misconduct himself or is incompetent or negligent or otherwise undesirable and then the Contractor shall remove such a person objected to and provide in his place a competent replacement.

9.0 CONTRACTOR'S FIELD OPERATION

9.1 The Contractor shall keep the site Engineer of TSECL informed in advance regarding his field activity plans and schedules for carrying-out each part of the works. Any review of such plan or schedule or method of work by the site Engineer of TSECL shall not relieve the Contractor of any of his responsibilities towards the field activities. Such reviews shall also not be considered as an assumption of any risk or liability by TSECL or any of his representatives and no claim of the Contractor shall be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The Contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.

9.2 The Contractor shall have the complete responsibility for the conditions of the Work-Site including the safety of all persons employed by him or his Sub-Contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion of the Contract and shall not be limited to normal working hours. The construction review by the site Engineer of TSECL is not intended to include review of Contractor's safety measures in, on or near the work Site, and their adequacy or otherwise.

10.0 PHOTOGRAPHS AND PROGRESS REPORT

10.1 The Contractor shall furnish Three (3) prints each to the Site Engineer of progress photographs of the work done at Site. Photographs shall be taken as and when indicated by the Site Engineer of TSECL or his representative. Photographs shall be adequate in size and number to indicate various stages of erection. Each photograph shall contain the date, the name of the Contractor and the title of the photograph.

10.2 The above photographs shall accompany the monthly progress report detailing-out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures, wherever necessary.

11.0 MAN-POWER REPORT

11.1 The Contractor shall submit to the Site Engineer of TSECL, on the first day of every month, a man hour schedule for the month, detailing the man hours scheduled for the month, skill-wise and area-wise.

11.2 The Contractor shall also submit to the Site Engineer of TSECL, on the first day of every month, a man power report of the previous month detailing the number of persons scheduled to have been employed and actually employed, skill-wise and the areas of employment of such labour.

12.0 PROTECTION OF WORK

The Contractor shall have total responsibility for protecting his works till it is finally taken over by TSECL. No claim shall be entertained by TSECL for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings, should any such damage to the Contractor's works occur because of any other party not being under his supervision or control. The Contractor shall make his claim directly with the party concerned. If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the contractor's works, the same shall be resolved as per the provisions of the Clause 7.0 above entitled "Cooperation with other Contractors". The Contractor shall not cause any delay in the repair of such damaged works because of any delay in the resolution of such dispute. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.

13.0 EMPLOYMENT OF LABOUR

13.1 The Contractor shall be expected to employ on the work only his regular skilled employees with experience of this particular work. No female labour shall be employed after darkness. No person below the age of eighteen years shall be employed.

13.2 All traveling expenses including provisions of all necessary transport to and from Site, lodging allowances and other payments to the Contractor's employees shall be the sole responsibility of the Contractor.

13.3 The hours of work on the Site shall be decided by the site Engineer of TSECL and the Contractor shall adhere to it. Working hours shall normally be Eight (8) hours per day – Monday through Saturday and may have to be extended in the interest of work.

13.4 The Contractor's employees shall wear identification badges while on work at Site.

13.5 In case TSECL becomes liable to pay any wages or dues to the labour or any Government agency under any of the provisions of the Minimum Wages Act, Workmen Compensation Act, Contract Labour Regulation Abolition Act or any other law due to act of omission of the Contractor, TSECL may make such payments and shall recover the same from the Contractor's bills.

14.0 FACILITIES TO BE PROVIDED

By the Contractor

14.1 Tools, tackles and scaffoldings

The Contractor shall provide all the construction equipment, tools, tackles and scaffoldings required for pre-assembly, erection, testing and commissioning of the equipment covered under the Contract. He shall submit a list of all such materials to the site Engineer of TSECL before the commencement of pre-assembly at Site. These tools and tackles shall not be removed from the Site without the written permission of the site Engineer.

14.2 First – aid

The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contractor's personnel shall be trained in administering first – aid.

14.3 Cleanliness

The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area at least once in a day. All such rubbish and scrap material shall be stacked or disposed in a place to be identified by the site Engineer of TSECL. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.

14.4 Communication

The contractor shall extend the telephone & telex facilities, if available at Site, for the purposes of interaction with the site office by him and TSECL.

By the Owner

14.5 Space

a) Land for Contractor's Office, Store, and Workshop etc if available shall be provided by TSECL. Otherwise contractor has to arrange at his own cost and responsibilities the accommodation for his site office, store and workshop etc.

b) The Site Engineer of TSECL shall at his discretion and for the duration of execution of the Contract make available at site, land for construction of Contractor's field office, workshop, stores, magazines for explosives in isolated locations, assembling yard, etc. required for execution of the Contract. Any construction of temporary roads, offices, workshop, etc. as approved by the site Engineer of TSECL shall be done by the Contractor at his cost.

c) On completion of work, the Contractor shall hand over the land duly cleaned to the site Engineer of TSECL. Until and unless the Contractor has handed over the vacant possession of land allotted to him for the above purpose, the payment of his final bill shall not be made. The Contractor shall be made liable to pay for the use and occupation at the rates to be determined by the Engineer if the Contractor over stays in the land after the Contract is completed.

14.6 Electricity – Power Supply

Where power supply is available with TSECL for construction purpose, the same shall be provided at the job at one point of the distribution system as may be decided by site Engineer of TSECL. The charge for extension of service line and energy consumption charges shall be

borne by the contractor. In case the contractor fails to pay the related charge of extension of service line and energy consumption within due date of the bill raised for the purpose, the amount will be deducted from the progressive bill of the contractor.

14.7 Water

Free supply of water shall be made available for the construction purpose whenever water is available and the same shall be given at an agreed single point at the Site. Any further distribution shall be the responsibility of the Contractor. Free drinking water if available shall also be provided at one agreed point in the Site. Further distribution either to his labour colony or his work Site or to his office shall be the responsibility of the Contractor.

15.0 LINES AND GRADES

All the works shall be performed on the lines, grades and elevations indicated on the drawings. The Contractor shall be responsible to locate and lay-out the works. Basic horizontal and vertical control points shall be established and marked by the Engineer at Site at suitable points. These points shall be used as datum for the works under the Contract. The Contractor shall inform the site Engineer of TSECL well in advance of the times and places at which he wishes to do work in the area allotted to him so that suitable datum points may be established and checked by the site Engineer to enable the Contractor to proceed with his works. Any work done without being properly located may be removed and/or dismantled at contractor expense.

16.0 FIRE PROTECTION

16.1 The work procedures that are to be used during the erection shall be those which minimize fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the Site at least once each day. Fuels, oils and volatile or inflammable materials shall be stored away from the construction and equipment and materials storage areas in safe containers. Un-treated materials shall not at all be used at Site for any other purpose unless otherwise specified. If any such materials are received with the equipment at the Site, the same shall be removed and replaced with acceptable material before moving into the construction or storage area.

16.2 Similarly corrugated paper fabricated cartons etc. shall not be permitted in the construction area either for storage or for handling of materials. All such materials used shall be of water proof and flame resistant type. All the other materials such as working drawings, plans etc. which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks, cutting flames and other similar fire sources.

16.3 All the Contractor's supervisory personnel and sufficient number of workers shall be trained for fire-fighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the Site during the entire period of the Contract.

16.4 The Contractor shall provide enough fire protection equipment of the types and number for the ware-houses, office, temporary structures, labour colony area etc. Access to such fire protection equipment shall be easy and kept open at all time.

17.0 SECURITY

The Contractor shall have total responsibility for all equipment and materials in his custody/stores, loose, semi-assembled and/or erected by him at Site. The contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the Contractor shall enter and leave the project Site only with the written permission of site Engineer of TSECL in the prescribed manner.

18.0 CONTRACTOR'S AREA LIMITS

The site Engineer of TSECL shall mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the Contractor and the Contractor shall not trespass the areas not so marked out for him. The Contractor shall be responsible to ensure that none of his personnel move out of the areas marked out for his operations. In case of such a need for the Contractor's personnel to work out of the areas marked out for him, the same shall be done only with the written permission of the site Engineer of TSECL.

19.0 CONTRACTOR'S CO-OPERATION

In case where the performance of the erection work by the Contractor affects the operation of the system facilities of TSECL, such erection work of the Contractor shall be scheduled to be performed only in the manner stipulated by the site Engineer and the same shall be acceptable at all times to the Contractor. The site Engineer may impose such restrictions on the facilities provided to the Contractor such as electricity, water etc. as he may think fit in the interest of TSECL and the Contractor shall strictly adhere to such restrictions and co-operate with the site Engineer of TSECL. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems which are erected by him. The Contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and erected by him, so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in the document and specification.

20.0 MATERIALS HANDLING AND STORAGE

20.1 All the equipment furnished under the Contract and arriving at Site shall be promptly received, unloaded, transported and stored in the storage arrange by the contractor at his risk and cost.

20.2 The Contractor shall be responsible for examining all the shipment and notify the Site Engineer of TSECL immediately of any damage, shortage, discrepancy etc. for the purpose of information only. The Contractor shall submit to the site Engineer of TSECL every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damage in transit, handling and/or in storage and erection of the equipment at Site. Any demurrage, wharf age and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.

20.3 The Contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection by the Site Engineers / Higher officials of TSECL.

20.4 All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings, etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the Site Engineer. The equipment stored shall be properly protected to prevent damage either to the equipment or the floor where they are stored. The equipment

from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at Site.

20.5 All electrical panels, control gears, motors and such other devices shall be properly dried by heating before they are installed and energized. Motor bearings, slip rings, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.

20.6 All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in a month from the date of receipt till the date of commissioning and a record of such measured insulation values maintained by the Contractor. Such records shall be made available for inspection by the Site Engineers / Higher officials of TSECL.

20.7 The Contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before the equipment are installed.

20.8 The consumable and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.

20.9 All the materials stored in the open or dusty location must be covered with suitable weather-proof and flame proof covering material wherever applicable.

20.10 If the materials belonging to the Contractor are stored in areas other than those earmarked for him, the Site Engineer shall have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.

20.11 The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally, all the electrical equipment such as motors, control gear, generators, exciters and consumables like electrodes, lubricants etc. shall be stored in the closed storage space. The site Engineer, in addition, may direct the Contractor to move certain other materials, which in his opinion shall require indoor storage, to indoor storage areas, which the Contractor shall strictly comply with.

21.0 CONSTRUCTION MANAGEMENT

21.1 The field activities of the Contractors working at Site shall be coordinated by the Site Engineer of TSECL and his decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractors and tradesmen regarding scheduling and co-ordination of work. Such decision by Site Engineer of TSECL shall not be a cause for extra compensation or extension of time for the Contractor.

21.2 The Site Engineer of TSECL shall hold weekly meeting with the Site Engineer / Supervisor of the contractor. The Site Engineer / Supervisor of the contractor shall attend such meetings and take notes of the discussions during the meeting and the decision of the Site Engineer of TSECL and shall strictly adhere to those decisions in performing his works. In addition to the above weekly meeting, the Site Engineer / Higher officials of TSECL may call for other meeting with the Site Engineer / Supervisor / any other authorized representative of the contractor and in such a case the personnel of the contractor shall attend such meetings.

21.3 Time is the essence of the Contract and the Contractor shall be responsible for performance of his works in accordance with the specified construction schedule. If at any time, the Contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such actions in writing to the Site Engineer of TSECL, satisfying that his action shall compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.

21.4 TSECL shall, however, not be responsible for provision of additional labour and/or materials or supply or any other services to the Contractor.

22.0 FIELD OFFICE RECORDS

The Contractor shall maintain at his Site office up-to-date copies of all drawings, specifications and other Contract Documents and any other supplementary data complete with all the latest revisions thereto. The Contractor shall also maintain in addition the continuous record of all changes to the above Contract Documents, drawings, specifications, supplementary data, etc. effected at the field and on completion of his total assignment under the Contract, shall incorporate all such changes on the drawings and other engineering data to indicate as installed conditions of the equipment furnished and erected under the Contract. Such drawings and engineering data shall be submitted to the Deputy General Manager in charge of the work in required number of copies.

23.0 CONTRACTOR'S MATERIALS BROUGHT ON TO SITE

23.1 The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the works under intimation to the Site Engineer. All such goods shall, from the time of their being brought vest in TSECL, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Site Engineer of TSECL. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.

23.2 After the completion of the Works, the Contractor shall remove from the Site under the direction of the Site Engineer of TSECL the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission from him.

24.0 PROTECTION OF PROPERTY AND CONTRACTOR'S LIABILITY

24.1 The Contractor shall be responsible for any damage resulting from his operations. He shall also be responsible for protection of all persons including members of public and employees of TSECL and the employees of other Contractors and Sub-contractors and all public and private property including structures, building, other plants and equipment and utilities either above or below the ground.

24.2 The Contractor shall ensure provision of necessary safety equipment such as barriers, signboards, warning lights and alarms, etc. to provide adequate protection and safety to persons and property.

25.0 INSURANCE

25.1 In addition to the conditions covered under the Clause entitled "Insurance" in General Terms and conditions of Contract, the following provisions shall also apply to the portion of works to be done beyond the Contractor's own or his Sub-contractor's manufacturing Works i.e. for the persons engaged by the agency/ contractor for execution of the work. In this respect the successful bidder shall furnish an Indemnity Bond in the prescribed format attached (Annexure-

IV) on a Non-Judicial Stamp paper of value Rs.30.00. The successful bidder must also furnish a list of workers/ labourers, likely to be engaged by them.

25.2 Workmen's Compensation Insurance

This insurance shall protect the Contractor against all claims applicable under the Workmen's Compensation Act, 1948. This policy shall also cover the Contractor against claims for injury, disability, disease or death of his or his Sub-Contractor's employee, which for any reason are not covered under the Workmen's Compensation Act, 1948. The liabilities shall not be less than:

Workmen's Compensation: As per statutory Provisions.

Employee's liability : As per statutory Provisions.

25.3 Comprehensive Automobile Insurance

This insurance shall be in such a form to protect the Contractor against all claims for injuries, disability, disease and death to members of public including the employees of TSECL and damage to the property of other arising from the use of motor vehicles during on or off the Site operations, irrespective of the ownership of such vehicles.

25.4 Comprehensive General Liability Insurance

25.4.1 This insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act or omission on the part of the Contractor, his agents his employees, his representatives and Sub-contractors or from riots, strikes and civil commotion. This insurance shall also cover all the liabilities of the Contractor arising out of the Clause stipulated in the General Terms and Conditions of Contract.

25.4.2 The hazards to be covered will pertain to all the works and areas where the Contractor, his Sub-contractors, his agents and his employees have to perform work pursuant to the Contract.

25.5 The above are only illustrative list of insurance covers normally required and it shall be the responsibility of the Contractors to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the Contract.

26.0 UNFAVOURABLE WORKING CONDITIONS

The Contractor shall confine all his field operations to those works which can be performed without subjecting the equipment and materials to adverse effects during inclement weather conditions, like monsoon, storms, etc. and during other unfavourable construction conditions. No field activities shall be performed by the Contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the Contractor in a proper and satisfactory manner in the performance of such Works and with the concurrence of the Site Engineer of TSECL. Such unfavourable construction conditions shall in no way relieve the Contractor of his responsibility to perform the Works as per the Schedule.

27.0 WORK & SAFETY REGULATION

27.1 The Contractor shall ensure proper safety of all the workmen, materials plant and equipment belonging to him or to owner or to others, working at the Site. The Contractor shall also be

responsible for provision of all safety notices and safety equipment required both by the relevant legislations and also by the Site Engineer as he may deem necessary.

27.2 The Contractor shall notify well in advance to the Site Engineer of his intention to bring to the Site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals, which may involve hazards. The Site Engineer shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contractor shall strictly adhere to and comply with such instructions. The Site Engineer shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by TSECL.

27.3 Further, any such decision of the Site Engineer shall not, in any way, absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by the Site Engineer, the Contractor shall use alternative methods with the approval of the Deputy General Manager in charge of the work without any cost implication to TSECL or extension of work schedule.

27.4 Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and/or storage in accordance with the rules and regulations laid down in the Petroleum Act 1934, Explosives Act, 1948, and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Site Engineer of TSECL. In case, any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.

27.5 All equipment used in construction and erection by Contractor shall meet Indian/International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipments shall be strictly operated and maintained by the Contractor in accordance with manufacturer's operation Manual and safety instructions and as per Guidelines/Rules of TSECL in this regard.

27.6 Periodical Examinations and all tests for all lifting/hoisting equipment & tackles shall be carried-out in accordance with the relevant provisions of Factories Act 1948, Indian Electricity Act 1910 and associated Laws/Rules in force from time to time. A register of such examinations and tests shall be properly maintained by the Contractor and shall be promptly produced as and when desired by the Site Engineer of TSECL or by the person authorized by TSECL.

27.7 The Contractor shall be fully responsible for the safe storage of his and his sub-contractor's radio-active sources in accordance with BARC/DAE Rules and other applicable provisions. All precautionary measures stipulated by BARC/DAE in connection with use, storage and handling of such material shall be taken by Contractor.

27.8 The Contractor shall provide suitable safety equipment of prescribed standard to all employees and workmen according to the need, as may be directed by Site Engineer of TSECL who shall also have right to examine these safety equipment to determine their suitability, reliability, acceptability and adaptability.

27.9 Where explosives are to be used, the same shall be used under the direct control and supervision of an expert, experienced, qualified and competent person strictly in accordance with the Code of Practices/Rules framed under the Indian Explosives Act pertaining to handling, storage and use of explosives.

27.10 The Contractor shall provide safe working conditions to all workmen and employees at the Site including safe means of access, railings, stairs, ladders, scaffoldings, etc. The scaffoldings shall be

erected under the control and supervision of an experienced and competent person. For erection, good and standard quality material only shall be used by the Contractor.

27.11 The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to TSECL or other contractors under any circumstances, whatsoever, unless expressly permitted in writing by Site Engineer of TSECL to handle such fuses, wiring or electrical equipment.

27.12 Before the Contractor connects any electrical appliances to any plug or socket belonging to TSECL, he shall :

a) Satisfy the Site Engineer of TSECL that the appliance is in good working condition :

b) Inform the site Engineer of the maximum current rating, voltage and phases of the appliances;

c) Obtain permission of the Site Engineer detailing the sockets to which the appliances may be connected.

27.13 The Site Engineer shall not grant permission to connect until he is satisfied that;

The appliance is in good condition and is fitted with suitable plug;

The appliance is fitted with a suitable cable having two earth conductors, one of which shall be

an earthed metal sheath surrounding the cores.

27.14 No electric cable in use by the Contractor/TSECL shall be disturbed without prior permission. No weight of any description shall be imposed on any cable and no ladder or similar equipment shall rest against or attached to it.

27.15 No repair work shall be carried out on any live equipment. The equipment must be declared safe by the Site Engineer before any repair work is carried out by the Contractor. While working on electric lines/equipment whether live or dead, suitable type and sufficient quantity of tools shall have to be provided by Contractor to electricians/workmen/officers.

27.16 The Contractors shall employ necessary number of qualified, full time electricians/Electrical Supervisors to maintain his temporary electrical installations.

27.17 In case any accident occurs during the construction/erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Site Engineer of TSECL and also to all the authorities envisaged under the applicable laws.

27.18 The Site Engineer of TSECL shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove short-comings promptly. The Contractor after stopping the specific work can, if felt necessary, appeal against the order of stoppage of work to the Deputy General Manager in charge of the work within 3 days of such stoppage of work and the decision of the Deputy General Manager in charge of the work in this respect shall be conclusive and binding on the Contractor.

27.19 The Contractor shall not be entitled for any damages/compensation for stoppage of work due to safety reasons as provided in para 27.18 above and the period of such stoppage of work shall

not be taken as an extension of time for completion of work and shall not be the ground for waiver of levy of liquidated damages.

27.20 It is mandatory for the Contractor to observe during the execution of the works, the requirements of safety rules which would generally include but not limited to the following :

Safety Rules:

a) Each employee shall be provided with initial indoctrination regarding safety by the Contractor, so as to enable him to conduct his work in a safe manner.

b) No employee shall be given a new assignment of work unfamiliar to him without proper introduction as to the hazards incident thereto, both to himself and his fellow employees.

c) Under no circumstances shall an employee hurry or take unnecessary chance when working under hazardous conditions.

d) Employees must not leave naked fires unattended. Smoking shall not be permitted around fire prone areas and adequate firefighting equipment shall be provided at crucial locations.

e) Employees under the influence of any intoxicating beverage, even to the slightest degree shall not be permitted to remain at work.

f) There shall be a suitable arrangement at every work site for rendering prompt and sufficient first aid to the injured.

g) The staircases and passageways shall be adequately lighted.

h) The employees when working around moving machinery must not be permitted to wear loose garments. Safety shoes are recommended when working in shops or places where materials or tools are likely to fall. Only experienced workers shall be permitted to go behind guard rails or to clean around energized or moving equipment.

i) The employees must use the standard protection equipment intended for each job. Each piece of equipment shall be inspected before and after it is used.

j) Requirements of ventilation in underwater working to licensed and experienced divers, use of gum boots for working in slushy or in inundated conditions are essential requirements to be fulfilled.

k) In cases or rock excavation blasting shall invariably be done through licensed blasters and other precautions during blasting and storage/transport of charge material shall be observed strictly.

27.21 The Contractor shall follow and comply with all relevant Safety Rules, relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any demur, protest or contest or reservation. In case of any discrepancy between statutory requirement and relevant Safety Rules referred above, the later shall be binding on the Contractor unless the statutory provisions are more stringent.

27.22 If the Contractor does not take all safety precautions and/or fails to comply with the Safety Rules as prescribed by Consortium or under the applicable law for the safety of the equipment and plant and for the safety of personnel and the Contractor does not prevent hazardous conditions which cause injury to his own employees or employees of other contractors, or Employees of TSECL or any other person who are at Site or adjacent thereto, the Contractors shall be

responsible for payment of compensation to Consortium members as per the compensation order issued by the appropriate authority of Government of Tripura / verdict issued by court.

The compensation mentioned above shall be in addition to the compensation payable to the workmen / employees under the relevant provisions of the Workmen's Compensation Act and rules framed there under or any other applicable laws as applicable from time to time. In case TSECL is made to pay such compensation then the amount of such compensation shall be deducted from the progressive bills / contract performance guaranty of the contractor.

28.0 CODEREQUIREMENTS

The erection requirements and procedures to be followed during the installation of the equipment shall be in accordance with the relevant Codes and accepted good engineering practice, the Engineering Drawings and other applicable Indian recognized codes and laws and regulations of the Government of India.

29.0 FOUNDATION DRESSING & GROUTING

i. The surfaces of foundations shall be dressed to bring the top surface of the foundations to the required level, prior to placement of equipment / equipment bases on the foundations.

ii. All the equipment bases and structural steel base plates shall be grouted and finished as per these specifications unless otherwise recommended by the equipment manufacturer.

iii. The concrete foundation surfaces shall be properly prepared by chipping, grinding as required to bring the type of such foundation to the required level, to provide the necessary roughness for bondage and to assure enough bearing strength. All laitance and surface film shall be removed and cleaned.

30.0 Grouting Mix

30.1 The Grouting mixture shall be composed of Portland cement, sand and water. The Portland cement to be used shall conform to ISI No. 269 or equivalent. Sand shall conform to ISI No. 383/2386 or equivalent. All grouts shall be thoroughly, mixed for not less than five minutes in an approved mechanical mixer and shall be used immediately after mixing.

30.2 Placing of Grout

30.2.1After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout a low dam shall be set around the base at a distance that shall permit pouring and manipulation of the grout. The height of such dam shall be at least 25 mm. above the bottom of the base. Suitable size and number of chains shall be introduced under the base before

placing the grout, so that such chains can be moved back and forth to push the grout into every part of the space under the base.

30.1.2 The grout shall be poured either through grout holes provided or shall be poured at one side or at two adjacent sides giving it a pressure head to make the grout move in a solid mass under the base and out in the opposite side. Pouring shall be continued until the entire space below the base is thoroughly filled and the grout stands at least 25 mm. higher all around than the bottom of the base. Enough care should be taken to avoid any air or water pockets beneath the bases. Vibrator shall be used to avoid any air or water pockets.

30.2 Finishing of the Edges of the Grout

The poured grout should be allowed to stand undisturbed until it is well set. Immediately thereafter, the dam shall be removed and grout which extends beyond the edges of the structural or equipment base plates shall be cut off, flushed and removed. The edges of the grout shall then be pointed and finished with 1:6 cement mortar pressed firmly to bond with the body of the grout and smoothened with a tool to present a smooth vertical surface. The work shall be done in a clean and scientific manner and the adjacent floor spaces, exposed edges of the foundations, and structural steel and equipment base plates shall be thoroughly cleaned of any spillage of the grout.

30.3 Checking of Equipment After Grouting

After the grout is set and cured, the Contractor shall check and verify the alignment of equipments, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings, etc. as applicable and the like items to ensure that no displacement has taken place during grouting. The values recorded prior to grouting shall be used during such post grouting checkup and verifications. Such pre and post grout records of alignment details shall be maintained by the Contractor in a manner acceptable to the site Engineer of TSECL.

31 CHECK OUT OF CONTROL SYSTEMS

After completion of wiring, cabling, the contractor shall check out the operation of all control systems for the equipment furnished and installed under these specifications and documents.

32 AVAILABILITY OF SHUTDOWN.

Shifting of 11 KV / LT lines in conjunction with the existing system obviously will require Shut-Down. Such Shut down will be provided by TSECL. The Contractor shall have to arrange during execution of the work required tools & tackles and skilled manpower to complete the work in all respect as per target of the particular shut down programme fulfilling entire requirement as specified in the work schedule.

SECTION – V

TECHNICAL SPECIFICATION SECTION

A. THREE & HALF CORE, FOUR CORE, TWO CORE & SINGLE CORE XLPE INSULATED AND XLPE SHEATHED ARMOURED LT CABLES:

1. SCOPE :

This specification covers details of design, engineering, manufacturing, testing, transportation at site, insurance, storage, supply, commissioning and erection of three & half core, two core, XLPE insulated and XLPE sheathed LT armoured circular cables with aluminium conductor suitable for working voltage to & including 1100 Volts, ISI marked & conforming to IS 7098 *Part-I/1988 with latest amendments or the equivalent International Standards.

2. STANDARDS :

Unless otherwise stipulated in this specification the following standards with latest amendments shall be applicable.

IS : 7098(Pt-I)/1988	XLPE Insulated (heavy duty) electric cable for working Voltages upto and including 1100 V
IS : 8130/1984	Conductors for insulated cables.
IS : 5831/1984	XLPE insulation and sheath of electric cables.
IS: 10810/1984	Method of test for cables.
IS : 3975/1979	Galvanized Steel Wire/Strips.
IS : 10418/1982	Drums for electric cables.

3. CLIMATIC CONDITIONS :

a. Maximum ambient temperature in open ai(°C)	: 50
b. Maximum ambient temperature in shade (°C)	: 45
c. Minimum temperature in shade(°C)	: 3
d. Relative humidity (%)	: 10 to 100
e. Maximum annual rainfall (mm)	: 1450
f. Maximum wind pressure (Kg/ Sqmtr.)	: 150

g. Maximum altitude above mean sea level (Mtrs) : 1000

h. Isoceraunic level (days/year) : 50

i. Seismic level (Horizontal acceleration) : 0.3 g.

j. General nature of climate : Moderately hot and humid tropical climate, conducive to rust and fungus growth.

4. GENERAL REQUIREMENT:

4.1 The material used for construction of the cables shall be of best qualities complying with the requirement of relevant standards. The cables shall be suitable for outdoor/indoor installation free in air and shall be capable of withstanding the normal stresses associated with transportation, erection, reeling and unreeling operations without getting deformed.

4.2 The cable shall be suitable for use where combination of ambient temperature and temperature rise due to load results in a conductor temperature not exceeding 90ºC under normal operation and 250ºC under short circuit condition.

4.3 Word “FRLS” shall also be embossed on it at every 5 (Five) meter distance.

FRLS properties – All cable shall be Flame Retardant, Low Smoke (FRLS) type. Outer sheath shall have the following properties -

Oxygen Index – Min 29	(As per ASTMD 2863)
Acid Gas Generation	Max 20% (as per IEC 7541)
Smoke Density Rating	60% (as per ASTMD 2843)
Flammability Test –	As per Swedish chimney test F3 (as per SEN 4241475)
	As per IEC 332 Part-3 (Category-B)

Minimum bending radius shall be 15 D

Repaired cables shall not be acceptable

5. MATERIAL :

5.1 CONDUCTOR

The conductor shall be composed of aluminium wire complying with IS: 8130/1984 or the equivalent international standards

5.2 INSULATION

Insulation shall be Cross Linked Polyethylene (XLPE) conforming to the requirements of IS:5831

5.3 FILLERS

5.3.1 The filler shall be of vulcanized rubber, un-vulcanized rubber or thermoplastic material and shall be provided to fill the gaps between cores.

5.3.2 The filler material shall be so chosen so as to be compatible with temperature of the cable and shall have no deleterious effect on other components of the cable. These shall not be harder than XLPE and PVC used for insulation and outer sheath respectively.

5.3.3 The central hole/void, if any, of the cable shall be invariable filled with suitable filler material so that there is no gap in the center.

5.4 ARMOURING

Armouring shall be of galvanized round steel wires for cable size 4 sq. mm & 6 sq. mm whereas armouring shall be of galvanized steel strips for cable sizes above 6 sq.mm.

5.5 OUTER SHEATH

The outer sheath shall consist of type ST-2 XLPE compound conforming to the requirements of relevant standards.

6. CONSTRUCTION :

6.1 CONDUCTOR

The construction of the conductor shall be stranded for cable size 6 sq.mm and above, whereas it is solid for 4 sq. mm as per relevant standards A protective barrier may be applied between the conductor and insulation. Such barriers when used shall be compatible with insulating material and suitable for the operating temperature of the cable.

6.2 INSULATION

The conductor (with protective barrier, wherever applied) shall be provided with Cross-Linked Polyethylene (XLPE) insulation applied by extrusion. The insulation shall be so applied that it fits closely on the conductor and it shall be possible to remove it without damage to the conductor. The thickness and tolerance on thickness of insulation shall be as per relevant standards.

6.3 CORE IDENTIFICATION :

The core shall be identified by different coloring of XLPE insulation as per relevant standards.

6.4 LAYING UP OF CORES :

The cores shall be laid up together with the suitable right hand lay. The interstices shall be filled with non-hygroscopic material.

6.5 INNER SHEATH (COMMON COVERING) :

6.5.1 The laid up cores shall be provided with an inner sheath applied either by extrusion or by wrapping. It shall be ensured that it is as circular as possible.

6.5.2 The inner sheath shall be so applied that it fits closely on the laid up cores and it shall be possible to remove it without damage to the insulation.

6.6 ARMOURING :

6.6.1 Application :

Armouring shall be applied over the inner sheath. The armor wires/strips shall be applied as closely as possible. The direction of lay of armour shall be left hand. A binder tape may be provided on the armour.

6.6.2 Type of Armour & Dimension :

The armour shall consist of galvanized round steel wires for cable size 4 mm2 & 6 mm2 whereas it shall be galvanized steel strips for cable size above 6mm2 with the dimensions as per IS 3975

6.6.3 Joints :

The joints in the armour wire / strips shall be made by brazing or welding and the surface irregularities shall be removed. A joint in any wire / strips shall be at least 300 mm from the nearest joint in any other armour / wire in the completed cable.

6.7 OUTER SHEATH

6.7.1 The outer sheath shall be applied over the armouring.

6.7.2 The color of the outer sheath shall be black.

6.7.3 The minimum thickness of XLPE outer sheath shall not fall below the thickness as per relevant standards.

7. TESTS AND TEST CERTIFICATES:

The cable should meet the requirement of all tests including optional tests as per relevant standards.

7.1 Routine tests :

1. Conductor resistance test.
2. High Voltage test.

7.2 Acceptance Tests :

1. Tensile test (for aluminium).
2. Wrapping test (for aluminium).
3. Conductor resistance test.
4. Test for thickness of Insulation & Sheath.
5. Tensile strength & elongation at break of Insulation & sheath.
6. Insulation resistance (volume resistivity) test.
7. High Voltage test.
8. Hot Set Test for Insulation.
9. Cold Bend Test for outer sheath.
10. Cold Impact Test for outer sheath.

7.3 Type Tests :

7.3.1 Tests of Conductor

1. Tensile test (for aluminium)
2. Wrapping test (for aluminium)
3. Conductor resistance test.

7.3.2 Test for armouring wires /strips.

7.3.3 Test for thickness of insulation and sheath.

7.3.4 Physical tests for insulation

1. Tensile strength and elongation at break.
2. Ageing in air oven.
3. Hot Set test.
4. Shrinkage test.

5. Water Absorption (Gravimetric).

7.3.5 Physical tests for Outer Sheath :

1. Tensile strength and elongation at break.

2. Ageing in air oven.

3. Loss of mass in air oven.

4. Shrinkage test.

5. Hot Deformation test.

6. Heat shock test.

7. Thermal Stability.

7.3.6 Insulation resistance (Volume Resistivity Test)

7.3.7 High Voltage Test.

7.3.8 Flammability test.

8. INSPECTION:

8.1 All test and inspection shall be made at the place of manufacture unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without charge to satisfy him that the material is being furnished in accordance with specification.

8.2 The purchaser reserves the right to have the test carried at the cost of the supplier by an independent agency whenever there is dispute regarding the quality of supply.

8.3 The contractor shall keep the Owner informed in advance about the program of manufacturing of cables so that arrangement can be made for inspection.

8.4 The Owner reserves the right to insist for witnessing the acceptance / routing tests of

9. IDENTIFICATION :

(i) The cable drum shall be printed with information as per cl. 21; 2 of IS and ISI Certification mark. Bidder shall submit xerox copy of valid ISI Licenses with technical bid.

(ii) For identification of cores, coloured strip of Red, Yellow, Blue and Black colours shall be used for

identification of phases/Neutral.

Following details of identification shall be embossed at intervals of length of one meter of cable outer sheath.

(iii) (a) Name of manufacturer (b) year of manufacture (c) voltage grade (d) Name of Owner "TSECL".

10. PACKING AND MARKING :

10.1 The cables shall be wound on non returnable wooden drums conforming to relevant standards of suitable size and packed. The ends of the cable shall be sealed by means of non-hygroscopic sealing material. Only one cable length shall be supplied on a drum.

10.2 The cable shall carry the following information stenciled /painted on the drum

1. Manufacturer's name, Brand name or trade mark.
2. Type of cable and voltage grade.
3. Number of cores.
4. Nominal cross-sectional area of the conductor.
5. Cable Code.
6. Length of cable on the drum.
7. Approximate gross weight.
8. Year of manufacture.

The words SUITABLE FOR OUTDOOR USE & LOW TEMPERATURE CONDITIONS.

11. STANDARD LENGTH :

11.1 The cables shall be supplied in the standard length of 250 meters for size 3.5Cx300 mm2 & 3.5Cx185 mm2, 500 meters for size 3.5Cx150 mm2, 3.5Cx120 mm2, 3.5Cx95 mm2, 3.5Cx70 mm2, 4Cx50 mm2 & 4Cx25 mm2, 1000 meters for size 4Cx16 mm2, 4Cx10 mm2, 4Cx6 mm2, 4Cx4 mm2, 2Cx10 mm2, 2Cx6 mm2, 2Cx4 mm2, and 500meter for size Single Core 185 mm2, 240 mm2, 300 mm2, 400 mm2.

11.2 A tolerance (+/-) 5% shall be allowed in standard length.

11.3 Only one cable length shall be acceptable of non-standard length measuring not less than 50% of standard length to complete the ordered quantity in each size.

12. QUANTITY TOLERANCE :

The quantity tolerance of (+/-) 2% shall be allowed in each size for completion of supply.

13. GUARANTEED TECHNICAL PARTICULARS :

The bidder shall furnish guaranteed technical particulars in Annexure-A.

14.0 DOCUMENTATION/: CONSTRUCTIONAL DRAWINGS

14.1 The bidder shall furnish following documents along with his offer.

14.2 Sectional view, showing the General constructional feature with conductor / conductor screen / insulation / armouring / inner and outer sheath etc.

14.3 Drawing of cable drums with details of material dimension and paint etc shall be submitted.

14.4 All the required type test reports for offered items tested at any Government recognized Laboratory.

14.5 Literature, pamphlets for the record items.

ANNEXURE-A

GUARANTEED TECHNICAL AND OTHER PARTICULARS FOR LT CABLE

1. Manufacturer's name and works address:

2. Standard specification to which the material shall confirm.:

3. VOLTAGE GRADE:

4. NO. OF CORES:

5. CONDUCTOR DETAILS :

a. Nominal cross section area of

i. Phase conductor (sq.mm):

ii. Neutral conductor (sq.mm):

b. No. and size of strands (mm) of

i. Phase conductor (sq.mm):

ii. Neutral conductor (sq.mm):

c. SHAPE OF CONDUCTOR:

d. Whether compacted or non compacted:

e. Resistance

i. Phase conductor (sq.mm):

ii. Neutral conductor (sq.mm):

6. INSULATION

a. Type:

b. Colour:

c. Thickness:

i. Phase conductor (sq.mm)

- Nominal (mm):
- Minimum (mm):

d. Neutral conductor (sq.mm)

- Nominal (mm):
- Minimum (mm):

7. Type of inner sheathing and colour:

8. Whether binder tape provided:

9. Armouring

a. Type:

b. Dimension (mm):

10. Outer Sheath

a. Material:

b. Thickness:

i. Nominal (mm):

ii. Minimum (mm):

c. Standard to which it confirms:

11. a. Type and size of filler used:

b. Min. wt. of filler in kg./km:

12. Max. overall diameter of the Cable in mm:

13. Nature of packing:

14. DRUM

a. Tare weight of Drum:

b. Whether drum is wheel mounted:

c. Standard specification to which drum shall conform:

d. Drum details &dimensions:

e. Whether 2-full ply flange construction or 2-full ply plus 1

segmental layer flange construction:

f. Drum size:

i. Flange diameter (d1) (mm):

ii. Barrel diameter (d2) (mm):

iii. Centre hole diameter (d3) (mm):

iv. Overall width (L1) (mm):

v. Travers (L2) (mm):

vi. Thickness of Flange:

vii. Barrel end (supporting disc or core segment)

a. Diameter (mm):

b.. Thickness (mm):

viii. Stretchers (core carrier planks)

a. Number (Min):

b. Thickness x width (mm):

ix. Barrel Battens thickness (core filler planks):

x. Barrel Middle Supports (middle core discs):

xi. Thickness of External Lagging. (mm):

DETAILS OF METAL COMPONENTS :

a. Clamping studs with hexagonal nuts

i. Numbers:

ii. Diameter (mm):

b. Square or Round washers

i. Numbers:

ii. Diameter (mm):

c. M.S. Bushes

i. Numbers:

ii. Thickness of sleeve (mm):

iii. Dimension of sleeve (mm):

iv Number of Bolts:

v. Diameters of Bolts:

d. M.S./C.I. Centre Plate

i. Numbers:

ii. Dimensions of Square / Triangular equal sides (mm):

ii. Centre Plate Bolts.:

- Numbers:
- Diameter of bolts (mm):
- Centre Hole Diameter (mm):
- Minimum Weight in kg./km
  - i. Aluminium:
  - ii. XLPE:
  - iii. PVC:
- Standard length of cable in meters & its tolerance:
- Whether material bears BIS Certification mark:
- BIS License No. & validity:
- Embossing:
- Any other particulars:

B. STRUCTURAL STEEL: -

The steel for Conductor cross Arms and other requirement as specified in the schedule shall be M.S. Structural Steel conforming to IS: 2062 Gr ASK.

C. EARTHING AND EARTHING G.I PIPE

1.0 Scope

GI earthing pipe should be made of 40 mm diameter ISI marked heavy duty A class GI Pipe. 12 mm dia suitable holes on its circumference shall be made as per approved drawing. The pipe should be in one piece. No joints or welding would be allowed on its length. Clamps made of 50x6mm GI flat duly drilled with 12 mm size holes should be welded at the top end for connection of earth conductor. Pipe used shall be 40mm NB diameter, ISI marked Galvanized Mild Steel Tubes continuously welded Electric

Resistance Welded ERW/High Frequency Induction welded (HFIW)/Hot finished welded (HFW) type, conforming to IS-554-1985 with latest amendment of Heavy duty quality (Class A).

2.0 MANUFACTURE

GI earth pipe (40 mm diameter & 2.5 meter long) shall be made of tubes which shall be made from tested quality steel manufactured by any approved process as follows:

a) Electric Resistance Welded (ERW).

b) High Frequency Induction Welded (HFIW) and

c) Hot finished Welded (HFW).

Tubes made by manual welding are not acceptable.

3.0 DIMENSIONS

The dimensions and weights of tubes shall be in accordance with Table-I and Table-II of IS: 1239 (Part-I)/1990 with latest amendments, subject to tolerance permitted therein. Necessary 12 mm diameter holes across the circumference shall be provided as per approved drawing. Drawings shall be approved by the owner before start of the manufacturing work. The tube, earthing pipe shall be provided with 50x6mm GS clamps on one end, one clamp is to be welded with the pipe and another is removable to enable measurement of earth resistance of the pit. Other end of the earth pipe should be cut half in slop to make it a sharp.

4.0 GALVANIZING

Tubes shall be galvanized in accordance with IS-4736-1986 with latest amendment for not (hot) dip zinc coating of Mild Steel Tubes. The minimum mass of zinc coating on the tubes shall be in accordance with clause 5.1 of IS-4736-1986 (specification for hot dip zinc) and when determined on a 100mm long test piece in accordance with IS: 6745:1972 shall be 400 g/m2. The zinc coating shall be uniform adherent reasonably smooth and free from such imperfections as flux, ash and dross inclusions, bare patches, black spots, pimples, lumpiness, rust, stains, bulky white deposits and blisters.

5.0 HYDRAULIC TEST

(Before applying holes) Each tube shall withstand a test pressure of 5 M Pa maintained for at least 3 seconds without showing defects of any kind. The pressure shall be applied by approved means and

maintained sufficiently long for proof and inspection. The testing apparatus shall be fitted with an accurate pressure indicator.

6.0 TEST ON FINISHED TUBES AND SOCKETS

The following tests shall be conducted by the manufacturer of finished tubes and sockets.

i. The tensile strength of length of strip cut from selected tubes when tested in accordance with IS-1894-1972, (Method for tensile testing of steel tubes), shall be at least 320N/mm2.

ii. The elongation percentage on a gauge length of 5.65/so (where so is the original cross sectional area of test specimen) shall not be less than 20%.

iii. When tested in accordance with IS-2329-1985 (Method for Bend test on Metallic tubes) the finished tube shall be capable of with standing the bend test without showing any sign of fracture or failure. Welded tubes shall be bent with the weld at 90 degree to the plane of bending. The tubes shall not be filled for this test.

iv. Galvanized tubes shall be capable of being bent cold without cracking of the steel, through 90 degree round a former having a radius at the bottom of the groove equal to 8 times the outside diameter of tube.

v. Flattening Test on Tubes above 50 mm Nominal Bore: Rings not less than 40 mm in length cut from the ends of selected tubes shall be flattered between parallel plates with the weld, if any, at 90 degree (point of maximum bending) in accordance with IS-2328- 1983. No opening should occur by fracture in the weld unless the distance between the plates is less than 75 percent of the original outside diameter of the pipe and no cracks or breaks in the metal elsewhere than in the weld shall occur, unless the distance between the plates is less than 60% of the original outside diameter. The test rings may have the inner and outer edges rounded.

7.0 GALVANIZING TEST

i. Weight of zinc Coating: For tubes thickness upto 6 mm the minimum weight of zinc coating, when determined on a 100 mm long test piece in accordance with IS-4736-1986 shall be 400 gm/m2.

ii. The weight of the coating expressed in gram/m2 shall be calculated by dividing the total weight of the zinc (inside plus outside) by the total area (inside plus outside) of the coated surface.

iii. Test specimen for this test shall be cut approximately 100 mm in length from opposite ends of the length of tubes selected for testing. Before cutting the test specimen, 50 mm from both ends of the samples shall be discarded.

iv. Free Bore Test: A rod 230mm long and of appropriate diameter shall be passed through relevant nominal bore of the sample tubes to ensure a free bore.

v. Uniformity of Galvanized Coating: The galvanized coating when determined on a 100 mm long test piece [see V (a) (iii)] in accordance with IS-2633-1986 (Method for testing uniformity of coating on zinc coated articles) shall with stand 4 one minute dips.

8.0 WORKMANSHIP

The tubes shall be cleanly finished and reasonably free from injurious defects. They shall be reasonably straight, free from cracks, surface flaws, laminations, and other defects, both internally and externally. The screw tubes and sockets shall be clean and well-cut. The ends shall be cut cleanly and square with the axis of tube.

9.0 MARKING

i. The medium class of tubes shall be distinguished by Blue color bands which shall be applied before the tubes leaves the manufacturers' works.

ii. Tubes shall be marked with the standard mark.

10.0 EARTHING ARRANGEMENT OF DISTRIBUTION TRANSFORMERS

10.1 The earth pits should be located as per REC Construction Standard F-5 (Annexure VI).

10.2 Pipe earth electrodes should be provided in each earth pit as per REC construction standard J-1 and J-2 (Annexure VII & VIII).

10.3 4 mm (8 S.W.G), G.I. wire should be used for earth leads.

10.4 One of the earth electrodes on either side of D.P. structure should be connected with;

(a) One direct connection from the L.T. Lightning arresters and cross-arm.

(b) One direct connection with Lightning arrester on H.T. side (11KV) and cross-arm.

10.5 To each of the remaining two earth electrodes, the following should be connected:-

(a) One separate connection from the neutral (on medium voltage side) of the transformer.

(b) One separate connection from the transformer body and the handle of 11KV A.B. switch.

(c) One separate connection from the earthing terminal of the poles.

GUARANTEED TECHNICAL PARTICULARS FOR 11 KV XLPE POWER CABLE

(To be filled in and signed by the Bidder)

Note: (Fill – up separate column for the following particulars for each type & size of cable)

1.0 GENERAL:

a. Name of Manufacturer:

b. Place of Manufacturing:

c. Applicable standard IS/IEC:

d. Design ambient temperature 0C:

e. Cable particulars, whether, concontractored,

as per clause 1.5 of Technical Specification

(Yes/No):

2.0 CABLES:

a. Voltage grade (Uo / U) :

b Whether suitable for neutral

Earthed / unearthed System:

c. Permissible voltage & frequency variation for satisfactory operation:

d. Nos. of cores & size :

e. Continuous current carrying capacity :

f. For standard condition as per IS

i) In air (Amp.):

ii) In ground (Amp):

iii) In duct (Amp):

iv) In trench (Amp):

g. For site condition

i) In air (Amp.)

ii) In ground (Amp)

iii) In duct (Amp)

iv) In trench (Amp)

3.0 CONDUCTOR:

a. Material & its applicable IS. :

b. Shape of conductor :

c. Nominal cross section area (mm2) :

d. Number of wires per core :

e. Nominal diameter & cross section

area of each wire used in each core of the

conductor :

4.0 CONDUCTOR SCREENING:

a. Type :

b. Material & its applicable IS. :

c. Continuous working temp 0C :

d. Nominal thickness (mm) :

5.0 INSULATION:

a. Material & its applicable IS:

b. Thickness of insulated (mm)

i) Between cores

ii) Between cores & inner sheath

c. Tolerance in thickness (percent) of insulated

d. Diameter of core over insulated (mm)

e. Specific insulated resistance at

ninety (90) degree Centigrade (Ohm-Cm):

6.0 INSULATED SCREENING:

a. Material & its applicable IS. :

b. Thickness (mm):

i) Semi-conducting part

ii) Metallic part (copper tape)

c. Whether overlapping provided for copper tape:

d. Current carrying capacity

i) Continuous (Amps.)

ii) S.C. current duration of 3-Sec.(KA):

e. Diameter of core over screening (mm):

f. Whether insulated screen is removable without the application of heat :

7.0 FILLER:

a. Material & its applicable IS :

b. Whether suitable for operating temperature of Cable : Yes/ No

c. No of fillers provided including central filler :

8.0 INNER SHEATH:

a. Material & its applicable IS:

b. Extruded or wrapped:

c. Thickness (mm) :

d. Diameter of cable over inner sheath (mm) :

9.0 ARMOURING:

a. Material & its applicable IS :

b. Type of armoring :

c. Nos. of strips :

d. Diameter of cable over armoring:

e. Current carrying capacity of armor

i) on continuous basis (Amp)

ii) short circuit current duration of 1 sec (KA)

10.0 OUTER SHEATH:

a. Material & its applicable IS. :

b. Thickness of sheath :

c. Tolerance on thickness of sheath :

d. Over all diameter of cable (mm) :

e. Scheme for identification :

11.0 CABLE CONSTANT:

a. AC resistance per core at operating temp. (Ohm/KM):

b. DC resistance per core at 20ºC (Ohm/KM):

c. Reactance per core (Ohm/KM) :

d. Capacitance per core (Microfarad/ KM) :

e. Insulated resistance at 27ºC(Ohm/ KM):

f. Loss tangent :

g. Dielectric constant :

h. Maxi. Cable charging current at normal operating voltage (Amp/KM) :

12.0 OTHER PARAMETERS:

a. Recommended minimum braiding radius (mm):

b. Safe pulling force:

c. Cable weight (Kg./KM) :

13.0 CABLE DRUM:

a. Net weight of cable (Kg.) :

b. Drum weight (Kg.) :

c. Shipping weight (Kg.) :

d. Whether ISI Mark shall be indicated on drum (Yes/No) :

e. Length of cable per drum (Meter) :

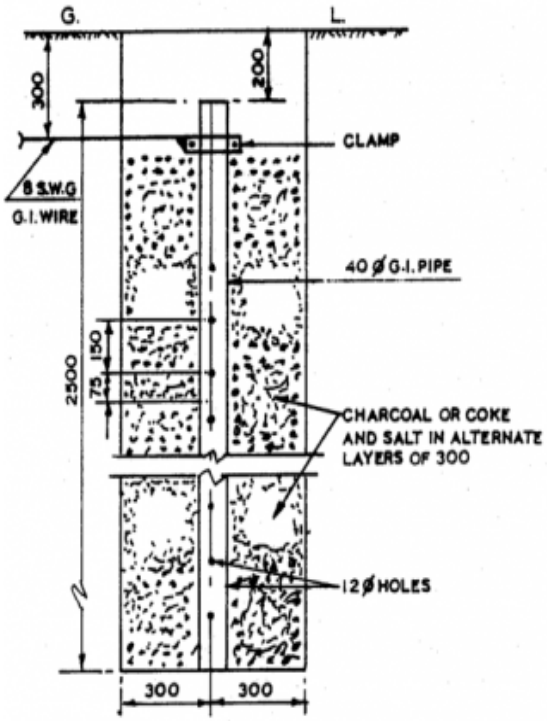
14.0 Whether details shall be embossed as stated under Cl. 9.4 of Technical Specification (Yes/No):

15.0 Whether type test reports submitted, as stated under Cl. 6.1of Technical Specification (Yes/ No):

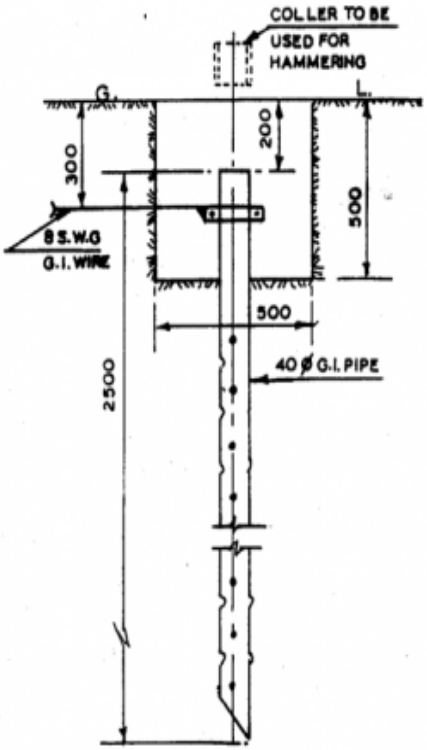
16.0 Whether drawings submitted as specified under Cl. 8.1 of Technical Specification. (Yes/ No) :

17.0 Whether unpriced schedule of offered items submitted with Technical offer. (Yes/ No) :

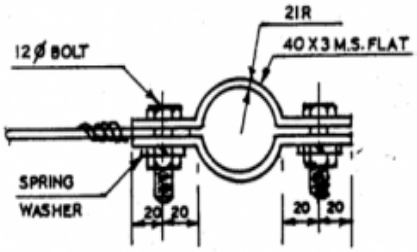
CONSTRUCTION STANDARD



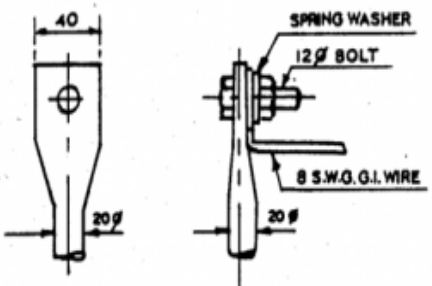
EARTHING FOR HARD, STIFF OR MEDIUM CLAY



EARTHING FOR ORDINARY SOIL WHERE PIPE COULD BE HAMMERED IN



TYPICAL DETAIL OF CLAMP FOR PIPE EARTH



TYPICAL DETAIL OF CONNECTION FOR ROD EARTH

ALL DIMENSIONS ARE IN mm.

NOTES:-

1. ALTERNATIVELY 20 ø G.I. ROD MAY BE USED INSTEAD OF PIPE.
2. WATER TO BE POURED INTO SUMP TO KEEP THE SOIL SURROUNDING THE EARTH PIPE / ROD MOIST.
3. FOR COIL EARTHING REFER CONSTRUCTION STANDARD. J-1.

PIPE / ROD EARTHING

SCALE :- N.T.S | SEPT. - 1972

D. GALVANIZED IRON PIPES

1.0 SCOPE:

The Specification covers the requirements for G.I. Pipes Heavy duty. Unless modified by this specification, requirement of IS 1239 (part-1) -1990 and 2004 shall be valid.

2.0 MATERIAL:

The material used for manufacturing of G.I. Pipes shall confirm to IS 1239 (part-1) -1990 and 2004.

3.0 DIAMENSIONS AND DIMENSIONAL TOLERANCES:

The dimensions and nominal mass of tubes shall be in accordance with Table 2 subject to the tolerances permitted in CL 8.1 and 9 of IS 1239 (Part -1)

4.0 THREADS:

- ♦ Unless specified otherwise, tubes shall be supplied as plain ends.
- ♦ External threads shall be tapered and confirmed to ASME B1.20.1 or BS 21.
- ♦ For checking conformity of threads gauging practice in accordance with ASME B1.20.1 or BS 21

5.0 FREEDOM FROM DEFECTS:

On visual examination the outside and inside surfaces of pipes shall smooth and f ree from defects such as cracks etc.

6.0 GALVANISING:

Pipes shall be galvanized to meet the requirement of IS 4736:1986.

- ♦ Zinc confirming to any grade specified in IS 4736:1986 shall be used for the purpose of galvanizing.
- ♦ Galvanizing Bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- ♦ Coating Requirement: minimum Mass of Zinc coating determined as per IS 6745 - 1972 shall be 400 gms/m2.

♦ Freedom from Defect: The zinc coating shall be uniform adhered, reasonably smooth and free from such imperfections as flux, ash bore patches, black spots, pimples, lumpiness runs, rust strains, bulky white deposits, and blisters.

♦ Criteria for Samplings: All materials of same type in coating bath having uniform coating characteristics shall be grouped together to continue a lot. Each lot shall be tested separately for the various requirements of the specifications. The number of units to be selected from each lot for the testing purpose shall be as per IS: 4736:1986

♦ The sample selected according to clause 6.1 and 6.2 of IS 4736 – 1986.

♦ The sample found confirming to above requirements shall then be tested mass of zinc coating in accordance with clause no 5.1 of IS 4736 -1986.

♦ Criteria for conformity: AS per IS 4736 -1986.

♦ Test procedure as per IS 4736-1986.

♦ Specification for painting of GI pipes

The entire length of the pipeline is to be painted at Contractor works as per following:

a) One coat of Primer application (Appropriate Zinc based primer)

b) Two coats of synthetic enamel paint – canary yellow of minimum of 30 microns per coat of reputed make like Asian, Berger and Nerolac.

7.0 PRESSURE TEST:

Hydrostatic pressure test shall be carried out at pressure of 5 Mpa (50Kgf/ Cm2). Contractor to submit the internal pressure test certificate for the same. If required, TSECL representative or Third Party Inspection agency appointed by TSECL shall witness finished goods testing as per the sample procedure specified in clause no 14 of IS 1239 (part – 1).

8.0 MARKING:

Each pipe shall be EMBOSSED with manufacturers name or trade mark and the size designation at the interval of not more than 2 meters.

Pipe shall be supplied in random length of 4 to 7 meters only.

Each packing containing pipes shall carry the following stamped or written by indelible ink.

a) Manufacturer name and trade mark.

b) Designation of pipe.

c) Lot number.

d) ISI Monogram

Each pipe confirming to this standard shall also be marked with BIS standard mark.

9.0 INSPECTION/ DOCUMENTS:

Inspection shall be carried out as per TSECL specifications.

The manufacturer will engage the Third Party Inspection agency approved by TSECL and the cost of the same will be included in the quoted rates.

TSECL representative or Third Party Inspection agency appointed by TSECL may carry out stage wise inspection during manufacturing / final inspection.

Contractor shall furnish all the material test certificates, proof of approval, license from specified authority as per specified standard, if relevant internal test / inspection reports as per TSECL technical specifications and specified code for 100% material, at the time of final inspection of each supply of each lot.

Even after Third Party Inspection TSECL reserves the rights to select a sample of fittings/ pipes randomly from each manufacturing batch and have these independently tested. Should the result of these testes fall outside the limits specified in TSECL technical specifications, then TSECL reserves the rights to reject all production supplied from the same batch.

S L No	Description	Bidder offer
1	Contractor is the manufacturer of Heavy Class GI Pipes as per IS 1239 (part - I)	
2	Raw Material used for manufacturing of GI pipes should be as per IS - 1239 (Part - I)	
3	GI Pipes should be supplied as Plain Ends	

4	Out side and Inside Surface of GI pipes should be Free from defects	
5	Zinc as per IS 4736:1986 used for galvanizing	
6	The molten metal in galvanizing bath shall contain not less than 98.5% by mass of zinc	
7	Mass of Zinc Coating as per IS 6745 - 1972 shall be 400 gms/m2	
8	Painting shall be done as per TSECL specifications with Minimum 30 microns per coat	
9	Selection of sample will be as per IS 4736 - 1986	
10	Hydrostatic Test pressure will be carried out at 5 Mpa.	
11	Marking will be done as per TSECL Specifications TSECL/R-APDRP/PART-B-Phase-II	

E. HEXAGONAL MS BOLTS & NUTS

1.0 SCOPE:

This specification covers the details of black hexagonal MS Bolts & Nuts of various sizes.

2.0 APPLICABLE STANDARDS:

Unless otherwise modified in this specification, the bolts and nuts shall comply with Indian Standard Specifications IS: 1363 - 1967 as amended from time to time or equivalent international standards.

3.0 WORKMANSHIP:

Full threaded bolts shall not be used. The bolts and nuts shall have hexagonal heads, which shall be neatly finished concentric and square with the shank and free from burrs, scale and other defects. Threads in nuts shall not be torn or ragged and shall be of proper contour. The fits of the nuts shall be such that there will be no locking of the nuts. Nuts and bolts of the same size shall be interchangeable. The thread of nuts & bolts shall have coarse pitch screw threads as per IS: 1363 - 1967 or relevant International Standards and shall meet with all applicable technical supply conditions covered under this standard.

2.0 PARTICULARS OF MATERIAL:

5.1 MECHANICAL PROPERTIES:

The mechanical properties of bolts covered in this standard shall conform to the property clause 4.6 and that for nuts shall conform to the property clause 4 specified in IS: 1363-1967 or its latest edition.

6.0 GRADE:

Bolts & nuts covered in this specification shall conform to Black Grade B, specified in IS: 1363-1967.

7.0 DESIGNATION:

Black Bolts & Nuts covered in this specification shall be designated as per table I of IS: 1363-1967.

8.0 DIMENSIONS:

The dimensions for black bolts & nuts shall be as given in table 2 & 3 of IS : 1363-1967.

The bolts and nuts shall have coarse pitch screw threads conforming to IS : 4218-1967 (ISO Metric screw threads) or the relevant International Standards.

Preferred length diameter combinations for black hexagonal bolts are given in table-4 IS : 1363-1967.

9.0 REQUIREMENTS:

9.1 The method of sampling and acceptance criteria of black hexagonal bolts and nuts shall be in accordance with IS: 2614-1964.

9.2 The bolts & nuts conforming to this standard shall comply with the requirements of IS: 1367-1967 in regard to requirements not specified in this standard.

10.0 TESTS:

All types of tests including routine tests shall be carried out according to relevant standards.

11.0 INSPECTION:

Inspection and testing shall be carried out in accordance with the general instructions.

12.0 PLACE OF MANUFACTURE:

The contractor shall state the place of manufacture, testing and name of the manufacturer of the various items included in his inspection offer.

13.0 PACKING AND TRANSPORT :

The contractor shall be responsible for suitable packing of all the material and marking on the consignment, so as to avoid any damage during transport and storage and to ensure correct dispatch. The packing shall be conforming to the requirement laid down in IS: 3256-1965 or its latest amendment.

14.0 DRAWING AND LITERATURE :

Illustrated and descriptive literature on the material must be submitted along with the offer for inspection.

15.0 RAW MATERIAL:

No assistance whatsoever for arranging the raw material for manufacture of bolts & nuts shall be provided by the employer. The delivery shall not be dependent upon availability of raw material.

16.0 MARKING :

The sealed container of bolts & nuts shall be marked with:

a) Manufacturer's name & trade mark.

b) Place of manufacture.

c) The marking shall be stenciled indelible ink on gunny bags.

d) Net weight with description of material.

F. MILD STEEL STRUCTURE

1.0 SCOPE

The materials shall conform, in all respect, to the high standard of design and workmanship and shall be capable of performing duties specified herein. Materials offered shall be complete in all respect. The size of the channel, angle and flat normally used for Distribution transformers structures, 11 KV line structures and LT line structures are as follows;

i) Channel 100x50X50X6 mm/75X40X40X6mm.

ii) Angle a) 50x50x6 mm

b) 65x65x6 mm

iii) Flat a) 50x6 mm

b) 50x8 mm

The above list is merely indicative and not comprehensive.

2.0 STANDARDS

Materials shall conform to the latest applicable Indian standards. In case bidders offer Steel Section and supports conforming to any other international specifications which shall be equivalent or better than IS, the same is also acceptable.

S No	Standard No.	Title
1	IS: 2062 Grade 'A' Quality	Specification for M.S. Angles, M.S. Channel and M.S. Flat
2	IS: 2062	Chemical and Physical composition of material
3	IS: 1852	Rolling and Cutting Tolerances for Hot Rolled Steel products

Name of Item	Type to be used as per IS
For channel 100x50	ISMC 100 Grade A
For angle 50x50x5	ISA 5050 Grade A
For angle 65x65x6	ISA 6565 Grade A

3.0 ACCEPTANCE OF OTHER AUTHORITATIVE STANDARDS

All relevant Indian standards specifications have been mentioned. However, the material meeting any other authoritative international standards, which ensures equal or better quality than the standards,

mentioned shall also be acceptable. Material for which Indian Standards are not available, the relevant British standards and IEC recommendations will be applicable. The bidder is required to attach photocopy of all such standards according to which the materials have been offered.

4.0 RAW MATERIAL

The Steel Sections shall be re-rolled from the BILLETS/INGOTS of tested quality as per latest version of IS: 2830 or to any equivalent International Standard and shall be arranged by the bidder from their own sources. The Chemical composition and Physical properties of the finished materials shall be as per the relevant standards.

5.0 TEST

Steel Sections shall be tested in IS approved Laboratory or standard Laboratory of the Bidder country having all facilities available for conducting all the tests as prescribed in relevant IS or IEC or to any equivalent International Standard or from any recognized and reputable International laboratory or Institutions.

The Bidders are required to specifically indicate that;

(i) They hold valid IS (or equivalent IEC) License.

(ii) Steel Sections offered are bearing requisite IS certification or equivalent IEC marks. The Bidders are required to submit a copy of the valid IS (or equivalent IEC) License clearly indicating size and range of product against respective ISS or any equivalent International Standards along with their offer.

6.0 CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF M.S. ANGLES, M.S. CHANNELS AND M.S. FLAT CONFORMING TO IS: 2062/84

A. Chemical composition:

Sl No	CHEMICAL COMPOSITION	FOR Fe 410 WA GRADE	
1	C	0.23%	Max.
2	Mn	1.5%	Max.
3	S	0.050%	Max.

4	P	0.050%	Max.
5	SI	0.40%	Max.
6	CE(Carbon Equivalent)	0.42%	Max.

B. Mechanical properties:

(i) Tensile strength Kfg/mm2 – 42, N/Min, : 410

(ii) Yield stress Min. for thickness/diameter

< 20 mm	26 kgf/m2 OR 250 N/mm2
20 – 40 mm	24 Kgf/mm2 OR 240 N/mm2
> 40 mm	23 kgf/mm2 OR 230 N/mm2

(iii) Elongation % : 23%

(iv) Bend Test (Internal Dia) : Min-3t

(t – is the thickness of the material)

7.0 TOLERANCE

Rolling and weight tolerances shall be as per latest version of IS: 1852 or to any equivalent International Standard.

8.0 MARKING

It is desirable that the Bidder should put his identification marks on the finished materials. The mark shall be in “legible English letters” given with marking dies of minimum 18 mm size.

9.0 INSPECTION AND TEST CERTIFICATES

The materials to be supplied will be subject to inspection and approval by the owner’s representative before dispatch and / or on arrival at the destination. Inspection before dispatch shall not, however, relieve the bidder of his responsibility to supply the Steel Sections strictly in accordance with the specification.

i) The owner's representative shall be entitled at all reasonable time during manufacture to inspect, examine and test at the bidder's premises the materials and workmanship of the Steel Sections to be supplied.

ii) As soon as the Steel Sections are ready for testing, the bidder shall intimate the owner well in advance, so that action may be taken for getting the material inspected. The materials shall not be dispatched unless waiver of inspection is obtained or inspected by the owner's authorized representative.

iii) Test certificates shall be in accordance with latest version of the relevant Indian Standards or any equivalent International Standards.

iv) The acceptance of any batch/lot shall in no way relieve the bidder of any of his responsibilities for meeting all the requirements of the specification and shall not prevent subsequent rejection of any item if the same is later found defective.

10.0 QUALITY ASSURANCE PLAN

The Bidders must establish that he is following a proper quality assurance programme for manufacture of Steel Sections. The Bidders shall invariably furnish following information along with his bid.

i) Statement giving list of important raw materials, names if sub-contractors for the raw material, list of standards according to which the raw material is purchased and copies of test certificates thereof.

ii) Information and copies of test certificates as in (i) above in respect of bought out items.

iii) List of machines and manufacturing facilities available.

iv) Levels of automation achieved and list of areas where manual processing exists.

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

vi) List of testing equipment available with the Bidder for final testing of materials specified and test plant limitation, if any, via-a-vis type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in schedule of deviations from specified test equipments.

G. EARTHING SYSTEM: -

1.1 The earthing of the Sub-station Switchyard shall form an earth mat to achieve resistance of 1.50Ω. There shall be sufficient numbers of risers for connection to different equipments, structures, fencing etc. The tenderer shall supply all the materials such as: -

i. Perforated 40 mm. dia. Hot Dip G.I. pipe of length 2.5 mtr. each. The earthing shall be done as per IS: 3043 / 1966.TSECL will supply drawing of earthing as per REC Specification.
ii. Minimum no. of earth pit will be 12 (twelve) nos. and minimum G.I. flat run for underground earth mat will be as per final layout of the Sub-station. Tenderer shall quote unit rate for each of the said items.

H. **Technical Specification of 9 KV, 5 KA Gapless Silicon Polymeric Lightning Arrestors conform to IEC 60099-4 /IS-3070 Part-3 - 1993 with latest amendments**

1. SCOPE:

This specification covers design manufacture assembly, testing at manufacturers works supply and delivery of single phase outdoor type gapless metal oxide, polymeric housed surge arresters for use in effectively earthed system with the transformer neutral effectively earthed with normal voltage of 11 KV for 9 KV Lightning arrestors . The rated voltage of Arrestors shall be 9 KV (rms) for 11KV system.

2. DEFINITIONS

2.1 SURGE ARRESTER

A device designed to protect electrical apparatus from high transient over voltages.

2.2 GAPLESS METAL-OXIDE SURGE ARRESTER

A surge arrester having one or several non-linear metal-oxide resistors with highly non-linear voltage-current characteristics, connected in series, but having no integrated series or parallel spark gaps.

2.3 POLYMERIC HOUSED SURGE ARRESTER

A metal oxide surge arrester with a housing made of polymeric material preferably Silicone rubber, without air voids neither between the housing and the metal –oxide resistors nor the housing itself. Arresters must have directly moulded housings. The surge arresters shall strictly conform to IEC 99-4 / IS-3070 Part-3 - 1993 with latest amendment if any in all respects. Maximum residual voltage shall comply with the requirement given hereunder :
The surge arresters meeting any other authoritative standards, which ensure equal or better performance than mentioned above, shall be acceptable.

2.4 POLYMERIC HOUSING MATERIAL

The polymer material which is used for the arrester housing must be tracking and erosion resistant, stabilized against UV radiation and preferably of Silicone Rubber.

3. CLIMATIC CONDITIONS :-

i. Location : At various locations in Tripura.

ii. Max. ambient air temperature (Deg0 C) : 45

iii. Min.ambient air temperature (Deg0 C) : 4

iv. Max yearly daily ambient air temperature (Deg0 C) : 40

v. Max average weighed average ambient temperature (Deg0 C) : 32

vi. Max. Altitude above mean sea level(Meters) : 1000 M.

4. The technical requirement have been detailed out below:

4.1 Required Technical particulars

	Particulars	NIT requirement
1.	Nominal system voltage	9KV
2.	Type of Arrestor	Gap-less (Metal Oxide)
3.	Applicable Standard	IEC 60099/4 IS 3070 Part-III latest Amendment.
4.	Rated Arrestor voltage KV rms	9
5.	Maximum continuous operating voltage KVrms	7.2
6.	Nominal discharge current rating (8/20 micro sec) KA	5.0
7.	Minimum discharge capability (KJ/KV)	NA
8	Long duration discharge class	Distribution Class
9.	Maximum residual voltage at nominal discharge current of 8/20 micro sec. wave, KV peak	32
10.	Maximum steep current impulse residual voltage at nominal discharge current, KV Peak	38
11.	Maximum switching impulse residual voltage at 500 Amp. (Peak)	NA
12.	Minimum prospective symmetrical current (KA)	15
13.	Impulse high current short duration discharge of 4/10 micro sec. wave (KAP)	65
14.	Max. radio interference voltage at 1000 Hz (micro volts)	--

15.	Overall temporary over voltage withstand capacity (KVrms)	
	a) 1.0 Sec.	10
	b) 10.0 Sec.	9.5
	c) 100.0 Sec.	9.0
16.	Impulse withstand voltage (KVP)	75
17.	Current impulse withstand level	18 impulse of long duration Current 75 Amp peak for 1000 micro secs.
18.	Pressure relief device	N.A.
19.	Disconnecting device	As per required specification IS:3070 (Part 2) 1985
20.	Min. creepage distance of Polymer housing (mm)	300
21.	Top & Bottom metal cap	Hot Dip Galvanized
22.	Terminal arrangement	Built in clamping Type, can be adjusted for Horizontal & Vertical take-off to suit conductor Size Weasal to raccoon.
23	Earthing Terminal	The base of L.A. shall be provided with two separate terminal / distinctly marked for connection to earth

4.2 Residual voltage for 8/20 micro sec. wave of nominal discharge current KA are specified above, however, we will prefer still lower residual voltage to ensure better protection.

4.3 Current impulse withstands level - The 9KV arrestors shall withstand 18 impulse of long duration current with a peak level of 75 Amp. & duration 1000 micro secs. 30KV arrestors shall meet the duty prescribed in line discharge Class-II of IEC TC-37.

4.4 Disconnecting Device: -

The arrestor for 11KV system be provided with a suitable disconnecting device. This shall be connected in series with the ground lead and should not effect the sealing system of the arrestor. The disconnecting device shall conform to the requirement specified in IS:3070 (Part-II)1993 & IEC 99 - 4 (1991-II) clause 5.12, 7.6.3.

5. PACKING & MARKING

5.1 PACKING

The Lightning Arrester shall be so packed that they are adequately protected against damage in ordinary handling and transit. To avoid damage of the Lightning Arrester transshipment in between the road transportation must be avoided i.e. each consignment should be transported from factory to DGM(MM), Electrical Stores Division, A.D. Nagar, Agartala through a single carrier.

5.2. MARKING

The following information shall be marked on each Lightning Arrester:

a). Manufacturers' name
b). Manufacturers' Trade mark

c). Rated voltage.
d). Rated frequency
e). Nominal discharge current
f). Year of manufacture
h). ISI certification mark if any

6. DRAWINGS:-

The supplier shall furnish following drawings along with Bid / Qoutation.

i) General outlines drawings of the complete arrester with technical parameters.
ii) Drawings showing clearance from grounded and other live objects and between adjacent poles of surge arresters required at various heights of surge arresters.
iii) Drawings showing details of pressure relief devices.
iv) Mounting clamp details of surge arresters.
v) Details of the terminal and ground terminals.
vi) Volt time characteristics of surge arresters.
vii) The detailed dimensional drawing with labelling of Silicon Polymeric Housing .

7. TESTS & TEST CERTIFICATES:

7.1 Type Test Certificates :- The complete type test certificate from Govt. approved laboratories i.e. CPRI, NFL, NTL, ERDA etc. for the LAs of all the types/rating as per IS 3070 (Part III)/ IEC 99/4 shall compulsorily be submitted in support of evidence of compliance of the specifications & guaranteed particulars. It should cover all the type tests as prescribed in Clause 7.1 of IEC 99/4 and IS-3070 (Part-III).

Note:- Type test report of manufacturer's laboratory shall not be acceptable.

7.2 Type Tests:-

The following TYPE TEST FOR ARRESTERS WITH POLYMERIC HOUSING shall be made in accordance with Clause IEC 60099-4/IS-3070 Part-III latest amendment:-

1. Insulation withstand test.
2. Residual voltage test
3. Long duration current impulse withstand test
4. Operating duty test
5. Partial discharge test.
6. Weather Ageing test for 1000 hrs.
7. Current Distribution Test.

7.3 ACCEPTANCE TESTS:

The following tests as per clause 8.2 of IEC 99/4 and IS-3070 Part-I & Part-II shall be done on the lower whole number of the cube root of the number of arresters to be supplied.

a) Power frequency reference voltage test at reference current on complete arresters.

b) Lightning impulse residual voltage test at nominal discharge current on complete arresters.

c) Partial discharge test.

d) Galvanizing test on exposed steel parts.

e) Visual/dimensional examination.

7.4 ROUTINE TESTS:-

The following routine tests as per Clause 8.1 of IEC 99/4 / IS-3070 Part-1/Part-IIIand IEC 60099-4 ; 2004-05 Standard are to be conducted by the manufacturer on offered lot for pre-despatch inspection. The lot offered without routine test reports shall not be considered & delay in acceptance of the offer will be on firm's account:-

a) Visual / dimensional examination.

- AC Reference Voltage Test (final arrester)

- Partial Discharge Test (final arrester including hardwares/accessories)

- Residual Voltage Test (final arrester or metal-oxide resistors)

The manufacturer shall provide a routine test report including all relevant details with respect to the test limits. On request, the manufacturer shall also provide a routine test protocol including all measuring results

8. INSPECTION

8.1 All tests and inspection shall be made at the place of manufacture unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without charge to satisfy him that the material is being furnished in accordance with specification. The bidder should clearly specify the testing facility available for electrical, mechanical, ceramic and metallurgical tests.

8.2 The purchaser reserves the right to have the tests carried out at the cost of the supplier

by an independent agency whenever there is dispute regarding the quantity of supply.

8.3 No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested, unless the inspection is waived off by the purchaser in writing. In the later case also, the equipment/material shall be dispatched only after satisfactory testing for all tests specified herein has been completed.

8.4 The acceptance of any quantity of material shall in no way relieve the supplier of any of his responsibilities for meeting all requirements of the specification, and shall not prevent subsequent rejection if such material is later found to be defective.

8.5 The number of sample selected to carry out the acceptance test shall be as per provision in the respective IS.

8.6. The purchaser has the right to have the tests carried out by an independent Agency subject to recovery of testing expenditure in case of failure, whenever there is dispute regarding the quality of supply.

9.0 GUARANTEED TECHNICAL PARTICULARS

GUARANTEED TEHCNICAL PARTICUARS OF 9 KV 5 KA POLYMER LIGHTNING ARRESTORS

S.No.	Particular	NIT requirement	Bidder's offer
1	Name of manufacturer & place of manufacture		
2	Type	Gap-less (Metal Oxide)	
3	Model		
4	Applicable standard	IEC 60099/4 IS 3070 Part-III latest Amendment.	
5	No. of units		
6	Rated voltage (KV rms)	9	
7	Rated frequency (Hz)		
8	Maximum continuous operating voltage (KV rms)	7.2	
9	Maximum leakage current at continuous operating voltage (micro amps)		
10	Temporary power frequency over voltage capacity (KV rms)		

	a) For 1 sec.		
	b) For 10 secs.		
	c) For 100 secs		
11	Nominal discharge current (KA)(8/20 micro sec wave)	5.0	
12	Energy class		
13	Minimum discharge capability (KJ/KV)	N. A.	
	a) For single impulse energy		
	b) For 2 consecutive discharge with 50/60 sec between them		
14	Maximum Switching Serge protection level at 500A		
15	Maximum equivalent front of wave protection level (KVp)		
16	Maximum residual voltage at nominal discharge current of 8/20 micro sec wave (KVP)	32	
	a) 5 KA		
	b) 10 KA		
	c) 20 KA		
17	Maximum steep current Impulse residual voltage at nominal discharge current(KVP)	38	
18	Maximum switching impulse Residual voltage at 500 Amp. Peak	NA	

19	Minimum prospective symmetrical current (KA)	15	
20	Impulse high current short duration discharge of 4/10 Micro sec wave (KAP).	65	
21	Long duration current impulse withstand:		
	a) Current peak (Amps.)		
	b) Virtual duration (Micro sec.)		
22	Maximum radio interference voltage at 1000 Hz (micro volts / DB)	- -	
23	Protective ratio		
24	Total creepage distance		
25	Impulse withstand voltage	75	
26	Reference current (MAP)		
27	Partial discharge i.e. PICO		
28	Power frequency withstand voltage of arrestor Housing (KV rms)		
	a) Dry		
	b) Wet		
29	Lightning impulse withstand voltage of arrestor housing (KVP)		
30	Current impulse withstand level	18 impulse of long duration Current 75 Amp peak for 1000 micro secs.	
31	Type of dis-connective device	As per required specs IS: 3070 (Part 2) 1985	

32	Dimensions of Arrestor :		
	a) Max. dia of polymer (mm)		
	b) Complete height of arrestor (mm) from base to line side		
	c) Total creepage of distance of arrestor housing (mm)		
	d) Net weight of each arrestor (Kg)		
	e) Housing type		
	f) Housing material		
	g) Colour of Housing		
	h) Void-free Design (State Yes / No.)		
33	Construction of arrester		
	a) Material of valve		
	b) Details of sealing		
	c) Description of pressure relief system		
	d) No. of unit per arrester		
34	Type of bracket		
35	Material of Top & Bottom metal cap		
36	Type of terminal arrangement (Whether as per tender Specification)	Built in clamping Type, can be adjusted for Horizontal & Vertical take-off to suit conductor Size Weasal to raccoon.	
37	Size of line/ground terminals		
38	Minimum recommended spacing between Centre to centre of LA.		

39	Clearance required from ground equipment at various heights of arrester units.		
40	Earthing arrangement provided for earthing side of arrester (whether as per our requirement)	The base of L.A. shall be provided with two separate terminal / distinctly marked for connection to earth	

I. 11 KV AIR BREAK SWITCH

2.1. SCOPE

This specification covers the Design, manufacture & testing at works and supply of air break isolators suitable for 11 KV system voltages.

2.2. SYSTEM VOLTAGES

The system on which the isolators will be installed will be :

1) 11 KV 3 phase 50 Hz plus or minus 3% with solidly earthed neutral system.

2.3. APPLICABLE STANDARD

Unless otherwise stipulated in this specification, the A.B. switches shall conform to IS: 9921 (Pt. I to IV) or its latest amendment. In case of difference, if any, between this specification and the IS: 9921, the provisions of ISS will hold good.

2.4.

i) Current Carrying Capacity

The continuous current carrying capacity for the different system voltages shall be as under:

System Voltage Current carrying capacity

11 KV 200Amps.

ii) Rated short time current

The rated short time current for 1 sec. shall be 16 KA.

iii) Rated mainly active load breaking capacity:

The rated mainly active load breaking capacity shall be 10A.

iv) Rated transformer off-load breaking capacity:
The rated transformer off-load breaking capacity shall be 6.3A (rms).

v) Rated line-charging breaking capacity :
The rated line-charging breaking capacity shall be 2.5A (rms).

vi) Rated Cable charging Breaking Capacity :
The rated cable charging breaking capacity shall be 10A (rms).

2.5. NUMBER OF POSTS

Number of posts per phase for different system voltages shall be as under: -

1) 11 KV three posts per phase. Each post having single insulator unit.

2.6. GENERAL REQUIREMENTS

I. The A.B. switch shall be of outdoor type. They shall be of triple pole; gang operated type and shall be suitable for vertical installation. The A.B. switch should be with arcing horns. The sizes of rods used for arcing horns would be 8 mm. M.S. hot dip galvanized. The current carrying connectors should be of two-bolt type having nuts and bolts, with spring washer & plane washers. Connectors shall be of tinned copper. All ferrous parts shall be hot dip galvanized and copper parts heavily tinned.

All current carrying parts should have current density less than 1.6 Amps/mm.sq. wherever not specified & the minimum cross section for fixed contact shall be 300 sq.mm. In case flexible copper breaded tape the weight of tape shall be not less than 47% grams/phase.

All joints in current carrying path shall be of two bolt type. Each joint shall be provided with one plane and one spring washer on not less than 2 mm. thickness even it is not shown in the drawing.

II. POST INSULATORS

Design and manufacture of post insulator should be such as avoid stress concentration due to direct engagement of the porcelain with the metal fittings and retention of water in it recesses of metal fittings.

The post insulator unit shall be assembled in a suitable Jig, to ensure the correct positioning of the top and bottom metal fittings relative to one another. The faces of metal fittings shall be parallel and at right angle to the axis of insulator and corresponding holes on top and bottom metal fittings shall lie in a vertical plane containing the axis of the insulator. The cap and the pedestal must not become loose. The pedestal should be of malleable cast iron and cap should be of malleable cast iron or aluminum. The vertical alignment of post insulator must not vary after operations.

The M.C.I./Al. Cap, the insulator and M.C.I. pedestal of post insulators shall bear the markings of original manufacturers like JSI, HTIF, BHEL, WSI, SIL etc. and their monograms.

For any other equivalent make of post insulators, the bidders should submit the complete type test reports along with the offer for scrutiny and approval of the Board. However the post insulator used for A.B. switch shall be as per Board's choice.

Each post insulator shall have minimum creep age of 300 mm. and should conform to the requirements of IS: 2544 of 1973.

III. FIXED AND MOVABLE CONTACT SYSTEM

The fixed & moving contacts material shall be electrolytic hard-drawn copper heavily tinned. The contact shall be of high pressure and self aligning type with positive wiping action and minimum contact pressure shall be ¼ lb. per Amp. of current carrying capacity.

IV. MECHANICAL STRENGTH

A.B. Switches shall withstand rated mechanical terminal load and electromagnetic forces without impairing their operational reliability or current carrying properties.

V. SECURING POSITIONS

Isolators inclusive of their operating mechanism should not come out of their open or closed positions by gravity, wind pressure, vibrations or reasonable shocks.

Isolators shall be capable of resisting in closed position the dynamic and thermic effects of the maximum possible short circuit current at the installation point and should not open under the influence of short circuit current.

VI. NAME PLATE

Isolators shall be provided with a nameplate containing following information.

a) Name of manufacturer.
b) Order reference.
c) Rated voltage - KV.
d) Rated normal current in Amps.
e) Rated one second short-time current in Amps.

Name of manufacturer should also be provided on the operating device.

The nameplate should be riveted to the base channel at the centre of each pole and operating mechanism including parts. Sticker may be used for parts of operating mechanism.

VII. PHASE TO PHASE CLEARANCE

The phase to phase clearance shall be as under:-

System Voltage

11 KV	75 cm.

VIII. ISOLATION DISTANCE

The minimum distance between the fixed and the nearest part on the moving contact in the completely open position should not be less than the following for different system voltage.

System Voltage	Min. Isolating Distance
11 KV	31 cm.

The withstand level across the break, shall be as specified under type test.

IX. OPERATING MECHANISM

This should comprise of 'B' Class G.I. Operating pipe of 32 mm. outer diameter and6 meter length in single piece without joint. The mechanism should give good mechanical leverage with minimum of loose/lost motion. There should be provision for pad-locking in both 'on' and 'off' position.

2.7. TESTING FACILITIES, TESTS & TEST CERTIFICATE

The tenderer must clearly indicate what testing facilities are available in the works of manufacturers and whether the facilities are adequate to carry out all Routine, Acceptance as well as Type Tests. The facilities should be available to Boards engineers if deputed to carryout or witness the tests in the manufacturer's works.

If any test can not be carried out at the manufacturer's works the reasons should be clearly stated. The A.B. Switch shall be tested in accordance with the procedures detailed in IS: 9921.

2.8. Routine Tests

Every switch manufactured and to be supplied against the Corporation's order will be subjected to routine test mentioned below:

i) Power frequency voltage test (Dry) on isolators which are completely assembled at Manufacturer's works. The test should comply with the following :
System Voltage: One minute Power Frequencies withstand voltage. To earth and between poles (Dry).

11 KV : 28 KV RMS as per ISI 9921.

ii) Measurement of resistance of the main circuit.
This test should comply with clause No. 4.2 of IS: 9921 (Part-4).

iii) Tests to prove satisfactory operation.

iv) Manufacturers test certificate for Acceptance and Routine tests on post type insulators as per IS: 2544.

v) Acceptance tests for complete Isolators :
The following shall be acceptance tests for complete Isolators :

a) Temperature rise test as per IS : 9921.
b) Measurement of resistance of the Main Circuit.
c) Power frequency voltage (Dry) test on Main circuit.
d) Verification of dimensions.
e) Mechanical test on post insulators as per latest recommendations in IS: 2544.
f) Galvanizing test as per latest recommendations in IS: 2544.

The post insulator shall be inspected at the works of the original manufacturer of post insulators. The A.B. Switch shall be supplied duly assembled.

2.9. Type Tests

The Contractor shall submit type test Certificate in accordance with IS: 9921 for test carried not older than 3 years. However, for guidance of the tenderer, different type tests are mentioned below.

a) Temperature rise test.
b) Measurement of Resistance of Main Circuit.
c) Short Circuit current carrying capability for 1 second. The short time current rating for 1 second should be 16 KA.

J. STEEL MATERIALS FOR 11 KV BUS

This scope covers supply, fabrication and erection of SAIL / TISCO / IISCO make 100 X 50 X 50 X 6 mm. / 75 X40x 40 X 6 mm. M.S. channel, 65 X 65 X 6 mm. / 50 X 50 X 6 mm. angle and 50 X 6 mm. M.S. flat as per renovation requirement of the 11 KV bus approved by the owner.

K. All nuts, bolts etc. shall conform to IS: 1363 / 1960.

L. Technical specifications for 200 KVA BIS Certified (label-2), outdoor type three phase,11kV/433-250V,Distribution Transformer.

1.0 SCOPE :

This specification covers the design, manufacture, testing at works, supply/ delivery & transportation of oil immersed, naturally air cooled (type ONAN), three-phase, 50 Hz, 11/0.433-0.250 KV step down, double-wound, outdoor non sealed type Distribution Transformer of capacity 200 KVA as per IS : 1180 (Part-1-2014) F.O.T. at Electrical Stores Division, A.D. Nagar, Agartala.

1.1 TYPE :

i) The transformers shall be double wound, three phase, oil immersed, oil natural air natural cooled (type 'ONAN'), core type suitable for outdoor installation and shall be insulated with DPC insulation on HV & LV windings. Insulation should be of temperature class as per the temperature rise stipulated in this specification.

ii) The neutral point of the secondary (LV winding) is intended for solidly earthed system and should be brought out to a separate insulated terminal.

1.2 STANDARD RATINGS :

Standard Ratings	200 KVA
System voltage (max.)	12 kV
Rated voltage HV	11 kV
Rated voltage LV	433 - 250 V*
Frequency	50 Hz. Subject to fluctuation of ± 5%.
No. of Phases	Three
Connection HV	Delta
Connection LV	Star (Neutral brought out)
Vector group	Dyn-11
Type of cooling	ONAN
No Load Voltage ratio	11000 / 433-250 Volts
Rated basic insulation level	75 KVp as per IS- 1180(Part-I) : 2014.

1.3 Winding Connections and Phase displacement :

The primary windings of the transformers shall be connected in delta and the secondary windings in star vector symbol, Dyn-11], so as to produce , a positive phase displacement of 30° from the primary to secondary vectors of the same phase. The neutral of the secondary winding shall be brought out to a separate insulated terminal.

1.4 Taps :

No tapings shall be provided for transformer upto & i/c 200 KVA rating.

2.0 STANDARDS

The transformer/materials shall conform in all respect to the relevant Indian/International Standard Specification, with latest amendments thereof as guided in IS-1180(Part-I): 2014; some of them are listed below:

IS No.	Title
191:2007	Copper
335:1993	New insulating oils
554:1999	Pipe Threads Where Pressure-Tight Joints are made on the Threads Dimensions, Tolerances and Designation
1576:1992	Solid press board for electrical purpose
1608:2005	Mechanical testing of metals-tensile Testing
1747:1972	Nitrogen
1885(Part 38):1993	Electro-technical vocabulary: Part 38 Power transformers and reactors
1897:2008	Copper strip for electrical purpose
2026	Power transformers:
(Part 1):2011	General
(Part 2):2010	Temperature rise
(Part 3):2009	Insulation levels, dielectric tests and external clearances in air
(Part 5):2011	Ability to withstand short circuit
(Part 8):2009	Application guide
(Part 10):2009	Determination of sound levels
2099:1986	Bushings for alternative voltages above 1000Volts
3024:2006	Grain oriented electrical steel sheets and strips
3347	Dimensions for porelain transformer bushings for use in lightly Polluted Atmospheres
(Part1/Sec1):1979	Part1: Up to and including 1kV: Section 1 Porcelain parts
(Part1/Sec2):1979	Part1: Up to and including 1kV: Section 2 Metal parts
(Part2/Sec1):1979	3.6kV Bushings: Section 1 Porcelain parts

(Part2/Sec2):1979	3.6kV Bushings: Section 2 Metal parts
(Part3/Sec1):1988	17.5kV Bushings: Section 1 Porcelain parts
(Part3/Sec2):1988	17.5kV Bushings: Section 2 Metal parts
(Part4/Sec1):1988	24kV Bushings: Section 1 Porcelain parts
(Part4/Sec2):1982	24kV Bushings: Section 2 Metal parts
(Part5/Sec1):1979	36kV Bushings: Section 1 Porcelain parts
(Part5/Sec2):1979	36kV Bushings: Section 2 Metal parts
3639:1966	Fittings and accessories for Power Transformers
4253(Part 2): 2008	Cork composition sheet- Part 2 Cork and Rubber
6162 (Part 1): 1971	Paper covered aluminium conductors Round conductors
6162(Part 2): 1971	Rectangular conductors
7404(Part 1): 1991	Paper covered copper conductors: Part 1 Round conductors
7421:1988	Porcelain bushings for alternating voltages up to and including 1000V
8999:2003	Pipe Threads Where Pressure-Tight Joints are made on the Threads Verification by Means of Limit Gauges
9335 (Part 1): 1979	Cellulosic papers for electrical purposes: Definitions and general requirements
(Part 2): 1998	Methods of test
(Part3/Sec1):1984	Specifications for individual materials, Section 1 General purposes electrical paper
(Part3/Sec3):1984	Specifications for individual materials, Section 3 Crepe paper
(Part3/Sec5):1985	Specifications for individual materials, Section 5 Special paper
11149:1984	Specifications for rubber gaskets
12444:1988	Continuously cast and rolled electrolytic copper wire rods for electrical conductors

13730(Part 0/Sec3): 2012	Specifications for particular types of winding wires: General requirements Section 3:Enameled round copper wire,
(Part 17):1996	Polyvinyl acetal enameled rectangular copper wire, Class 105
(Part 27):1996	Paper covered rectangular copper wire
16081:2013	Insulating liquids- Specification for unused synthetic organic esters for electrical purposes

3.0 CLIMATIC CONDITIONS:

The Distribution Transformers to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per 1180(Part-I): 2014 or latest revision.

i. Location: At various locations in Tripura.

ii. Max. ambient air temperature (Deg0 C): 500C

iii. Maximum relative humidity: 95% (sometime approaches Saturation point)

iv. Max. Altitude above mean sea level(Meters): 1000 M.

4.0. LIMITS OF TEMPERATURE RISE:

4.1 The type of cooling shall be ONAN as per IS:2026 (Part-2)

4.2 The permissible temperature rise shall not exceed the limits of when measured by resistance method for transformer winding and measured by thermometer for top oil when tested in accordance with IS: 2026(Part-2) :

KVA Rating	for transformer winding (when measured by resistance method)	for top oil (by thermometer)
Upto & i/c 3-ph 200 KVA	40oC	35oC
Higher than 200 KVA upto & i/c 3-ph 2500 KVA	45oC	40oC

5.0. DESIGN AND CONSTRUCTION :

5.1 Core :

5.1.1 Material : CRGO Sheet

5.1.2. The core shall be of NEW high grade cold rolled grain annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, bolted together and to the frames firmly to prevent vibration or noise. All core clamping bolts, MS hard wares etc. inside the tank shall be effectively insulated The complete design of core must ensure permanency of the core losses with continuous working of the transformers. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated in the offer.

The grade of core laminations shall be M4 or better.

N.B 1: The successful bidder shall be required to submit the manufacturer's test report Showing the Watt loss per Kg and the thickness of the core lamination to ascertain the quality of core materials.

The purchaser reserves the right to get sample of the core material tested at any Government recognized laboratory.

Core Clamping for CRGO :

1. MS channel shall be used on top and bottom
2. Core Channel on LV side to be reinforced at equidistance, if holes / cutting is done for LT lead in order to avoid bending of channel.
3. MS Channels shall be painted with varnish or oil-resistant paint.

5.1.3. Details of Core :

i. The core shall be stack type. The assembled core shall be securely clamped and bolted together, firmly to the frames to prevent vibration or noise.

ii. The values of Audible sound level (decibels) at rated voltage and frequency for oil immersed distribution transformer (as per NEMA standard) is given below:

Sl no	KVA rating	Audible sound level (decibels)
i.	0 – 50	48
ii.	51 – 100	51
iii.	101 – 300	55
iv.	301 - 500	56

iii. The core clamping frame shall be provided with lifting eyes for the purposes of tanking and un-tanking of the live parts of the transformer. The whole core shall be electrically connected by copper strip of adequate section to the core frame at two separate points for being eventually earthed through the tank to drain off electrostatic potential that may built up.

Core top and bottom of yoke shall be supported with M.S. Channel of proper size and Properly bolted together for stack type core.

iv. Adequate provision shall be made to prevent movement of the core and winding relative to the tank during transport and installation or while in service.

v. Top & bottom yoke should be constructed as per drawing & design of the manufacturer but the core losses & magnetizing current should be guaranteed.

vi. All channels, top and bottom yoke, Nut Bolts, Tie rods shall be painted with oil and corrosion resistant paint before use.

vii. The cores shall conform to IS: 649 (testing for steel sheets & strips & magnetic circuit).

5.1.4. The transformer core shall not be saturated for any value of V/f ratio to the extent of 112.5% of the rated value of V/f ratio (i.e. 11 KV/50 due to combined effect of voltage and frequency) up to 112.5% on any tapping without injurious heating at full load condition and will not get saturated. The supplier shall furnish necessary design data in support of this situation.

5.1.5. Flux Density :

The maximum flux density in any part of the core shall not exceed 1.9 Tesla for Distribution Transformer upto & i/c 3-ph 2500 KVA .

The vendor shall furnish necessary design data in support of this stipulation. Tenderer should submit Maximum flux density & Core-weight calculation sheet.

5.1.6. No load current :

No load current at rated voltage and at 112.5% of rated voltage shall not exceed the values given below:

KVA Rating	Percentage of rated full load current	
	At 100 % rated voltage	At 112.5 % rated voltage
Upto & i/c 3-ph 200 KVA	3% of Full load current.	6% of Full load current
Higher than 200 KVA upto & i/c 3-ph 2500 KVA	2% of Full load current.	5% of Full load current

5.2 Winding :

5.2.1 Materials:

i) HV winding shall be wound from Double paper covered aluminium conductor for 200 KVA .

ii) LV winding shall be wound from Double paper Covered aluminium for 200 KVA .

5.2.2 Current Density:

Current density for HV and LV winding should not be more than -

2.8 A / sq. mm for Copper and

1.6 A / sq.mm for Aluminium conductor.

5.2.3 LV Winding shall be in even layers so that the neutral formation will be at top.

5.2.4 Inter layer insulation shall be Manila paper / dotted Kraft Paper insulation should be used.

5.2.5 Proper bonding of inter layer insulation with the conductor shall be ensured. Test for bonding strength shall be conducted.

5.2.6 The core / coil assembly shall be securely held in position to avoid any movement under short circuit conditions.

5.2.7 Bracing of Windings :

i. The windings and connections shall be braced to withstand shocks which may occur during transport or due to switching / short circuit and other transient conditions during service.

ii. Coil clamping rings, if provided, shall be of steel or of suitable insulating material. Axially laminated material other than Bakelite paper shall not be used.
Transformer shall be provided with the requisite number of windings and shall be designed to withstand the electromechanical stress exerted under short circuit conditions as per ISS: 2026 – 1977.

iii. Class 'A' insulation shall be used. Paper insulation shall be dry and uniform and free from punctures and other defects. Solid insulation shall be of best quality. Wooden supports, if used, shall be well seasoned and compatible with hot transformer oil. The test certificate of the raw materials shall be made available by the transformer manufacturer on request during Inspection & Testing.

iv. The winding shall be so designed to reduce to a minimum the out of balance forces in the transformer at all voltage ratings.

v. The winding shall also be designed such that all coil assembles of identical voltage rating shall be interchangeable and repairing of the winding can be made readily without special equipments.

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5.3.1. Losses and Impedance:

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

Rating in KVA	Maximum Total Losses (in watts) at		Impedance (%) at 75° C
	50 %	100 %	

	Loading	Loading	
16	135	440	4.5%
25	190	635	4.5%
63	340	1140	4.5%
100	475	1650	4.5%
200	780	2300	4.5%

No Positive tolerance shall be allowed on the maximum losses displayed on the label for both 50% and 100 % loading values. . In case, the actual loss values exceed the above guaranteed values, the transformers shall be rejected at the risk, cost and responsibility of the supplier. The bidder should guarantee individual No load losses & Load loss without any positive tolerance. The values guaranteed in G.T.P. for flux density, no load current at rated voltage, no load current at 112.5% of rated voltage and no load loss at rated voltage shall be individually met.

However, the bidder must indicate in GTP the No load loss & Load loss for evaluation as per formula given.

5.3.2. Bids will be evaluated as per the loss evaluation formula given in REC, K-5 Standard as amended upto date. Loss capitalization factor shall be taken as follows:

i. Iron Loss (No load loss factor) : Rs. 4,82,900.00 / KW ;

ii. Copper Loss (Load loss factor) : Rs. 1,57,000.00 / KW ;

5.4.0 Clearance inside the tank (for stack type core construction):

7.4.0 Insulation material and Clearance:					
Sl no	Particulars	KVA ratings			
		25	63	100	200
7.4.1	Radial clearance of LV coil to core (bare conductor) shall not be less than	3.5 mm	3.5 mm	4.0 mm	4.0 mm

7.4.2	Radial clearance between HV & LV shall not be less than	11 mm	11 mm	10.0 mm	10.0 mm
7.4.3	Phase to phase clearance between HV conductor shall not be less than	11 mm with the minm of 2 x 1 mm press board to cover the rods.	11 mm with the minm of 2 x 1 mm press board to cover the rods.	10.0 mm	10.0 mm
7.4.4	Minimum electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the windings) should be	30 mm	30 mm	30 mm	30 mm
7.4.5	Minimum end insulation to earth shall be	25 mm	25 mm	25 mm	25 mm
7.4.6	No. of coils HV & LV / phase (minimum)				
	HV =	4 nos	4 nos	4 nos	6 nos
	LV =	1 no	1 no	1 no	1 no
7.4.7	Minimum thickness of locking spacers between HV	10 mm	10 mm	10 mm	10 mm

	coils				
7.4.8	No. of axial wedges between LV and HV winding equal-spaced around LV	6 nos	6 nos	8 nos	8 nos
7.4.9	Minimum external clearances of Bushing terminals				
	HV : Phase to Phase =	255 mm	255 mm	255 mm	255 mm
	HV : Phase to Earth =	140 mm	140 mm	140 mm	140 mm
	LV : Phase to Phase =	75 mm	75 mm	75 mm	75 mm
	LV : Phase to Earth =	40 mm	40 mm	40 mm	40 mm

5.5.0. TRANSFORMER TANK

5.5.1. Construction :

TANK- For non-sealed or sealed type transformer, transformer tank can be of plain tank configuration with/without radiator or cooling tubes. The tank can also be made of corrugated panels of adequate thickness, also used for cooling. The transformer tank covers shall be bolted/clamped alternatively welded with tank rim so as to make a leak proof joint. The curb design in case of welded construction shall be such that it is possible to remove the weld and reweld the tank at least two ties. The tank design shall be such that the core and windings can be lifted freely. The tank plate shall be of such strength that the complete transformer when filled with oil may be lifted easily by means of the lifting lugs provided. Top cover shall be slightly sloping (difference of heights should be 20mm ± 10% towards H.V. bushing). Ends of cover plate should be bent to 90 degrees to avoid entry of water through cover plate gaskets and cover the top with end walls. Shape of the tank shall be rectangular only. No other shape will be accepted. The tank shall be fabricated by welding at corners. No Horizontal or vertical joints in tank side and its bottom or top cover will be allowed.

(a) (i) Side wall plate thickness: 4.00 mm ± Tolerance as per relevant IS:1852.
(ii) Top and bottom plate thickness: 6.0 mm ± Tolerance as per relevant IS:1852.

(b) For transformers upto 200 KVA plain tank shall be capable of withstanding a pressure of 80 KPa and a vacuum of 250 mm of mercury. Limiting values of the deflections are specified in 21.5.1. of IS-1180(Part-I): 2014.

(c) Reinforced by welded angle of size 40x40x6mm on all the outside walls on the edge of tank to Form two equal compartments. One face of reinforcement angle should be continuous welded with the tank surface such that other side of the angle forms inverted "L".

(d) The permanent deflection is not more than 5 mm upto 750 mm length, 6.5 mm upto 1250 mm length and 8.0 mm upto 1750mm length when transformer tank without oil is subjected to a vacuum of 760 mm. of mercury.

(e) Lifting Lugs: 4 Nos. welded heavy duty lifting lugs of M.S. Plate 8 mm. thick suitably reinforced by vertical supporting flat welded edgewise below the lug on the side wall.

(f) Pulling Lug: 4 Nos. of welded heavy duty pulling lugs of M.S. Plates of 8 mm thick shall be provided on length side to pull the transformers horizontally.

(g) Top cover Gasket & Bolts:
(i) Gaskets wherever used shall conform to Type III as per IS 11149/Type C as per IS 4253.
(ii) GI Nut Bolts :- All bolts/nuts/washers exposed to atmosphere shall be as follows:

a) Size 12 mm or below – stainless steel

b) Above 12mm – steel with suitable finish like electro galvanized with passivation or hot dip galvanized.

(iii) The height of the tank shall be such that the minimum clear height upto the Top Cover Plate of 30 mm. clearance is achieved from the topmost live part of the tap changer.

5.5.2 (a) Heat dissipation by tank walls excluding top and bottom- Tenderer should submit the calculation sheet.

(b) Heat Dissipation by fin type radiator will be worked out on the basis of manufacturers' data sheet. Tenderer should submit the calculation sheet.

(c) Radiators shall be provided on both sides. They should be fixed at right angle to the sides and not diagonally.

5.5.3 Inside of tank shall be painted with varnish or oil resistant paint. For external surface coat of thermo setting powder paint or one coat of epoxy primer followed by two coat polyurethane base paint shall be used. Table 12 shall be referred to for paint thickness for normal /medium corrosive atmosphere

For highly polluted atmosphere and special application external paint transformer manufacturer.

Table 12 paint scheme for Distribution Transformer

(Clause 15.1)

Sl. No.	Paint Type	Area to be Painted	No. of coats	Total Dry Film Thickness(Min Micron)
i)	Thermo setting powder paint	Inside	01	30
ii)	Liquid paint	Outside	01	60
a)	Epoxy (primer)	Outside	01	30
b)	Polyurethane(finish coat)	Out side	02	25 each
c)	Hot resistant paint/varnish	inside	01	35 / 10

5.6.0 CONSERVATOR FOR NON-SEALED TYPE TRANSFORMER

5.6.1 Transformers of ratings 63 KVA and above with plain tank construction, the provision of conservator is mandatory. For corrugated tank and sealed type transformers with or without inert gas cushion conservator is not required .

5.6.2 When a conservator is provided, oil gauge and the plan or dehydrating breathing device shall be fixed to the conservator which shall also be provided with a drain plug and a filling hole (11/4" normal size thread) with cover. The capacity of a conservator tank shall be designed keeping in view the total quantity of oil and its contraction and expansion due to temperature variations. In addition, the cover of main tank shall be provided with an air release plug to enable air trapped within to be released, unless the conservator is so located as to eliminate the possibility of air being trapped within the main tank.

5.6.3 The inside diameter of the pipe connecting the conservator to the main tank should be 25 to 50 mm and it should be projected into the conservator so that its end is at least 20 mm above the bottom of the conservator so as to create a sump for collection of impurities. The minimum oil level corresponding to 5o C should be above the sump level.

5.7 Breather: Breather joints will be screwed type. It shall have die-cast Aluminium body. Inside container for silicagel will be of tin sheet. Make of breathers shall be subject to purchaser's approval. Volume of breather shall be suitable for 500 gm (Minimum) of Silicagel.

5.8 Terminals:

(i) Brass rods of 12 mm dia. for H.T. with necessary Nuts, check nuts and plain thick tinned washers.

(ii) L.T. terminal shall be manufactured with necessary nuts, check nuts and plain thick tinned washers in accordance with relevant IS with latest amendment.

5.9. Bushings :

(i) For 11 KV- 12 KV Bushing will be used and for 433 volts 1.1 KV terminal bushing will be used. Bushings of the same voltage class shall be interchangeable. Bushings with plain sheds as per IS - 3347 shall be mounted on side of the tank and not on the top cover. Only continuous sheet metal pocket shall be provided for mounting of all H.V/L.V. bushings and the same shall not be fixed on pipes. Sheet metal pocket shall be designed in such a way that all HT bushings shall remain parallel and equidistance all through and inside connections of winding to bushings shall remain within the pocket. Bushings having been type tested as per IS-3347 shall only be acceptable.

(ii) Internal Connections: - In case of HV winding, all jumpers from windings to bushing shall have cross section larger than the winding conductor (normally, 1.5 times). For copper winding, joints will be made by using silver brazing alloy. alternatively joints wi1I be made by using tubular connectors properly crimped at three spots.

LT star connection will be made by using Copper Flat and properly brazed or bolted with crimped lugs on winding by means of plain or spring washers and lock nuts to the flat. Other end of the conductor is brazed on OIL" shape copper flat and flat nut bolted with neutral bushing Stud. The star connection should be wrapped with cotton/paper tape.

Firm connection for LV winding to bushings shall be made by adequate size of OIL" shape flat, nut bolted with LV Bushing stud.

SRBP tube / insulation paper should be used for delta connection and on the portion of HV winding joining to HV bushing.

5.10 Rollers:- For Transformers of rating 200 KVA, 4 Nos. rollers of 150 mm diameter and 50 mm width shall be provided.

5.11 Tank Base Channel: To be fitted across the length of the transformer.

i. For 16 KVA Transformer - Two channels of 75 mm x 40 mm.
ii. For 25 KVA Transformer - Two channels of 75 mm x 40 mm.
iii. For 63 KVA Transformer - Two channels of 75 mm x 40 mm.
iv. For 100 KVA Transformer - Two channels of 75 mm x 40 mm.
v. For 200 KVA Transformer - Two channels of 100 mm x 50 mm.

5.12 ABILITY OF TRANSFORMERS TO WITHSTAND EXTERNAL SHORT CIRCUIT

The performance of transformer under external short-circuit conditions shall be in accordance with IS 2026 (Part 5).

5.13 EFFICIENCY AND REGULATION :

When statement of efficiency and regulations are required they shall be based on specified loading at the rated KVA and unity power factor and computed in accordance with Annex B and Annex C respectively.

Note : Efficiency and regulations at other power factors agreed between the user and supplier shall be compound.

5.14 TOLERENCE

The tolerance on electrical performance excluding losses shall be as given in IS 2026(Part-I).

5.15.0 FITTINGS

5.15.1 Standard Fittings (as per amendment no-1 to I.S. 1180 : 2014)

The following standard fittings shall be provide

a) Two earthing terminals with the earthing symbol =1

b) Oil level gauge indicating oil level at minimum 30o C and maximum operating temperature.

NOTES

1. Minimum and maximum positions correspond to the operating temperature of (-) 5oC and 90oC respectively (for non-sealed type transformer).

2. Minimum position corresponds to the operating transformer of 30oC (for sealed type transformers)

c) Air release device (for non-sealed type transformers)

d) Rating and terminal marking plates.

e) Plain breathing device for non-sealed type transformers which would not permit ingress of rain water and insects up to 200 KVA transformers. Above 200 KVA transformers dehydrating breather shall be provided.

f) Drain cum sampling valve ¾" nominal size thread, IS 554) preferably steel with plug for three phase transformer.

g) Thermometer pocket with cap

h) Oil filling holes having 1 ¼" nominal size thread) with cover (for sealed type transformers without conservator).

j) An extended pipe connection on upper end with welded cover for sealed type transformers .The pipe should be suitably threaded over a sufficient length to enable use of a refilling/siphon connection after removing the welded cover or any other similar arrangement capable of reuse.

NOTE – The bottom drain valve filling hole may used for filtration purpose

k) Lifting lugs for the complete transformer as well as for core and winding assembly

m) Nitrogen/air filling device/pipe with welded cover capable of reuse (for sealed type transformer)

n) Pressure relief device or explosion vent above 200 KVA

p) One filter valve on the upper side of the tank (for transformer above 200KVA)

q) Unidirectional flat rollers (for transformers above 200 KVA)

r) Inspection hole (for transformers above 200KVA)

s) Pressure gauge for sealed transformers with radiators and nitrogen cushion (above 200KVA)

t) HV side neutral grounding strip (where one of the HV bushing terminal is connected to earth).

u) LV earthing arrangement for single phase transformers and

v) Buchholz relay for transformers above 1000 KVA

5.15.2 Optional Fittings (as per amendment no-1 to I.S. 1180 : 2014)

The following shall be available as additional fittings at the option of the user wherever specified

a) Dehydrating breather in lieu of plain breathing device for transformers up to 200 KVA
b) Filter valve 1 ¼" nominal size thread) for transformers up to 200KVA
c) Arching norms or suitable rating lighting arrestors for HT side – 3 Nos transformers upto 200 KVA
d) Bird guard
e) Terminal connectors
f) Oil temperature indicator and winding temperature indicators for transformers above 200 KVA
g) Jacking pads (for transformer above 200 KVA)
h) Buchholz rely (for transformers above 200 KVA)
i) Magnetic oil level gauge (for transformer above 1 600 KVA) with low oil level alarm contact
j) Non return valve (for conducting pressure test)
k) Pressure relief device or explosion vent (up to 200KVA)
l) Protection relay for sealed type transformers for internal parameters that is pressure temperature, oil level and gas detection (above 1 00 kva) and
m) 4 No's anti-theft stainless steel fasteners with breakaway nut shall be provided at top cover (up to 200 KVA)

Note – IS 3639 describes some of the fittings and accessories.

5.16.0 TESTS

5.16.1 General

All routine type and special tests as described in 7.16.2 to 7.16.3 shall be performed as per relevant parts of IS 2026. Pressure and oil leakage test shall be conducted as per 7.16.4

5.16.2 Routine Tests (to be conducted on all units)

The following shall constitute the routine tests.

a) Measurement of winding resistance IS 2026(Part I)
b) Measurement of voltage ratio and check of phase displacement IS 2026(PartI)
c) Measurement of short-circuit impedance (principal trapping, when applicable and load loss at 50 percent and 100 percent load IS 2026 (PartI)
d) Measurement of no-load loss and current IS 2026(Part I)
e) Measurement of insulation resistance IS 2026(Part I)
f) Induced over-voltage withstand test IS 2026 (Part3)
g) Separate source voltage withstand test IS: 2026(Part3)
h) Pressure test (see 7.16.4)
i) Oil leakage test (see 7.16.4)

Type Tests (to be conducted on one unit)

The following shall constitute the type tests :

a) Lighting impulses test IS: 2026(Part-I)
b) Temperature rise test IS: 2026 (Part -2)
   Note: routine tests before and after circuit test shall be conducted as per IS 2026(Part-I)
c) Short circuit withstand test IS: 2026(Part5) up to 200KVA
   Note routine tests before and after short circuit test shall be conducted as per IS 2026 (Part)
d) Pressure test (see 21.5)

5.16.3 Special Tests (to be conducted on one unit)

The following shall constitute the special tests which shall be carried out by manual agreement between the user and the supplier.

a) Determination of sound levels IS 2026 (Part 10)
b) Short-circuit withstand test IS: 2026(Part5) above 200 KVA
   Note Routine test before and after short circuit test shall be conducted as per IS:2026(Part i)
c) No load current at 112.5 percent voltage (see 5.9.3)
d) Paint adhesion tests. The test is performed as per ASTM D3359 (Standard Test Methods) for measuring adhesion by Tape test)
e) BDV and moisture content of oil in the transformer (IS 335)
   Note Test at d) and e) may be carried out on more than one unit subject to agreement between user and supplier

5.16.4 Pressure and Oil leakage Test

For Transformer up to 200 KVA

Pressure test (type test)

For non-sealed and sealed type transformers, the transformer tank shall be subjected to air pressure of 80 kpa for 30 minutes and vacuum of 250mm of Mercury for 30 minutes.

The permanent deflection of flat plates, after pressure / vacuum has been released, shall not exceed the value given below .

Length of Plate	Deflection
Upto 750,,	5mm
751 to 1 250mm	6.5mm

Pressure (routine test)

a) Non sealed type transformer (plain tanks)

The transformer with bolted cover shall be tested at an air pressure of 35 ka above atmosphere pressure maintained inside the tank for 10 min. There should be no leakage at any point.

c) Corrugated tanks
The corrugated transformer tank shall be tested for air pressure of 15 kpa above atmosphere pressure maintained inside the tank for 10 min. There should be no leakage at any point.

d) Sealed type transformer
The transformer with welded cover shall be tested at an air pressure of 80 kpa above atmosphere pressure maintained inside the tank for 10 min. There should be no leakage at any point.

Oil leakage test (routine test)

The assembled transformer for non-sealed and sealed type with all fittings including bushing in position, shall be tested at a pressure equivalent to twice the normal head measured at the base of the tank for 8 h. There should be no leakage at any point. Tank with corrugations shall be tested for oil leakage test a pressure of 15 kpa measured at the top of the tank for 6 h. There should be no leakage at any point.

5.17.0 INFORMATION REQUIRED WITH ENQUIRY AND ORDER

5.17.1 The information to be supplied by the manufacturer with enquiry and order to the purchaser shall be in accordance with Annex D.

5.19.0. TERMINAL MARKING PLATES AND RATING PLATES:

The transformers shall be provided with a plate showing the relative physical position of the terminal and their markings engraved on it. The transformers shall be provided with non-detachable rating plate of Aluminum anodized material fitted in a visible position, furnishing the information's as

specified in IS: 2026. The rating plate shall be embossed /engraved type. The relative position of tapping switch and corresponding voltages may also be shown on the rating plate.

Further M.S. plate of size 125mm x 125 mm be got welded on width side of transformer on stiffener angle. On this plate, name of firm, order no. and date, rating, serial no. and date of dispatch should be engraved.

7.20. TRANSFORMER OIL:

The transformer shall be supplied complete with first filling of oil and the same shall comply with IS: 335 -1983 with latest version thereof and ageing characteristics specified. . These characteristics6 are shown in Annexure- A. Type test certificate of oil being used shall be produced at the time of inspection.

ANNEXURE-A

TECHNICAL PARTICULARS OF TRANSFORMER OIL

Sl. No	Characteristics	Requirements
A	NEW OIL	
1	Flash Point Pensky Marten (Closed)	140U
2	Neutralization value a)Total acidity, Max b)Inorganic acidity	 a)0.03 mg KQH/g b)NIL
3	Corrosive Sulfur	Non-corrosive
4	Electric Strength(breakdown voltage Min) a) New Unfiltered Oil b) New oil after filtration	 30 KV (rms) 60 KV (rms)
5	Dielectric dissipation factor (tan delta) at 90° c	0.002
6	Specific resistance (resistivity) a) at 90°C Min. b) at 27°C Min	 35xl0 12 Ohm-cm 1500xlO 12 Ohm-cm
7	Oxidation stability a) Neutralization value after oxidation, Max b) Total sludge after oxidation Max c) S.K. Value	 0.40 mg KQH/g 0.10% by weight 4% to 8%
8	AGEING CHARACTERISTICS Ageing characteristics after accelerated ageing(open breaker method with copper catalyst) a) Specific resistance (resistivity) i) at 27°C ii) at 90°C b) Dielectric dissipation factor(Tan Delta) c) Total acidity in mg KgH/g d) Total sludge value	 2.5xl012Ohm-em(Min) 0.2xl012 0h-cm(Min) 0.20 Max 0.05 Max 0.05%by weight(Max)
B	CHARACTERISTICS OF OIL IN THE TRANSFORMER The important characteristics of the transformer oil after it is filled in the transformer (within 3 months of filling) shall be as follows :-	

1	Electric strength (breakdown voltage)	40 KV(Min.)
2	Dielectric dissipation factor Tan. Delta at 900C	0.01 (Max.)
3	Specific resistance (Resistivity)at 270C(Ohm-cm)	10 xl012 Ohm-cm
4	Flash point ,PM.(closed)	1400 C (Min)
5	Interfacial tension at 270C	0.03 N/m (Min.)
6	Neutralization value (total acidity)	0.05mgQH/g(Max.)
7	Water content	35 PPM (Max.)

5.21 The suppliers may carefully note following specific requirements of short circuits, impulse voltage and temperature rise tests :

(a) Short circuit test and impulse voltage tests: The purchaser intends to procure transformers designed and successfully tested for short circuit and impulse test. In case the transformers proposed for supply against the order are not exactly as per the tested design, the suppliers shall be required to carry out the short circuit test and impulse voltage test at their own cost in the presence of the representative of the Purchaser.

The acceptance of supply is dependent on successful withstand of short circuit and healthiness of the active parts thereafter on un-tanking after a short circuit test. Apart from dynamic ability test, the transformers shall also be required to withstand thermal ability test or thermal withstand ability will have to be established by way of calculations.

It may also be noted that the Purchaser reserves the right to conduct short circuit test and impulse voltage test in accordance with the ISS, afresh on each ordered rating at Purchaser's cost, even if the transformers of the same rating and similar design are already tested. This test shall be carried out on a transformer to be selected by the purchaser either at their works when they are offered in a lot for supply or random sample units from the supplies already made. The findings and conclusions of these tests shall be binding on the supplier.

In case the transformer does not pass in either of the tests and if the active part details are not found to be in line with the design tested and approved, the following punitive measures shall be taken:

(i) 10% payment of the bill for the supplies already made will be recovered by the Purchaser.

(ii) For transformers already supplied, the guarantee period shall stand twice the normal guarantee period incorporated in the order and the period of performance Security Deposit shall be suitably extended to cover the extended guarantee period.

(iii) Further supply of balance quantity of transformers will not be accepted till another transformer from the manufactured batch is satisfactorily tested (or transformers are modified according to the testes design) for both tests at Supplier's cost and consequent to this if there is any delay in executing the order, the same shall be to Supplier's account.
The Purchaser reserves the right to take action as per terms and conditions of the order.

(iv) The test charges shall be borne by the firm.

Note : Purchaser reserves the right to get all or any type test carried out on at least one sample for each rating of transformer at the cost of supplier from any recognized laboratory government test house approved by the purchaser.

(b) Temperature rise test :- Heat run test shall have to be conducted at supplier's cost on one transformer of each rating in any offered lot during the course of supplies. In case of transformers with tapes shall be conducted on the lowest tap feeding corresponding losses at 75 degrees.

To facilitate conduction of heat run test on any unit in any lot at any point of time during the supplies, the manufacturers will provide a thermometer pocket which gets immersed in oil on the side of the transformer in all the transformers. This pocket shall also be used for connecting thermal sensing device to monitor the variations in temperature and whenever required to operate the protective devices. The Sensor pocket shall be of 12 mm. diameter with blanking screwed cap, removable at site. The depth of the projecting stem of this pocket inside the transformer will be below oil level. It shall not infringe with electrical clearance nor obstruct the untanking of the active part.

(c) Transformer shall be subjected to test for over fluxing of core, wherever required by the purchaser's inspecting officer.

(d) Test For Spill Current in Neutral : The test will comprise of measuring current between shorted secondary phases and neutral on applying impedance voltage at primary winding. The value should not exceed 2 % of full load current.

5.22 ACCEPTANCE TEST:- The following tests shall be witnessed by the Purchaser's Representative at the works of manufacturer :

(i) All the routine tests as mentioned in clause 12.1 shall be performed on minimum 10% quantity of offered lot.

(ii) Heat run test - One unit of the ordered quantity.

(iii) Verification of active parts on one unit of each rating of ordered quantity along with total weight of one unit.
One unit of each rating offered shall be dismantled at the time of pre-despatch

inspection for physical verification for constructional details.

(iv) Further, the Purchaser's Inspector reserves the right to get the Spill Current Measurement Test and also the Pressure Test performed on any tank during his inspection.

5.23 TESTING F ACILITIES :- The tenderer should have adequate testing facilities for all routine and acceptance tests and also arrangement for measurement of losses, resistance etc.

5.24 TEST AND INSPECTION :

Stage Inspection : Transformer plays a crucial role in the Power Distribution network and any failure creates disruption of power supply to consumers and the extent of effect depends upon the quality during manufacturing process.

To maintain the quality of manufacturing process, the purchaser reserves the right to conduct stage inspection during manufacturing at works. Unless and until stage inspection is being conducted or

waiver of stage inspection is being cleared, the pre-despatch inspection call shall not be taken into consideration. To ensure about the quality of transformers, the inspection may be carried out by the Purchaser's representative at following two stages :

(i) When raw material is received, and the assembly is in process in the shop floor.
(ii) At finished stage i.e. transformers are fully assembled and are ready for dispatch.

The manufacturer should give prior importance on the following details before the process of assembling and the same shall be verified at the time of stage inspection. The matter should be treated as essential criteria during stage inspection.

a) After the main raw materials i.e. core and coil materials and tanks are arranged and transformers are taken for production on shop floor and a few assemblies have been completed, the firm shall intimate in this regard, so that inspector(s) for carrying out such inspection could be deputed, as far as possible within 15 days from the date of intimation. During the stage inspection a few assembled core shall be dismantled to ensure that the CRGO laminations (M4 or better) used are of good quality. Further, as and when the transformers are ready for dispatch, an offer intimating about the readiness of transformers, for final inspection' for carrying out tests as per relevant I.S.S. and as in clause 12 & 15, shall be sent by the firm along with Routine Test Certificates. The inspection shall normally be arranged at the earliest after receipt of offer for pre-delivery inspection.

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

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

d) Random sample checking and testing of the transformer selected at random from the supplies made to the Stores, shall be done for verification of technical details, design and losses as per approved drawings and technical particulars and specification of the order. In case of variations, the lot shall be rejected.

e) The Purchaser has all the rights to conduct any test at his own cost by an independent agency whenever there is dispute regarding the quality of supply or interpretation of test results. However, in the event of failure of transformers in such tests, the expenses incurred in testing shall be to the Supplier's account.

f) A quantity of more than 100 Nos. shall not be entertained for stage inspection. Further, the stage inspection shall be carried out in case :

- At least 25% quantity offered has been tanked, and Core Coil Assembly of further least 30 % of the quantity offered has been completed.
- Quantity offered for stage inspection should be offered for final inspection in full within 15

days from the date of issue of clearance for stage inspection, otherwise stage inspection already cleared shall be liable for cancellation.

• Quantity offered for stage inspection should be offered for final inspection in full within 15 days from the date of issue of clearance for stage inspection, otherwise stage inspection already cleared shall be liable for cancellation.

5.25. INSPECTION & TESTING OF TRANSFORMER OIL:

To ascertain the quality of the transformer oil, the original manufacturer's test report should be submitted at the time of inspection. Also arrangements should be made for testing of transformer oil, after taking out the sample from the manufactured transformers and tested in the presence of purchaser's representative.

5.26. TEST REPORTS ON THE ANALYSIS OF RAW MATERIAL:

The supplier shall furnish details of source(s) of raw materials, test certificates and report on the analysis of electrolytic copper/Aluminium used for the winding and the steel used for core, insulation material and also other bought out items from sub-suppliers.

5.27. DRAWINGS:

The General Arrangement dimensional drawing and Core Coil Assembly Drawing showing internal construction of each rating of transformer shall be submitted with the tender. Guaranteed and other technical particulars of the transformers should also be submitted in A-4 size for approval.

5.28 STANDARD MARK: The standard mark as given in column 1 of the First Schedule of the license shall be applied clearly and indelibly by stenciling/screen or ink jet printing / embossing / etching / engraving on the rating plate, provided that the distribution transformers conform to specified requirements of the Indian Standard.

5.28.1 RATING PLATE : The rating plate shall be according to Clause 13.1 of IS 1180 (Part 1) : 2014 with latest amendment and shall be fitted in a visible position.

Dimensions of Rating Plate, Terminal Marking Plate and Combined Rating and Terminal Plate is as per supplier's choice subject to consist the datas as per NIT requirement.

Further M.S. plate of size 125mm x 125 mm be got welded on width side of transformer on stiffener angle. On this plate, name of firm, order no. and date, rating, serial no. and date of despatch should be engraved

5.28.2 MARKING: In addition, the BIS Certification Mark Licence No. (CM/L XXXXXXXXXX) and reference to BIS web site “For details of BIS certification marks scheme refer www.bis.org.in” shall be clearly and indelibly marked on the rating plate.

5.28.3 TERMINAL MARKING PLATE: Each transformer to be provided with a terminal marking plate as per Clause 13.2 of IS 1180 (Part 1):2014

6. PACKING

Transformer shall be delivered suitably packed. Although the method of packing is left to thediscretion of the manufacturer it should be robust enough for rough handling that is

during transportation by road.

All accessories shall be dispatched in boxes or cases. They shall be securely bound with wire and shall have all descriptive marking stamped thereon.

7. GUARANTEED TECHNICAL PARTICULARS

The guaranteed technical particulars of the distribution transformer offered, shall be given by the bidder in the schedule annexed in the bid document by the bidder along with the tender.

SCHEDULE

GURANTEED TECHNICAL PARTICULARS FOR 200 KVA, BIS certified, DISTRIBUTION TRANSFORMER

Sl.No	Particulars	N.I.T. requirement	Bidders' offer
1	Continuous Max. Rating (KVA)	200 KVA	
2	Normal Ratio of Transformer	11 / 0.433 - 0.250 KV	
3	Method of connection	Vector Group : Dyn-11	
4	Max. Hot spot temp	ambient air temperature shall be taken as 500C	
5	Max.Top Oil temp above ambient temperature	35oC	
6	Max. Winding temp above ambient temperature	40oC	
7	Flux density	Shall not exceed 1.9 Tesla for Distribution Transformer upto 3-ph 2500 KVA.	
8	Type of transformer	Core type	
9	CORE		
a)	Core Material & Grade	CRGO, Grade – M4 or better	
b)	No of CRGO lamination piece in which top & bottom yoke is proposed to be constructed		
c)	No. of steps		
d)	Dimensions of core steps i) Gross ii) Effective		

e)	Core area i) Gross ii) Effective		
f)	Core Diameter		
g)	Core length (leg centre)		
h)	Window Height		
i)	Insulation between bottom of core & base channel		
j)	Size of core base channel (Cut channels are not acceptable)		
k)	Core height (inclusive of base channel and insulation in between)		
l)	No. & dimensions of steel channel used for clamping of core		
m)	Size & No. of :- i) Core bolts ii) Tie rods		
n)	Insulation of core bolts i) Core bolts ii) Tie bolts		
o)	Painting of : i) Core Channel ii) Core bolt iii) Tie rod		
p)	Whether top yoke is cut or holes are made for LV connectors. If yes, whether enforcement is done		
q)	Weight of Core (without channels)		
10	Magnetizing current(% of rated current) a) at 90 % Voltage b) at 100 % Voltage c) at 112.5 % Voltage d) Tolerance		
11	Current Density	should not be more than - i. 2.8 A / sq. mm for Copper and 1.6 A / sq.mm for Aluminium conductor.	
12	WINDINGS: a) Material	HV winding shall be i. wound from Double paper covered aluminum conductor for 200 KVA and	

		ii. LV winding shall be wound from Double paper Covered aluminium for 200 KVA . Foil winding will not be acceptable.	
12	b) Size of winding wires for i) H.T. ii) L.T		
	c) Type of Insulation of i) HV winding ii) LV winding		
	d) Internal & external dia. of i) HV coil ii) LV coil		
	e) No. of Coils / Phase i) HV ii) LV	i) HV = 6 nos; ii) LV = 1 no.	
	f) No. of turns per coil i) HV ii) LV		
	g) Height of i) LV coil ii) HV coil		
	h) Method of connection of winding ends to bushing terminals:	i) For HV- The ends of windings brazed with copper wire. Other end of copper wire should be bolted with HV stud by forming loop and using washer. ii)For LV- Other end of LV winding should be crimped with lugs (identical metal) and then bolted with LV stud terminals by using EL shaped Al. Flat. iii) Method of forming star connection— All the three ends of LV windings should be crimped with proper size of lugs (identical metal) and then bolted with Al flat 6 mm thick. (In place of using nut bolt system, brazing is proposed to be done for (i) & (ii) above, the same may please be clearly mentioned)	

	i) Resistance / Phase at 750C a) HV b) LV		
	j) Dia of Copper wire used for Delta formation (The dia should be around 1.5 times that of winding wire)		
13	Maximum allowable No Load losses at normal ratio at 750C		
14	Maximum allowable Load losses at normal ratio at 750C 11		
15	Total losses at normal ratio at 750C (Max)		
16	Maximum Total Losses (No load loss + Load loss) in watts, at 75° C		
	a) At 100% loading.	2300 watt	
	b) At 50% loading.	780 watt	
17	Tolerance on losses at normal ratio between HV & LV windings at 750C		
18	Impedance voltage at normal ratio between HV & LV windings at 750C		
19	Impulse test level of HV & LV windings at 1.2/50 micro second wave.		
20	INULATION OF MATERIAL: Insulation material used & its thickness: a) Between core & LV b) Spacers c) Inter layer d) Between HV &LV winding e) Between phases f) End insulation		

21	CLEARANCE a) LV to Core (Radial) b) Between HV & LV (Radial) c) Phase to phase between HV & LV conductor d) Between winding & body i) Length wise ii) Breadth wise iii) Top cover and top most live part e) End insulation f) Thickness of locking spacers between HV coils g) Axial wedges between HV & LV coils h) size of duct between LV & HV	 a) 4.0 mm (minimum) b) 10.0 mm (minimum) c) 10.0 mm (minimum) d) 30 mm(minimum) e) 25.0 mm (minimum) f) 10.0 mm (minimum) g) 8 nos.	
22	TANK: a) Shape b) Thickness of tank sheets: i) Top & bottom ii) Side walls iii) Collar	 a) Rectangular i) 6.0 mm ± Tolerance as per relevant IS:1852 ii) 4.0 mm ± Tolerance as per relevant IS:1852. iii) Collar	
22	c) Internal dimensions of tank: i) Length (l) ii) Breadth (b). iii) Height (h1) (h2) (Difference between h1 & h2 should be 20 mm) d) Gasket used between top cover and tank i) Material. ii) Thickness iii) Type of joint e) Pulling lugs i) No.	 d) Gaskets wherever used shall conform to Type III as per IS 11149/Type C as per IS 4253. e) Pulling lugs i) 4 nos of welded heavy duty ;	

	ii) thickness iii) Position of fixing f) Lifting lugs i) No. ii) Thickness iii) Position of fixing g) Reinforcement of tank sides	ii) 8 mm thick ; iii) provided on length side; f) Lifting lugs i) 4 nos welded heavy duty lifting ii) 8 mm; iii) on the side wall. g) By Angle size 40x40x6 mm	
24	BUSHING:		
	a) Characteristics : i) Dry Flashover Voltage- HV - LV - ii) Wet Flashover Voltage- HV - LV - iii) Impulse Flashover Voltage HV - LV - b) Material bushing rods c) Size of bushing rods d) Mounting on side walls or top cover e) Whether continuous sheet metal pocket used for mounting all three/four: i) HV bushings. ii) LV bushings. (Pipe are not acceptable) f) Bushing clearances i) Phase to phase: HV- LV- ii) Phase to earth : HV – LV – g) Arrangement of studs	f) Bushing clearances i) Phase to phase : HV - 255 mm; LV - 75 mm; ii) Phase to earth : HV – 140 mm; LV – 40 mm; g) Arrangement of studs provided for fixing of HV Bushings should be in diamond shape so that the arcing horns are positioned vertically.	
25	CONSERVATOR: a) Dimensions. b) Volume c) Diameter of pipe used for		

	conservator and tank d) Please confirm whether pipe is projected into the conservator 20 mm above the bottom of the conservator.	c) inside diameter of the pipe connecting the conservator to the main tank should be 25 to 50 mm. d) The pipe should be projected into the conservator so that its end is at least 20 mm above the bottom of the conservator so as to create a sump for collection of impurities. The minimum oil level corresponding to 5o C should be above the sump level.	
26	RADIATORS: a) Nos. of Radiator. b) No. of Radiators mounted. i) On LV side ii) On HV side c) Nos. of fins per radiator d) Size of each fin.		
27	OIL TO FILLED IN : a) Grade Characteristics. b) Transformer tank i) Volume ii) Weight c) Conservator : i) Volume ii) Weight d) Total Oil filled i) Volume		

	ii) Weight		
28	OVERALL DIMENSION OF TRANSFORMERS: a) Length b) Breadth c) Height		
29	Engraving of Sl.No. & name of firm a) On bottom or core clamping channel b) Side of wall & top cover of tank. c) Date of dispatch on the tank.		
30	MS Plate of size 125x125 mm welded on side wall stiffener of tank with engraving of : i) Name of the firm ii) Rating iii) Serial No. iv) Order No. & date. v) Date of Despatch.		
31	Weight of Windings : a) HV b) LV.		
32	Weight of core & Winding assembly :		
33	Untanking weight if core & winding (including oil absorption)		
34	Weight of tank & fittings including radiators		
35	Weight of complete transformer including fittings & Oil		
36	Colour of Transformer	Grey and conservator white.	
37	REFERENCE OF TYPE TEST REPORTS : a) Short circuit test report No. & dt. b) Impulse test report No. & dt.		
38	Top cover and side walls of the transformer tanks should be welded with “U” clamps on four corners and centre of both length sides.		
39	Reference of BIS certificate obtained by the bidder and its validity date (Copy of the certificate to be submitted with Part – I bid)		
40	BIS logo sticker with registration no to be provided on the body of the transformer		

8. STANDARD RATINGS & PRINCIPAL PARAMETERS :

The Transformers shall be suitable for outdoor installation with three phase, 50 Hz, 11 kV system in which the neutral is effectively earthed and they should be suitable for service under fluctuations in supply voltage upto plus 10% to minus 15%.

Sl.	Item	Specification
1	Continuous rated capacity	200 kVA
2	System voltage (max.)	12 kV
3	Rated voltage HV	11 kV
4	Rated voltage LV	433 - 250 V
5	Line current HV	5.25 A
6	Line current LV	133.0 A
7	Frequency	50 c/s +/- 5%
8	No. of Phases	Three
9	Connection HV	Delta
10	Connection LV	Star (Neutral brought out)
11	Vector group	Dyn-11
12	Type of cooling	ONAN
13	Noise level at rated voltage and frequency	55 db
14	Permissible temperature rise over ambient (as per IS : 2026) - i) Of top oil measured by thermometer ii) Of winding measured by resistance	 35 Deg.C 40 Deg.C.

15	Minimum clearances in air of bushing terminals with connectors fitted. a) HV phase to phase / phase to earth (mm) b) LV phase to phase / phase to earth (mm) c) LV phase to neutral (mm) d) LV neutral to Earth (mm)	 255 / 140 75 / 40 75 55
16	No load Voltage Ratings	11000 / 433 - 250 Volts
17	Taps	No tapings shall be provided for transformer upto & i/c 200 KVA rating

9.0 FOLLOWING TENDER ENQUIRY PROFORMA SHOULD BE DULY FILLED UP BY THE INTENDING BIDDERS:-

PROFORMA- (I). INFORMATION TO BE FURNISHED BY THE TENDERER FOR APPRAISAL OF FIRM'S CAPABILITY & CAPACITY TO MANUFACTURE ITEM (S) EQUIPMENTAS PER REQUIREMENT TO TENDER ENQUIRY :

1	(A)	(i)	Name of the tendering Firm	
		(ii)	Complete address of the required office	
		(iii)	Telegraphic address	
		(iv)	Phone No.	
		(v)	Fax No.	
		(vi)	Email No.	
	(B	(i)	Name of the two responsible officers of the	

	)		firm with designation (Managing Director / Partner/Chief Engineer / Works Engineer etc.	
		(ii)	Day of which weekly holiday is observed.	
	©	Complete address of the works:		
		(i)	Name and Designation of the Chief Executive of the Works and his immediate junior	
		(ii)	Telephone number(s)	
		(ii i)	Email No.	
		(i v)	Fax No.	
		(v)	Day on which weekly holiday is observed	
2	Year of the Establishment :			
3	Financial Position :			
	(a).	(i)	Land (Area & Value)	
		(ii)	Building (Covered area & value)	
		(ii i)	Plant & Machinery (Value in Rs. Lakh)	
		(i v)	Total drawing limit(Certificate from bankers) (Rs. Lakh)	
	(b)	Annual financial turnover (duly audited for the last three		
		years) (Rs. Lakhs)		
	©	Latest Income Tax Clearance Certificate.		

4	Manpower : (Nos)			
	(a)	Graduate Engineer(s)		
	(b)	Diploma holder(s)		
	©	Skilled workers		
	(d)	Unskilled workers		
5	Production capacity per month of the item covered in your quotation and justification for assessment			
	(a)	Details of plant & machinery installed (please attached separate sheets, if necessary).		
	(b)	Details of raw material required		
	©	Source of raw material.		
	(d)	Stock in hand.		
	(e)	Quality controls exercised in procurement of materials.		
6	Manufacturing process & quality control:-			
	(a)	Details of manufacturing process.		
	(b)	Scheme of quality controls		
		(i)	During manufacturing process.	
		(ii)	At the finished stage	
		(iii)	Whether any record is being maintained in respect of quality controls exercised	

7	(a)	Whether items offered conforms to IS or any other internationally recognized standards, if so, give reference.	
	(b)	Whether the firm is licensed to use ISI mark or any other Govt. Quality Mark. (copies of latest test certificates issued by Govt. Laboratories / any Recognized Test House be attached.	

PROFORMA- (II). Details of Testing Facility :

Name of Test			Detail of testing facilities available	Remarks
1	Test of Raw Materials			
	a)			
	b)			
2	Routine Test (Using power analyzer for No Load & and Load loss Test)			
	a)			
	b)			
3	Acceptance Test			
	a)			
	b)			
4	Type Test			
	a)			
	b)			

Note : In case, testing facilities are not available for certain test, indicate in remarks column from which testing house(S)/institution (s) these tests will be got carried out.

PROFORMA- (III). DETAILS OF TENDERER'S EXPERIENCE:

Tenderer shall furnish here particulars of similar orders executed / under execution by him, to whom a reference may be made by Purchaser, in case such a reference is necessary.Sl. No.	Name of the client and Description of order	Value of order (in Rs.)	Period of supply by the tenders against target	Name and address to whom reference may be made
1	2	3	4	5
1				

2				
3				
4				
5				

Proforma-IV. Checklist for STAGE INSPECTION for DT's

(To be furnished by the Manufacturer)

To conduct the stage inspection it is mandatory for bidders to furnish the following information as per their technically vetted designed data base, failing to which the offer may be treated as disqualified.

9.0 CHECK LIST FOR TRANSFORMER - CORE ASSEMBLY STAGE

Check the following with reference to the core drawing.

a	Dimension of yoke clamp & insulation	
b	Height & stack of each step.	
c	Height of window dimension.	
d	Core circle & core centre dimensions	
e	Thickness of core stamping.	

NOTE:

1. Tolerances to be mentioned as per design.
2. After varnishing the assembled core send it to core testing department for no-load loss measurement before coil erection.

2.0 CHECK LIST FOR TRANS.FORMER - COIL WINDING STAGE:

Refer the applicable process specification and Electrical specification:

1	The size of Winding Wire.	

2	The size, thickness and number of layers of the Insulation	
3	The Insulation scheme.	
4	The inner & outer diameter.	
5	The height of the Coil.	
6	The total height of the coil assembly before & after shrinkage.	
7	The dimensions of the inter layer duct (L.V.).	
8	Continuity between conductors of low voltage Winding.	
	Record any other general observations / comments / deviation.	

3.0. CHECK LIST FORTRANSFORMER - CORE COIL ASSEMBLY STAGE:

1	Blow air under pressure to remove loose materials, dust etc., before tanking the transformers.	
2	The specification for drying process with reference to a. Dimensions of drying. b. Temperature of the oven. c. Insulation resistance.	
3	Reference to core coil assembly drawing.	
a	Dimensions of the strip provided between core and low voltage coil and between low voltage coil and high voltage coil.	
b	Dimensions of the cylinder provided between core & low voltage coil and between low voltage coil and high voltage coil.	
c	High voltage and low voltage connections with reference to the particular connection drawings.	
d	The dimensions & clearance of all the barriers provided.	
e	The insulation resistance of coil.	
f	The various electrical clearance as per the connection drawing.	

4.0 CHECK LIST FOR TRANSFORMER FINAL ASSEMBLY STAGE:

Check for all round clearance after the core coil assembly is lowered into the tank.

a	From Higher Voltage lead to tank.	
b	From Higher Voltage winding to tank	
c	From Low Voltage connections to the tank.	
d	From Higher Voltage lead to the turret.	
e	From Tap Switch connections to the tank.	

5.0 MAXIMUM FLUX DENSITY AND CORE WEIGHT CALCULATION

(To be filled in by Bidder and shall be furnished with the Technical Bid)

Step No	Width of steps [mm]	Stack Thickness [mm]	Gross Iron Area [mm²]
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Bmax = E/(4.44 x f x Ai x N)

Where E = L.V. winding phase voltage / phase

f = Rated frequency = 50 HZ.

Bmax. = Maximum flux density in Tesla.

Ai = Net iron area in sq.m = Gross iron area x stacking factor in sq.m

N = Number of L.V.winding, turns/phase

Stacking Factor = 0.97 maximum

Core weight calculation:-

Core dia [in mm] =

Window height [in mm] = Limb center [in mm] =

Weight of core = [3 x window height + 4 x limb centre + 2 x max. width] x Net iron area x Density of core

NB: - 1 Specific loss vs. flux density graph for the type of core lamination to be used has to be furnished.

2. VA/Kg. Vs flux density graph for the core lamination to be used has to be furnished.

3. Any other factor assumed for above calculation to be explained with reasons.

N.B.:- The bidder may use its own method of calculation towards determination of maximum flux density and weight of the core. But the same shall be supported with proper explanation and justification.

6.0 CHECK LIST FOR TRANSFORMER - READY FOR DESPATCH:

1. Check the accessories / components with reference to General assembly drawing and packing list.
2. Check the serial number on the items dismantled with respect to the numbers given in the general assembly drawing.
3. Check gas filling equipment wherever used for operation.
4. Check oil level of equipment before despatch.

M. TECHNICAL SPECIFICATIONS FOR 11KV DROP OUT FUSE ELEMENTS

1.0 SCOPE

This specification covers the design, manufacture, testing at works, supply/delivery & transportation of 11KV Drop Out Fuse Elements conforming to IS: 9385(P-II)/1980.

2.0 STANDARDS

2.1 The 11KV Drop Out Fuse Elements shall conform in all respects to the relevant Indian/ International Standard Specification, with latest amendments.

TECHNICAL SPECIFICATIONS FOR 11KV Drop Out Fuse Elements

AS PER IS: 9385 (P-II)/1980.

1	Rated Current /Capacities for 11KV Drop Out Fuse Elements	i.	3 Amp.
		ii.	5 Amp.
		iii.	10 Amp.
		iv.	15 Amp.
		v.	20 Amp.
		vi.	25 Amp.
		vii.	30 Amp.
2	Rated Voltage	12 KV (Maximum System Voltage).	
3	Material	The Drop Out Fuse Elements shall be made of Copper (Tin-coated) conforming to IS: 9385 (Part-II)/1980.	
4	Total length of each element including stranded wire ends for binding	600 mm.	
5	Elements shall be completed with SRBP Tube of Dimensions	8 mm outer diameter and 140 mm length.	

3.0 SERVICE CONDITIONS

The 11KV Drop Out Fuse Elements shall be supplied as per the Specifications given in this Section and shall be suitable for satisfactory continuous operation under the following climatic conditions as per IS: 9385(P-II)/1980 or latest revisions.

i.	Location	At various locations in Tripura.
ii.	Maximum Ambient Air Temperature (oC):	50oC.
iii.	Maximum Relative Humidity	95% (sometime approaches Saturation

		point).
iv.	Maximum Altitude above mean Sea Level (Metres):	1000 metres.

4.0 TESTS

4.1 Following tests shall be carried out at the works of the manufacturer as per relevant IS before delivery of each lot.

A. Type Tests:

(a) Dielectric test

(b) Temperature rise test

(c) Breaking test

(d) Test for time / current characteristics.

B. Routine Tests:

(a) Dielectric test

(b) Temperature rise test

(c) Breaking test

(d) Test for time / current characteristics

(e) Dimensional checkup as per specifications on selected samples.

C. Acceptance Tests:

(a) Dimensional checkup as per specifications on selected samples

(b) Breaking test

(c) Test for time / current characteristics.

Samples at random will be selected from the offered lot for the acceptance tests and the lot will be accepted subject to the successful passing of the tests.

Note: Purchaser reserves the right to get all or any type test carried out on one sample per 200 pieces of 11KV Drop Out Fuse Elements at the cost of the Supplier from any recognized laboratory / government test house.

4.2 The supplier shall submit the Type Test Certificates of 11KV Drop Out Fuse Elements along with the Tender.

4.3.0 ACCEPTANCE TESTS

4.3.1 All Acceptance Tests shall be carried out at the Works of the Manufacturer unless otherwise especially agreed upon by the Manufacturer and Purchaser at the time of Purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without any charge to satisfy him that the material is being furnished in accordance with the specifications.

4.3.2 The purchaser reserves the right to have the tests carried out at the cost of the supplier by an independent agency whenever there is any dispute regarding the quality of the materials.

5.0 PACKING & MARKING

5.1 PACKING

The 11KV Drop Out Fuse Elements shall be so packed that the Fuse Elements are adequately protected against damage in ordinary handling and transit. To avoid damage of the 11KV Drop Out Fuse Elements, transshipment in between the road transportation must be avoided i.e. each consignment shall be transported from factory to DGM(MM), Electrical Stores Division, A.D. Nagar, Agartala through a single carrier.

5.2 MARKING

A. The following informations shall be marked on metal tag attached to each fuse element:

a) Rated Current

6.0 GUARANTEED TECHNICAL PARTICULARS

The Guaranteed Technical Particulars of the 11KV Drop Out Fuse Elements shall be given by the Bidder along with the Tender.

Guaranteed Technical Particulars for 11KV Drop Out Fuse Elements

(To be furnished by the Manufacturer)

Sl no	Description	NIT requirement	Bidder's offer.
1	Make & Manufacturer		
2	Place of Manufacture		

3	Rated Current /Capacities	i.	3	Amp.	
		ii.	5	Amp.	
		iii.	10	Amp.	
		iv.	15	Amp.	
		v.	20	Amp.	
		vi.	25	Amp.	
		vii.	30	Amp.	
4	Rated Voltage	12 KV (Maximum System Voltage).			
5	Material	The Drop Out Fuse Elements shall be made of Copper (Tin-coated) conforming to IS: 9385 (Part-II)/1980.			
6	Total length of each element including stranded wire ends for binding	600 mm.			
7	Elements completed with SRBP Tube of Dimensions	8 mm outer diameter and 140 mm length.			
8	Markings	The following informations shall be marked on metal tag attached to each fuse element: a) Rated Current b) TSECL/MMD/2018-19.			
9	Reference IS Code	IS: 9385(P-II) / 1980.			

7.0. PRE-DESPATCH INSPECTION

7.1. Despatch of material is subjected to pre-despatch inspection / testing by the purchaser's representative/engineers and clearance thereof. All acceptance tests and inspection shall be carried out at the place of manufacture unless otherwise specially agreed upon by the purchaser and the supplier at the time of purchase.

In case of waiver of inspection, the consignee will be at liberty for testing of material in the laboratories of Tripura or outside for acceptance if required, at the cost of the supplier.

7.2. The manufacturer shall offer to the inspectors representing the purchaser all the reasonable testing facilities free of charge for inspection and testing to satisfy that material being supplied is in accordance with the specifications.

7.3. The purchaser's representative/engineer attending above testing will carry out testing of suitable number of items as per the sampling procedure laid down in the corresponding IS as the case may be and shall issue test certificate approvals to the manufacturer and give clearance for dispatch.

However, the Final Acceptance will be given by the Consignee after necessary verifications and tests at destination.

8.0. INSPECTION AFTER RECEIPT OF STORES

8.1. The purchaser shall have option to test the samples selected at random from the supply affected to ensure that the supplies conform in quality and workmanship to the relevant specifications and also conform to the approved sample.

8.2. Fifteen days advance intimation will be given to the suppliers to depute representative to witness the tests. If they fail to be present, the testing will be carried out in absence of their representative on the schedule date. If the materials fail, in above random sample testing, the lot will be rejected.

8.3. No testing charges would be recovered for the first testing. In case the repaired/ replaced supplied item fail again on testing, the charges for testing together with all incidental expenses incurred by the purchaser shall be borne by the suppliers.

8.4. The materials supplied against the order and not conforming to the specifications shall have to be collected by the supplier at his cost, on refunding the amounts paid therefore, within 7 days of intimation of failure of these meters on testing.

N. TECHNICAL SPECIFICATION FOR BI-METALLIC LUGS

1.0 SCOPE

This specification covers the design, manufacture, testing at works, supply/ delivery & transportation of Bi-metallic lugs conforming to relevant specifications.

3.0 STANDARDS

2.1 The Bi-metallic lugs shall conform in all respect to the relevant Indian / International Standard Specification, with latest amendments as available.

SPECIFICATION FOR BI-METALLIC LUGS AS PER RELEVANT IS

1) Type of Bi-metallic lug: - Non-Ferrous Bi-metallic lug.

2) Standard :-Relevant IS/IEC-61238-2.

3) Materials of Bi-metallic lug :-i). Palm:-EC Grade Forged Copper,

ii). Al. Barrel:-EC Grade Aluminium Rod.

4) Finish:- Natural and degreased.

5) Jointing Process:- High Speed Friction Welding/ Casting.

6) Filling of Al. Barrel:- Filled with Oxide inhabiting Compound and sealed by plastic Cap.

7) Breaking Load on Bi-metallic Joint (minimum):

Sl.No.	Lug Size	Minimum Breaking Load of Bi-metallic Lug Joint.
1.	70 mm2-10	428 Kgf.
2.	95 mm2-10	581 Kgf.
3.	120 mm2-12	734 Kgf.
4.	185 mm2-12	1132 Kgf.
5.	240 mm2-12	1468 Kgf.

8) Dimensions of Bi-Metallic Lugs as per drawing:-

Sl. No.	Lug Size	Dimensions in mm along with Tolerances								
		Ø A ± 0.25	Ø B ± 0.25	Ø E ± 0.25	Ø D ± 1	G ± 0.5	L1 ± 2	L2 ± 2	L ± 3	T ± 0.5
1.	70 mm2-10	12.5	20	10.5	25	12.5	42	49	87	5
2.	95 mm2-10	12.5	20	10.5	25	12.5	42	49	87	5
3.	120 mm2-12	15	25	13.0	30	15	58	67	112	7
4.	185 mm2-12	17	32	13.0	30	15	58	67	112	7
5.	240 mm2-12	20	32	13.0	30	15	58	67	112	7

9) Weight of Bi-Metallic Lugs (excluding oxide inhabiting Compound and plastic Cap):-

Sl. No.	Lug Size	Weight per piece in gms (minimum.)
1.	70 mm2-10	66
2.	95 mm2-10	63
3.	120 mm2-12	142
4.	185 mm2-12	191
5.	240 mm2-12	178

10) Chemical composition:- i).Alumium(Purity):-99.60%

ii). Copper (Purity):- 99.95%

3.0 SERVICE CONDITIONS

The Bi-metallic lugs to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per relevant ISS.

i. Location: At various locations in Tripura.

ii. Max. ambient air temperature (Deg0 C): 45

iii. Min. ambient air temperature (Deg0 C): 4

iv. Max yearly daily ambient air temperature (Deg0 C): 40

v. Max average weighed average ambient temperature (Deg0 C): 32

vi. Max. Altitude above mean sea level(Meters): 1000 M.

4.0 TEST AND INSPECTION

4.1 Following tests shall be carried out at the works of the manufacturer as per relevant ISS before delivery of each lot in presence of the representative of purchaser:

A. Type Tests:

(a) Visual examination test,

(b) Checking of Dimensions,

(c) Thermal / Electrical Ageing Test,

(d) Mechanical Strength Test on Bi-metallic Joint (Breaking Test).

B. Routine Tests:

(a) Visual examination test,

(b) Checking of Dimensions,

(c) Thermal / Electrical Ageing Test,

(d) Mechanical Strength Test on Bi-metallic Joint (Breaking Test).

C. Acceptance Tests:

(a) Visual examination test,

(b) Checking of Dimensions,

(c) Mechanical Strength Test on Bi-metallic Joint (Breaking Test).

Sample at random will be selected from the offered lot for the above testing as per IS

Note : Purchaser reserves the right to get all or any type test carried out on one sample of Bi-metallic lugs at the cost of supplier from any recognized laboratory / government test house.

4.2 The supplier shall furnish the type test / the routine test certificates as part of the condition for supply of Bi-metallic lugs in bulk quantity at the discretion of the purchaser.

4.3.0 INSPECTION

4.3.1 All tests and inspection shall be made at the place of manufacture unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without charge to satisfy him that the material is being furnished in accordance with specification.

4.3.2 The purchaser reserves the right to have the tests carried out at the cost of the supplier by an independent agency whenever there is dispute regarding the quality of supply.

5.0 PACKING & MARKING

5.1 PACKING

The Bi-metallic lugs shall be packed in Heat Shrinked Wrapped Corrugated Cartons so that the Bi-metallic lugs are adequately protected against breakage and damage in rough handling during transit and storage at storeyard. The gross weight of the packing shall not normally exceed 25 Kg. to avoid damage of the Bi-metallic lugs transshipment in between the road transportation must be avoided i.e. each consignment should be transported from factory to DGM(MM), Electrical Stores Division, A.D. Nagar, Agartala through a single carrier.

5.2 MARKING

A. The following information shall be marked on each Bi-metallic lug:

a) Manufacturers' Trade mark
b) The Manufacturers' name
c) Lug Size.
d) 'TSECL/2019-20'.
e) ISI certification mark if any

6.0 GUARANTEED TECHNICAL PARTICULARS

The guaranteed technical particulars of the Bi-metallic lugs shall be given by the bidder alongwith the Technical Bid as per requirement of tender enquiry proforma 6.0 (IV) as enclosed in this section.

6.0 (IV) Guaranteed & other technical particulars for Bi-metallic Lugs.

(To be furnished by the Manufacturer)

SL. No. Description

1) Name of Manufacturer:-

2) Place of Manufacture:-

3) Type of Bi-metallic lug: -

4) Standard: -

5) Materials of Bi-metallic lug :-i).Palm:-

ii). Al Barrel:-

6) Finish:-

7) Jointing Process:-

8) Filling of AL Barrel:-

9) Breaking Load on Bi-metallic Joint (minimum):

9) Dimensions of Bi-Metallic

Sl.No.	Lug Size	Breaking/Shearing load on Bi-metallic Lug Joint(Min.)
1.	70 mm2-10	
2.	95 mm2-10	
3.	120 mm2-12	
4.	185 mm2-12	
5.	240 mm2-12	
6.	300 mm2-12	

Lugs as per drawing:-

Sl. No	Lug Size	Dimensions in mm along with Tolerances

		Ø A	Ø B	Ø E	Ø D	G	L 1	L 2	L	T
1.	70 mm2-10									1
2.	95 mm2-10									
3.	120 mm2-12									
4.	185 mm2-12									
5.	240 mm2-12									
6.	300 mm2-12									

10. Weight of Bi-Metallic Lugs: -

Sl. No.	Lug Size	Weight per piece in gm (minimum.)
1.	70 mm2-10	
2.	95 mm2-10	
3.	120 mm2-12	
4.	185 mm2-12	
5.	240 mm2-12	
6.	300 mm2-12	

1

1) Chemical composition:-

i).Aluminium: -

ii). Coppe

r:-

O. TECHNICAL SPECIFICATION FOR COMPOSITE PIN INSULATORS

FOR USE IN 11 KV SYSTEM

1.0 SCOPE::

This specification covers design, manufacture, testing and supply of composite Insulators for use in the 11KV overhead transmission lines and substations. The composite Insulators shall be of the following type:

i) Long rod type Pin Insulators intended to be mounted rigidly on a supporting structure to support ACSR/ Rabbit conductors

2.0 APPLICABLE STANDARDS::

2.1 Standards:-

Following Indian/International Standards, which shall mean latest revision, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification, shall be referred while accessing conformity of Insulators with these specifications.

2.1.1 In the event of supply of Insulators conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent or better to those specified. In case of award, salient features of comparison between the standards proposed by the Bidder and those specified in this document will be provided by the Supplier to establish equivalence.

Sl.No.	Indian Standard Standard	Title	International Standard
1		Definition, test methods and acceptance criteria for composite Insulators for A.C. overhead lines above 1000V.	IEC:1109
2	IS:2071	Methods of High Voltage Testing.	IEC:60060-1
3	IS:2486	Specification for Insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements locking devices.	IEC:60120 IEC:60374
4		Thermal Mechanical performance test and mechanical performance test on string Insulators units	IEC:60575
5		Characteristics of string Insulator units of the long rod type.	IEC:60433

Sl.No.	Indian Standard Standard	Title	International Standard
6		Hydrophobicity Clarification Guide.	STRI guide 1.92/1
7		Radio interference characteristics of overhead power lines and high voltage equipment.	CISPRl18-2 Part 2
8	IS:8263	Methods of RI Test of HV Insulators	IEC:60437
9		Standard for Insulators – Composite-Distribution Dead -end type.	ANSI-C29.132-2000
10	IS:4759	Hot dip zinc coatings on structural steel & other allied products.	ISO:1459
11	IS:2629	Recommended practice for Hot Dip galvanization for iron and steel	ISO:1461(E)
12	IS:6745	Determination of weight of zinc coating on zinc coated Iron and steel articles.	ISO:1460
13	IS:3203	Methods of testing of local thickness of electroplated coatings.	ISO:2178
14	IS:2633	Testing of Uniformity of coating of zinc coated articles.	
15		Standard specification for glass fiber standards.	ASTM D 578-05
16		Standard specification for compositional analysis by Thermogravimetry.	ASTM D 578-05
17	IS:4699	Specification for refined secondary zinc	

3.0 Technical Description of Composite Insulators::

3.1 Service condition:-

The polymer Insulators to be supplied shall be suitable for satisfactory continuous operation under condition s as specified below:

(i)	Maximum temperature of air in shed	45oC
(ii)	Minimum temperature of air in shed	4oC
(iii)	Maximum relative humidity	95% (The humidity some time approaches saturation point)

(iv)	Minimum relative humidity	10 %
(v)	Average number of dust-storm days per annum	40 days
(vi)	Average number of rainy days per annum	90 days
(vii)	Number of months of tropical monsoon conditions per annum	3 months
(viii)	Average annual rainfall	1250 mm
(ix)	Maximum wind pressure	150 Kg / Sq. mm
(x)	Altitude not exceeding	1000 metres
(The limit of ambient temperature shall be 45oC peak and 35oC average over a period of 24 hours)		

3.2 Composite Insulators long rod type to support conductor for 11KV overhead power lines:-

3.2.1 The Insulators shall be suitable for 3 Φ, 50 Hz, effectively earthed 11kV O/H distribution system in a moderately polluted atmosphere. Long rod Insulators shall be of Pin type.

3.2.2 Bidder must be an indigenous manufacturer and supplier of composite Insulators of rating 11kV & 33kV or above OR must have developed proven in house technology and manufacturing process for composite Insulators of above rating OR possess technical collaboration/ association with a manufacturer of composite Insulators of rating 11 kV or above. The Bidder shall furnish necessary evidence in support of the above along with the bid, which can be in the form of certification from the utilities concerned, or any other documents to the satisfaction of the owner.

3.2.3 Insulators shall have sheds with good self-cleaning properties. Insulator shed profile, spacing, projection etc, and selection in respect of polluted conditions shall be generally in accordance with the recommendation of IEC-60815/IS: 13134.

3.2.4 The size of Composite insulator, minimum creepage distance and mechanical strength along with hardware fittings shall be as follows:

	Type of composite Insulator	No minal system voltage kV (rms)	High est syst em voltage kV (rms)	Visible discharge test voltage kV(rms)	Wet power frequency withstand voltage kV (rms)	Impulse withstand voltage kV (rms)	Minimum creepage distance (mm)	Min. failing load KN
	11KV Pin Insulator	11	12	9	35	75	320	5

Note: Creepage distances have been considered in line with IS-13134 (which specifies 20 mm/ kV for moderately polluted environment).

3.3 Dimensional Tolerance of Composite Insulators :-

The tolerances on all dimensions e.g. diameter, length and creepage distance shall be allowed as follows according to IEC 61109:-

± (0.04d+1.5)mm when d ≤ 300mm

± (0.025d+6)mm when d > 300mm

Where, d being the dimensions in millimeters for diameter, length or creepage distance as the case may be,

However, no negative tolerance shall be applicable to creepage distance.

3.4 Interchangeably:-

The composite Insulators including the end fitting connection shall be of standard design suitable for use with the hardware fittings of any make conforming to relevant IEC/IS standards.

3.5 Corona and Rl Performance:-

All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.

3.6 Maintenance:-

3.6.1 The composite Insulators offered shall be suitable for use of hot line maintenance technique so that usual hot line operation can be carried out with ease, speed and safety.

4. BASIC FEATURES::

4.1 Design and construction:-

The composite Pin insulator shall have a core, housing & weather shed of insulating material and steel/aluminum alloy hardware components for attaching it to the support/conductor.

4.1.1 Core:-

It shall be a glass-fiber reinforced epoxy resin rod of high strength (FRP rod). Glass fibers and resin shall be optimized in the FRP rod. Glass fibers shall be Boron free electrically corrosion resistant (ECR) glass fiber or Boron free E-Glass and shall exhibit both high electrical integrity and high resistance to acid corrosion. The matrix of the FRP rod shall be Hydrolysis

resistant. The FRP rod shall be manufactured through Pollution process. The FRP rod shall be void free. The dia of FRP Rod should be 24 mm. (Minimum).

4.1.2 Housing (Sheath):-

The FRP rod shall be covered by a seamless sheath of a silicone electrometric compound

or silicone alloy compound of a thickness of 3mm minimum.

It should protect the FRP rod against environmental influences, external pollution and humidity. It shall be extruded or directly molded on the core and shall have chemical bonding with the FRP rod. The strength of the bond shall be greater than the tearing strength of the polymer. Sheath material in the bulk as well as in the sealing/bonding shall be free from voids.

4.1.3 Weather sheds:-

The composite polymer weather sheds made of silicone electrometric compound or silicon alloy shall be firmly bonded to the sheath, vulcanized to the sheath or molded as part of the sheath and shall be free from imperfections. The weather sheds should have silicon content of minimum 30% by weight. The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer. The interface, if any, between sheds and sheath (housing] shall be free from voids.

4.1.4 End Fittings:-

End fittings transmit the mechanical load to the core. They shall be made of spheroidal graphite cast Iron, malleable cast iron or forged steel or aluminum alloy. They shall be connected to the rod by means of a controlled compression technique. The gap between fitting and sheath shall be sealed by a flexible silicon electrometric compound or silicon alloy compound sealant. System of attachment of end fitting to the rod shall provide superior sealing performance between housing, i.e. seamless sheath and metal connection. The sealing must be moisture proof. The dimensions of end fittings of Insulators has been shown in the drawing (11KV & 33KV both separately). The details of end fittings for fixing the same with V cross arms and top clamps are given below : -

S. N.	Item	Length of end fittings to be fixed	Minimum threaded portion of end fittings	Dia of end fitting rod
1	11KV	200mm	150mm	20mm

Upper end fittings shall be suitable to hold suitable Conductor for 11KV. The size of the fitting shall be in such a way that conductor could be bound firmly so that it may not slip from the groove while in service even under the adverse condition.

5.0 Work manship::

5.1 All the materials shall be of latest design and conform to the best engineering practices adopted in the high voltage field. Bidders shall offer only such Insulators as are guaranteed by them to be satisfactory and suitable for continued good service in power transmission lines.

5.2 The design, manufacturing process and material control at various stages shall be such as to give maximum working load, highest mobility, best resistance to corrosion, good finish and elimination of sharp edges and corners.

5.3 The design of the Insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration.

5.4 The core shall be sound and free of cracks and voids that may adversely affect the Insulators.

5.5 Weather sheds shall be uniform in quality. They shall be clean, sound, smooth and shall be free from defects and excessive flashing at parting lines.

5.6 End fittings shall be free from cracks, seams, shrinks, air holes and rough edges. End fittings should be effectively sealed to prevent moisture ingress; effectiveness of sealing system must be supported by test documents. All surfaces of the metal parts shall be perfectly smooth with out projecting points or irregularities, which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.

5.7 All ferrous parts shall be hot dip galvanized to give a minimum average coating of zinc equivalent to 610 gm/Sq.m, or 87μ m thickness and shall be in accordance with the requirement of IS: 4759, The zinc used for galvanizing shall be of purity 99.5% as per IS: 4699, The zinc coating shall be uniform, adherent, smooth, reasonably bright continuous and free from imperfections such as flux, ash rust stains, bulky white deposits and blisters. The galvanized metal parts shall be guaranteed to withstand at least four successive dips each lasting for one H) minute duration under the standard price test. The galvanizing shall be carried out only after any machining.

5.8 INSPECTION

5.8.1. All test and inspection shall be made at the place of manufacture unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall

afford the inspector representing the purchaser all reasonable facilities without charge to satisfy him that the material is being furnished in accordance with specification.

5.8.2. The purchaser reserves the right to have the test carried at the cost of the supplier by an independent agency whenever there is dispute regarding the quality of supply.

6. Marking::

Each insulator unit shall be legibly and indelibly marked with the following details as per IEC-61109:

(a) Month &Year of manufacture
(b) Min. failing toad/guaranteed mechanical strength in kilo Newton followed by the word 'KN' to facilitate easy identification.

(c) Manufacturer's name/Trade mark

(d) Visible marking 'TSECL/MMD/Year of Manufacture.

7. Bid Drawings::

7.1 The Bidder shall furnish full description and illustration of the material offered.

7.2 The Bidder shall furnish along with the bid the outline drawing of each insulator unit including a cross sectional view of the long rod insulator unit. The drawing shall include but not be limited to the following information:

(a) Long rod diameter with manufacturing tolerances

(b) Minimum Creepage distance with positive tolerance

(c) Protected creepage distance

(d) Eccentricity of the long rod unit

(i) Axial run out

(ii) Radial run out

(e) Unit mechanical and electrical characteristics

(f) Size and weight tongue & clevis

(g) Weight of composite long rod unit.

(h) Materials

(i) Identification mark

(ii) Manufacturer's catalogue number

8. Tests and Standards::

Insulators offered shall be manufactured with the same configuration & raw materials as used in the Insulators for which design & type test reports are submitted. The manufacturer shall submit a certificate for the same. The design & type test reports submitted shall not be more than 05 years old.

8.1 Design tests:-

For polymeric insulators, it is essential to carryout design test as per Clause 4.1 of IEC-61109 /92-93 with latest amendments. The design tests are intended to verify the suitability of the design, material and method of manufacture better technology. When a composite insulator is subjected to the design test the result shall be considered valid for the whole class of insulators, which are represented by the one tested and having the following characteristics: -

- Same material for the core and sets and same manufacturing method.
- Same material for the fittings, the same design, the same method of attachment.
- Same or greater layer thickness of the shed material over the core (including a sheath where used)
- Same are smaller ratio of the highest system voltage to insulator length.
- Same are smaller ratio of all mechanical loads to the smallest core diameter between fittings.
- Same are greater diameter of the core.
- the tested composite insulator shall be identified by a drawing giving all the dimensions with the manufacturing tolerances

- Manufacturer should submit test report from CPRI-Bangalore, ERDA, University of Roorkee, IITs, Jadavpur University, Indian Institute of Science or other Govt. Institution or from an NABL Accredited Laboratory or approved by the purchaser.
- for design test as per IEC-61109 (Clause-5) along with the bid . Additionally following tests shall be carried out or reports for the tests shall be submitted after award of contract :- + UV test: The test shall be carried out in line with clause 7.2 of ANSI C29.13

8.2 Type Tests:-

The tenderer shall furnish detailed type test report of the offered composite insulars as per Clause-8.2 of the technical specification at the NABL approved lab to prove that the composite insulators offered meet the requirements of the specifications. These type test should have been carried out within 5years prior to the date of opening of this tender. The following type tests shall be conducted on a suitable number of individual insulator units, components, materials or complete strings and the test reports should invariably be submitted with the bid:

S.	Description of type test	Ten procedure/standard
1	Dry lightning impulse withstand voltage	As per IEC 61109 (clause 6.1)
2.	Dry power frequency voltage withstand test-part of Type test.	As per IEC 61109
3	Wet power frequency test	As per IEC 61 109 (clause 6.2)
4	Mechanical load-time test	As per IEC 61 109 (clause 6.4)
5	Radio interference test	As per IEC 61109 (clause 6.4)
6	Recovery of Hydrophobicity test	Annexure-A This test may be repealed every 3 yrs by the
7.	Chemical composition test for silicon content	Annexure-A Or any other rest method acceptable to the owner
8.	Tests on housing & shed materials-Hardness test	As per ASTM D 2240-2005.
9.	Tests on housing & shed materials-Accelerated weathering tests (Test done of 10 KV 5 KA polymer surge arrester, housing material is same in both surge	As per IEC 60099
10	Tests on housing & shed materials-Tracking & Erosion test	As per ASTM D 2303-1997
11	Tests on housing & shed materials-Flammability test	As per UL 94-02009
1	Test on core materials – Dye penetration	As per IEC 61109 / IEC 62217.
13	Test on core materials – Water diffusion test test	As per IEC 61109 / IEC 62217.
1	Brittle fracture resistance test	Annexure - A

NOTE :- The purchaser may like to conduct any other test(s) in addition to above at bidder's cost to establish the performance of the material as per the system requirement.

8.3 It shall be the option of the owner to accept the Insulators based on type test reports submitted by the manufacturer. The owner shall be free to repeat the type test & may witness the same.

8.4 All the type test given in Clause No. 8.2 in addition to routine & acceptance test shall be carried out on insulator along with hardware fittings wherever required.

8.5 Acceptance (sample) Tests

8.5.1 For Composite Insulators

(	Verification of dimensions	Clause 7.2 IEC: 61109,
(	Galvanizing test	IS:2633/IS:6745
(	Verification of the specified mechanical load	Clause 7.4 IEC: 611 09,

Routine Tests:-

S	Description	Standard
1	Identification of marking	As per IEC: 61 109 Clause 8.1
2	Visual Inspection	As per IEC 61 109 Clause 8.2
3	Mechanical routine test	As per IEC: 61 109 Clause 8.3

8.5 Tests During Manufacture

Following tests shall also be carried out on all components as applicable

a) Chemical analysis of zinc used for galvanizing

b) Chemical analysis, mechanical, metallographic test and magnetic particle inspection for malleable castings.

c) Chemical analysis, hardness tests and magnetic particle inspection for forgings.

8.7 Additional Tests:-

8.7.1 The Owner reserves the right at his own expenses, for carrying out any other test(s) of reasonable nature carried out at Supplier's premises, at site, to in any other place in addition to the aforesaid type, acceptance and routine tests to satisfy himself that the material comply with the Specifications.

8.7.2 The Owner also reserves the right to conduct all the tests mentioned in this specification at his own expense on the samples drawn from the site at Supplier's premises or at any other test center. In case of evidence of non compliance, it shall be binding on the part of the Supplier to prove the compliance of the items to the technical specifications by repeat tests or correction of deficiencies or replacement of defective items, all without any extra cost to the Owner,

8.8 Tests on Insulator Units

8.8.1 RIV Test (Dry):-

The insulator string along with complete hardware fittings shall have a radio interference voltage level below 100 micro volts at one MHz when subjected to 50 Hz AC voltage of 10 kV for 11 kV class insulators and 30 KV for 33KV Class insulators respectively under dry condition. The test procedure shall be in accordance with IS:326B /I EC : 437/CISPfi 18-2.

8.8.2 Brittle Fracture Resistance Test:-

Brittle fracture test shall be carried out on naked rod along with end fittings by applying "1 n HNO3 acid" (63 g cone, HN03 added to 937 g water) to the rod. The rod should be held at 80% of SML for the duration of the test. The rod should not fail within the 96 hour test duration. Test arrangement should ensure continuous wetting of the rod with Nitric acid.

8.8.3 Recovery of Hydrophobicity & Corona test:-

The test shall be carried out on 4mm thick samples of 5cm x 7cm

i) The surface of selected samples shall be cleaned with isopropyl alcohol. Allow the surface to dry and spray with water Record the Hydrophobicity classification in line with STRI guide for Hydrophobicity classification.. Dry the sample surface.

ii) The sample shah subjected to mechanical stress by bending the sample over a ground electrode. Corona is continuously generated by applying 12 kV to a needle like electrode placed 1mm above the sample surface. The test shall be done for 100 hrs.

iii) Immediately after the corona treatment, spray the surface with water and record the HC classification. Dry the surface and repeat the corona treatment as at clause 7 above. Note HC classification. Repeat the cycle for 1000 hrs. or until an HC of 6 or 7 is obtained. Dry the sample surface.

iv) Allow the sample to recover and repeat hydrophobiticiy measurement at several lime intervals. Silicone rubber should recover to HC 1 - HC 2 within 24 to 48 hours, depending on the material and the intensity of the corona treatment.

8.8.4 Chemical composition test for Silicon content

The content of silicon in the composite polymer shall be evaluated by EDX (Energy Dispersion X-ray) Analysis or Thermo-gravimetric analysis. The test may be carried out at CPRI or any other NABL accredited laboratory. Test certificate is to be submitted with bid .

9.0 GUARANTEED TECHNICAL PARTICULARS

The guaranteed technical particulars of the 11 KV 5 KN Composite polymeric Pin Insulator offered shall be given by the bidder along with the tender.

Guaranteed Technical Particulars OF 11 KV, 5 KN, Composite Polymer INSULATORS LONG rod type)

TRIPURA STATE ELECTRICITY CORPORATION LIMITED

(A Govt. of Tripura Enterprise)

(To be filled and kept in envelopes containing Technical Offer)

Sl. No.	Description	NIT Requirement	To be filled in by the bidder	
1.	Name of Manufacturer			
2.	Address:			
	(a) registered Office			
	(b) Factory	`		
3.	(a) Type of Insulators	11KV composite polymer pin insulator		
	(b) No of phases	3- phase		
4.	Standard specification to which the Insulators manufactured and tested	IEC-61109 with up to date amendment.		
5.	Name of material used in manufacture of the Insulator (with class / grade)			
(a)	Material of core rod	ECR glass fiber or Boron content free E-Glass.		
(b)	Material of Housing & weather sheds (silicon content by weight)	Silicon electrometric compound or Silicon Alloy Compound.		
(c)	Material of end fittings : tongue/clevis	Spheroidal graphite CI/ Malleable CI/ Forged steel/ Al. Alloy.		
(d)	Sealing compound for end fitting	Flexible silicon electrometric compound/ silicon		

Sl. No.	Description	NIT Requirement	To be filled in by the bidder	
		alloy compound sealant.		
6.	Colour Glaze of Insulator			
7.	Electrical Characteristics:			
(a)	Nominal system Voltage (KV rms)	11KV		
(b)	Highest System Voltage (KV rms)	12KV		
(c)	Dry power frequency withstand (KV rms)	>60KV minimum		
(d)	Wet power frequency withstand (KV rms)	35KV		
(e)	Dry flash over voltage (KV rms)	>60KV		
(f)	Wet flash over voltage (KV rms)	>35KV		
(g)	Dry lighting impulse withstand voltage	75KV		
	(a) Positive	>75KV		
(h)	Dry lighting impulse flashover voltage			
	(a) Positive (KV peak)	>75KV		
(i)	RIV at 1 MHz when energized at 10kV/30kV (rms) under dry condition (microvolt)	As per IEC specification & <100µV		
(j)	Creepage distance (min) mm	320mm		
8.	Mechanical Characteristics:			
	Minimum failing load (KN)	5KN		
9.	Dimensions of Insulator:			
i.	Weight (Kg.)	0.9kg ±10%		
ii.	Dia of FRP rod (mm)	24mm minimum.		
iii.	Length of FRP rod (mm)	200±5mm		

Sl. No.	Description	NIT Requirement	To be filled in by the bidder	
iv.	Dia of weather sheds (mm)	100±5mm		
v.	Thickness of housing (mm)	3mm		
vi.	Dry arc distance (mm)			
10.	Dimensioned drawings of Insulator (including weight with tolerances in weight) enclosed.			
11.	Method of fixing of sheds to housing specify):- single mould or modular construction (injection molding/compression molding)	Single mould or modular construction (injection molding/ compression molding.		
12.	No. of weather sheds			
13.	Type of sheds			
	(i) Aerodynamic			
	(ii) With under ribs			
14.	Packing details			
	(a) Type of packing.			
	(b) No. of Insulators in each pack			
	(c) Gross weight of package			
15.	The drawing shall include but not be limited to the following information:			
(a)	Long rod diameter with manufacturing tolerances			
(b)	Minimum Creepage distance with			

Sl. No.	Description	NIT Requirement	To be filled in by the bidder	
	positive tolerance			
©	Protected creepage distance			
(d)	Eccentricity of the long rod unit			
	(i) Axial run out			
	(ii) Radial run out			
(e)	Unit mechanical and electrical characteristics			
(f)	Size and weight tongue & clevis			
(g)	Weight of composite long rod unit.			
(h)	Materials			
	(i) Identification mark			
	(ii) Manufacturer's catalogue number			
16.	Any other particulars which the bidder may like to give.			
17.	NIT clause no-6 : Marking	Should be confirmed as per NIT clause regarding marking.		

P. TECHNICAL SPECIFICATION FOR 11KV COMPOSITE POLYMERIC DISC INSULATOR (B & S TYPE)

1.0 SCOPE

This specification covers design, manufacture, testing, inspection, packing and supply of composite insulators for use in the 11 KV overhead transmission lines. The composite polymer insulators shall be of following type:

1.1 Long rod insulators ball and socket type for AAAC/ACSR conductors in tension

application at dead end/angle / cut point.

1.2 The Bidder should be original manufacturer of the composite insulators and shall have all the facilities to manufacturing and in house testing or their product.

This will be pre-qualifying requirement as a "Bidder".

2.0 STANDARDS

Following Indian/International Standards, which shall mean latest revision, with amendments / changes adopted and published, unless specifically stated otherwise in the Specification, shall be referred while accessing conformity of Insulators with these specifications.

Sr. No.	Indian Standard Standard	Title	International Standard
1		Definition, test methods and acceptance criteria for composite Insulators for a. c. overhead lines above 1000V.	IEC:61109
2	IS: 731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000V.	IEC: 60383
3	IS:2071	Methods of High Voltage Testing.	IEC:60060-1
4	IS:2486	Specification for Insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements locking devices.	IEC:60120 IEC:60372
5		Thermal Mechanical performance test and mechanical performance test on string Insulators units.	IEC:60575

6	IS: 13134	Guide for the selection of insulators in respect of polluted condition.	IEC: 60815
7		Characteristics of string insulator units of the long rod type.	IEC: 60433
8		Hydrophobicity Classification Guide.	STRI guide 1.92/1
9		Radio interference characteristics of overhead power lines and high voltage equipment.	CISPR 18.2 Part 2
10	IS:8263	Methods of RI Test of HV Insulators.	IEC:60437
11		Standard for Insulators- Composite-Distribution Dead-end Type.	ANSI C 29.13-2000
12	IS:4759	Hot dip zinc coatings on structural steel & other allied products.	ISO:1459
13	IS:2629	Recommended practice for Hot Dip galvanization for iron and steel	ISO:1461(E)
14	IS:6745	Determination of weight of zinc coating on zinc coated Iron and steel articles.	ISO:1460
15	IS:3203	Methods of testing of local thickness of electroplated coatings.	ISO:2178
16	IS:2633	Testing of Uniformity of coating of zinc coated articles.	
17		Standard specification for glass fiber	ASTM D

		standards.	578-05
18		Standard specification for compositional analysis by Thermogravimetery.	ASTM E 1131-03
19	IS:4699	Specification for refined secondary zinc	

2.1 The 11KV Disc Insulator / materials shall conform in all respect to the relevant Indian/International Standard Specification, with latest amendments thereof:

SPECIFICATION FOR 11KV COMPOSITE POLYMERIC DISC INSULATOR (B & S TYPE) AS PER IEC:61109

Name	Material
Socket fitting	S. G. Iron as per IS:1865
Security Clip(W Clip)	Phosphor Bronze
Housing	Polymer Silicon
FRP Rod	Fiber Reinforced Plastic
Ball fitting	S. G. Iron as per IS:1865

Sl	Description	Min. requirement for 11 KV 45 KN
1	Type of Insulator	Polymeric Composite
2	Standard according to which the insulators manufactured and	IEC 61109:2008
3	Name of material used in manufacture of the insulator with class/grade)	SILICON Wacker-Germany Dow Corning-USA or equivalent Silicon material as per
a)	Material of core(FRP rod) (i) E-glass of ECR-glass.	ECR or BORRON FREE
b)	Material of housing & weather sheds (silicon content by weight)	SILICON RUBBER
c)	Material of end fittings	SGI
d)	Sealing compound for end fittings	RTV SILICON
4	Colour	GREY
5	Electrical characteristics	

a)	Nominal system voltage	11 KV
b)	Highest system voltage	12 KV
c)	Dry Power frequency withstand	70 KV
d)	Wet Power frequency withstand	45 KV
e)	Dry flashover voltage	80 KV
f)	Wet flash over voltage	50 KV
g)	Dry lighting impulse withstand voltage a) Positive	110 KV
h)	Dry lighting impulse flashover voltage a) Positive	120 KV
i)	RIV at 1 MHz when energized at 10 KV /30kV (rms) under dry condition.	<100 micro volts
j)	Creepage distance (Min.)	320 MM
6	Mechanical characteristics : Minimum failing load	45 KN
7	Dimensions of insulator	
i)	Weight	1.25 KG(Approx.)
ii)	Dia of FRP rod	16 MM (Min.)
iii)	Length of FRP rod	240 MM (Min.)
iv)	Dia of weathersheds	To be submitted by bidder
v)	Thickness of housing	3 MM
vi)	Dry arc distance Dimensioned drawings of insulator (including weight	160+5 MM (+ve tolerance shall be allowed)
8	Method of fixing of sheds to housing specify). Single mould or Modular construction (injection moulding	Injection moulding
9	No of weathersheds	3 (min.)
10	Type of sheds	
i)	Aerodynamic	Aerodynamic
ii)	With underribs	
11	Packing details	
a)	Type of packing	Strong corrugated box of minimum 7 ply duly paleted / Wooden Box
b)	No. of insulators in each pack	30 nos.(Maximum)
c)	Gross weight of package.	50 KG. (Maximum)

12	Any other particulars which the bidder may like to give.	
13	The insulators shall have "W" type phosphors Bronze or "R" type Stainless steel security clips for ball sockets portion of insulators	YES
14	Length of Crimping dye for crimping at both end of FRP Rod should be	25 MM

3.0 SERVICE CONDITIONS

The 11KV Composite Polymeric Disc Insulator to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per IEC: 61109 or latest revision.

i.	Location	At various locations in Tripura.
ii.	Maximum Ambient Air Temperature (oC):	50oC.
iii.	Maximum Relative Humidity	95% (sometime approaches Saturation point).
iv.	Maximum Altitude above mean Sea Level (Metres):	1000 metres.

4.0 TEST AND INSPECTION

Insulators offered shall be manufactured with the same configuration & raw materials as Used in the insulators for which design & type test reports are submitted. The mnufacturer shall submit a certificate for the same. The design & type test reports submitted shall not be more than five years old.

4.1 DESIGN TESTS :

For polymeric insulators it is essential to carry out design test as per clause 4.1 of IEC 61109 / 92-93 with latest amendments. The design tests are intended to verify the suitability of the design, materials and method of manufacture (technology). When a composite insulator is submitted to the design tests, the result shall be considered valid for the whole class of insulators, which are represented by the one tested and having the following characteristics:

- Same materials for the core, and sheds and same manufacturing method;
- Same material of the fittings, the same design, the same method of attachment;
- Same or greater layer thickness of the shed material over the core (including a Sheath where used);
- Same or smaller ratio of the highest system voltage to insulation length;
- Same or smaller ratio of all mechanical loads to the smallest core diameter between fittings
- Same or greater diameter of the core.

The tested composite insulators shall be identified by a drawing giving all the imensions with the manufacturing tolerances

Manufacturer should submit test reports for Design Tests as per IEC – 61109 (clause –5) along with the bid. Additionally following tests shall be carried out or reports for the tests shall be submitted after award of contract :

UV test: the test shall be carried out in line with clause 7.2 of ANSI C29.13.

4.2 TYPE TESTS :

The type tests are intended to verify the main characteristics of a composite insulator. The type tests shall be applied to composite insulators, the class of which has passed the design tests.

4.2.1 Following Type test shall be conducted on a suitable number of individual insulator units, components, materials or complete strings:

Sl no	Description of type test	Test procedure / standard
1	Dry lightning impulse withstand voltage test	As per IEC 61109(Clause 6.1)
2	Wet power frequency test	As per IEC 61109(Clause 6.2)
3	Mechanical load-time test	As per IEC 61109(Clause 6.4)
4	Radio interference test	As per IEC 61109(Clause 6.5) revised
5	Recovery of Hydrophobicity test	Annexure – B This test may be repeated every 3 yrs by the manufacturer
6	Chemical composition test for silicon content	Annexure – B Or any other test method acceptable to the owner
7	Brittle fracture resistance test	Annexure – B

The bidder shall submit type test reports as per IEC 61109 along with the bid.

Additional type tests required if any shall be carried out by the manufacturer, after award of contract for which no additional charges shall be payable. In case, the tests have already been carried out, the manufacturer shall submit reports for the same.

4.3 ACCEPTANCE TESTS :

The test samples after having withstood the routine test shall be subject to the Following acceptance tests in order indicated below:

(a)	Verification of dimensions	Clause 7.2 IEC: 61109
(b)	Verification of the locking system (if applicable)	Clause 7.3 IEC: 61109,

©	Verification of tightness of the interface Between end fittings & Insulator housing	Clause 7.4 IEC: 61109 amendment 1of 1995
(d)	Verification of the specified mechanical load	Clause 7.4 IEC: 61109, amendment 1of 1995
(e)	Galvanizing test	IS:2633/IS:6745

4.4 ROUTINE TESTS:

Sl no	Description	Standard
1	Identification of marking	As per IEC: 61109 Clause 8.1
2	Visual Inspection	As per IEC: 61109 Clause 8.2
3	Mechanical routine test	As per IEC: 61109 Clause 8.3

Every polymeric insulator shall withstand mechanical routine test at ambient

Temperature tensile load at RTL corresponding to at least 50 % of the SML for at least

10 sec.

4.5 TESTS DURING MANUFACTURE:

Following tests shall also be carried out on all components as applicable

(a)	Chemical analysis of zinc used for galvanizing
(b)	Chemical analysis, mechanical, metallographic test and magnetic particle inspection for malleable castings.
©	Chemical analysis, hardness tests and magnetic particle inspection for forgings.

4.6 QUALITY ASSURANCE PLAN :

4.6.1 The successful bidder shall submit following information along with the bid:

4.6.2 Test certificates of the raw materials and bought out accessories.

4.6.3 Statement giving list of important raw material, their grades along with names of sub-Suppliers for raw materials, list of standards according to which the raw materials are tested. List of tests normally carried out on raw materials in presence of bidder's representative.

4.6.4 List of manufacturing facilities available.

4.6.5 Level of automation achieved and lists of areas where manual processing exists.

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

4.6.7 List of testing equipments available with the bidder for final testing of equipment Along with valid calibration reports.

4.6.8 The manufacturer shall submit Manufacturing Quality Assurance Plan (QAP) for Approval & the same shall be followed during manufacture and testing.

4.6.9 The successful bidder shall submit the routine test certificates of bought out raw materials / accessories and central excise passes for raw material at the time of inspection.

4.6.10 The Owner's representative shall at all times be entitled to have access to the works and all places of manufacture, where insulator, and its component parts shall be manufactured and the representatives shall have full facilities for unrestricted inspection of the Supplier's and sub-Supplier's works, raw materials, manufacture of the material and for conducting necessary test as detailed herein.

4.6.11 The material for final inspection shall be offered by the Supplier only under packed condition. The owner shall select samples at random from the packed lot for carrying out acceptance tests. The lot offered for inspection shall be homogeneous and shall contain insulators manufactured in 3-4 consecutive weeks.

4.6.12 The Supplier shall keep the Owner informed in advance of the time of starting and the progress of manufacture of material in their various stages so that arrangements could be made for inspection.

4.6.13 No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested unless the owner in writing waives off the inspection.

In the later case also the material shall be dispatched only after satisfactory testing Specified herein has been completed.

4.6.14 The acceptance of any quantity of material shall in no way relieve the Supplier of his responsibility for meeting all the requirements of the specification and shall not prevent subsequent rejection, if such material are later found to be defective.

4.7 RETEST AND REJECTION:

4.7.1 Sample Procedure for testing of insulators shall be as per clause 7.1 to 7.6 of IEC 61109 for Acceptance & Routine Tests.

For the sampling tests, two samples are used, E1and E2. The sizes of these samples Are indicated in the table below.

Lot Size (N)	Sample Size	
	E1	E2
N < 300	Subject to agreement	
300 < N < 2000	4	3
2000 < N < 5000	8	4
5000 < N < 10000	12	6

If more than 10000 insulators are concerned, they shall be divided into an optimum Number of lots comprising between 2000 and 10000 insulators. The results of the tests shall be evaluated separately for each lot.

The insulators shall be selected by the purchaser's representative from the lot at random.

The samples shall be subjected to the applicable sampling tests.

The sampling tests are:

Verification of dimensions	- (E1 + E2)
Verification of the locking system	- (E2)
Verification of tightness of the interface between end fittings & Insulator housing	- (E2)
Verification of the specified mechanical load SML	- (E1)
Galvanizing test	- (E2)

In the event of a failure of the sample to satisfy a test, the retesting procedure shall be As follows :

If only one insulator or metal part fails to comply with the sampling tests, a new sample equal to twice the quantity originally submitted to the tests shall be subjected to retesting. The retesting shall comprise the test in which failure occurs. If two or more insulator or metal parts fail to comply with any of the sampling tests or if any failure occurs during the retesting, the complete lot is considered as not complying with this standard and shall be withdrawn by the manufacturer.

Provided the cause of the failure can be clearly identified, the manufacturer may sort the lot to eliminate all the insulators with these defects. The sorted lot then be resubmitted for testing. The number then selected shall be three times the first chosen quantity for tests. If any insulators fail during this retesting, the complete lot is considered as not complying with this standard and shall be withdrawn by the manufacturer.

4.7.2 Verification of dimensions (E1 + E2)

The dimensions given in the drawings shall be verified. The tolerances given in the Drawing are valid. If no tolerances are given in the drawings the values mentioned in

This specification shall hold good.

4.7.3 Verification of the locking system (E2)

This test applies only to the insulators equipped with socket coupling as specified by IEC 120 and is performed according to IEC 383.

4.7.4 Verification of tightness of the interface between end fittings & Insulator housing (E2)

One insulator selected randomly from the sample E2, shall be subjected to crack indication by dye penetration, in accordance with ISO 3452,on the housing in the zone embracing the complete length of the interface between the housing and metal fitting and including an additional area, sufficiently extended beyond the end of the metal part.

The indication shall be performed in the following way.

- the surface shall be properly pre-cleaned with the cleaner ;
- the penetrant, which shall act during 20 minutes, shall be applied on the Cleaned surface;
- with in 5 minutes after the application of the penetrant, the insulator shall be subjected, at the ambient temperature, to a tensile load of 70 % of the SML, applied between the metal fittings; the tensile load shall be increased rapidly but smoothly from zero up to 70 % of the SML, and then maintained at this value for 1 minute;
- the surface shall be cleaned with the excess penetrant removed, and dried;
- the developer shall be applied if necessary;
- the surface shall be inspected.

Some housing materials may be penetrated by the penetrant. In such cases evidence shall be provided to validate the interpretation of the results.

After the 1 min. test at 70 % of the SML, if any cracks occur, the housing and, if necessary, the metal fittings and the core shall be cut, perpendicularly to the crack in

the middle of the widest of the indicated cracks, into two halves. The surface of the two halves shall then be investigated for the depth of the cracks.

4.7.5 Verification of the specified mechanical load SML

The insulators of the sample E1 shall be subjected at ambient temperature to at tensile load, applied between the couplings. The tensile load shall be increased rapidly but smoothly from zero to approximately 75 % of the SML, and then be gradually increased to the SML in a time between 30 sec. to 90 sec.

If 100 % of the SML is reached in less than 90 s, the load (100 % of the SML) shall be maintained for the remainder of the 90 s. (This test is considered to be equivalent to a 1 min withstand test at the SML.)

The insulators have passed the test at 4.7.4 & 4.7.5 above if:

- No failure (breakage or complete pull out of the core, or fracture of the metal fitting) occurs either during the 1 min. 70 % withstand test (a) or during the 1min.100 % withstand test (b).
- No cracks are indicated after the dye penetration method described in 4.7.4 above.
- The investigation of the halves described in 4.7.4 above shows clearly that the Cracks do not reach the core.

4.7.6 Galvanizing test

This test shall be performed according to IS: 2633/IS: 6745 on galvanized parts.

P. *TECHNICAL SPECIFICATION FOR KIT-KAT FUSE UNITS*

1.0 SCOPE

This specification covers the design, manufacture, testing at works, supply/ delivery & transportation of Single core, General Lighting Service Lamps conforming to ISS:2086/1993(3rd revision) or latest amendments.

4.0 STANDARDS

2.1 The Kit-Kat Fuse Unit shall conform in all respect to the relevant Indian/ International Standard Specification, with latest amendments.

SPECIFICATION FOR 63A, 100A 200A & 300A KIT-KAT FUSE UNITS AS PER IS: 2086/1993 (3rd revision).

1. Type of Fuse Units :- Single circuit re-wireable 63A,100A,200A & 300A extended type porcelain Kit-Kat Fuse Units.
2. Standard :- Conforming to IS:2086/1993(3rd revision)
3. All metal parts of the Kit Kat Fuse Unit including washer for fuse wire fixing screws shall be copper alloy / Brass except Nuts & Bolts & other washers.
4. The hole for the bolts in the extended terminal shall be threaded.
5. Nuts, Bolts & Washers etc. shall be of Mild Steel with proper metallization / galvanization.
6. The bolts in the extended terminal shall be provided with two hexagonal nuts to be with matching height with flat washer & spring washer as mentioned in Sl. No.13.
7. Porcelain potion of the Kit Kat Fuse Units shall be milky white glazed and free from spots and roughness.
8. 300 Amps & 200Amps Kit Kat Fuse Units shall be open base type while 63 Amps & 100 Amps ones to be conventional type.
9. One metal block complete with reversed loop female contact as per drawing shall be fitted on a porcelain block and two such blocks shall be fitted on two ends of a sheet metal channel for 200 Amps Kit Kat Fuse Units.
10. Dimension of porcelain base & carrier for 63Amps , 100 Amps , 200 Amps & 300Amp Kit Kat Fuse Units shall be not less than the following figures (all dimensions are in mm):

Sl. No.	Rating	Base			Carrier		
		L	B	h	L	B	H
1	63A	105	40	35	105	40	25

2	100A	135	50	45	135	50	30
3	200A	55	32	23	175	55	47
		(In two pieces)					
4.	300A	62	43	33	205	70	55
		(In two pieces)					

10. Porcelain carrier of 200 Amps Kit Kat Fuse Unit shall have thorough hole for hand gripping.

11. Dimension of channel for base of 300 Amps Kit Kat Fuse Unit shall not be less than the following figures (all dimensions are in mm):

Sl. No.	Rating	Length	Breadth	Height	Thickness of Sheet	Hole dia. & No.
1	300A	205	65	12	1.5	8d x 6

12. Dimension of Metalised / G.I. Nuts & Bolts (full threaded) and Washers etc., shall not be lesser than following (all dimensions are in mm).

SL. No.	Rating	Length of the bolt	Dia of the bolts	Thickness of flat & Spring washer	Outside dia of flat washer
1	2	3	4	5	6
(c)	63A	20	8	1.00	16
(d)	100A	25	8	1.50	19
(e)	200A	30	10	2.00	22
(f)	300A	35	12	2.00	27

13. Number & minimum dimension of fuse fixing screws & washers shall be as below

(all dimensions are in mm).

(a) 63 Amps : 1No. x2, 3.50 'd' with 0.75 thick, 4 'd' hole and 10 'od' Washer (2nos.)

(b) 100 Amps : 1No. x2, 5.00 'd' with 1.00 thick, 6 'd' hole and 13 'od' Washer (2nos.)

(c) 200 Amps : 2No. x2, 6.00 'd' with 1.25 thick, 7 'd' hole and 15 'od' Washer (4nos.)

(d) 300 Amps : 2No. x2, 7.00 'd' with 1.25 thick, 8 'd' hole and 16 'od' Washer (4nos.)

14. Contact Area between male and female metal parts shall not be less than the followings:

(a). 16 x 15 x 4 Sq.mm -for 63 Amps

(b). 21 x 20 x 4 Sq.mm - " 100 "

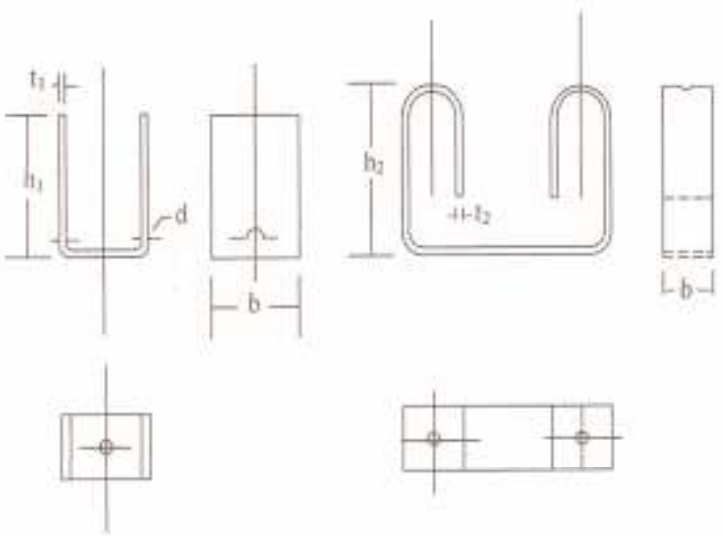
(c). 28 x 30 x 4 Sq.mm - " 200 "

(d) 36x35x4 Sq.mm- '' 300 ''

15. Dimensions of male and female metal parts and extended terminal blocks, etc. shall be as per drawings / specification enclosed.

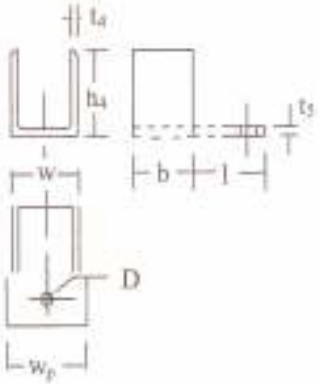
KIT KAT FUSE UNIT

Details of Metal Parts

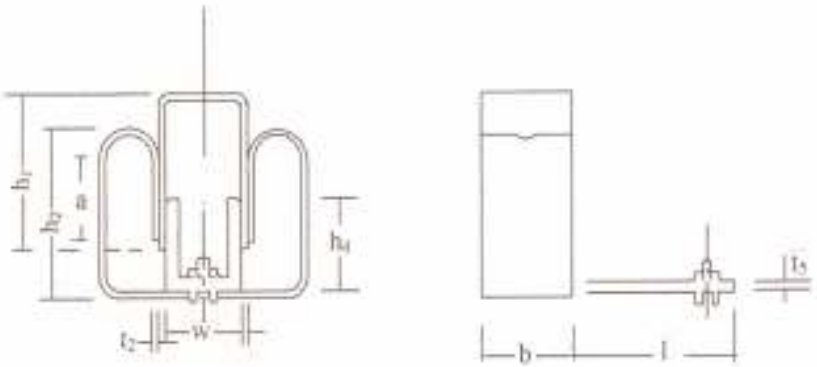


CARRIER CONTACT

REVERSE LOOP BASE CONTACT



TERMINAL BLOCK CUM EXTENDED PLATE



Capacity	h_1	h_2	w	t_1	t_2	t_4	h_4	t_5	b	a	l	D	d	w_p
63A	28	17	12.5	1.7	0.8	3.0	13	3.5	16	8	27	8	4.5	17
100A	37	21	16	2.1	1.1	3.5	19	4.5	21	10	30	8	6	21
200A	50	29	22	3.0	1.3	4.5	27	5.0	28	20	35	10	6	22

'A' dimensions are in mm

Reference :

1. Carrier Contact h_1, t_1, b, d
2. Reverse loop Base contact - h_2, t_2, b
3. Terminal Block cum extended plate - w, t_4, b, t_5, l, w_p, D
4. 'D'-Dia of Cable socket fixing hole (threaded) in extended plate.
   'd'-dia of fuse wire fixing hole (threaded) in moving contact (carrier contact)
5. Contact area -a x b

Note

1. Carrier and base contacts are made of copper alloy/ brass.
2. Washers (for fuse wire fixing screws) are made of brass / copper alloy.
3. All Nuts & Bolts, washers for cable socket, fixing hole are metalised / galvanized Mild steel.
4. 400 Amps Fuse unit is open base type.

3.0 SERVICE CONDITIONS

The Kit Kat Fuse Units to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per IS: 2086/1993(3rd revision) or latest revision.

i. Location:	At various locations in Tripura.
ii. Max. ambient air temperature (Deg0 C):	500C
iii) Maximum relative humidity	95% (sometime approaches Saturation point)
vi. Max. Altitude above mean sea level(Meters):	1000 M.

4.0 TEST AND INSPECTION

4.1 Following tests shall be carried out at the works of the manufacturer as per relevant ISS before delivery of each lot in presence of the representative of purchaser:

A. Type Tests:

(a) Visual examination,

(b) Test for dimensions,

(c) Test for mechanical endurance,

(d) Test for mechanical Strength,

(e) Test for withdrawal force,

(f) Test for temperature-rise,

(g) Insulation resistance test,

(h) High voltage test,

(i) Test for breaking capacity,

(j) Test for water absorption (ceramic),

(k) Test on ceramic material,

(l) Ignition test.

B. Acceptance Tests:

(a) Visual examination,

(b) Test for dimensions,

(c) Test for mechanical endurance,

(d) Test for withdrawal force,

(e) Test for temperature-rise,

(f) Insulation resistance test,

(g) High voltage test,

(h) Test for water absorption (ceramic),

(i) Temperature cycle test (for ceramic material).

C. Routine Tests:

(a) High voltage test.

Sample at random will be selected from the offered lot for the above testing as per IS.

Note : Purchaser reserves the right to get all or any type test carried out on one sample per 1000 Kit-Kat Fuse Units at the cost of supplier from any recognized laboratory / government test house.

4.2 The supplier shall furnish the type test / the routine test certificates as part of the condition for supply of Kit-Kat Fuse Units in bulk quantity at the discretion of the purchaser.

4.3.0 INSPECTION

4.3.1 All tests and inspection shall be made at the place of manufacture unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without charge to satisfy him that the material is being furnished in accordance with specification.

4.3.2 The purchaser reserves the right to have the tests carried out at the cost of the supplier by an independent agency whenever there is dispute regarding the quality of supply.

Q. LT Panel Board 400 Amp (Outdoor type)

1.1 Outdoor type 400 Amp, 4pole , Fixed capacity, MCCB Panel board (Out-door type feeder pillar)

1.2 The cubical should be with LED type Phase indication lamp, Amps & Volt meter with facility to connect 300 sqmm 3½ Core XLPE cable [as in-comer] & Outgoing facility of 185 sqmm XLPE L.T cable through cable gland

1.3 The L.T distribution cubical shall be suitable for double door & both side opening facility and to be fabricated

with 2mm CRCA sheet and Tropical, totally enclosed, metal-clad, weather-proof, vermin and dust proof.with

following incoming & outgoing MCCBs.

1.4 A. 400 A, 4 Pole, 35 KA, thermal magnetic protection MCCB with O/L & S/C protection - 02 no. (As incomer) with change over provision B. 100 A, TPN, 35KA MCCB - 4 nos.(As outgoing)

R. LT Panel Board 100 Amp (Outdoor type)

1.1 Outdoor type 100 Amp, 4pole , Fixed capacity, MCCB Panel board (Out-door type feeder pillar).

1.2 The cubical should be with LED type Phase indication lamp, Amps & Volt meter with facility to connect 185 sqmm 3½ Core XLPE cable [as in-comer] & Outgoing facility of 120 sqmm XLPE L.T cable through cable gland.

1.3 The L.T distribution cubical shall be suitable for double door & both side opening facility and to be fabricated with 2mm CRCA sheet and Tropical, totally enclosed, metal-clad, weather-proof, vermin and dust proof.with following incoming & outgoing MCCBs.

1.4 A. 100 A, 4 Pole, 35 KA, thermal magnetic protection release MCCB with O/L & S/C protection - 1 no. (As incomer) B. 40 A, TPN, 35KA MCCB - 4 nos |(As outgoing) (Adjustable thermal & fixed magnetic setting)

S. Outdoor type Distribution Board

Out Door type Distribution board with 40 A, TPN MCCB and Aluminium Bus Bar indicating lamp with all accessories.

T. ACSR – WEASEL (6/1/3.35sqmm).The Conductor (ACSR) shall be subjected to all routine tests as per relevant ISS at the MANUFACTURERS' WORKS.

U Structure, Insulators and Other Sundry Materials: -

1.1 Scope: -

This work shall be on turn key nature, as such while quoting rates Contractor should take in to account all sorts of auxiliary materials required for erection and commissioning of the transformer and other equipments.

1.2 Structure: -

The steel for structures for Substation Gantry towers, Shielding Tower, Equipment Support and Post Insulator etc. shall conform to IS: 2062 and galvanizing shall be made as per IS: 2633 / 1972, 6745 / 1972 and 4759 / 1968. The Contractor shall furnish necessary design, drawing and bill of materials. The structure shall be completed with GI nuts, bolts, washer and striper bolts etc. Testing shall be done as per IS: 2633 / 1972.

1.3 Post Insulators: -

The post insulators shall be of out door type and shall conform to IS: 2544 / 1963. The minimum power frequency and impulse withstand value shall be as follows: -

i. Rated voltage : - 36 KV.
ii. Dry one minute power frequency withstand value : - 95 KV.
iii. Wet one minute power frequency withstand value : - 75 KV.
iv. Impulse voltage withstands value 270 KV. The minimum creepage distance for 33 KV insulators shall be 550 mm. The insulators are subjected to routine, type and sample tests.

1.4 Hardware of Insulators: -

The insulators shall be provided with clamp of suitable size for connection of ACSR-DOG conductor including necessary nuts, bolts and washers etc. All nuts, bolts and washers shall be galvanized steel in accordance with IS: 2633 / 1964.

V TENSION CLAMP: -

Single insulator tension fittings (Ball & socket type) for 11 KV 70 KN disc insulator to accommodate ACSR conductor (DOG) in the 33 KV Switchyard Bus as per specification, drawing and conforming to relevant IS.

W. REQUIRED GUARANTEED TECHNICAL PARTICULARS FOR ACSR CONDUCTOR (RABBIT)

SL. NO	DESCRIPTION	UNIT	RABIT	WEASEL
1.0	Particulars of Raw Materials		EC Grade Aluminium wire Rod, Core Wire, Alloy Rod, Aluminium wire, Alloy Rode etc.	
1.1	Aluminium			
a.	Minimum Purity of Aluminium.	%	99.5	99.5
b.	Maximum Copper content	%	0.04	0.04
1.2	Steel Wires/Rods			
a.	Carbon	%	0.50 to 0.85	0.50 to 0.85
b.	Manganese	%	0.50 to 1.10	0.50 to

				1.10
c.	Phosphorus	%	Max to 0.035	Max to 0.035
d.	Sulphur	%	Max to 0.045	Max to 0.045
e.	Silicon	%	0.10 to 0.35	0.10 to 0.35
1.3	Zinc			
a.	Minimum Puriyy of Zinc	%	99.95	99.95
2.0	Minimum Strands after stranding.			
2.1	Diameter			
a.	Nominal	Mm	3.35	2.59
b.	Maximum	Mm	3.38	2.62
c.	Minimum	Mm	3.32	2.56
2.2	Minium breaking Load of strand	KN	1.36	0.85
2.3	Maximum Resistance of 1 m. length	Ohm	0.003265	0.005490
3.0	Steel Strands after stranding			
3.1	Diameter			
a.	Nominal	Mm	3.35	2.59
b.	Maximum	Mm	3.42	2.64
c.	Minium	Mm	3.28	2.54
4.0	Galvanizing (After stranding)			
a.	Minium weight of Zinc conting per uncoated wire surface	gm/m²		
b.	Minimum number of one minute dips galvaized strand can withstand in the test.	Nos	2 dip 1 min & 1 dip ½ min	Two dip 1 min

c.	Minimum number of twists in a guage length times dia of wire which the strand can withstand in the torsion test (after stranding)	Nos	16	16
5.0	ACSR Stranded Conductor			
5.1	UTS of Conductor	KN	18.25	11.12
5.2	Lay ratio of conductor	Max	14	14
a.	Outer Steel Layer		N.A	N.A
b.	12 wire Aluminium Layer		N.A	N.A
c.	18 wire Aluminium Layer		N.A	N.A
d.	24 wire Aluminium Layer		N.A	N.A
5.3	D.C. resistance of Conductor at 20ºC	Ohm/Km	0.5524	0.9289
5.4	Strandard length of conductor.	M	2000	2000
5.5	Maximum single length of conductor that can be manufactured if required for single strength.	Meter	2000	4000
5.6	Tolerance on strandard length of conductor.	%	+/- 5%	+/- 5%
6.0	Direction of lay for outside layer.	Kg/Km	Right hand	Right hand
6.1	Liner mass of the conductor.			
a.	Standard.	Kg/Km	214	128
b.	Minimum	Kg/Km	211.17	126.31
c.	Maximum.	Kg/Km	216.83	129.69
7.0	No. of cold pressure butt welding	Nos	Two	Two

	available at works.			

X. TECHNICAL SPECIFICATION FOR PVC INSULATED LT POWER CABLE.

PVC Insulated Aluminum Conductor as specified in the BIDDING SCHEDULE shall be of Single Core (1Core) 1100 Volts grade and as per IS: 1554 (Part-I)1988. The various electrical properties of such CABLES are specified below:

Nominal Conductor area. Sq.mm.	DC Resistance of conductor at 20 degree Centigrade (Ohm/Km.)	Reactance Of cable at 50 Hz. (Ohm/Km.)	Capacitance Of cable. (Microfarad/Km.)	Short Circuit rating of cable for 1 sec. (KA)
70	0.443	0.104	1.14	5.322
95	0.320	0.101	1.17	7.223
120	0.253	0.0956	1.30	9.124
185	0.164	0.0919	1.33	14.07
240	0.125	0.0899	1.40	18.25

Routine Tests of cables shall have to be conducted at manufacturers' works as per provisions of the relevant ISS.

Y . PCC Poles

1. TECHNICAL SPECIFICATION

1.1. Cement : - The cement used in the manufacture of 'pre-stressed concrete poles' shall be Ordinary Portland Cement of 43 Grade of reputed brand only conforming to IS: 8112.

1.2. Aggregate used for the manufacture of Pre-stressed concrete poles (PCC poles) shall conform to IS: 383-1970. The nominal maximum size of aggregate shall in no case exceed 10mm.

1.3. Water : -

Water should be free from chlorides, sulphates, other salts and organic matter.

1.4. Admixtures : -

Admixtures should not contain calcium chloride or other chlorides and salts which are likely to promote corrosion of pre-stressing steel.

1.5. Pre-stressing steel (i.e. Tension wire) : -

The pre-stressing steel for works should conform to IS: 6003 of 1983. The diameter of pre-stressing steel wire shall be 4 mm. with a minimum ultimate tensile strength of 175 kg. / mm2.

1.6. Concrete mix and strength : -

The concrete mixture shall be designed as per requirements below:

a) Minimum works cube strength of 28 days should be at least 250 kg. / cm2.

b) The concrete strength at transfer should be at least 125 kg. / cm2.

c) The mixture should contain 380 kg. to 510 kg. of cement per cubic meter of concrete, actual consumption will be determined by cube strength but the consumption in all cases will be based on 510 kg. / cum.

d) The mixture should contain as low as water content as is constant with adequate workability.

e) The concrete shall be compacted thoroughly by vibration, pressure, shock spinning or other means and shall have density of not less than 2.4 tones mm3.Hand compaction shall not be permitted and the required compaction shall be permissible by 'electric vibrator'.

f) The Concrete strength at transfer shall not be less than half the 28 days strength ensured in the design i.e. 250 x 0.5 = 125 kg. / cm2.

1.7. Curing : -

The concrete shall be covered with layer of soaking canvas, Hessian or similar absorbent materials and constantly wet up to the time when the strength of concrete is at least equal to the minimum

strength of concrete at transfer of pre-stress. Thereafter, the pole may be removed from the mould and watered at intervals to prevent surface cracking of the unit. The intervals should depend on the atmospheric humidity and temperature.

1.8. The Pre-stressing wires shall be de-tensioned only after the concrete has attained the specified strength at transfer (i.e. 125 kg. / cm2). The cube meant for the purpose of determining the strength at transfer (by cube test) should be cured, done for each incoming stock of cement as far as possible under conditions similar to those under which the poles are tested.

1.9. Eye-hook : -

Separate eye-hook shall be provided for handling and transportation, one each at a distance of 0.15 times the overall length from either end of the pole. Eye-hook should be properly anchored and should be on the face that has the shorter dimension of the cross-section. Stacking should be done in such a manner that the broad side of the pole is vertical. Each tier in the stack should be supported on timber sleepers located at 0.15 times the overall length measured from the end. The timber supports in the stack should be aligned in a vertical line.

1.10. Earthing : -

Earthing shall be provided by having a length of 8-SWG, G.I. Wire embedded in concrete during manufacture and 150 mm. ends of the wires should be left projecting from the pole at 250 mm. from top and 150 mm. below ground level. The earth wire shall not be allowed to come in contact with the pre-stressing wires.

1.11. Number of tests :-

i) All the poles shall be tested for overall length, cross-section and uprightness. The tolerance shall be (+/-) 15 mm. on overall length, (+/-) 3 mm. on cross sectional dimension and 0.50 % up-rightness.

i) The number of poles to be tested for transfer strength test shall be 3 (three) Nos. from each lot of 100 (hundred) Nos. Poles.

1.12. Planting height of the pole shall be marked by putting paint at a height of 1.25 mtr, 1.30 mtr. & 1.50 mtr. from the bottom for 7.50 m. long, 8.00 m. long & 9.00 m. long PCC Poles respectively.

1.13. The poles shall be clearly indelibly marked with the following particulars during manufacture so as to easily read after erection position.

A) Month and Year of Manufacture.

B) Transverse Strength of Pole in Kg.

C) Serial No. of pole & abbreviated name of firm.

1.14. Any lot of pole / pole rejected will have to be replaced at free of cost.

Details Specification of 9.0 mtr. / 200 kg. Prestressed Concrete pole.

1..... Factor of Safety.....= 2.5

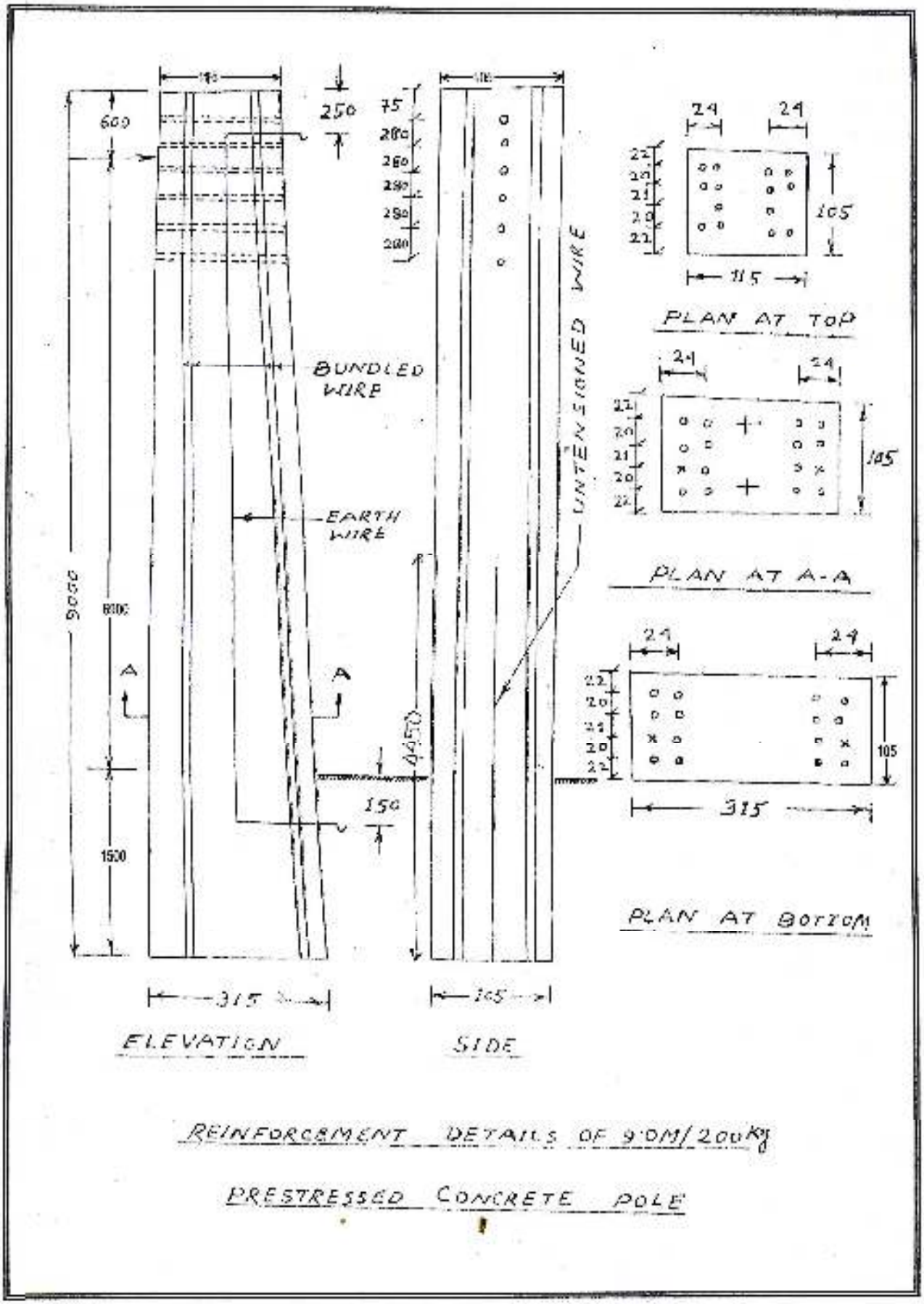
2..... Concrete Grade .....= M-250

3. Diameter of Prestressing Wire.....= 4 mm.
4. Ultimate Tensile Strength of Prestressing Wire.....= 17500 Kg. / cm2
5. Number of Tensile Wire.....= 14
6. Number of Untensioned Wire.....= 2
7. Concrete Quantity per Pole.....= 0.203 m3
8. Steel Quantity per Pole.....= 13.30 Kg.
9. Weight of Pole.....= 490 Kg.
10. Clear cover to Wire.....= 20 mm.
11. Location of Holes: - As per REC Standard.
12. 'O' Denotes Tensioned Wire.
13. 'X' Denotes Untensioned Wire.
14. '+' possible position of Earth Wire.
15. All Dimensions are in mm.
16. Drawing not to Scale.

NOTE :

1. For holding part length untensioned wires in position, 4mm stirrups may be use suitable spacing.

2. If any practical difficulty is experienced in using part length untensioned wires, full length wires may be used instead. But the tension in these wires should not exceed their ultimate tensile strength value. However, it may be noted that use of part untensioned wires will be more economical.



REINFORCEMENT DETAILS OF 9·0M/200Kg PRESTRESSED CONCRETE POLE

Z. GI Wires

1. SCOPE

This specification covers details of solid G.I. Wires for use in rural distribution system.

2. APPLICABLE STANDARDS

Except when they conflict with the specific requirements of this specification, the G.I. wires shall comply with the provisions of IS:280-1978 and IS:7887-1975 or the latest version thereof.

3. APPLICATION & SIZES

G.I. wires covered in this Specification are intended for thefollowing applications :

Application	Sizes (nominal dia)
Bearer wire for service	3.15mm (for single phase cables services) 4 mm (for three phase services)
Earthing of Transformers, poles & Fittings.	4 mm
Continuous Earthwire for. 11 KV lines	4 mm
Protective guarding at the crossing of over-head power lines with roads, railway tracts and telecommunication lines	3.15, 4 and 5 mm

4. MATERIAL

4.1 The wires shall be drawn from the wire rods conforming to IS:7887-1975 or the latest version thereof.

4.2 The requirements for chemical composition for the wires shall conform to IS:7887.

4.3 The wires shall be sound, free from split surface flaws, rough jagged and imperfect edges and other detrimental defects on the surface of the wires.

5. GALVANISING

The wires shall be galvanised with 'Heavy Coating' as per IS:4826-1979 or the latest version thereof.

6. GRADES

GI wires shall be classified into two grades based on their tensile strength :

Grade	Tensile Strength (MPa)
Annealed	300-550
Hard	550-900

7. TOLERANCE IN DIAMETER

The tolerance on nominal diameter at any section of wire shall not exceed (±)2.5%. Further, the maximum difference between the diameters at any two cross-sections of wires shall not exceed 2.5%.

8. TESTS

The following tests shall be carried out in accordance with IS:280-1978 or the latest version thereof as per sampling criteria stipulated therein :

i) Dimensional check (dia) - refer clause 7 above.

ii) Visual inspection regarding freedom from defects refer clause 4.3 above.

iii) Tensile test

iv) Wrapping test (for wire diameters smaller than 5mm)

v) Bend test (for wire diameters 5mm only)

vi) Coating test - refer clause 5 above

vii) Chemical composition

9. PACKING

The wires shall be supplied in 50-70 kg. coils, each coil having single continuous length. Each coil of wire shall be suitably bound and fastened compactly and shall be protected by suitable wrapping.

10. MARKING

Each coil shall be provided with a label fixed firmly on the inner part of the coil bearing the following information :

a) Manufacturer's name or trade mark

b) Lot number and coil number

c) Size

d) Grade (Annealed or Hard)

e) Mass

f) Length

g) ISI Certification mark, if any

AA. TECHNICAL SPECIFICATION FOR CIVIL WORKS

1. The document shall be read in conjunction with the other tendering documents.
2. The work shall be carried according to the description of the item(s) in the bill of quantities attached in part-I. The building work shall gradually conform to specifications for works in "The Tripura PWD Specification 1972 Building work" where Tripura PWD specifications for building work is silent, CPWD specification or provisions contained in National Building Code" (Latest Edition) shall be followed.
3. "Specification for Road & Bridge works (Latest Revision) " published by the Ministry of shipping, Road transport & Highways (MoRTH), Specification for rural roads, MoRD) shall be followed, and where the said specification is silent or items which are not covered, The Tripura PWD specification, 19721 the specification of CPWD/CPHEEO/CWC/BIS or relevant IRC Standard specifications as amended till date as determined by the Deputy General Manager, in that order should be followed.
4. OPC cement of ISI Marked 43 grade containing 50kg each bag, conforming IS: 81 12 only to be used of current manufacturing date not before 90days to reach in at work site.
5. Cement will be of in machine stitched polythene bag of preferable manufacturer (i). Star (ii). Velly Strong (III). Crown etc.
6. Sand shall be of relevant IS code.

SECTION-VII

SPECIAL INSTRUCTIONS TO BIDDER(S)

- The Bidder(s), before submitting of Bid(s), are advised to invariably visit the sites of the works and satisfy himself/themselves about physical volume of works to be carried out, acquaint him/them with the environment, take into consideration details of all minor & major Technical requirements so as to ensure successful completion of the work with ease & comfort on award.
- The Contractor shall, be fully responsible for total erection and commissioning of all Equipment, cables, & all associated items (to be supplied by the owner and themselves) as per standard & requirement of TSECL. Therefore the Contractor shall give due importance to each & every details of the work. He shall be liable to take care of and arrange for even any petty but integral component (not considered in the scope of the work) for total successful erection .testing at site and completion of the work.
- The Bidder(s) shall have to furnish "Guaranteed Technical Particulars" of each item of Equipment / Switchgear / Spares / others as per "Technical Particulars" sought in FORMAT(s) / SPECIFICATIONS appended in the Bidding Document. Furnishing of "Technical Particulars" of such item(s), which have not been sought through formal FORMAT in the Document, shall be the responsibility of the Bidder(s) as per guaranteed particulars of the related Manufacturer(s).
- The Bidder(s) shall have to furnish Manufacturer's "Literature on product Specification" of all Major equipment with Bidding Document.
- The Bidder(s) shall also furnish "Technical Particulars" of all sub-item(s) of Main Items.
- List of MAKE for Equipment / Switchgear/other materials and all items have been furnished in the Bidding Document. For any Left-Out item, the Bidder(s) shall have to supply item of such MAKE acceptable as StandardProduct and to be authenticated by supporting Document as to utilization by any State Electricity board/Power utility/Power corporation of the Country.
- The Successful Bidder shall have to submit "Design, drawing and dimensional details" of all equipment, accessories, equipment foundation, Steel Structure supports of Equipment, Drawing & Design of Tower & Beam / guarder, Electrical layout of Transformer bays, foundation lay out, Erection Key Diagram etc. as required, Switchgears, Structures, Construction Standards and Bill of materials for all components etc. within 15 days as per requirement and stipulations in the Bidding document from the date of issue of L.O.A. for approval of the Owner. The work shall be based strictly on such approved drawing.
- The erection & commissioning shall be executed by the manufacturer's engineer of the following items like Relay control panel, VCB, Isolator, CT, PT etc.
- Engineer having supervisor license of appropriate class shall be engaged throughout the erection and commissioning the Job.
- Cable jointing work shall be carried out by engaging appropriate class of jointer having valid license.
- Before execution of work valid documentary proof shall be submitted to the consignee of the work.
- Specification of All Civil Works shall be guided by the Standards of TRIPURA PWD (Public Works Department).The Successful Bidder shall have to submit "Design and drawing of Distribution Sub-station layout,11 KV & LT Line layout, Foundation of Equipment and Structures, Cable Trench Details, etc." within 15 days as per requirement and stipulations in the Bidding document from the date of issue of L.O.A. for approval of the Owner. The work shall be based strictly on such approved drawing
- The Spares and Tools & Plants as specified in the Schedule shall be of the particular MAKE. All such spares and T & P shall be supplied along with related Literature / Manual / Catalogue of concerned Manufacturer..

All materials and equipments (Other than those considered in scope of this NIT) for the work shall be delivered / supplied by TSECL from its store yard within the project Area / stock yard within Agartala Municipal Corporation area.

- ROW (Right of Way) is to be arranged by agency / contractor. TSECL will however, provide and extend all and best possible support as may be required in obtaining Right of Way.
- Date on which erection of line / lines (Over ground or Underground) with all allied accessories, equipments and sub-station structures etc. in full respect and up to satisfaction of Engineer in charge will be done shall be treated as date of completion of Erection. However warranty and liability for completing and commissioning of materials, devices, equipment etc. considered for supplying in this NIT within scope of supply of bidder shall be regulated as per provisions already contained in the document.

GENERAL & TECHNICAL FIELD REQUIREMENT

SCOPE OF WORKS:

The scope of works include execution on Turnkey Basis with complete system design, procurement / manufacture, manufacturer's quality assurance, shop testing (including type testing where specified/required), transportation, storage, erection, including all civil/structural works, site testing, commissioning of all items & materials as elaborated below including all associated activities that though not exclusively specified here in but are required for the completion of the entire works under this package.

- This specification intends to cover but not restrict to the following activities, services and works.
- Complete design and engineering of all over ground & underground lines, Distribution sub-stations, equipment, control gears, other material and services.
- Providing engineering data, drawings and O&M manuals for Owner's review, approval and records.
- Manufacturing, supply, testing, packing, transportation and insurance from the manufacturer's work to the site of such materials in the document.
- Receipt, storage, insurance, preservation and conservation of equipment, materials, accessories at the site.
- All civil and structural works as required.
- Fabrication, pre-assembly (if any), erection, testing at site and putting into satisfactory operation of all the equipment/material including successful commissioning.
- In addition to the requirements indicated in the Technical Specifications, all the requirements as stated in other sections shall also be considered as a part of this specification as if completely bound herewith.
- The Bidder shall be responsible for providing all material, equipment and services specified or even not specified but otherwise which are required to ensure operability, maintainability and the reliability of the complete work covered under this specification.
- All services & activities required to be given contractually, by the bidder, during warranty period.
- The package envisages following works at Electrical Sub-Division Matabari, under ED –Udaipur.
- Survey, 33KV BAY, line Isolator, Cable Pit, control Room.

- No materials to be supplied by TSECL
  All dismantled materials if any shall have to be returned to ESD Stores.

ABBREVIATIONS

ACSR	Aluminum Conductor Steel Reinforced
DT	Distribution Transformer
PCC	Pre-stressed Compact Concrete
STP	Steel Tubular Pole
HT	High Tension
LT	Low Tension
MS	Mild Steel
XLPE	Cross Linked Poly-ethylene
GI	Galvanized Iron
BOM	Bill Of Material
G. O.A.B.	Gang Operated Air Break
DC	Direct Current
E & M	Electrical and Mechanical

BOARD

LT PANEL BOARD-100 AMP

TECHNICAL SPECIFICATIONS OF CABLE FAULT LOCATOR AND CABLE ROUTE TRACER

1. TECHNICAL PROPOSAL & SPECIFICATION OF CABLE FAULT LOCATOR

The cable fault locator shall be capable of Locating / detecting all under-ground transmission and distribution (Paper/Oilfield/PVC/XLPE) power cable faults up to 33kV network. The equipment should capable and locate open circuit / short circuit / low-insulation / lashing / earth type cable faults in underground cable. It is a compact, trolley based and rugged in construction to endure years of hard and rough field use. The equipment have capability to deliver high output energy that is necessary to ascertain easily to condition and break down faults in power cables, joints, and terminations and long cable network.

The system shall have the following fault location methods / technique:

a) Time Domain Reflectometer

b) Impulse Current method

c) Secondary impulse method / ARM

2. Technical Specifications / Requirements:

2.1 H.V. Surge wave tester or Impulse Generator

The instrument is use for pinpoint location of all types of underground Cable faults up to 33kV power networks with acoustic method.

It shall produce single short surge as well as repetitive surge this period can be varied using a timer.

The single short surges are meant for breaking down a fault for analysis with the digital fault pre-locator and repetitive surges for pin pointing the faults with surge wave receiver

Maximum Impulse voltage: 0-32 kV in suitable steps of 8/16/32kV.

1. Energy Dissipated: 1000 Joules at each steps

2. Safety Protection: The instrument should be operational through control panel and should have protective circuit breakers

3. Automatic discharging facility of cable under test, in case of power failure or after switching off.

4. It will have in built in arc refection module

5. Surge Tester should have CE approval

Technical Specification:

a. Power supply : 230V AC + 10%, 50 Hz single phase.

b. Output ranges : 0 - 8 / 0 – 16 / 0 - 32 kV selectable & continuously variable.

c. Output energy : 1000 Joules full energy at every range.

d. Impulse mode : Single and Auto.

e. Arc Reflection Module : 32kV – 1000Joules

f. Impulse mode : Single and Auto.

g. Auto impulse Sequence : 1.5, 3 and 6 seconds intervals.

h. Indication : 1) On/off lamp indication.

2) Analog moving coil meter for output voltage (kV) Indication

3) Analog moving coil meter for mains input (V) Indication

4) Variac, HV switch, HV output safety interlocks

i. Over load Protection : 1) Input current Limiter switch in mains input supply.

2) Fast blow fuse in 24 Volt controlled supply.

j. Safety Protections : 1) Variac Zero inter-lock.

2) Output cable plug inter-lock.

3) HV Switch inter-lock.

4) Over Heat Protection.

5) Input current Limiter switch.

6) Emergency off switching.

k. Cooling system : Air cooled.

l. Operating Time : 6-8 hours continuous.

m. Earth Discharge : Soft and automatic discharge.

Accessories: 1) 10 meter 10 sq mm single core screen output HV cable with heavy duty brass clamp.

2) 10 meter mains supply connecting cord.

3) 10 meter yellow/green earthling cable.

3.2 Fault Pin-pointing OR Surge Wave Receiver

The surge wave receiver is capable for pinpoint of cable faults by acoustic method in LT/HT cables. It is an associate instrument of surge wave tester. The seismic ground microphone shall be picked up the acoustic and magnetic signals and the acoustic signal to be indicated in audibly in the headphone and visually on LCD bar-graph display. The equipment shall have dual channel LCD display denoting the signal strength of magnetic & acoustic signal. The equipment should light weight with integrated batteries and low power consumption.

- It is should require following features:
- Guides the operator to be walk on cable route while pinpointing the cable fault
- Separate sensitivity and volume/level controls for magnetic and acoustic channels.
- Dual channels LCD display denoting the signal strength of magnetic and acoustic signals.
- Light weight, small and flexible receiver with high sensitive ground microphone
- Surge wave receiver should have CE approval

Technical Specification:

1. Display Indication: i) LCD bar-graph display with backlight facility

ii) Indication of signal strength of acoustic & magnetic channels.

iii) Internal battery level status.

2. Acoustic Mute function: To locate fault in busy & crowded area.

3. Acoustic Freq. Range: 70 Hz to 3000 Hz (acoustic) broad band filter.

4. Magnetic channel: 9820Hz +/- 10 Hz bandwidth filter

5. Gain: More than 96dB max for each channel.

6. Output impedance: 500 ohms for headphones.

7. Input impedance: 500 Ohms for ground microphone.

8. Controls: Separate controls for acoustic & magnetic

9. Power Supply: 8 x1.5V dry AA size batteries for 12V DC

Accessories: 1) Ground Microphone

2) Connection leads

3) Special Headphone

4) Caring Sticks

3.3 Cable fault pre locator

Microprocessor control, menu driven, portable, light weight cable fault locator

1. Three selectable mode of operation: Low voltage impulse (TDR) / Impulse current mode I CM /Single Impulse Mode (SIM)

2. Range : 0 – 64kM in selectable ranges

3. Voltage withstand 400V AC

4. Sampling speed 200MHz

5. In built 8.4 inch Colour LED screen with 160º viewing angle . Touch screen & manual operation.

6. Internal storage of waveform . 100 memories

7. Built in Lithium ion battery with integrated charger

8. Communication to PC thru USB device

9. Auto Cursor and cursor drag function , easy to locate .

10. Propagation velocity : 90 – 300 m/sec.

11. Gain & Zoom facility

12. Transmitting pulse width 40nS – 3.5µS

13. Programmed test data should be displayed on screen on test result

14. Laptop based pre locator shall not be acceptable.

Surge generator and pre locator should be fixed in a hand driven trolley with top metal cover for protection against dust and accidental damage. It should have minimum 8 inch rubber wheel with necessary handle for easy transportation .and movement. Output cables, mains power cable, earth cable shall be wounded in drums / frame and it shall be rigidly fitted in the back / side panel of trolley. Surge wave receiver should be portable to be carried separately. 35kV discharge rod to be supplied along with the system.

1.0 DOCUMENTATION:

1.1 The bidder shall furnish following documents along with his offer.

1.1.1 Sectional view, showing the General constructional feature with conductor / conductor screen / insulated / armouring / inner and outer sheath etc.

1.1.2 Drawing of cable drums with details of material dimension and paint etc shall be submitted.

1.1.3 All the required type test reports for offered items tested at any Government recognized Laboratory as stated under Clause No. 6.1 (B).

1.1.4 Literature, pamphlets for the record items.

2.0 PACKING AND FORWARDING:

2.1 The cable shall be wound on wooden drums as per IS: 10418 – 1972 and packed in drums suitable for vertical / horizontal transport, as the case may be and shall be suitable to withstand rough handling during transport and outer storage. The outer surface of the drum shall be painted with white aluminum pint. Similarly, the inside surface of drum shall have the protective layer of varnish / paint to protect it from white ants.

2.2 The wooden drums shall be reinforced with steel bends and strips for better protection.

2.3 The ends of the cable shall be sealed by means of non hygroscopic sealing materials.

2.4 The following information may be stenciled on the drum with either water proof ink or oil paint:

i. Reference of IS / IEC standard.

ii. Manufacturer's name or trademark.

iii. Type of cable and voltage grade.

iv. No. of cores.

v. Nominal cross-sectional area of conductor.

vi. Cable code.

vii. Length of cable on the drum

viii. No. of lengths on the drum (if more than one)

ix. Direction of rotation of drum (by means of an arrow)

x. Position of outer end of cable

xi. Gross weight

xii. Country of manufacture

xiii. Year of manufacture

xiv. Reference of A/T No. & date

xv. Property of TSECL

xvi. Name of consignee and the destination.

The drum may also be marked with ISI Certification Mark. Over and above, name plate of aluminum of suitable size and thickness, containing all the above information, shall be fixed on the drum in addition to the painting.

2.5 The contractor shall be responsible for any damage to the cables during transit due to improper and inadequate packing. Wherever necessary, proper arrangement for lifting, such as lifting hooks, shall be provided. Any cable found short inside the packing cases shall be supplied by the contractor, without any extra cost.

2.6 Each consignment shall be accompanied by a detailed packing list, containing the following information:

(a) Name of consignee

(b) Details of consignment

(c) Destination

(d) Total weight of consignment

(e) Handling and unpacking instruction

(f) Bill of materials, indicating contents of each package.

3.0 GUARANTEED TECHNICAL PARTICULARS:

The bidder shall furnish all Guaranteed Technical Particulars, as called for, of this Specification. Particulars, which are subject to guarantee, shall be clearly identified. Offer not containing these in formations will not be considered for acceptance.

4.0 PERFORMANCE CERTIFICATE:

Bidders shall also submit performance reports for the specified size of cables supplied to other State Electricity Boards / reputed contractors, with the clear indication of the period since when the cables performed satisfactory service.

5.0 LEGIBLE SUBMISSION:

Only required relevant, legible documents shall be submitted to avoid delay due to back reference.

ANNEXURE - A

4.3 **Insulation: -** The insulation shall be water tree retardant (TR) cross linked polyethylene insulation applied by extrusion and shall conform to the following requirements:

Sl .No.	Properties	Requirements
1.	Tensile Strength	12.5N/mm², Min.
2.	Elongation to break	200 percent, Min
3.	Aging in air oven: a) Treatment: Temperature: Duration: b) Tensile Strength variation: c) Elongation variation:	 135±3°C 7 days ±25 percent, Max

		±25 percent, Max
4.	Hot set: a) Treatment: Temperature: Time under load Mechanical stress b) Elongation under load c) Permanent elongation (set) after cooling	 200±3°C 15 min 20N/cm² 175 percent, Max 15 percent, Max
5.	Shrinkage: a) Treatment: Temperature Duration b) Shrinkage	 130±3°C 1 hour 4 percent, Max
6.	Water absorption (Gravimetric): a) Treatment: Temperature: Duration b) Water absorbed	 85±2°C 14 days 1 mg/cm², Max
7.	Volume Resistivity a) at 27°C b) at 70°C	 $1x10^{14}$ ohm-cm, Min $1x10^{13}$ ohm-cm, Min
8	Thermal Resistivity	350 degrees C cm/W
9	Power factor at maximum conductor temperature	0.008
10	Dielectric strength	22 kV/mm

Manufacturing processes to produce high-quality cables with the following characteristics:

- Cure consistency with hot set/creep less than 100%
- No voids larger than 75 microns per 16.4 cubic cm
- No ambers larger than 250 microns per 16.4 cubic cm

- No contaminants larger than 125 microns and less than 5 between 50-125 microns per cubic 16.4 cubic cm tested.
- Partial discharge less than 5 pico coulombs at 52 kV
- Neutral indent on cable is less than 375 microns
- Cable insulation concentricity greater than 90% tested
- No protrusions greater than 75 microns at the conductor shield and 125 microns at the insulation shield

System Power	Ø	Height (H)	Mounting Hole Distance (D)
25W	329	405	76
35W	329	405	76

All dimensions are in mm
Tolerance: ± 2 mm

LED POST TOP LIGHT 15 W

Aesthetically designed LED post Top with aluminium enclosure and die casted heat sink exhibits classic look with symmetrical light distribution and excellent heat dissipation for long life.

PRODUCT SPECIFICATIONS

Features & Benefits

- Delivers excellent illumination & symmetrical Light
- Long life & photo biologically safe LEDs
- High performance electronic driver
- No harmful UV & IR radiations
- IP 65 and IK07 aluminum housing
- Maximum ambient temperature : 45 °C
- Operating voltage range: 140 V - 270 V
- Average life L70B50: 50000 hours

Housing

Die-cast aluminum spigot for mounting LED driver and spun aluminum canopy which is painted white inside.

Finish

Pure polyester powder coated matt black finish after phosphochromate treatment.

Light source

High efficiency long life LED module with SMD LED package mounted on MCPCB. Lumen efficacy of LED >140 lm/W and viewing angle of 120° to ensure better uniformity (For detailed photometric data,please refer LM79 report & IES file).

Cover

high quality polycarbonate clear diffuser is used over LED module to enhance the lumen output and milky acrylic diffuser to reduce glare.

Electronic driver

Built-in potted electronic LED driver with APFC, (SMPS based constant current supply), lower THD, Open Circuit Protection, over Voltage protection, Surge Voltage Protection upto 4kV other safety test as per IS 15885 Part-2/Sec

DECLARATION

I/We hereby declare that I/We have personally gone through the Bid- Document containing General terms and conditions, Erection Conditions of Contract, Technical Specifications, Other Instructions/Special instructions etc. incorporated in the Bidding Document for the works /supply and I/We do agree to abide by all the rules and regulations of TSECL, Agartala, Tripura.

Signature of Contractor

ANNEXURE-I

PROFORMA OF BANK GUARANTEE FOR

CONTRACT PERFORMANCE

(To be stamped in accordance with stamp Act)

Ref. …….

Bank Guarantee No. …… Date……

To

Tripura State Electricity Corporation Limited

Bidyut Bhavan, 79 Tilla,

Agartala – 799001,

West Tripura.

Dear Sir,

In consideration of Tripura State Electricity Corporation Limited (hereinafter referred to as the 'Owner', which expression shall unless repugnant to the contest or meaning thereof include its successors, administrators and assigns) having awarded to M/s …….. with its registered / Head office at ……(hereinafter referred to as 'Contractor' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a Contract by issued of Owner's Letter of Award No……..dated……..and the same having been acknowledged by the Contractor, resulting in a Contract bearing No. ……dated ……..valued at ……for ……(scope of contract) and the Contactor having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to ……being .(%) per cent) of the said value of the Contract to the Owner.

We, …… (Name & Address) having its Head Office at……(hereinafter referred to as the 'Bank', which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators , executors and assigns) do hereby guarantee and undertake to pay the Owner, on demand any or all monies payable by the Contractor to the extent of ……..as aforesaid at any time up to …… ** (see in note below) …….. (days/month/year)

without any demur, reservation, contest, recourse or protest and/or without any reference to the Contractor.

Any such demand made by the Owner on the bank shall be conclusive and binding notwithstanding any difference between the Owner and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the Owner and further agrees that the guarantee herein contained shall continue to be enforceable till the Owner discharges this guarantee.

The Owner shall have the fullest liberty without affecting in any way the liability of the Bank under the guarantee, from time to time to extend the time for performance or the Contract by the Contractor.

The Owner shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor, and to exercise the same at any time in any manner, and either to enforce or to for bear to enforce any covenants, contained or implied, in the Contact between the Owner and the Contractor or any other course or remedy or security available to the Owner. The Bank shall not be released to its obligations under these presents by any exercise by the Owner of its liberty with reference to the matters aforesaid or any of them or by reason of any other act of omission or commission on the part of the Owner or any other indulgences shown by the Owner or by any other matter or thing what so ever which under law would, but for this provision have the effect of relieving the Bank.

The bank also agrees that the Owner at its option shall be entitled to enforce this guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and not withstanding any security or other guarantee the Owner may have in relation to the Contactor's liabilities.

Notwithstanding anything contained herein above our liability under this guarantee is restricted to ……..and it shall remain in force upto and including ……..and shall be extended from time to time for such period (not exceeding one year), as may be desired M/s ……..on whose behalf this guarantee has been given.

Dated this ……. day of ……20……. At ……

WITNESS

…… ……

(Signature) (Signature)

…… ……

(Name) (Name)

…… ……

(Official Address) (Official Address)

Attorney as per Power

Of Attorney No. …….

Date …….

NOTES:

- This sum shall be 'ten per cent (10 %)' of the Contact Price.

** The date will be ninety (90) days after the end of date of 'Warranty Period' as specified in the Contract.

1. The Stamp Papers of appropriate value shall be purchased in the name of issuing Bank.

ANNEXURE – II

APPLICATION FOR EXTENSION OF TIME

(Part – I)

- Name of Contractor _____
- Name of work (as given in the contract) _____

  _____

  _____

- Agreement no. _____
- Contract amount _____
- Date of Commencement of work as per agreement _____
- Period allowed for completion of work (as per agreement) _____
- Date of completion stipulated in the agreement _____
- Actual date of completion _____
- Period for which extension of time has been given previously if any _____
  - 1st extension vide No. _____
  - 2nd extension vide No._____
  - 3rd extension vide No. _____
  - 4th extension vide No. _____
- Period for which extension have been previously given (Copies of the previous application should be attached).
- Hindrances on account of which extension is applied for with date on which hindrances occurred.

Sl. No.	Nature of hindrances	Date of occurrence	Period for which hindrances is likely to last	Extension of time applied for by the	Overlapping period, if any, giving reference to items	Period for which extension is	Remarks as to why the hindrances occurred and

				contr actor	which overlap	appli ed for.	justifica tion for extensi on of time

- Total period for which extension is now applied for on account of hindrances mentioned above.
- Extension of time required for extra work: - _____ Months. _____ days.
- Detailed for extra work and the amount involved: -
- Total value of extra work: -
  - Proportionate period of extension of time based on estimated amount put to tender on account of extra work: -
- Total extension of time required for 11 & 12: -

Signature of Contractor

APPLICATION FOR EXTENSION OF TIME

(Part – II)

(To be filled in by TSECL)

- Date of receipt of application from_____ contractor for the work of _____in the Sub-Divisional _____.

- Acknowledgement issued by the Sr. Manager, vide his No._____ _____ Dated _____.

- Recommendation of Sr. Manager, in – charge of the Sub-Division is to whether the reasons given by the Contractor are correct and what extension, if any, recommended by him, if he does not recommended the extension, reasons for rejection should be given

Dated ……..	Signature of the Sr. Manager in-charge of Sub-Division.

APPLICATION FOR EXTENSION OF TIME

(Part – III)

(To be filled in by TSECL)

- Date of receipt in the Divisional office: _____
- Report of DGM, in-charge of the Division regarding hindrances mentioned by the contractor_____

Sl. No.	Nature of hindrances	Date of occurrence	Period for which hindrances is likely to last	Extension of time applied for by the contractor	Overlapping period, if any, giving reference to items which overlap	Next extension applied for	Remarks as to why the hindrances occurred and justification for extension recommended

- Recommendation / Approval of the DGM, in-charge of the Division: -

  (The present progress of work should be stated and whether the work is likely to be completed by the date upto which extension is applied for, if extension of time is not recommended, what compensation is proposed to be levied under clause 13 of section - III.

  Signature of DGM

- Recommendation / Approval of the AGM, in-charge of the Circle: -

  Signature of AGM

- Recommendation / Approval of the GM (Technical): -

  Signature of GM (Technical)

- Recommendation / Approval of the CMD: -

  Signature of CMD

ANNEXURE – III

(N.J. Stamp of Rs.30/-)

BEFORE THE NOTARY

_____: TRIPURA.

INDEMNITY BOND

THIS INDEMNITY BOND IS EXECUTED ON THE_____ DAY OF____ 2010 A. D. By Shri _____,

S/O. Shri / Late _____, Vill._____ _____

P.S. _____, District _____, aged about _____ years, a citizen of India (Here-in-after called the Contractor indemnifier) in favour of Tripura State Electricity Corporation Ltd. (TSECL) (Here-in-after called the Corporation) under the terms and conditions here-in-after mentioned : -

WHEREAS, I am a Class __Government Contractor and the Corporation awarded me to execute the work namely

_____

_____

I agree to indemnify the corporation that in the event of any accident of any workman, arising out of and in course of employment, during execution of the work I shall be liable to pay full compensation to the workmen employed by me for execution of the work.

I also agree to indemnify and save harmless the corporation that, the lives & bodies of my workmen(s), employed by me for execution of this work, are duly insured with the _____Insurance Company_____

Branch under Act / Scheme.

I further agree to indemnify and save harmless the corporation that the corporation or any of its Director (s) or Officer(s) or Manager(s) shall not be made liable to pay any compensation to any workmen in the event of death or bodily injury, arising out of the in course of employment under me, employed by me for execution of the work namely

_____

_____

IN WITNESS WHERE OF I SIGN THIS INDEMNITY BOND TODAY, THE DAY, MONTH, YEAR FIRST ABOVE WRITTEN IN PRESENCE OF FOLLOWING WITNESSES.

Witnesses 1. 2. Identified by me _____ Advocate	_____ Full Signature of Contractor (INDEMNIFIER)

(Bidder's Letter Head) ANNEXURE – IV

To,

The Deputy General Manager, ED-Amarpur

Tripura State Electricity Corporation Limited

Amarpur, Gomati Tripura

Sub: "No Deviation" declaration

Ref: NIT No: ---------- Date:

Sir,

I/We hereby accept and abide by the scope & terms and conditions of NIT document unconditionally and on the Scope of Work, or any related area there are no deviations in this response. (----Name of bidder----) has adhered to all the qualification requirements as well as other items listed in the NIT.

Yours faithfully,

Signature: _____

Full Name: _____

Address: _____

ANNEXURE – V

PROFORMA FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT/FACILITIES

(TO BE GIVEN BY BANKER OF BIDDER)

BANK CRTIFICATE

This is to certify that M/S…… (FULL NAME AND ADDRESS) who are submitting their Bid to ……..against their tender specification vide Ref. No……. and date ……..is our customer for the past ……years.

Their financial transactions with our bank have been satisfactory. They enjoy the following fund based and non fund based limits including guarantees, L/C and other credit facilities with us against which the extent of utilization as on date is also indicated below:

Sl.No.	TYPE OF FACILITY	SANCTIONED LIMIT AS ON DATE	UTILIZATION AS ON DATE…….

This letter is issued at the request of M/S…….

Sd/-

Name of Bank……..

Name of authorized Signatory…….

Designation……

Phone No……

Address……

SEAL OF THE BANK