

Procedure for Participating in Tender

Tender Enquiry No	Work Description	EMD (Rs. Lacs)	Tender Participation Fee (Rs)	Last date and time for Payment of Tender Participation Fee
TPNODL/OT/2021-22/076	Turnkey Projects-For Elephant Corridor under Package- 1,2,4,7,8,21 Under Balasore and Mayurbhanj District Of Phase IV.	2Lac/Each Package	5000/Each Package	18.10.2021 15:00 hrs

Please note that corresponding details mentioned in this document will supersede any other details mentioned anywhere else in the Tender Document.

Procedure to Participate in Tender.

Following steps to be done before “Last date and time for Payment of Tender Fee” as mentioned above:

1. Eligible and Interested Bidders to submit duly signed and stamped letter on Bidder's letter head indicating
 - a. Tender Enquiry number
 - b. Name of authorized person
 - c. Contact number
 - d. E-mail id
 - e. Details of submission of Tender Fee
 - f. GST Registration No
2. Non-Refundable Tender Fee, as indicated in table above, to be submitted in the form of Direct Deposit in the following bank account and submit the receipt along with a covering letter clearly indicating the Tender Reference/ Enquiry Number –



NIT No.: TPNODL/OT/2021-22/076, Dtd.28.09.2021

Beneficiary Name – TP Northern Odisha Distribution Limited

Bank Name – Union Bank of India

Branch Name – Balasore Branch

Account No – 500601010280332

IFSC Code – UBIN0550060

E-mail with necessary attachment to be sent to kartikchandra.behera@tpnodl.com before last date and time for payment of Tender Fee.

Interested bidders to submit Tender Fee and Authorization letter before Last date and time as indicated above, after which link from TPNODL E-Tender system (Ariba) will be shared for further communication and bid submission.

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc. will happen only through TPNODL E-Tender system (Ariba). User manual to guide the bidders to submit the bid through E-Tender system (Ariba) is also enclosed.

No e-mail or verbal correspondence will be responded. All communication will be done strictly with the bidders who have done the above step to participate in the Tender.

Also, it may be strictly noted that once date of “Last date and time for Payment of Tender Participation Fee” is lapsed no Bidder will be sent link from TPNODL E-Tender System (Ariba). Without this link BA will not be able to participate in the tender. Any last moment request to participate in tender will not be entertained.

Any payment of Tender Fee / EMD by Bidder who have not done the prerequisite will not be refunded.

Also all future corrigendum to the said tender will be informed on Tender section on website www.tpnodl.com

OPEN TENDER NOTIFICATION

FOR

**Strengthening of Electrical Infrastructure For
Elephant Corridor of Package- 1,2,4,7,8,21 under
Balasore and Mayurbhanj District of Phase IV as per
Specification.**

**Tender Enquiry No.: TPNODL/OT/2021-22/076
Due Date for Bid Submission: 27.10.2021 15.00 hrs**

TP NORTHERN ODISHA DISTRIBUTION LIMITED

(A Tata Power & Odisha Government Joint Venture)

Registered & Corporate Office: Januganj, Remuna Golei, Balasore – 756 019, Odisha, India

Phone: +91 6782 244865, Email: contactus@tpnodl.com, Website: www.tpnodl.com

CIN: U40106OR2021SGC035951

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1.0 Event Information

1.1 Scope of work

Open Tender is invited in e-tender bidding process from interested Bidders for entering into a Contracts as defined below:

S. No.	Description	Name Of The Package	EMD Amount (Rs.)	Tender Fee (Rs.)
1	Turnkey Projects-For Elephant Corridor under Package- 1,2,4,7,8,21 Under Balasore and Mayurbhanj District Of Phase IV.	Package- 1 / Balasore District	2,00,000 /Package	5000/Package
		Package- 2 / Balasore District		
		Package 4/ Mayurbhanj District		
		Package 7/ Mayurbhanj District		
		Package 8/ Mayurbhanj District		
		Package 21 / Balasore District		

Note- The bidders can quote for one or Multiple packages.

For package wise location please refer to the attached Excel sheet in Annexure.

SCOPE OF WORK:

The work shall include mobilization of necessary equipment and machinery providing necessary engineering supervision and technical personnel skilled and unskilled manpower etc. You shall make your arrangement for locating the co-ordinates for erection of interposing poles on longitude/latitude basis and prepare survey report prior to execution of the work. All the work (Location Details in Annexure-IA and details of materials covered under each item in Annexure-IB) shall be carried out as per tender specification / latest REC specification and Construction Standards as well confirming to latest edition of the corresponding Indian Standard Codes including detailed survey lines including supply, erection of all materials, equipment, inspection, commission and handing over to TPNODL as per tender specification.

The detailed scope of the work shall include:

- Detailed survey of lines, sub-stations, interposing poles on longitude/latitude basis and preparation of SLD & BOQ worked out from the dimensions of the drawings, joint inspection report, certificate of documents etc. in compliance to applicable forest rules and guidelines.
- To provide complete manufacture details, testing facilities & schedule of supply of materials from the approved vendors (materials which are to be supplied by you) confirming standard technical specification for obtaining prior approval of TPNODL.
- To provide engineering drawing, data, operational manual, guaranteed technical particulars etc. wherever applicable for obtaining TPNODL's approval prior to execution of work.
- Receipt, storage, preservation and conservation of equipment at the site.
- Pre-assembly, if any, erection testing and commissioning of all the equipment;
- Reliability tests and performance and guarantee tests on completion of stage wise commissioning of involved lines and sub-stations;

- vii. Loading, unloading and transportation of all materials at own risk from the manufacturer's facility to the site.
- viii. Erection of interposing poles by adopting best practice.
- ix. Renovation of 11KV line with supply of HT insulated covered conductor.
- x. Fitting of spikes in the poles (both new & existing) with proper jointing of clamps by Welding, to prevent theft.
- xi. Couping of existing Joist poles as per REC standard and specification.
- xii. Fencing of existing sub-station with barbed wire.
- xiii. Stringing of HT insulated conductor on existing & new poles by using all fittings & accessories.
- xiv. During execution of erection work any damaged or inclined / defective materials or pole on existing system found and determined as such after joint inspection at adjacent site are to be replaced / rectified for strengthening of network with the written approval the Engineer-In-Charge.
- xv. Testing, Commissioning of lines / installations in the presence of Engineer-In-Charge.
- xvi. Getting the lines inspected by the Electrical Inspector after completion of work including deposit of required inspection fees by own i.e. not claiming from TPNODL.
- xvii. *All expenditure towards inspection of materials at manufacturer's site and inspection of work after completion shall be borne by you.*
- xviii. Dismantling of existing electrical network, if any and returning the dismantled items to the TPNODL's stores at your own cost.

1.2 Availability of Tender Documents

Please refer "Procedure to participate in the e-tender".

Bidders are requested to visit TPNODL website www.tpnodl.com regularly for any modification / clarification to the bid documents.

1.3 Calendar of Events

(a)	Date of sale/ availability of tender documents from TPNODL Website	From 06.10.2021 onwards
(b)	Date by which interested and eligible vendors to pay tender fee and confirm participation in accordance with "Procedure for participating in tender"	18-10-2021 15:00 hrs
(c)	Date & Time of Pre-Bid Meeting (If any)	Not applicable due to COVID- 19. Queries to be answered through e-mail / TPNODL Tender Website.
(d)	Last Date of receipt of pre-bid queries, if any	19.10.2021: 15:00 Hrs
(e)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	22.10.2021: 15:00 Hrs
(f)	Last date and time of receipt of Bids	27.10.2021: 15:00 Hrs
(g)	Date & Time of opening technical bids & EMD (Envelope-1 & 2)	27.10.2021: 15:30 Hrs
(h)	Date & Time of opening of Price of	Will be notified to the successful bidders

qualified bids	through our website / e-mail.

Note :- In the event of last date specified for submission of bids and date of opening of bids is declared as a closed holiday for TPNODL, Balasore office the last date of submission of bids and date of opening of bids will be the following working day at appointed times.

1.4 Mandatory documents required along with the Bid

- 1.4.1 EMD of requisite value and validity
- 1.4.2 Tender Fee in case the tender is downloaded from website
- 1.4.3 Requisite Documents for compliance to Qualification Criteria mentioned in Clause 1.7.
- 1.4.4 Drawing, Type Test details item as specified at Annexure I (as applicable)
- 1.4.5 Duly signed and stamped 'Schedule of Deviations' as per Annexure III on bidder's letter head.
- 1.4.6 Duly signed and stamped 'Schedule of Commercial Specifications' as per Annexure IV on bidder's letter head.
- 1.4.7 Proper authorization letter / Power of Attorney to sign the tender on the behalf of bidder.
- 1.4.8 Copy of PAN, GST (In case any of these documents is not available with the bidder, same to be explicitly mentioned in the 'Schedule of Deviations')

Please note that in absence of any of the above documents, the bid submitted by a bidder shall be liable for rejection.

1.5 Deviation from Tender

Normally, the deviations to tender terms are not admissible and the bids with deviation are liable for rejection. Hence, the bidders are advised to refrain from taking any deviations on this Tender. Still in case of any deviations, all such deviations shall be set out by the Bidders, clause by clause in the 'Annexure III - Schedule of Deviations' and same shall be submitted as a part of the Technical Bid.

1.6 Right of Acceptance/ Rejection

Bids are liable for rejection in absence of following documents:-

- 1.6.1 EMD of requisite value and validity
- 1.6.2 Tender fee of requisite value
- 1.6.3 Price Bid as per the Price Schedule mentioned in Annexure-I
- 1.6.4 Necessary documents against compliance to Qualification Requirements mentioned at Clause 1.7 of this Tender Document.
- 1.6.5 Filled in Schedule of Deviations as per Annexure III
- 1.6.6 Filled in Schedule of Commercial Specifications as per Annexure IV
- 1.6.7 Receipt of Bid within the due date and time

TPNODL reserves the right to accept / reject any or all the bids without assigning any reason thereof.

1.7 Qualification Criteria

- 1)The prospective Bidder(s) should be a registered Sole Proprietor Firm/ Partnership Firm/ Company, possessing valid HT Electrical License issued from ELBO (Electrical License Board of Odisha), Government of Odisha. In case bidder does not have Electrical Contractor License from said Authority, he can submit the undertaking and shall provide the valid HT license issued from the ELBO (Electrical License Board of Odisha), GoO before the award of contract The Bidder should have to submit the following valid documents.
 - i) EPF and ESI Registration
 - ii. GST and PAN. Certificate

iiii). Valid Labour License

(Bidder should submit it within 20 days from the award of contract from Local Authority)

- 2) Bidder must quote for the complete Individual Package.
- 3) The Average Annual Turnover of the prospective bidder(s) during FY 17-18, FY 18-19 and FY 19-20 should be at least Rs. 10 Crores. Copy of audited P&L Account to be submitted in this regard.
- 4) The bidder should have experience in field of similar work/ Construction and installation commissioning work of 33 kV / higher voltage in any power distribution utility during last 3 years. The total amount of executed work (33kV or higher rating) shall be at least Rs 5 Crs in last 3 years. Copy of work order / completion certificate to be submitted in this regard.
- 5) Bidder should have Performance Certificates issued from one reputed Power Distribution Utility / Companies of India in the same field as mentioned in point 4.
- 6) Bidder should not be blacklisted / debarred by any Govt. Organization Utility. Bidder has to submit undertaking for the same.

1.8 Marketing Integrity

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts. Bidders must agree to these rules prior to participating. In addition to other remedies available, TPNODL reserves the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the General Condition of Contracts. A bidder who violates the market place rules or engages in behaviour that disrupts the fair execution of the marketplace, may result in restriction of a bidder from further participation in the marketplace for a length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

- Failure to honor prices submitted to the marketplace
- Breach of terms as published in TENDER / NIT

1.9 Supplier Confidentiality

All information contained in this tender is confidential and shall not be disclosed, published or advertised in any manner without written authorization from TPNODL. This includes all bidding information submitted to TPNODL. All tender documents remain the property of TPNODL and all suppliers are required to return these documents to TPNODL upon request. Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

2.0 Evaluation Criteria

- The bids will be evaluated technically on the compliance to tender terms and conditions.
- The bids of the Technically qualified BAs will be evaluated commercially on the overall BOQ basis lowest Cost on package wise as calculated in Schedule of Items [Annexure I].. Hence all bidders are advised to quote their most competitive rates against each line .
- Bidder has to **mandatorily** quote against each item Package Wise of Schedule of Items [Annexure I] and strictly as per the defined format. Failing to do so, the bids are liable for rejection.

NOTE: In case of a new bidder new to TPNODL, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However TPNODL reserves the right to carry out factory inspection and evaluation for any bidder prior to technical qualification. In case a bidder is found as Disqualified in the factory evaluation, their bid shall not be

evaluated any further and shall be summarily rejected. The decision of TPNODL shall be final and binding on the bidder in this regard.

2.1 Price Variation Clause:

The prices shall remain firm during the entire contract period.

3.0 Submission of Bid Documents

3.1 Bid Submission

Bidders are requested to submit their offer in line with this Tender document. TPNODL shall respond to the clarification raised by various bidders and the replies will be sent to all participating bidders through e-mail.

Bids shall be submitted in 3 (Three) parts:

FIRST PART: "EMD" of Rs. 2, 00,000/- (Rupees Two Lacs only) per Package shall be submitted. The EMD shall be valid for 210 days from the due date of bid submission in the form of BG / Bankers Pay Order favouring "The TP Northern Odisha Distribution Limited". The EMD has to be strictly in the format as mentioned in General Condition of Contract, failing which it shall not be accepted and the bid as submitted shall be liable for rejection. A separate non-refundable tender fee of stipulated amount also needs to be transferred online through NEFT / RTGS in case the tender document is downloaded from our website.

TP Northern Odisha Distribution Limited Bank Details for transferring Tender Fee and EMD is as below:

Account Name: The TP Northern Odisha Distribution Limited.

Bank Name: Union Bank of India, Balasore

Bank Account No. : 500601010280332

IFSC Code: UBIN0550060

In case of submission of EMD in shape of Bank Guarantee, original hard copy shall be sealed in separate envelope clearly indicating Tender Reference Number, Name of Tender and Name of Business Associate and shall be addressed to:

HOD (Contracts)

The TP Northern Odisha Distribution Limited,
Januganj, Balasore- 756019, Odisha.

SECOND PART: "TECHNICAL BID" shall contain the following documents:

- a) Documentary evidence in support of qualifying criteria
- b) Technical literature / GTP / Type test report etc. *(if applicable)*
- c) Qualified manpower available
- d) Testing facilities *(if applicable)*
- e) No Deviation Certificate as per the Annexure III – Schedule of Deviations
- f) Acceptance to Commercial Terms and Conditions viz Delivery schedule / period, payment terms etc. as per the Annexure IV – Schedule of Commercial Specifications.
- g) Quality Assurance Plan / Inspection Test Plan for supply items *(if applicable)*

The technical bid shall be properly indexed and is to be submitted through TPNODL E-tender platform (Ariba) only. Hard copy of Technical Bids need not be submitted.

THIRD PART: "PRICE BID" shall contain only the price details and strictly in format as mentioned in Annexure I along with explicit break up of basic prices, Taxes & duties, Freight etc. In case any discrepancy is observed between the item description stated in Schedule of Items mentioned in the tender and the price bid submitted by the bidder, the item description as mentioned in the tender document (to the extent modified through Corrigendum issued if any) shall prevail. Price Bids have to be mandatorily submitted only through e-procurement portal of TPNODL. Bids submitted through any other form / route shall not be admissible. The interested bidders are requested to obtain user name and password for purpose of bid submission through e-procurement portal of TPNODL, Balasore.

SIGNING OF BID DOCUMENTS:

The bid must contain the name, residence and place of business of the person or persons making the bid and must be signed and sealed by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.

The Bid being submitted must be signed by a person holding a Power of Attorney authorizing him to do so, certified copies of which shall be enclosed.

The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid.

A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

The Bidder's name stated on the Proposal shall be the exact legal name of the firm.

3.2 Contact Information

All the bidders are requested to send their pre-bid queries (if any) against this tender through e-mail within the stipulated timelines. The consolidated reply to all the queries received shall be posted on TPNODL website by the stipulated timelines as detailed in calendar of events.

Communication Details:

Name: Mr. Kartik Chandra Behera
Contact No: 8908972132
E-Mail ID: kartikchandra.behera@tpnodl.com

HOD (Contracts):

Name: Mr. Hrusikesh Pradhan
Contact No.: 9438906036
E-Mail ID: hkusikesh.pradhan@tpnodl.com

HOD (Contracts):

Name: Mr. Vipin Chauhan
Contact No.: 9717393121

E-Mail ID: vipin.chauhan@tpnodl.com

3.3 Bid Prices

Bidders shall quote for the entire Scope of Supply / work with a break up of prices for individual items and Taxes & duties. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of TPNODL. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications / Scope of Work / SLA mentioned in the tender, shall be deemed to be included in prices quoted.

3.4 Bid Currencies

Prices shall be quoted in Indian Rupees Only.

3.5 Period of Validity of Bids

Bids shall remain valid for 180 days from the due date of submission of the bid.

Notwithstanding clause above, the TPNODL may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and responses thereto shall be made in writing.

3.6 Alternative Bids

Bidders shall submit Bids, which comply with the Bidding documents. Alternative bids will not be considered. The attention of Bidders is drawn to the provisions regarding the rejection of Bids in the terms and conditions, which are not substantially responsive to the requirements of the bidding documents.

3.7 Modifications and Withdrawal of Bids

The bidder is not allowed to modify or withdraw its bid after the Bid's submission. The EMD as submitted along with the bid shall be liable for forfeiture in such event.

3.8 Earnest Money Deposit (EMD)

The bidder shall furnish, as part of its bid, an EMD amounting as specified in the tender. The EMD is required to protect the TPNODL against the risk of bidder's conduct which would warrant forfeiture. The EMD shall be denominated in any of the following form:

- Online transfer of requisite amount through NEFT / RTGS.
- Bank Guarantee valid for 210 days after due date of submission.

The EMD shall be forfeited in case of:

- a) The bidder withdraws its bid during the period of specified bid validity.

Or

- b) The case of a successful bidder, if the Bidder does not
- i) accept the purchase order, or
 - ii) furnish the required performance security BG

3.9 Type Tests (if applicable)

The type tests specified in TPNODL specifications should have been carried out within five years prior to the date of opening of technical bids and test reports are to be submitted along with the bids. If type tests carried out are not within the five years prior to the date of bidding, the bidder will arrange to carry out type tests specified, at his cost. The decision to accept / reject such bids rests with TPNODL.

4.0 Bid Opening & Evaluation process

4.1 Process to be confidential

Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence the TPNODL's processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

4.2 Technical Bid Opening

Bids shall be opened as per the schedule mentioned in Calendar of Events. In case of limited tenders, the bids shall be opened internally by TPNODL. Owing to COVID Scenario, in case of Open Tenders also, the bids shall be opened internally by TPNODL. Technical bid must not contain any cost information whatsoever.

First the "EMD" will be checked. Bids without EMD/ cost of tender (if applicable) of required amount/ validity in prescribed format, shall be rejected.

Next, the technical bid of the bidders who have furnished the requisite EMD will be opened, one by one. The salient particulars of the techno commercial bid will be read out at the sole discretion of TPNODL.

4.3 Preliminary Examination of Bids/ Responsiveness

TPNODL will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order. TPNODL may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

Arithmetical errors will be rectified on the following basis: If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.

Prior to the detailed evaluation, TPNODL will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.

Bid determined as not substantially responsive will be rejected by the TPNODL and/or the TPNODL and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

4.4 Techno Commercial Clarifications

Bidders need to ensure that the bids submitted by them are complete in all respects. To assist in the examination, evaluation and comparison of Bids, TPNODL may, at its discretion, ask the Bidder for a clarification on its Bid for any deviations with respect to the TPNODL specifications and attempt will be made to bring all bids on a common footing. All responses to requests for clarification shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted owing to any clarifications sought by TPNODL. After all techno commercial issues are clarified, the date of price bid opening will be intimated to the technically accepted bidders and same shall also be notified at TPNODL website.

4.5 Price Bid Opening

Price bids will be opened at the stipulated date and time. The EMD of the bidder withdrawing or substantially altering his offer at any stage after the technical bid opening will be forfeited at the sole discretion of TPNODL without any further correspondence in this regard.

4.6 Reverse Auctions

TPNODL reserves the right to conduct the reverse auction (instead of public opening of price bids) for the products/ services being asked for in the tender and reserves the rights to conduct the manual negotiation with the BA who is declared L1 after Reverse Auction.. The terms and conditions for such reverse auction events shall be as per the Acceptance Form attached as Annexure VI of this document. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form attached as Annexure VI as a token of acceptance for the same.

5.0 Award Decision

TPNODL will award the contract to the successful bidder whose bid has been determined to be the lowest-evaluated responsive bid as per the Evaluation Criterion mentioned at Clause 2.0. The Cost for the said calculation shall be taken as the all-inclusive cost quoted by bidder in Annexure I (Schedule of Items) subject to any corrections required in line with Clause 4.3 above. The decision to place purchase order/LOI solely depends on TPNODL on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that TPNODL may deem relevant.

TPNODL reserves all the rights to award the contract to one or more bidders so as to meet the requirement or nullify the award decision without assigning any reason thereof.

Work order of maximum two packages to be awarded to a successful bidder, TPNODL reserves the right to relax the clause for allotment of work order if the situations so warranty..

In case any service provider is found unsatisfactory during the contract period, the award will be cancelled and TPNODL reserves the right to award other service provide who are found fit.

6.0 Order of Preference/Contradiction:

In case of contradiction in any part of various documents in tender, following shall prevail in order of preference:

1. Schedule of Items (Annexure I)
2. Post Award Contract Administration (Clause 7.0)/SCC
3. Submission of Bid Documents (Clause 3.0)
4. Scope of Work and SLA (Annexure VII)
5. Technical Specifications (Annexure II)
6. Inspection Test Plan (Annexure VIII)

7. Acceptance Form for Participation in Reverse Auction (Annexure VI)
8. General Conditions of Contract (Annexure IX)

7.0 Post Award Contract Administration

7.1 Special Conditions of Contract

- Post award of Purchase Order(PO), Business Associate (BA) shall submit applicable Performance Bank Guarantee@3% of Order Value within 15 days from the date of issue of Order,PBG submitted, shall be released after completion of applicable guarantee period plus one month.
- Warranty Period:-24 months on work and Material Except VCB from the date of completion of the work But For VCB Warranty period shall be 60 Months from the date of completion of Work.
- **Delivery period** Time being the essence of the contract; the entire work shall be completed within **4 months** from the date of issue of LOA/PO.
- Each bidder shall submit bid by himself only. A bidder in joint venture / consortium shall not be allowed to participate in the Tender
- All similar components and/or parts of similar equipment supplied shall be interchangeable with one another. All equipment supplied under this contract shall be subject to TPNODL's approval. TPNODL however reserves the right to re-schedule the completion period, if situation so warrants .
- TPNODL shall short close the issued Release Order / Rate contract, in case of any quality issues.
- Any change in statutory taxes, duties and levies shall be borne by TPNODL.
- Payment Terms:-As per Composite GCC
- All other terms and conditions of TPNODL GCC shall be applicable.

7.2 Drawing Submission & Approval

The relevant drawings and GTPs need to be submitted as per special condition of contract mentioned in point no. 7.1.

7.3 Delivery Terms

The delivery of material shall be made as per special condition of contract mentioned in point 7.1.

7.4 Warranty Period

Guarantee/Warranty Period of the supplied material shall be as per technical specification attached separately with this tender.

7.5 Payment Terms

- **80%** (Eighty percent) of contract price on pro-rata basis along with taxes and duties shall be paid progressively after accommodating mobilisation advance on proportionate basis for each completed items of work duly certified by the Engineer-In-Charge against each calendar month by the first week of the succeeding month along with material utilization certificate. No payment shall be released unless the accounts for utilization of materials follow with proper certification by the Engineer-In-Charge of submission of claim.
- Balance **20%** (Twenty Percent) of contract price shall be paid after completion of all works, envisaged under this package including any additions and alterations, testing

& commissioning, return of dismantled materials / unspent TPNODL's supply materials, taking over certificate and after readiness of the full line for commercial operation. The payments shall be subjected to clearance from electrical inspectorate.

7.6 Climate Change

Significant quantities of waste are generated during the execution of project and an integrated approach for effective handling, storage, transportation and disposal of the same shall be adopted. This would ensure the minimization of environmental and social impact in order to combat the climate change.

7.7 Ethics

- TPNODL is an ethical organization and as a policy TPNODL lays emphasis on ethical practices across its entire domain. Bidder should ensure that they should abide by all the ethical norms and in no form either directly or indirectly be involved in unethical practice.
- TPNODL work practices are governed by the Tata Code of Conduct which emphasizes on the following:
 - We shall select our suppliers and service providers fairly and transparently.
 - We seek to work with suppliers and service providers who can demonstrate that they share similar values. We expect them to adopt ethical standards comparable to our own.
 - Our suppliers and service providers shall represent our company only with duly authorized written permission from our company. They are expected to abide by the Code in their interactions with, and on behalf of us, including respecting the confidentiality of information shared with them.
 - We shall ensure that any gifts or hospitality received from, or given to, our suppliers or service providers comply with our company's gifts and hospitality policy.
 - We respect our obligations on the use of third party intellectual property and data.

Bidder is advised to refer GCC attached at Annexure IX for more information.

Any ethical concerns with respect to this tender can be reported to the following e-mail ID: sunil.bhattar@tpnodl.com

8.0 Specification and standards

Attached separately with tender.

9.0 General Condition of Contract

Any condition not mentioned above shall be applicable as per GCC for Supply attached along with this tender at Annexure IX.

10.0 Safety

Safety related requirements as mentioned in our safety Manual put in the Company's website which can be accessed by:

<http://www.tpnodl.com>

All Associates shall strictly abide by the guidelines provided in the safety manual at all relevant stages during the contract period.

ANNEXURE I
Schedule for Items

PACKAGE-1, 2, 21 UNDER BALASORE DISTRICT

PACKAGE-4, 7, 8 UNDER MAYURBHANJ DISTRICT

Name of District:

Name of Package:

Name of Electrical Division:

Name of Electrical Section:

Sl no.	Particulars	Unit	Qty.	Supply		Erection		Total Amount (Rs.)
				Rate/unit (Rs.)	Amount (Rs.)	Rate/unit (Rs.)	Amount (Rs.)	
1 i)	Supply & Erection of 33KV interposing Poles with all accessories including fabrication. Using: i) 11 mtr long, ,(150x150mm) R.S Joist (34.6 Kg/Mtr.) ,SAIL/TATA/JINDAL) make only ii) 33 KV 'V' Cross Arm (22 Kg each) G.I iii) Back Clamp for 'V' Cross Arm (1.7 Kg each) G.I with through bolt. iv) 33 KV Pole Top Bracket 100X50x6 mm Channel (4.9 Kg each) G.I with clamp v) 33 KV Pin Insulator 10KN (Polymer type) vi) G.I Nuts & Bolts vii) G.I Coil Earthing viii) Padding & concreting including coupling (7.01x1'x1' = 7. 01cft = 0.1668 Cum PCC 1:4:8) including supply of materials.	No.						
2 i)	Supply & Erection of 11KV interposing Poles with all accessories including fabrication. Using: i) 10 mtr long, ,(150x150mm) R.S Joist (34.6 Kg/Mtr.) , SAIL/TATA/JINDAL) make only ii) 11 KV 'V' Cross Arm (10.2 Kg each) G.I iii) Back Clamp for 'V' Cross Arm (.85 Kg each) G.I with through bolt. iv) 11 KV Pole Top Bracket 75X40x6 mm Channel (2.9 Kg each) G.I	No.						

	v) 11 KV Pin Insulator 10KN (Polymer type) vi) G.I Nuts & Bolts vii) Coil Earthing viii) Padding & concreting including coupling (5.46'x1'x1' = 5.46cft = 0.1545 Cum PCC 1:4:8) including supply of materials.						
ii)	Supply & Erection of 11KV interposing Poles with all accessories including fabrication. Using: i) 11 mtr long, (150x150mm) R.S Joist (34.6 Kg/Mtr.), SAIL/TATA/JINDAL) make only ii) 11 KV 'V' Cross Arm (10.2 Kg each) G.I iii) Back Clamp for 'V' Cross Arm (0.85 Kg each) G.I with through bolt. iv) 11 KV Pole Top Bracket 75X40x6 mm Channel (2.9 Kg each) G.I v) 11 KV Pin Insulator 10KN (Composit type) vi) G.I Nuts & Bolts vii) Coil Earthing viii) Padding & concreting including coupling (7.01'x1'x1' = 7.01cft = 0.1668 Cum PCC 1:4:8) including supply of materials.	No.					
3	Renovation 11KV line with supply & Erection of 11KV HT insulated conductor with all fitting accessories in complete. Using: HT insulated conductor (99 mm ² AAAC) , Make: Apar / Rechem/ Havels/Gupta Power /other reputed mfr. having valid type test report(including required accessories such as Plastic Insulator Ties , Dead End Clamp, Pearcing Connector, Suspension Clamps , Pre-Insulated Junction Sleeves, etc. & 11KV Pin Insulator10KN (Polymer type) , 11KV 70KN Disc Insulator (B&S) (Polymer type) with HW fitting at cut point / end point , jointing kit as per requirement).	CKm*					

4	Supply & Erection of 18mm HT Stay Set Complete. Using: i) 18 mm HT Stay Set (GI) ii) 7/8 SWG GI Stay Wire (7 strands each of 4.06 mm dia) iii) HT GI Stay Clamp (1.9 Kg per pair) iv) Nuts & Bolts (GI) v) HT Stay Insulator vi) Concreting (0.5m X 0.5m X 0.5m= 0.125 cum PCC 1:4:8) including supply of all materials.	Set						
5 i)	Supply & Erection of LT interposing Poles with all accessories including fabrication. Using: i) 9 mtr long, 9mtr 100x116mm RS Joist(23kg Per meter)(SAIL/ TATA / JINDAL Make only & no other make acceptable) PSC Pole ii) Pole clamp for Eye hook((XLPE Aerial bunched Cable) iii) Eye hook for A.B. Cable((XLPE Aerial bunched Cable)) iv) G.I Nuts & Bolts v) Coil Earthing GI vi) Padding & Concreting of Pole including Couping (5.92*1*1 = 5.92cft =0.167 (PCC 1:4:8) including supply of materials	No.						
6	Supply & erection / conversion of 3-Ph AB Cable (4x50+1x35+1x16)mm² with all accessories. Using: i) 4x50+1x35+1x16 mm ² LT XLPE AB Cable ii) Suspension Clamp with Eye hook iii) Dead End Clamp iv) Sundries	Km						
7	Supply & Erection of 16mm LT Stay Set Complete. Using: i) 16 mm LT Stay Set (GI) ii) 7/12 SWG GI Stay Wire (7 strands each of 2.642 mm dia) iii) LT GI Stay Clamp (1.4 Kg per pair) iv) Nuts & Bolts (GI) v) LT Stay Insulator vi) Concreting (0.5m X 0.5m X 0.5m= 0.125 cum PCC 1:4:8) including supply of all materials.	Set						
8	Supply & rigidly fixing of spikes (GI) on the poles.							

	(Each set consists of 2 pairs of spike clamp made up 50x6 mm flat and 8 mm square bar (solid type) GI as per drawing. (1 st pair at 2 feet from concrete level & 2 nd pair at 7 feet from Ground level to be fixed on each pole)	Set						
9.	Couping of existing Joist Pole (1m X 0.5m X 0.5m = 0.25 Cum , PCC 1:4:8) including supply of materials.	No.						
10	Fencing of Sub-station (including Supply of Cement post, barbed wire , Gate & other materials) as per drawing .	No.						
11 i).	Supply & installation of 11KV VCB including all accessories and commissioning in complete. Using:i) 11KV Outdoor type VCB with CT, CR Panel for feeder protection. ii) Construction of Plinth/ Structure iii) Required quantity of 2.5 mm ² Cu. Control cable. iv) Sundries VCB Make: Siemens/ ABB/CGL/ BHEL.	No.						
ii)	Supply & installation of 33KV VCB including all accessories and commissioning in complete. Using: i) 33KV Outdoor type VCB with CT, CR Panel for feeder protection. ii) Construction of Plinth/ Structure iii) Required quantity of 2.5 mm ² Cu. Control cable. iv) Sundries VCB Make: Siemens/ ABB/CGL/ BHEL.	No.						
12	Other items if any to be clearly specified	LS						
	Total Amount (in Rs.)							

Any items not specified above but required for construction work are to be taken into account by the bidder and the bidder should quote accordingly.

Total Price in words

(.....)

Bidder will be permitted to enter the item wise rates only. No other modification shall be permitted. Bidders are required to sign each and every page and enclose the same in the Price Bid in sealed Condition.

Note:

- (i) Unit rate is inclusive of all taxes and duties (exclusive of GST, the GST @ 18%).
 - (ii) Any discrepancy in unit rate and amount, unit rate stands.
 - (iii) Any column left blank shall be treated as nil/ inclusive of.
 - (iv) Erection charges shall be inclusive of transportation of materials.
- (Qty: Package wise quantity can be obtained page no. 22)**

(‘*’ CKm : Circuit Km means length of line, 1CKm = 3.0 Km length of 1core Cover insulated conductor)

Signature of the Bidder with Seal

(This form should be duly filled up by the tenderer & submitted in duplicate in separate envelopes Package wise).

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Package wise quantity

Name of the package	District	No. of location	33KV Interposing as per field requirement (in No.)			11 KV Interposing as per field requirement (in No.)	11KV Insulated Conductor (99sqmm) in CKm	Fixing of 18mm HT Stay (in Set)	LT Interposing Pole (9mtr) (in No.)	3-Ph LT AB Cable (4x50+1x35+1x16mm2) (in Km)	Fixing of 16mm LT Stay (in Set)	Spike(2nos. Per set per Pole) in No.	Couping of Pole in No.	Fencing of Sub-station(in No.)	VCB	
			11 mtr	10 mtr	11 mtr										33KV	11KV
PKG-1	Balasore	16	0	0	145	11.65	90	72	12.6	35	217	217	13	0	0	
PKG-2	Balasore	46	0	0	185	9.35	92	157	6.15	75	342	342	23	4	0	
PKG-4	Mayurbhanj	22	11	247	5	6	138	120	8.2	82	500	296	52	1	0	
PKG-7	Mayurbhanj	9	0	18	118	16.4	136	141	12.2	122	272	270	17	2	0	
PKG-8	Mayurbhanj	22	150	435	45	1	208	346	9.1	120	1134	916	17	0	0	
PKG-21	Balasore	57	0	0	28	1.2	60	431	46.35	227	459	459	52	3	3	
	Total	172	161	700	526	45.6	724	1267	94.6	661	2924	2500	174	10	3	

NOTE:

- The quantity mentioned above is for evaluation purpose only and may vary during the execution.
- The bidders are advised to quote prices strictly in the above format. Failing to do so, bids are liable for rejection.
- The bidder must fill each and every column of the above format. **Mentioning "extra/inclusive" in any of the column may lead for rejection of the price bid.**
- No cutting/ overwriting in the prices is permissible.
- The prices shall inclusive of packaging/F&I/loading/unloading and FOR TPNODL Locations.

Annexure II

Technical Specifications attached separately with the tender.

ANNEXURE III

Schedule of Deviations

*Bidders are advised to refrain from taking any deviations on this TENDER. Still in case of any deviations, all such deviations from this tender document shall be set out by the Bidders, Clause by Clause in this schedule and submit the same as a part of the **Technical Bid**.*

Unless specifically mentioned in this schedule, the tender shall be deemed to confirm the TPNODL'S specifications:

Technical Deviations:-

S. No.	Clause No.	Tender Clause Details	Details of deviation with justifications

Commercial Deviations:-

S. No.	Clause No.	Tender Clause Details	Details of deviation with justifications

By signing this document we hereby withdraw all the deviations whatsoever taken anywhere in this bid document and comply to all the terms and conditions, technical specifications, scope of work etc. as mentioned in the standard document except those as mentioned above.

Seal of the Bidder:

Signature:

Name:

ANNEXURE IV

Schedule of Commercial Specifications

(The bidders shall mandatorily fill in this schedule and enclose it with the offer Part I: Technical Bid. In the absence of all these details, the offer may not be acceptable.)

S. No.	Particulars	Remarks
1.	Prices firm or subject to variation (If variable indicate the price variation clause with the ceiling if applicable)	Firm / Variable
1a.	If variable price variation on clause given	Yes / No
1b.	Ceiling	----- %
1f.	Inclusive of transit insurance	Yes / No
2.	Delivery	Weeks / months
3.	Guarantee clause acceptable	Yes / No
4.	Terms of payment acceptable	Yes / No
5.	Performance Bank Guarantee acceptable	Yes / No
6.	Liquidated damages clause acceptable	Yes / No
7.	Validity (180 days) (From the date of opening of technical bid)	Yes / No
8.	Inspection during stage of manufacture	Yes / No
9.	Rebate for increased quantity	Yes / No (If Yes, indicate value)
10.	Change in price for reduced quantity	Yes / No (If Yes, indicate value)
11.	Covered under Small Scale and Ancillary Industrial Undertaking Act 1992	Yes / No (If Yes, indicate, SSI Reg'n No.)

ANNEXURE V

Checklist of all the documents to be submitted with the Bid

Bidder has to mandatorily fill in the checklist mentioned below:-

S. No.	Documents attached	Yes / No / Not Applicable
1	EMD of required value	
2	Tender Fee as mentioned in this RFQ	
3	Company profile/organ gram	
4	Signed copy of this RFQ as an unconditional acceptance	
5	Duly filled schedule of commercial specifications (Annexure IV)	
6	Sheet of commercial/technical deviation if any (Annexure III)	
7	Balance sheet for the last completed three financial years; mandatorily enclosing Profit & loss account statement	
8	Acknowledgement for Testing facilities if available (duly mentioned on bidder letter head)	
9	List of Machine/tools with updated calibration certificates if applicable	
10	Details of order copy (duly mentioned on bidder letter head)	
11	Order copies as a proof of quantity executed	
12	Details of Type Tests if applicable (duly mentioned on bidder letter head)	
13	All the relevant Type test certificates as per relevant IS/IEC (CPRI/ERDA/other certified agency) if applicable	
14	Project/supply Completion certificates	
15	Performance certificates	
16	Client Testimonial/Performance Certificates	
17	Credit rating/solvency certificate	
18	Undertaking regarding non blacklisting (On company letter head)	
19	List of trained/untrained Manpower	

Annexure VI**Acceptance Form for Participation In Reverse Auction Event**

(To be signed and stamped by the bidder)

In a bid to make our entire procurement process more fair and transparent, TPNODL intends to use the reverse auctions through SAP-SRM tool as an integral part of the entire tendering process. All the bidders who are found as technically qualified based on the tender requirements shall be eligible to participate in the reverse auction event.

The following terms and conditions are deemed as accepted by the bidder on participation in the bid event:

1. TPNODL shall provide the user id and password to the authorized representative of the bidder. *(Authorization Letter in lieu of the same shall be submitted along with the signed and stamped Acceptance Form).*
2. TPNODL will make every effort to make the bid process transparent. However, the award decision by TPNODL would be final and binding on the supplier.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of TPNODL, bid process, bid technology, bid documentation and bid details.
4. The bidder is advised to understand the auto bid process to safeguard themselves against any possibility of non-participation in the auction event.
5. In case of bidding through Internet medium, bidders are further advised to ensure availability of the entire infrastructure as required at their end to participate in the auction event. Inability to bid due to telephone line glitch, internet response issues, software or hardware hangs, power failure or any other reason shall not be the responsibility of TPNODL.
6. In case of intranet medium, TPNODL shall provide the infrastructure to bidders. Further, TPNODL has sole discretion to extend or restart the auction event in case of any glitches in infrastructure observed which has restricted the bidders to submit the bids to ensure fair & transparent competitive bidding. In case of an auction event is restarted, the best bid as already available in the system shall become the start price for the new auction.
7. In case the bidder fails to participate in the auction event due any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid as submitted by the bidder as a part of the tender shall be considered as the bidder's final no regret offer. Any offline price bids received from a bidder in lieu of non-participation in the auction event shall be out-rightly rejected by TPNODL.
8. The bidder shall be prepared with competitive price quotes on the day of the bidding event.
9. The prices as quoted by the bidder during the auction event shall be inclusive of all the applicable taxes, duties and levies and shall be FOR at TPNODL site.
10. The prices submitted by a bidder during the auction event shall be binding on the bidder.
11. No requests for time extension of the auction event shall be considered by TPNODL.
12. The original price bids of the bidders shall be reduced on pro-rata basis against each line item based on the final all inclusive prices offered during conclusion of the auction event for arriving at Contract amount.

Signature & Seal of the Bidder

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1.0 SCOPE

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at stores/ site and performance of LT Stay Set.

2.0 Applicable Standards:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:

Ref IS	Description
IS 4579 -96	Hot Dip Galvanizing For Fabrication
IS 1852 – 85	Tolerance For Raw Material
IS 1367part (13) - 1983	Hot Dip Galvanizing For Tension Screw
IS 2062	Manufactured from raw material as per IS 2062 grade E-250 quality 'A'

3. CLIMATE CONDITION FOR INSTALLATION

i.	Maximum Ambient Temperature	50°c
ii.	Maximum daily average ambient temperature	40°c
iii.	Minimum Ambient Temperature	2°c
iv.	Maximum humidity	99.7%
v.	Minimum humidity	15%
vi.	Average Annual Rainfall	1800mm
vii.	Average wind speed prevailing in the area	200kmph
viii.	Average Thunderstorms prevailing in the area	70 days per annum
ix.	Average Dust storms prevailing in the area	20 days per annum
x.	Average number of rainy days per annum	160
xi.	Maximum Altitude above sea level	1200m
xii.	Rainy months	June to October

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Environmentally, some of the regions, where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden.

Therefore, Outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive and humid coastal atmosphere.

The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.

4. GENERAL TECHNICAL PARTICULARS

Sl. No	Description	Units	Requirement	Tolerance
1.	Manufacturer name and address		To be specified by bidder	
2	Relevant Standard		IS: 2062, IS: 2633, IS: 2629, TPNO-OTH-010	
3	Material		Manufactured from raw material as per IS 2062 grade E-250 quality 'A'	
	Dimensions			
4	Anchor Rod			
A	Nominal Diameter of rod	Mm	16 mm diameter	(+/-) 0.5 mm
B	Length of rod	Mm	2100 mm	(+/-) 0.5 %
C	Inner dia of round eye	mm	24 mm	(+ 3%)
D	Size of MS Nut Bolt, Square MS Washers confirming to IS 1387 (1967) and IS 1363 (1967)		16mm Sq. Washer 40X 40X 1.6mm	
5	ANCHOR PLATE			
A	Size of anchor plate	Mm	300 x 300 x 6 mm	
B	Dia of hole made at the centre of the plate	Mm	18 mm	
6	RCC Base Plate		Mix of concrete 1:2:4	
A	Dimension [L x B x Thickness]	mm	450 mm x 450 mm x 75 mm	(+/-) 5 mm
B	Rectangular opening at center	mm	25 mm x 75 mm	(+/-) 0.5 mm
7	Tension Screw			
A	Eye Bolt	mm	2 No. with 16 mm dia; inner diameter of rounded part of screw 24 mm.	(+/-) 0.5 mm
B	Length of the central part	mm	310 mm	(+) 5 mm
C	Total length after full tightening of both screw / Eye bolt	mm	445 mm	

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D	Total length after full opening of both screw / Eye bolt	mm	665 mm	
8	MS Angle	mm	50 mm x 50 mm x 6 mm; Long 250 mm	(+/-) 0.5 mm ; in length (+/-) 5 mm
9	Stay Collar	mm	All dimensions shall be provided by the bidder with drawings	
10	Surface finish of stay set		Hot Dip galvanized	
11	Minimum strength of welding provide on various components of stay set (IS: 823/1964)		3100 kg	
12	Average weight of finished stay set	kg	8.16 kg (min)/ 9.8 kg (max)	±5%

5. GENERAL CONSTRUCTION:

5.1 ANCHOR ROD WITH MS ANGLE

Overall length of rod should be 2100 mm to be made out of 16 mm diameter GS rod. One end of rod to be made into a round eye having an inner diameter of 24 mm and outer dia 64 mm with best quality welding. Other end fitted with MS Angle 50 mm x 50 mm x 6 mm; 250 mm long.

5.2 RCC BASE PLATE

All material shall be of RCC. With concrete ratio 1:2:4 And 6 nos of 8 mm TOR both ways shall be used.

5.3 TENSION SCREW

Eye bolt to be made of 16 mm dia GS Rod having an overall length of 250 mm. One end of the rod to be threaded up to 185 mm length. The other end of the rod shall be rounded into a circular eye of 24 mm inner dia with proper and good quality welding. Tension screw central part shall be one piece forging with total width 310 mm. Tension screw being a threaded fastener be hot dip galvanized as per relevant IS : 1367 (part 13) – 1983.

5.4 STAY COLLAR

To be made of 50 x 6 MS Strip and hot dip galvanized as per IS 4759.

6. MARKING

The LT Stay Set shall carry the following information contained in a label attached to it:

- Reference to the Standards.

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- b) Manufacturer's name
- c) Year of manufacture.
- d) The following shall be embossed on the LT Stay Set," PROPERTY OF TPNODL".

7. TESTS

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All Routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the LT Stay Set in additions to others specified in the IS/IEC/SANS Standards.

Following tests shall be applicable.

- 1) Visual examination, Verification of dimension and marking test.
- 2) Tensile Strength.
- 3) Galvanization (Uniformity) test.
- 4) Cube test/ Compression test

8. TYPE TEST CERTIFICATES

The bidder shall furnish the type test certificates of the LT Stay Set for the tests as mentioned as above as per the corresponding standards. All the tests shall be conducted by CPRI/ERDA/Other NABL accredited Laboratory as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPNODL.

9. PRE-DISPATCH INSPECTION:

The Material shall be subject to inspection by a duly authorized representative of the TPNODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to TPNODL's representatives when the work is in progress. Inspection by the TPNODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPNODL. Following documents shall be sent along with material

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- Test reports
- MDCC issued by TPNODL
- Invoice in duplicate
- Packing list
- Drawings & catalogue
- Guarantee / Warrantee card
- Delivery Challan
- Other Documents(as applicable)

10. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPNODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

11. GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 48 months from the date of commissioning or 60 months from the date of last supplies made under the contract whichever is later. Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be.

Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

12. PACKING AND TRANSPORT:

Supplier shall ensure that all equipment covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit.

13. TENDER SAMPLE: As and when required.

14. QUALITY CONTROL:

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The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections. The bidder shall ensure that the material supplied is as per the Guaranteed Technical Particulars as specified in the specifications.

15. MINIMUM TESTING FACILITIES

Supplier / Manufacturer shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International/ Indian standards.

16. MANUFACTURING ACTIVITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. DRAWINGS AND DOCUMENTS:

Following documents shall be prepared based on TPNODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- a) Completely filled in Technical Particulars
- b) General description of the equipment and all components including brochures.
- c) Experience List
- d) Type test certificates

After the after of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser

	TP NORTHERN ODISHA DISTRIBUTION LTD, BALASORE		
	TECHNICAL SPECIFICATION		
Document Title	SPECIFICATION FOR LT STAY SET		
Document No.		Eff. Date:	
Revision No.	00	Page	
Prepared by:	Reviewed By:	Approved By:	Issued By:

Following Drawings/Documents shall be submitted after the award of the contract

S. No	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	Manual/Catalogues/drawings for all components.		√	
3	Technical details and test certificates.		√	√
4	Installation Instructions		√	√
5	Transport/shipping dimension drawing		√	√
6	QA & QC Plan	√	√	√
7	Routine, Acceptance and Type test Certificates	√	√	√

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.

18. GUARANTEED TECHNICAL PARTICULARS:

Bidder shall submit guaranteed technical particulars in the attached format.

Sr. No.	Description	Units	To be furnished by vendor
1.	Material		
2.	Anchor Rod	mm	
3.	Nominal Diameter of rod	mm	
4.	Length of rod	mm	
5.	RCC Base Plate		
6.	Dimension [L x B x Thickness]	mm	
7.	Rectangular opening at center	mm	
8.	Tension Screw		
9.	Eye Bolt	mm	
10.	Length of the central part	mm	
11.	Total length after full tightening of both screw / Eye bolt	mm	

	TP NORTHERN ODISHA DISTRIBUTION LTD, BALASORE		
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12.	Total length after full opening of both screw / Eye bolt	mm	
13.	MS Angle	mm	
14.	Stay Collar	mm	

19. . SCHEDULES OF DEVIATIONS:

SCHEDULE OF DEVIATIONS	The bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless specifically mentioned in this schedule, the Bidder shall be deemed to confirm the TPNODL's specifications. Schedule of Deviations (TO BE ENCLOSED WITH BID) All deviations from this specification shall be set out by the bidders, clause by clause in this schedule. Unless specifically mentioned in this schedule, the tender shall be deemed to confirm TPNODL's specifications.								
	<table border="1"> <tr> <th>SL. NO.</th> <th>Clause No.</th> <th>Details of deviation with justifications</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>			SL. NO.	Clause No.	Details of deviation with justifications			
	SL. NO.	Clause No.	Details of deviation with justifications						
	We confirm that there are no deviations apart from those detailed above.								
Seal of the Purchaser:									
Designation: Signature:									

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
	TECHNICAL SPECIFICATIONS		
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1. Scope
2. Applicable Standards
3. Climatic Conditions Of The Installation
4. General Technical Requirements
5. General Constructions
6. Marking
7. Tests
8. Type Test Certificates
9. Pre-Dispatch Inspection
10. Inspection After Receipt At Stores
11. Guarantee
12. Packing
13. Tender Sample
14. Quality Control
15. Minimum Testing Facilities
16. Manufacturing Activities
17. DRAWINGS AND DOCUMENTS
18. Guaranteed Technical Particulars
19. Schedule Of Deviations

Initiator		HOG (Engineering)	

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1. SCOPE OF WORK:

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at stores/ site and performance of 18 mm GI Stay HT Stay Set

2. APPLICABLE STANDARDS:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities

Ref IS	Description
IS 4579 -96	Hot Dip Galvanizing For Fabrication
IS 1852 – 85	Tolerance For Raw Material
IS 1367part (13) - 1983	Hot Dip Galvanizing For Tension Screw
IS 2062	Manufactured from raw material as per IS 2062 grade E-250 quality 'A'

3. CLIMATIC CONDITIONS:

The climatic conditions at site under which the store shall operate satisfactory, are as follows.

i.	Maximum Ambient Temperature	50°c
ii.	Maximum daily average ambient temperature	40°c
iii.	Minimum Ambient Temperature	2°c
iv.	Maximum humidity	99.7%
v.	Minimum humidity	15%
vi.	Average Annual Rainfall	1800mm
vii.	Average wind speed prevailing in the area	200kmph
viii.	Average Thunderstorms prevailing in the area	70 days per annum
ix.	Average Dust storms prevailing in the area	20 days per annum
x.	Average number of rainy days per annum	160
xi.	Maximum Altitude above sea level	1200m
xii.	Rainy months	June to October

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
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Environmentally, the region where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators. Therefore, outdoor material shall be designed and protected for use in exposed, heavily polluted salty corrosive and humid coastal atmosphere

4. GENERAL TECHNICAL REQUIREMENTS:

S No	Description	Units	Requirement	Tolerance
1.	Material		Manufactured from raw material as per IS 2062 grade E-250 quality 'A'	
2.	Anchor Rod	mm		
a	Nominal Diameter of rod	mm	18 mm diameter	(+/-) 0.5 mm
b	Length of rod	mm	2100 mm	(+/-) 0.5 %
3.	RCC Base Plate		Mix of concrete 1:2:4	
a	Dimension [L x B x Thickness]	Mm	450 mm x 450 mm x 75 mm	(+/-) 5 mm
b	Rectangular opening at centre	Mm	25 mm x 75 mm	(+/-) 0.5 mm
4.	Tension Screw			
a	Eye Bolt	mm	1 No. with 18 mm diameter ; inner diameter of rounded part of screw 22 mm.	(+/-) 0.5 mm
b	Length of the central part	mm	310 mm	(+) 5 mm
c	Total length after full tightening of both screw / Eye bolt	mm	445 mm	
d	Total length after full opening of both screw / Eye bolt	mm	665 mm	
5.	MS Angle	mm	50 mm x 50 mm x 6 mm; Long 250 mm	(+/-) 0.5 mm; in length (+/-) 5 mm
6.	Stay Collar	mm	All dimensions shall be provided by bidder along with drawing.	(+/-) 5 mm

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
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5. GENERAL CONSTRUCTIONS:

a) ANCHOR ROD WITH MS ANGLE

Overall length of rod should be 2100 mm to be made out of 18 mm diameter MS rod. One end of rod to be made into a round eye having an inner diameter of 22 mm and outer diameter 64 mm with best quality welding. Other end fitted with MS Angle 50 mm x 50 mm x 6 mm; 250 mm long. Hot Dip galvanized as per IS 4759-1996.

b) RCC BASE PLATE

All material shall be of RCC. With concrete ratio 1:2:4 And 6 no's of 8 mm TMT bar both ways shall be used for reinforcement. Reinforcement bars cross point be welded or perfectly tied up with soft wire.

c) TENSION SCREW

Two no. of eye bolt to be made of 18mm diameter MS Rod having an overall length of 250 mm. One end of the rod to be threaded up to 185 mm length. The other end of the rod shall be rounded into a circular eye of 22 mm inner diameter with proper and good quality welding. Tension screw central part shall be one piece forging with total width 310 mm. Tension screw being a threaded fastener be hot dip galvanized as per relevant IS : 1367 (part 13) – 1983.

d) STAY COLLAR

To be made of 50 x 6 MS plate and hot dip galvanized as per IS 4759 and all other constructional details & dimensions as mentioned in drawing.

6. MARKING:

The 18 mm GI HT Stay Set shall carry the following information contained in a label attached to it:

- Reference to the Standards.
- Manufacturer's name
- Year of manufacture.
- The following shall be embossed on the Stay Set, " PROPERTY OF TPNODL"

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
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7. TESTS:

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All Routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the HT Stay Set in additions to others specified in the IS/IEC/SANS Standards

Following tests shall be applicable

- 1) Visual examination, Verification of dimension and marking test.
- 2) Tensile Strength.
- 3) Galvanization (Uniformity) test.
- 4) Cube test/ Compression test

8. TYPE TEST CERTIFICATES:

The bidder shall furnish the type test certificates of the HT Stay Set for the tests as mentioned as above as per the corresponding standards. All the tests shall be conducted by CPRI/ERDA/Other NABL accredited Laboratory as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPNODL

9. PRE DISPATCH INSPECTION:

The Material shall be subject to inspection by a duly authorized representative of the TPNODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to TPNODL's representatives when the work is in progress. Inspection by the TPNODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPNODL.

Initiator		HOG (Engineering)	

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Following documents shall be sent along with material

- a) Test reports
- b) MDCC issued by TPNODL
- c) Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORES:

The material received at TPNODL store will be inspected for acceptance and shall be liable for rejection, If found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering Department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is later, (the time scale of 12/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be.

Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

12. PACKING:

Supplier shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport and be packed in such a manner so as to protect the equipment from damage in transit. The material used for packing shall be environmentally friendly.

Initiator		HOG (Engineering)	

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13. TENDER SAMPLE:

Bidder shall submit the sample of material with the offer (in case of first supply to TPNODL).

14. QUALITY CONTROL:

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections. The bidder shall ensure that the material supplied is as per the Guaranteed Technical Particulars as specified in the specifications.

15. MINIMUM TESTING FACILITIES:

Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. DRAWINGS AND DOCUMENTS:

Following documents shall be prepared based on TPNODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- a) Completely filled in Technical Particulars.
- b) General description of the equipment and all components including brochures.
- c) Type test Certificates
- d) Experience List.

After the after of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
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Following Drawings/Documents shall be submitted after the award of the contract

S. No	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	Manual/Catalogues/drawings for all components.		√	
3	Technical details and test certificates.		√	√
4	Installation Instructions		√	√
5	Transport/shipping dimension drawing		√	√
6	QA & QC Plan	√	√	√
7	Routine, Acceptance and Type test Certificates	√	√	√

All the Documents and Drawings shall be in English Language

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
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18. GUARANTEED TECHNICAL PARTICULARS:

Sr. No	Description	Units	Bidder Offer
1.	Material		
2.	Anchor Rod	mm	
a	Nominal Diameter of rod	mm	
b	Length of rod	mm	
3.	RCC Base Plate		
a	Dimension [L x B x Thickness]	mm	
b	Rectangular opening at centre	mm	
4.	Tension Screw		
a	Eye Bolt	mm	
b	Length of the central part	mm	
c	Total length after full tightening of both screw / Eye bolt	mm	
d	Total length after full opening of both screw / Eye bolt	mm	
5.	MS Angle	mm	
6.	Stay Collar	mm	

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
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19. SCHEDULE OF DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications

Sr No.	Clause No.	Details of deviation with justification,

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
	TECHNICAL SPECIFICATIONS		
Doc. Title	SPECIFICATION FOR AAAC 33kV (241mm²) & 11kV (99 mm²) (COVERED TYPE)		
Doc. No	ENG-EHV-001	Eff. Date: 13.09.2021	
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3. CLIMATIC CONDITIONS OF THE INSTALLATION
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1. SCOPE

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at store/ site and performance of 33kV 241 sq.mm covered AAAC for trouble free and efficient operation. The specific requirements are covered in the enclosed technical datasheet

2. APPLICABLE STANDARDS:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured, and tested in accordance with the latest editions of the following Indian, International standards and shall conform to the regulations of the local authorities:

- IS 398 (Part – IV): 1994 – Aluminum conductor for overhead transmission purposes – Part IV Aluminum Alloy Stranded conductor
- IS 5216 – Guide for safety procedures and practices in electrical works.
- IS 5831: 1984 – Specification for PVC insulation and sheath of electric cables
- IS 7098 (Part I):1988 – Specification for cross – linked polyethylene insulated PVC sheathed cables – Part I for working voltage up to and including 1100 volts
- IS 8130 :1984 – Specification for conductor for insulated electric cables & flexible cords
- IS 10418: 1982 – Specifications for drums for electric cables
- BS 5468 – Cross-linked polyethylene insulation of electric cables
- IEC 540 – Test methods for insulations and sheaths of electric cables and cords
- IEC 60228-3/2004 – Conductor for insulated cables
- EN50937 – 1:2006 – Testing & Specifications of Covered Conductor for voltage 1kV to 33kV
- ASTM G -53 /DIN56687 – UV Testing of XLPE insulation
- IEEE-383:1974 Standard for type test of class IE electric cables, field splices, and connections for nuclear power generating stations.

Initiator		HOG (Engineering)	

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3. CLIMATIC CONDITIONS:

a)	Maximum Ambient Temperature	50 °C
b)	Maximum Daily Average Ambient Temperature	40 °C
c)	Minimum Ambient Temperature	2 °C
d)	Maximum Humidity	99.7 %
e)	Minimum Humidity	15 %
f)	Average Annual Rainfall	1800 mm
g)	Average Wind Speed prevailing in the area	200 km/hr.
h)	Average Thunderstorms prevailing in the area	70 days per annum
i)	Average dust storms prevailing in the area	20 days per annum
j)	Average number of rainy days per annum	160
k)	Maximum Altitude above sea level	1200 m
l)	Seismic Level	0.24g to 0.48g

Note: The atmosphere across coastal divisions of TPNODL is very saline, laden with salt, acid and dust suspended during dry months and subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS

Sl. No.	Particulars	UoM	Requirements	
			33kV / 241	11kV / 99
1	Type of conductor		HT, AAAC Covered Conductor	
2	Type of Insulation		Track resistant, UV- resistant, & corrosion resistant	
3	Insulation Layers		Extruded Longitudinal water blocking layer, semiconductor compound by extrusion	
4	Applicable Standards		IS 398 - PT - IV, & EN 50397 - L	
5	Cross-sectional area	mm ²	241	99
6	Layup of conductor	No. / mm	19/4.02	7/4.26
7	Conductor diameter, bare conductor, nominal	mm	20.1	12.75
8	Form of Conductor		Stranded circular	Stranded circular
9	Inner semi-conductor layer, thickness, nominal	mm	0.3	0.3
10	Inner XLPE covering, thickness, nominal	mm	2.43	1.1
	Outer UV - resistance XLPE covering, thickness, nominal	mm	1.2	1.2

Initiator		HOG (Engineering)	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED		
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11	Diameter over covering, min - max	mm	26.8 – 29.3	17.1 – 19.1
12	Weight, nominal	kg/KM	1023	450
13	Rated Operating Voltage U ₀ /U(U _m)	kV	19/33(36)	6.35/11(12)
14	DC resistance at 20°C, maximum	Ω/km	0.132	0.318
15	Resistance temperature co-efficient	/°C	0.004	0.004
16	Operating temperature, maximum	°C	90°C	90°C
17	Maximum allowable Temperature during short circuit		250°C	250°C
18	Maximum Load (IEC 61597), cond. Temp. 90°C, air temp. 50°C, Solar radiation 1000W/m ² , wind speed 1m/s, α=0.9, ε = 0.15 approximate value	Amps	520	320
19	Maximum Short circuit current, 1 sec. 80 -250 °C	kA	24.1	10
20	Tensile Strength of conductor, minimum	kN	To be provided by bidder	To be provided by bidder
21	Type of Aluminium Alloy	-	To be provided by bidder	To be provided by bidder
22	Insulation Resistance (Volume Resistivity) (Min)	Ω-cm	To be provided by bidder	To be provided by bidder
		Ω-cm	To be provided by bidder	To be provided by bidder

5. **GENRERAL CONSTRUCTION**

These Specifications lay down the Constructional, Dimensional and Performance Requirements for Covered Conductors which consist of a Conductor surrounded by a Covering made of Insulating Material (as described hereunder) as protection against Accidental Contacts with other Covered Conductors and with Grounded Parts such as Tree Branches, etc.

5.1 CONDUCTORS

CONDUCTOR MATERIAL: Aluminum Alloy (AAAC)

NOMINAL CROSS SECTION: To be specified as per requirement

CONDUCTOR DESIGN: The Conductor shall be stranded, round and should be Non-Compacted. Non-Compacted Conductors shall comply with all the requirements of EN 50397-1-2006. The D.C. Resistance of the conductor shall not exceed that given in EN 50397-1-2006 by more than 5%.

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5.2 FILLING (WATER BLOCKING)

- The Stranded Conductor shall be longitudinally water tight by means of a water blocking material incorporated during the extrusion process. The use of grease / water swellable tape / water swellable powder etc. is not permitted. The water blocking material shall be stable at maximum operating conductor temperature of 90 Deg. Cent. The water blocking compound shall be compatible with the conductor material as well as the semi conducting polymer screen layer above it and not adversely affect its electrical or mechanical properties.

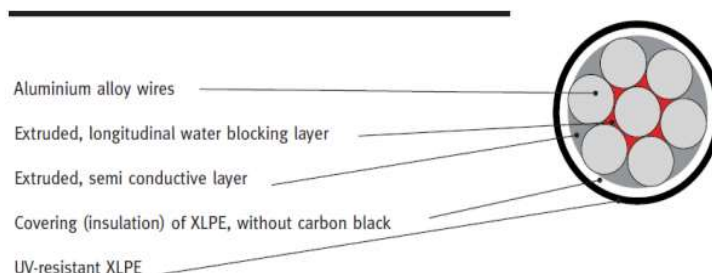
5.3 SEMICONDUCTOR SCREEN

- A semi conductive polymeric screen should be applied over the filled stranded conductor to ensure a lower voltage stress on the Insulation applied over the screen. The thickness of the semi conductive polymeric screen should be between 0.2 mm and 0.4 mm.

5.4 INSULATION

- The Insulation should be dual layered with the Inner Layer being XLPE with a nominal thickness of 1.2 mm for Voltages up to 11 KV and the Outer Layer being a suitable Polymer which is UV Resistant, Non Tracking and Erosion Resistant with a nominal wall thickness of 1.1 mm for Voltages up to 11 KV. The nominal combined Insulation Thickness of both Layers should be 2.3 mm for 11 KV.
- Nominal thickness of 2.4 mm for Voltages for 33 KV and the Outer Layer being a suitable Polymer which is UV Resistant, Non Tracking and Erosion Resistant with a nominal wall thickness of 1.1 mm for Voltages 33 KV. The nominal combined Insulation Thickness of both Layers should be 3.6 mm for 33 KV.
- The conductor manufacturing and stranding process shall incorporate the longitudinal water blocking also.
- The Semi Conducting Screen, Inner Insulation and Outer Insulation should be extruded in one step i.e. triple extrusion to ensure a good, permanent bond between the three layers and also with the conductor.
- It shall be possible to remove the Semi Conducting Screen, Inner and Outer Insulation Layers without damage to the conductor.
- Figure 1 shows the Cross Section of a Covered Conductor with AAAC Conductor

FIGURE 1 (AAAC)



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5.5 LAYING OF CORES

Cores shall be laid up with a right-hand lay, and shall have a lay length not exceeding $28(d_1+d_2)$, where; d_1 is the core diameter, including sheath, in mm. d_2 is the diameter of the messenger, including the outer protective covering where applicable, in mm.

5.6 STRANDING

The wire used in the construction of a stranded conductor shall, before and after stranding, satisfy all the relevant requirements of IS 398(Part-IV): 1994. The lay ratio of the different layers shall be within the limits given in IS 398(Part-IV): 1994. The successive layers shall have opposite directions of lay, the outermost layer being right - handed. The wires in each layer shall be evenly and closely stranded. The lay ratio of any layer shall not be greater than the lay ratio of layer immediately beneath it.

5.7 CABLE DRUM

Cables shall be furnished in the specified reels or coil lengths of 500 meters. Drums shall be of non-returnable wooden drums as per IS 10418:1982 and the drums should be free from defects such as through cracks, knots, warps and split. The ends of the cables shall be suitably sealed by means of non-hygroscopic sealing. The tolerance on the Drum length shall be +/- 5%.

6. MARKING

The cable shall carry the following information either stenciled on the drum or contained in a label attached to it:

- a) Reference to the Standards.
- b) Manufacturer's name
- c) Type of cable.
- d) Voltage grade.
- e) Number of cores.
- f) Nominal cross-section area of the conductor.
- g) Length of the cable on the drum.
- h) Length of the cable per m.
- i) Marking of PO
- j) Direction of rotation of the drum.
- k) Gross mass.
- l) Country of manufacture.
- m) Year of manufacture.
- n) ISI Certification mark.

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7. TESTS :

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All Routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the test shall be carried out as per EN50397 – 1:2006

TYPE TESTS :

Conductor Resistance Test
Thickness of Insulation & Covering
Tensile strength
%age Elongation at break of Insulation before ageing, after ageing & Completed Cable ageing
Carbon black content test on outer covering
Shrinkage test on outer covering
Shrinkage test on Insulation
Hot set test on Insulation
Water Absorption test on Insulation
Test for longitudinal water tightness
AC High Voltage test
Leakage Current Measurement
Tracking Resistance test

ELECTRICAL TESTS:

A) Conductor Resistance Test: To be done as a Routine as well as Type Test as per EN 50397-1-2006.

B) High Voltage Test as per EN 50397-1-2006. – Type test

Test Voltage --- Phase to Phase Voltage of the System for which the Covered Conductor is used.

No. of Specimens --- One

Length of Specimen (minimum) ---- 5 metres

Duration of Immersion in Water (minimum) ---- 1 Hour

Temperature of Water ---- (20 +/- 5) Degrees Centigrade

Test Duration ----- 4 Hours for Routine Test

48 Hours for Type Test

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Requirement: No Breakdown

C) Spark Test on Covering: Routine test

Test Voltage 0.7 X Phase to Phase Voltage of System (A, C,) or

Phase to Phase Voltage of System (D. C.)

Requirement: No Breakdown

D) Leakage Current Test - Type test

Test Voltage 0.7 X Phase to Phase Voltage of System (A. C.)

Requirement: Maximum Leakage Current 1mA

E) Tracking Resistance: - Type test

NON – ELECTRICAL TESTS ON COVERING: Type tests

A) Mechanical Properties :

a) Before Ageing of Sample: As per Table 1 (as per EN 50397-1-2006)

b) After Ageing of Sample: As per Table 1 (as per EN 50397-1-2006)

c) Ageing of Complete Product Sample: As per Table 1 (as per EN 50397-1-2006)

d) Hot-Set-Test: As per Table 1 and in accordance to (as per EN 50397-1-2006)

e) Pressure Test at High Temperature: As per Table 1 and in accordance with EN 60811-3-1, Sub Clause 6.1.

f) Water Absorption: As per Table 1 and in accordance with EN 50397-1-2006

TEST FOR LONGITUDINAL WATER TIGHTNESS

As Type Test with Heat Cycle and in accordance with 50397-1-2006.

No of Specimen – 1

Length of Specimen – 3 meters

Test Duration -- 24 hours

Bending Radius – 20 X Diameter of Covered Conductor

Requirement – No Leakage

As Routine Test without Heat Cycle and in accordance with IEC 60502 -2

No of Specimen – 1

Length of Specimen – 1 meter

Test Duration – 1 Hour

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8. **TYPE TEST CERTIFICATES:**

The bidder shall furnish the type test certificates of the cable for the tests as mentioned as above as per the corresponding standards. All the tests shall be conducted by CPRI/ERDA as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e., any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPNODL.

9. **PRE-DISPATCH INSPECTION:**

- The Material shall be subject to inspection by a duly authorized representative of the TPNODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPNODL's representatives at all times when the work is in progress. Inspection by the TPNODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPNODL.

Following documents shall be sent along with material

- a) Test reports
- b) MDCC issued by TPNODL
- c) Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) h) Other Documents (as applicable).

10. **INSPECTION AFTER RECEIPT AT STORE:**

The material received at TPNODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering & Contracts department.

11. **GUARANTEE:**

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an

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integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is later, (the time scale of 12/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

12. PACKING AND TRANSPORT:

The cable shall be wound on wooden drums and packed in line with requirements of IS 10418-1982. The ends of the cable shall be sealed by means of non-hygroscopic sealing material. Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

13. TENDER SAMPLE:

Bidder shall submit the sample of material with the offer (in case of first supply to TPNODL).

14. QUALITY CONTROL:

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15. TESTING FACILITIES:

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. TESTING FACILITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. SPARES, ACCESSORIES & TOOLS:

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The bidder shall provide a list of complete set of accessories and tools required for erection and maintenance of XPE along with the installation procedure.

18. DRAWINGS AND DOCUMENTS:

Following drawings and documents shall be prepared based on TPNODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- a) Completely filled in Technical Particulars
- b) General description of the equipment and all components including brochures.
- c) Experience List
- d) Type test certificates.

After the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser. All the Documents and Drawings shall be in English Language.

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.

Drawings / documents to be submitted after the award of the contract are as under:

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Sl. No.	Description	For Approval	For Review Information	Final Submission
1.	Technical Parameters	✓		✓
2.	Manual / Catalogues / Drawings for all components		✓	
3.	Technical Details and test certificates of XLPE compound		✓	✓
4.	Cross – sectional area of the cable		✓	✓
5.	Installation Instructions		✓	✓
6.	Instructions for use		✓	✓
7.	Transport / Shipping dimension drawing		✓	✓
8.	QA & QC Plan	✓	✓	✓
9.	Routine, Acceptance and Type test certificates	✓	✓	✓
10.	Fault Level calculation for armor and manual	✓	✓	✓

19. **GUARANTEED TECHNICAL PARTICULARS**

Bidder shall submit guaranteed technical particulars in the attached format:

Sl. No.	Particulars	UoM	Requirements	
			33kV / 241	11kV / 99
1	Type of conductor		To be provided by the bidder	
2	Type of Insulation		To be provided by the bidder	
3	Insulation Layers		To be provided by the bidder	
4	Applicable Standards			
5	Cross-sectional area	mm ²	To be provided by the bidder	
6	Layup of conductor	No. / mm	To be provided by the bidder	To be provided by the bidder
7	Conductor diameter, bare conductor, nominal	mm	To be provided by the bidder	To be provided by the bidder
8	Form of Conductor		To be provided by the bidder	To be provided by the bidder
9	Inner semi-conductor layer, thickness, nominal	mm	To be provided by the bidder	To be provided by the bidder

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10	Inner XLPE covering, thickness, nominal	mm	To be provided by bidder
	Outer UV - resistance XLPE covering, thickness, nominal	mm	To be provided by bidder
11	Diameter over covering, min - max	mm	To be provided by bidder
12	Weight, nominal	kg/KM	To be provided by bidder
13	Rated Operating Voltage U ₀ /U(U _m)	kV	To be provided by bidder
14	DC resistance at 20°C, maximum	Ω/km	To be provided by bidder
15	Resistance temperature co-efficient	/°C	To be provided by bidder
16	Operating temperature, maximum	°C	To be provided by bidder
17	Maximum allowable Temperature during short circuit		To be provided by bidder
18	Maximum Load (IEC 61597), cond. Temp. 90°C, air temp. 50°C, Solar radiation 1000W/m ² , wind speed 1m/s, α=0.9, ε = 0.15 approximate value	Amps	To be provided by bidder
19	Maximum Short circuit current, 1 sec. 80 -250 °C	kA	To be provided by bidder
20	Tensile Strength of conductor, minimum	kN	To be provided by bidder
21	Type of Aluminium Alloy	-	To be provided by bidder
22	Insulation Resistance (Volume Resistivity) (Min)	Ω-cm	To be provided by bidder
		Ω-cm	To be provided by bidder

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20. SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the Purchaser's specifications:

Sl. No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those mentioned above.

Seal of the Company

Designation

Signature

Initiator		HOG (Engineering)	

TECHNICAL SPECIFICATIONS FOR 11/22/33 KV MEDIUM VOLTAGE COVERED CONDUCTOR (MVCC) ACCESSORIES

1 SCOPE:

This specification covers design, manufacture, assembly, testing and supply of Accessories for All Aluminum Alloy Stranded Covered Conductors for use on 33 kV, 22 kV, 11 kV distribution system.

2 SERVICE CONDITIONS:

The Accessories to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

a)	Maximum ambient temperature (Degree C)	----- 50
b)	Minimum temperature of air in shade (Degree C	----- 3.5
c)	Relative Humidity (%)	----- 10 to 100
d)	Maximum Annual Rainfall (mm)	----- 1450
e)	Maximum Wind Pressure (kg/sq.m.)	----- 150
f)	Maximum altitude above mean sea level (meter)	----- 1000
g)	Isoceraunic level (days/ year)	----- 50
h)	Seismic level (Horizontal acceleration)	----- 0.3g

3 APPLICABLE STANDARDS:

Unless otherwise stipulated in this specification, the accessories of conductor shall conform to the following Standards (amended upto date).

1	EN 50397-1:2006	Covered Conductor Specification- Up to 33 KV
2	EN 50397-2:2006	Covered Conductor Accessories Specification- UP to 33 KV
3	EN 50397-2 (MARCH 2010)	Covered conductors for overhead lines and the related accessories for rated voltages above 1kV a.c. and not exceeding 36kV a.c. PART 2 : Accessories for covered conductors : tests and acceptance criteria
4	EN 50182	Conductors for overhead lines- Round wire concentric lay conductors
5	EN 61238-1: 2003	Compression and mechanical connectors for power cables for rated voltages up to 36 kVTest methods and requirements
6	ANSI C119.4 :2011	Electric Connectors - Connectors For Use Between Aluminum-To-Aluminum And Aluminum-To-Copper Conductors Designed For Normal Operation At Or Below 93°C And Copper-To-Copper Conductors Designed For Normal Operation At Or Below 100°C

4 TYPE OF MEDIUM VOLTAGE COVERED CONDUCTOR ACCESSORIES:

The Accessories of Medium Voltage Covered Conductor (MVCC) are specified below and shall consist of the following:

4.1 APPLICATION OF TENSION CLAMP FOR MEDIUM VOLTAGE COVERED CONDUCTOR:

Sr.No	Description	Application
1	Tension Assembly (TA)	For fitting onto a pole for tensioning at the beginning or end of a length of MVCC, or for anchoring while a major change in direction. The Tension assembly consists of one wedge type Tension / anchoring clamp and one Tracking protection IPC.

- Anchoring assemblies are used to firmly hold the MVCC to a concrete or steel pole and transmit the mechanical tension at the end of a run at a major change in direction of over 20 degrees.
- The clamp should consist of an Aluminum alloy corrosion resistant casted body, Rigid sling (“bail”) of Galvanised steel with Tracking IPC and self-adjusting fully insulating type of mechanical and weather resisting thermoplastic wedges which shall anchor/hold the cable.
- No tools shall be needed for fitting the MVCC into the clamp.

4.1.1 Design & Construction of Tension Clamp

A. Tension / Anchoring Clamp:

The following key criterion to be followed for the design of the same.

- There shall be no losable part (except Tracking IPC and bail) in the process of clamping arrangement.
- Locking mechanism should be wedge type self-locking. Wedges are to be made of high strength, climatic resistance Engineering Plastic with glass fibre.
- The fittings shall be able to withstand the specific minimum failure load (SMFL) and shall not damage the covering of cable. SMFL is the minimum failure load for clamp specified by the purchaser or declared by the supplier at which mechanical failure will not take place.

B. Rigid Sling (Bail) of Anchor Assembly

- The Anchoring assembly shall be supplied with a Galvanized steel rod to connect the Tension Clamp to the Insulator clamp on the pole.
- The Rigid Bail forming part of clamp should have sufficient distance between bracket and body of clamp and shall have sufficient mechanical strength to

withstand the mechanical test for the complete assembly tests in this specification.

- Flexible bail is not acceptable due to the reason to withstand the load.
- Rigid Bail should be fitted with provision to remove from the clamp to have easy installation.

C. Anti Tracking IPC

The Anchoring Clamp shall have an IPC to avoid tracking phenomenon by maintaining the metallic clamp as well as the cable passing through it at equipotential

Testing Requirements for an Anchoring Assembly.

Type tests as per EN 50397-2 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397 – 2.

S. No.	Test	Type Test	Acceptance Test	Routine Test
1.	Visual examination	√	√	√
2.	Dimension verification	√	√	√
3	Mechanical tests	√	√	
3.1	Tensile test at ambient temperature	√		
3.2	Tensile test at low temperature	√		
3.3	Tensile test at high temperature	√		
4	Environmental tests	√		
4.1	Corrosion test	√		
4.2	Climate ageing test	√		
5.	Check for permanent marking	√	√	

4.2 APPLICATION OF NON METALLIC ALIGNMENT TIES AND SUSPENSION CLAMP OF MEDIUM VOLTAGE COVERED CONDUCTOR:

Sl.No	Description	Application
1	Non Metallic Alignment Tie (AT)	For supporting and aligning MVCC at an intermediate pole in a length, with small angle of deviation. The Tie hold the MVCC in its position on top of the pin or post insulator. Insulator Tie consists of an “Insulated Plastic” Type for Lin Alignment.
2	Suspension Clamp (SC)	For supporting a length of MVCC at an intermediate pole in a length, with small angle of deviation with a hanging insulator. The suspension clamp consists of an “Assembly with one locking type Suspension clamp with provision to fix in Insulators.

4.2.1 Design & Construction of Non Metallic Alignment Ties and Suspension Clamp

A. Non Metallic Alignment Ties

The ties shall be designed suitably to hold the MVCC in its position on top of the insulator. The Tie shall be made of Insulating Plastic materials to ensure tracking resistance and to avoid any insulation damage to covered conductor due to abrasion while mechanical or wind induced vibration. Plastic coated metallic ties are not allowed.

Permanent marking with manufacturer's name and manufacturing date is mandatory on the non-metallic alignment ties

B. Suspension Clamps

The Suspension Clamps shall be made of Insulating Plastic to ensure tracking resistance and to avoid any insulation damage to covered conductor due abrasion while mechanical or wind induce vibration. The suspension clamp shall consist of a shear head locking arrangement which can be tightened by hand to avoid tool for installation.

Testing Requirements for an Non Metallic Alignment Tie.

Type tests as per EN 50397-2 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397 – 2.

Sl. No.	Test	Type Test	Acceptance Test	Routine Test
1	Visual examination	√	√	√
2	Dimensional verification	√	√	√
3	Check for Marking	√	√	√
4	Mechanical tests			
4.1	Failure Load Tests	√	√	√
4.2	Slip Load Tests	√	√	√
4.3	Lift / Side Load Tests	√	√	√
4.4	Thermal Tests under load	√		
5.	Environmental tests			
5.1	Corrosion test	√		
5.2	Climate ageing test	√		

Testing Requirements for Suspension Clamps

Type tests as per EN 50397-2 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397 – 2.

Sl. No.	Test	Type Test	Acceptance Test	Routine test
1	Visual examination	√	√	√

2	Dimensional verification	√	√	√
3	Check for Marking	√	√	√
4	Mechanical tests			
4.1	Failure Load Tests	√	√	√
4.2	Slip Load Tests	√	√	√
4.3*	Lift / Side Load Tests	√		
4.4	Thermal Tests under load	√		
5.	Environmental tests			
5.1	Corrosion test	√		
5.2	Climate ageing test			

*Lift/Side Load test for suspension clamp is not applicable for hanging type insulator

4.3 APPLICATION OF INSULATION PIERCING CONNECTORS OF MEDIUM VOLTAGE COVERED CONDUCTOR:

Sl.No	Description	Application
1	Mechanical Connector with Heat shrink sleeve	For main (Bare) to main (MVCC) networking Connection. This connector is to ensure the electrical characteristics with in the required limits, while ensuring necessary insulation protection against tracking and water penetration on MVCC.
2	Insulation Piercing Connector for Networking/ Branching /Looping (IPC – Type 2)	For main (MVCC) to main (MVCC) networking or branching of MVCC to another MVCC Or Branch Cable or Looping for transformer junctions. This connector is to ensure the electrical characteristics with in the required limits, while ensuring necessary insulation protection against tracking and water penetration on MVCC.
3	Insulation Piercing Connector with Aluminum Bail for earthing (IPC – Type 3)	For Temporary Earthing Provision from MVCC Cable for maintenance purpose. This connector is to ensure the electrical characteristics within the required limits, while ensuring necessary insulation protection against tracking and water penetration on MVCC.

4	Insulation Piercing Connector with Live line connector for Transformer connection (IPC – Type 3)	For Transformer connection from MVCC Cable. This connector is to ensure the electrical characteristics within the required limits, while ensuring necessary insulation protection against tracking and water penetration on MVCC. The connector allows connection and disconnection without removing the IPC from MVCC line.

4.3.1 Design & Construction of Insulation Piercing Connectors

A. Insulation Piercing Connectors for MVCC

Insulation Piercing Connectors (IPC) are used for making Tee / Tap-off/ connections to an MVCC.

Insulation Piercing Connectors are designed to make a connection between the uncut main conductor and a branch cable conductor without having to strip either cable to expose the conductor. Instead, the tightening action of the IPC will first pierce the Insulation, then make good electrical contact between the main and branch conductor while simultaneously insulating and sealing the connection.

B. Insulation Piercing Connectors-Construction

The connector bodies shall be made entirely of mechanical and weather resistant plastic insulation material made of weather & UV resistant reinforced polymer and no metallic part outside the housing is acceptable except for the tightening bolt or nuts. Any metallic part that is exposed must be free from potential during or after connector installation.

Screws or nuts assigned for fitting with IPC (Insulating Piercing connector), must be fitted with torque limiting shear heads to prevent over tightening or under tightening. While the min & max torque values are to be specified by Manufacturer, these should not exceed 27 N mtr for IPC for main conductor < 95 sq mm, and 42 Nmtr for main conductor >95, but < 240 sq mm.

The contact teeth or blade of the connector is made of tinned copper with equivalent Cross Section with respect to %IACS to suit the max branch cable size declared. The shear bolt/nut shall be suitable for tightening with a hexagonal socket of 13 mm or 17mm.

The IPCs shall be water proof and the water tightness shall be ensured by appropriate elastomeric materials and not by grease, gel or paste alone. Grease can be applied to protect the contact blade alone and shall not be visible on the outer surface of the connector. Connector should not be dipped in grease.

Each IPC should be provided with a cap to seal the cut end of the Branch cable. It should be of a design that once the connector is installed, it shall not be possible to remove the cap without dismantling the connector.

All the metallic parts of the connector should be corrosion resistant and there should not be any appreciable change in contact resistance & temperature after overloads & load cycling and should conform to the long duration tests specified in this standard.

Testing Requirements for Insulation Piercing Connectors

Type tests as per EN 50397-2 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397 – 2.

Sl. No.	Test	Type test	Acceptance Test	Routine test
1	Visual examination	√	√	√
2	Dimensional verification	√	√	√
3	Mechanical tests	√	√	√
4	Water Tightness test	√		
5	Climatic Ageing Test	√		
6	Corrosion Test	√		
7	Electrical Ageing Test	√		
8	Check for permanent marking	√	√	

Mechanical Connector with Heat Shrink Sleeve

Mechanical Connectors are used for bare conductor to covered conductor connection. The body as well as the shear head screws of the mechanical connector should be made of aluminum alloy. It should have a centered bore with tapered edges and a moisture block barrier in the center of the tube. Heat shrink sleeve shall be rated for up to 11/33 KV.

Testing Requirements for Mechanical Connector

Type tests as per EN 61238-1 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 61238-1.

Sl.No.	Test	Type Test	Acceptance Test	Routine Test
1	Visual examination	√	√	√
2	Dimensional verification	√	√	√
3	Check for permanent Marking	√	√	√
4	Mechanical Test	√	√	√
5	Water Tightness test	√	√	
6	Climatic Ageing Test	√		
7	Corrosion Test	√		
8	Electrical Ageing Test	√		

Live Line Connector (For Transformer Location)

Live line connector is used to make the electrical connection under voltage between a bare main conductor and a sheathed branch conductor. It is generally set up remotely by means of an insulating stick with a hook.

The body of the connector along with screws and bolts should be made of aluminium alloy. The live line connector should include a standardized gripping ring made of aluminium alloy to insert the hook pole thus allowing the connector to be fitted and clamped on the main conductor by its loosening and removal mechanism. To ensure the proper holding of the connector to the main conductor/ bail a flap shall be provided at the interface of the connector

Testing Requirements for Live Line Connector

Type tests as per EN 50397-2 & ANSI C119.4 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397-2 ANSI C119.4.

S.No.	Test	Type Test	Acceptance Test	Routine Test
1	Visual examination	√	√	√
2	Dimensional verification	√	√	√
3	Check for Marking	√	√	√
4	Mechanical Test	√	√	√
6	Climatic Ageing Test	√		
7	Corrosion Test	√		
8	Electrical Ageing test*	√		

*Electrical ageing test shall be as per ANSI C119.4

4.4 APPLICATION OF MID SPAN JOINTS OF MEDIUM VOLTAGE COVERED CONDUCTOR:

Sl.No	Description	Application
1	Midspan Joints for AAAC Covered Conductor (MJ)	Mid-span tension joints for jointing AAAC MVCC over a span
2	Midspan Joints for ACSR Covered Conductor (MJ)	Mid-span tension joints for jointing ACSR MVCC over a span

4.4.1 Design & Construction of Mid Span Joints

A. Mid Span Jointing Sleeves for AAAC Covered Conductor

The sleeves should be Pre-Insulated type. Sleeve should be made of Aluminum, insulated with an Anti-UV black thermoplastic tube hermetically sealed two ends with 2 flexible rings. Strip length, Hexagonal crimping die reference and size to be marked on the outer surface of plastic sleeve.

B. Mid Span Insulated Jointing Sleeves for ACSR Covered Conductor

The sleeves consist of an aluminum tube with torques limited shear head bolts, and pressure pads. A heat shrinkable sleeve rated for up to 11/33 KV shall be provided over the joint

Testing Requirements for Mid Span Joints

Type tests as per EN 50397-2 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397 – 2.

S.No.	Test	Type Test	Acceptance Test	Routine Test
1	Visual examination	√	√	√
2	Dimensional verification	√	√	√
3	Check for Marking	√	√	√
4	Mechanical Test	√	√	√
5	Water Tightness test	√		
6	Climatic Ageing Test	√		
7	Corrosion Test*	√		

*Corrosion test is not applicable for pre insulated type joints.

4.5 APPLICATION OF ARC PROTECTION DEVICES FOR MEDIUM VOLTAGE COVERED CONDUCTOR:

Sl.No	Description	Application
1	Arching Horn Assembly*	Arching Horn Assembly is an Arc protection device for power arc evacuation without insulator damage. This shall be installed on either side of tension pole.

* recommended for 33kv system

4.5.1 Design & Construction of Arc protection device

The arching Horn Assembly protection device consists of:

- Two arcing horns with adjustable distance “L” directly mounted on the insulator terminals.
- A covered conductor with clamp on the horn side.
- An insulation piercing connector on the main cable side.

Testing Requirements for Arc Protection Devices

Type tests as per EN 50397-2 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397 – 2.

Sl. No.	Test	Type Test	Acceptance Test	Routine test
1	Visual examination	√	√	√
2	Dimensional verification	√	√	√
3	Check for Marking	√	√	√
4	Clamp Bolt Tightening Test	√	√	√
5	Short Circuit test	√	√	

4.6 APPLICATION OF END CAP OF MEDIUM VOLTAGE COVERED CONDUCTOR:

4.6.1 Heat Shrinkable End Cap

The Insulated End Cap shall be suitable for effectively sealing the end Terminal of the covered conductors. The inner diameter range of the Cap shall be such that it shall tightly fit to the covered conductors to prevent entry of moisture.

Testing Requirement

Type tests as per EN 50397-2 shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

The following tests are intended to establish design characteristics as per EN 50397 – 2.

Sl. No.	Test	Type Test	Acceptance Test	Routine test
1	Visual examination	√	√	√
2	Dimensional verification	√	√	√
3	Check for Marking	√	√	√

5.0 MARKING:

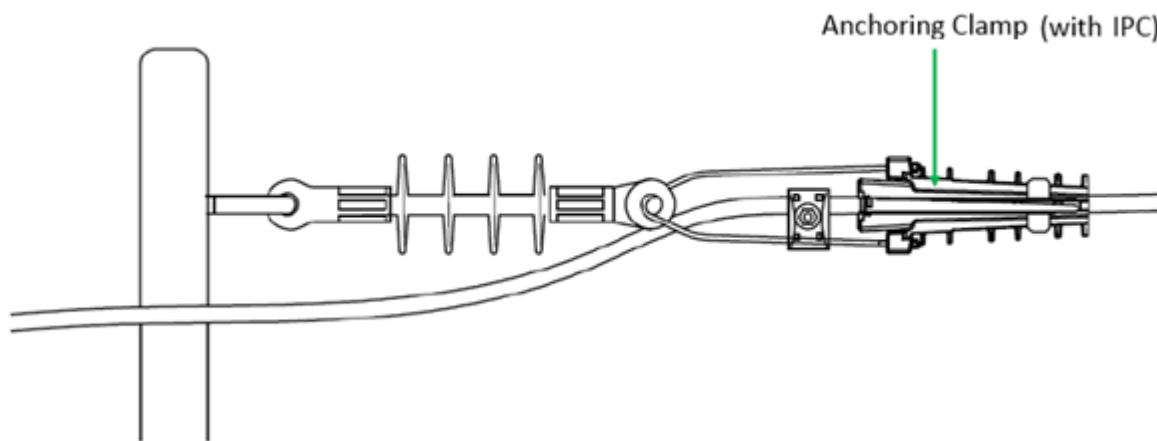
5.1. On Accessories

Manufacturer's name with designation if any.

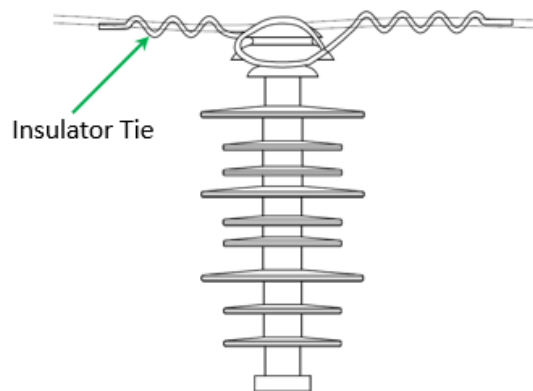
Batch code and Manufacturing period (MM/YY) is to be marked.

ANNEXURE I: - TYPICAL GENERAL ARRANGEMENT DIAGRAM AND DRAWINGS

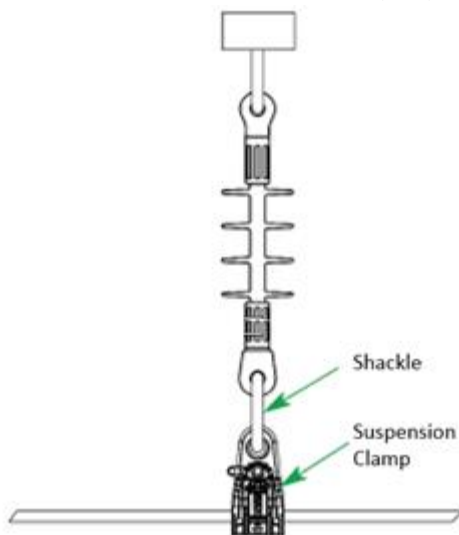
1. Tension Assembly (TA) with Anchoring clamp and one Tracking protection IPC



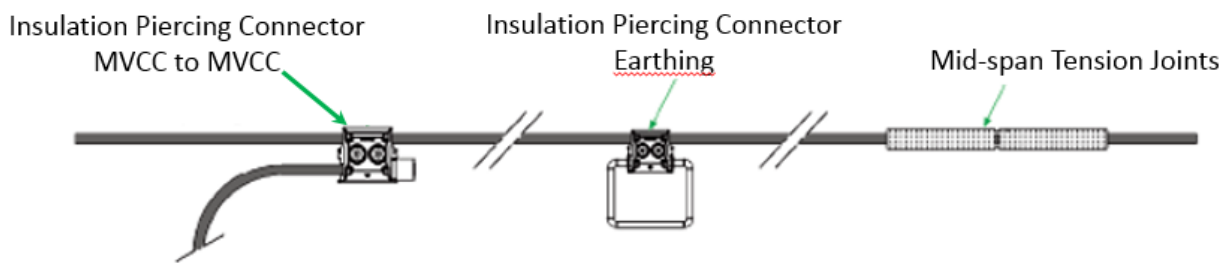
2. Non Metallic Alignment Tie (AT)



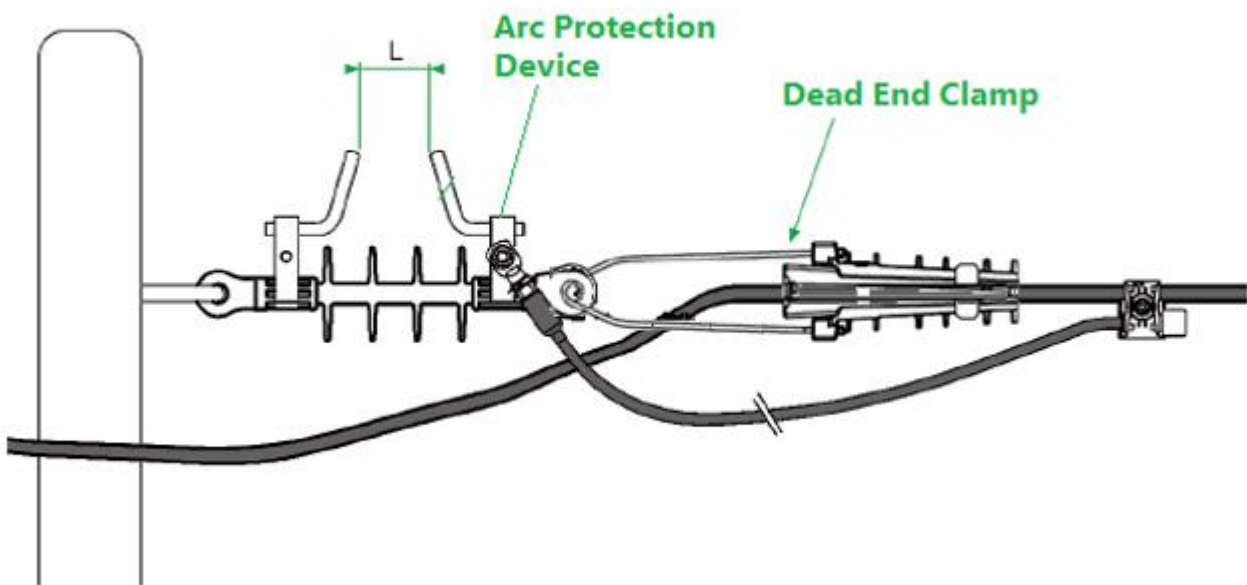
3. Suspension Clamp (SC)



4. Insulation Piercing Connector for Networking / Branching / Looping,
Insulation Piercing Connector with Aluminum Bail for earthing and Midspan
Joints (TJ)

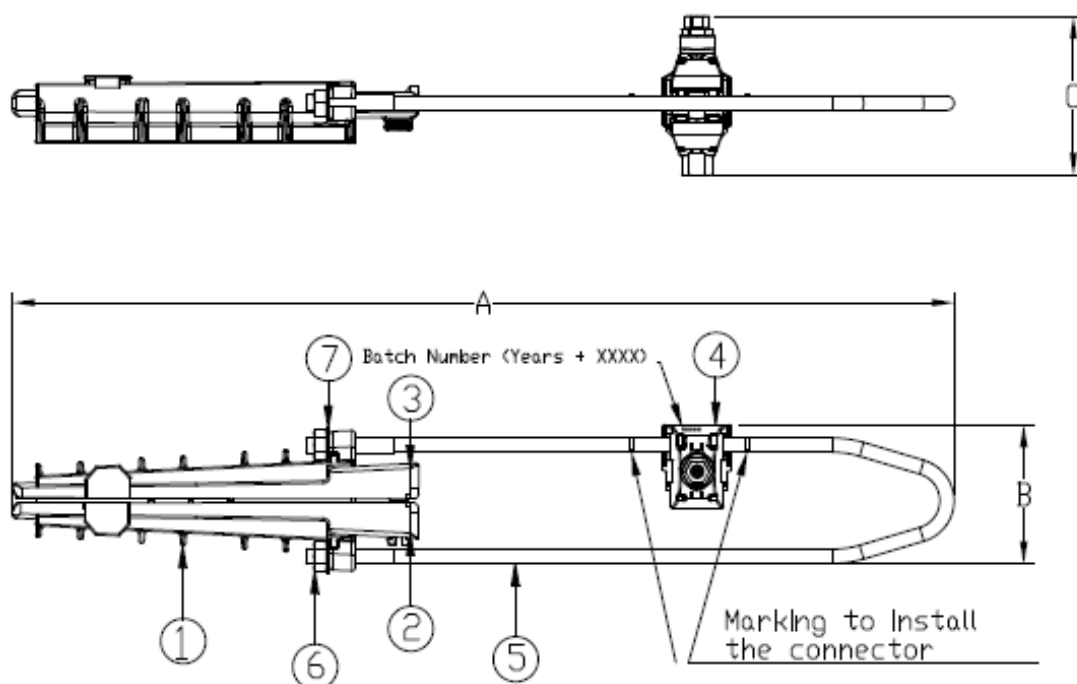


5. Arc Protection Device



TYPICAL DRAWINGS

1. Tension Assembly (TA) with Anchoring clamp and one Tracking protection IPC



7	2	WASHER	GALVANIZED STEEL
6	2	LOCK NUT	GALVANIZED STEEL
5	1	SS ROD	GALVANIZED STEEL
4	1	TRACKING IPC	-
3	1	LEFT WEDGES	HEAT AND UV RESISTANT THERMOPLASTIC
2	1	RIGHT WEDGES	HEAT AND UV RESISTANT THERMOPLASTIC
1	1	BODY	ALUMINIUM ALLOY
PART	QTY	DESCRIPTION	MATERIAL

NOTE:
 STANDARD: EN 50397-2
 CABLE RANGE : SUITABLE COVERED CONDUCTOR
 MARKING :PRODUCT REFERENCE,
 MANUFACTURER LOGO,
 BATCH CODE, MANUFACTURING PERIOD
 General Tolerance : $\pm 5\%$

NAME OF THE CUSTOMER :

A/T . NO :

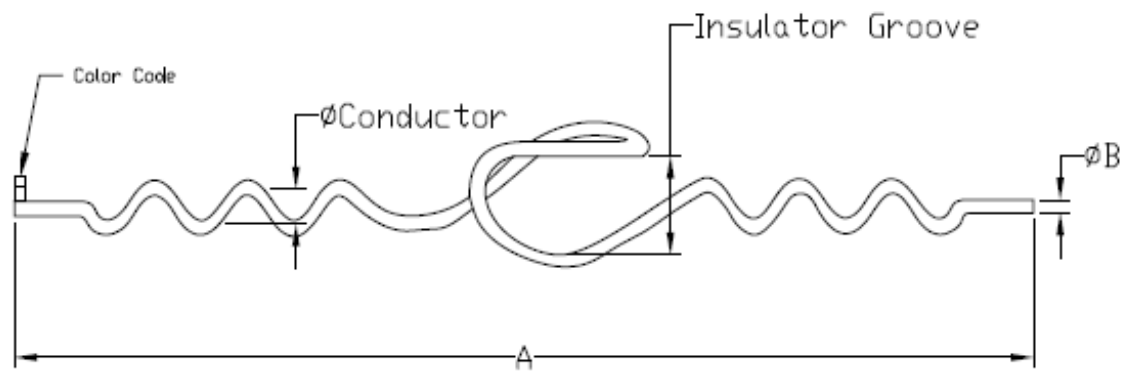
QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE			
DRN			
CHD			
APPD			
		SCALE	DRG. NO.
		NTS	

2. Non Metallic Alignment Tie (AT)



NOTE:

STANDARD: EN 50397-2

CABLE RANGE : SUITABLE COVERED CONDUCTOR

MARKING :PRODUCT REFERENCE,

MANUFACTURER LOGO,

BATCH CODE, MANUFACTURING PERIOD

General Tolerance : $\pm 5\%$

NAME OF THE CUSTOMER :

A/T . NO :

QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE

DRN

CHD

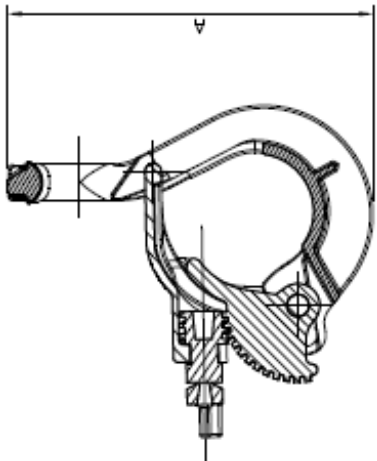
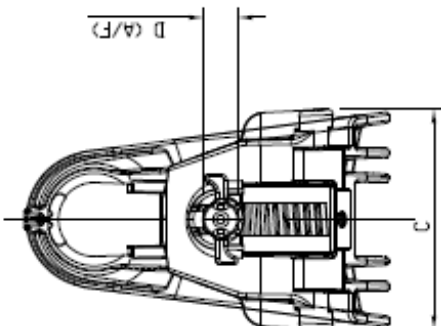
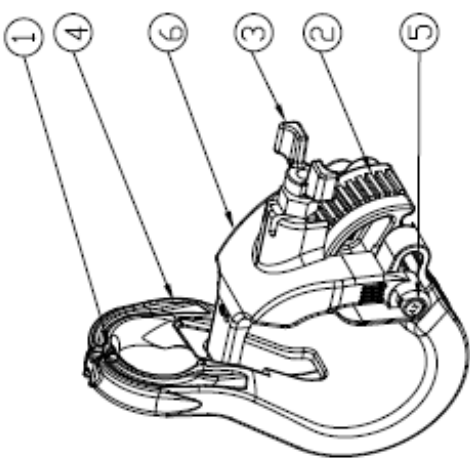
APPD

SCALE

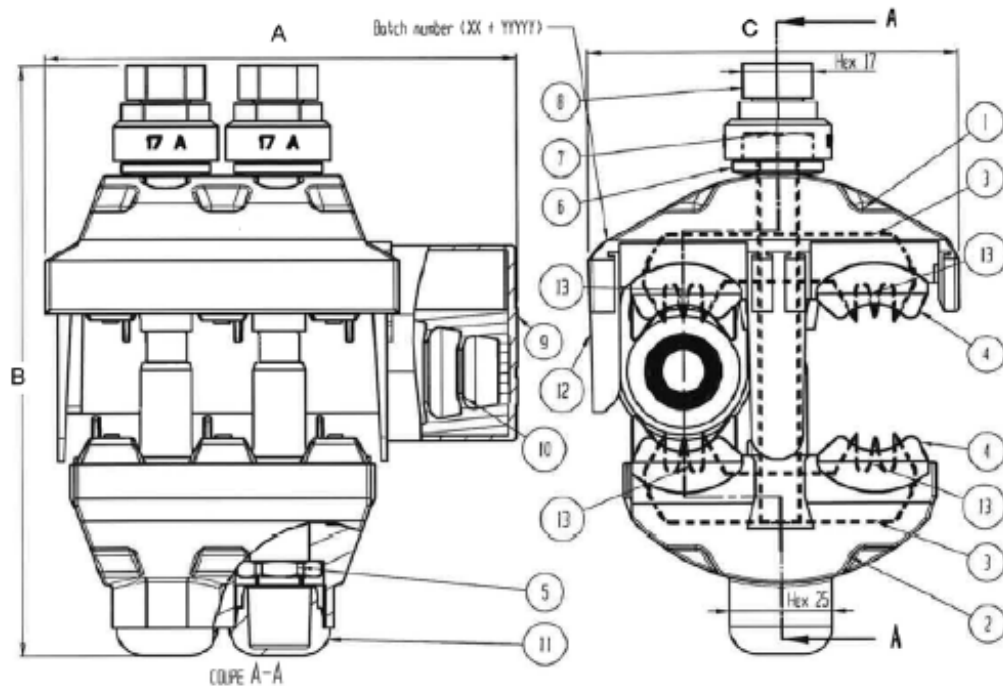
NTS

DRG. NO.

3. Suspension Clamp (SC)

 section A-A			NOTE: STANDARD: EN 50397-2 CABLE RANGE : SUITABLE COVERED CONDUCTOR MARKING : PRODUCT REFERENCE, MANUFACTURER LOGO, BATCH CODE, MANUFACTURING PERIOD General Tolerance : ±5%																															
NAME OF THE CUSTOMER : A/T . NO : QUANTITY : DETAILS OF COVERED CONDUCTOR ACCESSORIES :																																		
NAME OF THE MANUFACTURE & SYMBOL																																		
DATE	BY	CHKD	APPRD	SCALE	DRG. NO.	NTS																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sl No</th> <th>Qty</th> <th>Designation</th> <th>Material</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>1</td> <td>Brk</td> <td>Polyamide - Black</td> </tr> <tr> <td>5</td> <td>1</td> <td>Pin</td> <td>Aluminium Alloy</td> </tr> <tr> <td>4</td> <td>1</td> <td>Suspension Clamp</td> <td>Polyamide - Black</td> </tr> <tr> <td>3</td> <td>1</td> <td>Shear Head</td> <td>Polyamide - Black</td> </tr> <tr> <td>2</td> <td>1</td> <td>Lever</td> <td>Polyamide FV - Black</td> </tr> <tr> <td>1</td> <td>1</td> <td>Selle</td> <td>Stainless Steel AISI 304</td> </tr> </tbody> </table>							Sl No	Qty	Designation	Material	6	1	Brk	Polyamide - Black	5	1	Pin	Aluminium Alloy	4	1	Suspension Clamp	Polyamide - Black	3	1	Shear Head	Polyamide - Black	2	1	Lever	Polyamide FV - Black	1	1	Selle	Stainless Steel AISI 304
Sl No	Qty	Designation	Material																															
6	1	Brk	Polyamide - Black																															
5	1	Pin	Aluminium Alloy																															
4	1	Suspension Clamp	Polyamide - Black																															
3	1	Shear Head	Polyamide - Black																															
2	1	Lever	Polyamide FV - Black																															
1	1	Selle	Stainless Steel AISI 304																															

4. Insulation Piercing Connector for Networking / Branching / Looping



13		Bleed	Silicone Based
12	1	Marking	Color - White
11	2	Screw Protection	Polyethylene - pink
10	1	Cap seal	Thermoplastic Rubber - Green
9	1	EndCap	Polymide GF - Black
8	2	Shear head	Polycarbonate GF - Black
7	2	Screw	Galvanized steel
6	2	Washer	Galvanized steel
5	2	Nut	Galvanized steel
4	2	Seal	Thermoplastic Rubber - Black
3	6	Electrical contact blade	Tinned copper alloy
2	1	1/2 body, nut side	Polymide GF - Black
1	1	1/2 body, screw side	Polymide GF - Black
PART	QTY	DESCRIPTION	MATERIAL

NOTE:
STANDARD: EN 50397-2
CABLE RANGE : SUITABLE COVERED CONDUCTOR
MARKING :PRODUCT REFERENCE,
MANUFACTURER LOGO,
BATCH CODE, MANUFACTURING PERIOD
General Tolerance : $\pm 5\%$

NAME OF THE CUSTOMER :

A/T . NO :

QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE

DRN

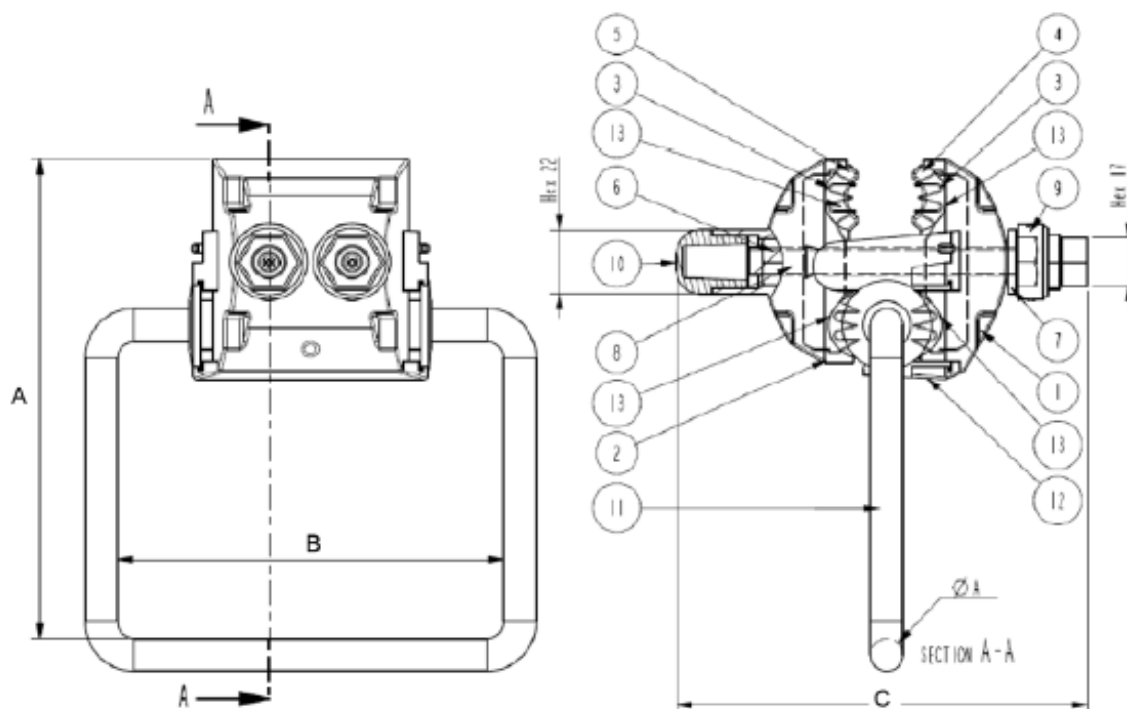
CHD

APPD

SCALE DRG. NO.

NTS

5. Insulation Piercing Connector with Aluminum Bail



13		Lubricant	Silicone Based
12	1	Marking	Color - White
11	1	Bail (See Table)	See Table
10	2	Screw Protection	Polyethylene - Pint
9	2	Shear head	Polycarbonate GF - Black
8	2	Screw	Galvanized steel
7	2	Washer	Galvanized steel
6	2	Nut	Galvanized steel
5	1	Seal : nut side	Thermoplastic Rubber - Black
4	1	Seal : screw side	Thermoplastic Rubber - Black
3	6	Electrical contact blade	Tinned copper alloy
2	1	1/2 body, nut side	Polymide GF - Black
1	1	1/2 body, screw side	Polymide GF - Black
PART	QTY	DESCRIPTION	MATERIAL

NOTE:
 STANDARD: EN 50397-2
 CABLE RANGE : SUITABLE COVERED CONDUCTOR
 MARKING :PRODUCT REFERENCE,
 MANUFACTURER LOGO,
 BATCH CODE, MANUFACTURING PERIOD
 General Tolerance : ±5%

NAME OF THE CUSTOMER :

A/T . NO :

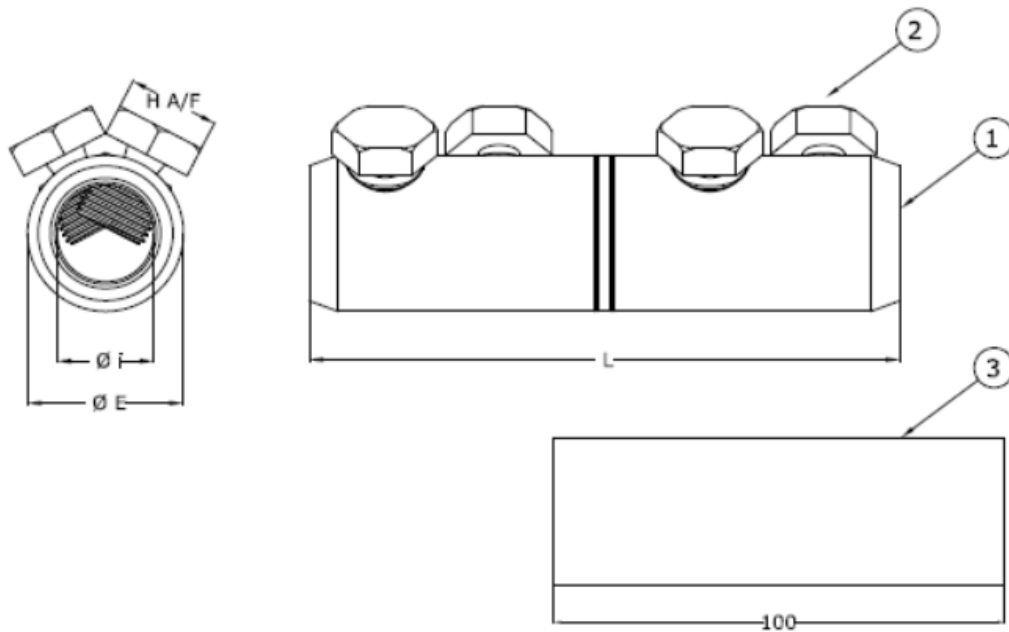
QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE		SCALE	DRG. NO.
DRN			
CHD			
APPD			
		NTS	

6. Mechanical Connector for Bare to Covered connection



5	400-600	3
4	240-400	3
3	120-240	2
2	70-150	2
1	25-95	1
Sl.No.	Cable range Al/Cu (mm ²)	No Of Bolts on Each Side

3	1	HEAT SHRINK SLEEVE	UV RESISTANT POLYMER
2	X	SHEAR OFF BOLT	ALUMINIUM ALLOY
1	1	BODY	ALUMINIUM ALLOY
PART	QTY	DESCRIPTION	MATERIAL

Note :
 STANDARD: EN 50397-2
 CABLE RANGE: SUITABLE COVERED CONDUCTOR
 MARKING: PRODUCT REFERENCE,
 MANUFACTURERE LOGO,
 BATCH CODE, MANUFACTURING PERIOD
 GENERAL TOLERANCE: ±5%

NAME OF THE CUSTOMER :

A/T . NO :

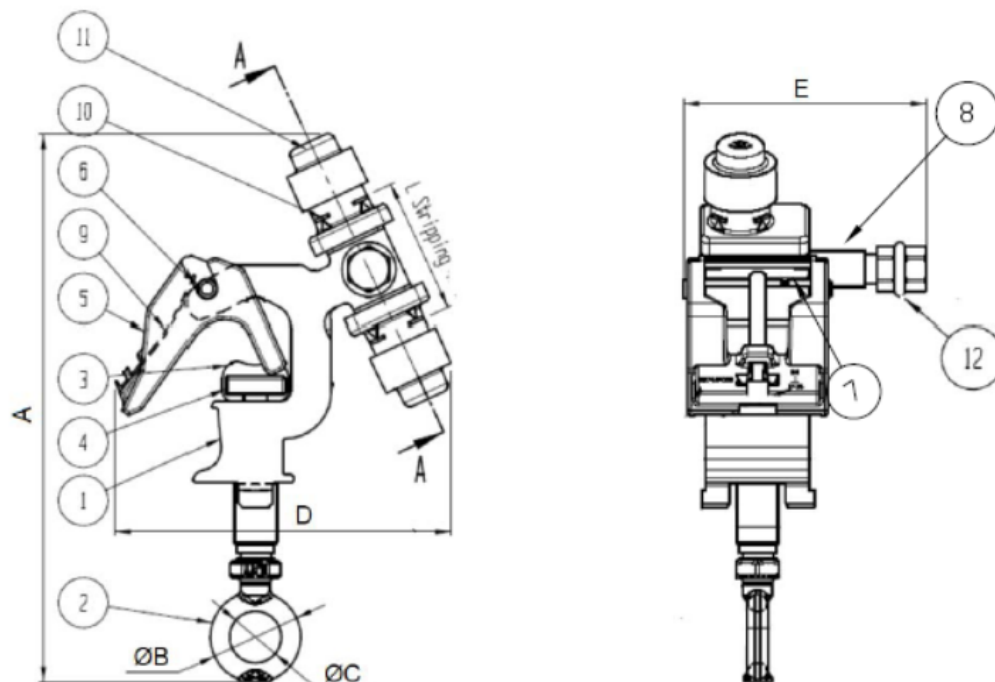
QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE	01/06/2018	SCALE NTS		DRG. NO.
DRN				
CHD				
APPD				

7. Live Line Connector



Prt	Qty	Description	Material
12	1	O-ring seal (Option F)	Thermoplastic rubber - Black
11	2	Indicator	Thermoplastic rubber - Black
10	2	Seal	Thermoplastic rubber - Black
9	1	Leaf spring	Inox
8	1	Top screw	Aluminium alloy
7	1	Top jaw	Aluminium alloy
6	1	Pin	Aluminium alloy
5	1	Composite plastic flap	Polyamide GF - Black
4	2	Clip	ABS - Black
3	1	Main Jaw	Aluminium alloy
2	1	Main screw	Aluminium alloy
1	1	Body	Aluminium alloy

NOTE:

STANDARD: EN 50397-2

CABLE RANGE : SUITABLE COVERED CONDUCTOR

MARKING :PRODUCT REFERENCE

MANUFACTURING LOGO

BATCH CODE, MANUFACTURING PERIOD

General Tolerance : ±5%

NAME OF THE CUSTOMER :

A/T . NO :

QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE 01/06/2018

DEN SSM

CHD VVA

APPD JVJ

SCALE

NTS

DRG. NO.

8. Midspan Joints (TJ) for AAAC Covered Conductor

4	2	Contact Greese	Mineral based Plastic
3	2	Marking	-
2	2	Seal	Thermoplastic Rubber - Black
1	1	Overmolding	POM - Blacked Aluminium Alloy
REP		DESCRIPTION	MATERIAL

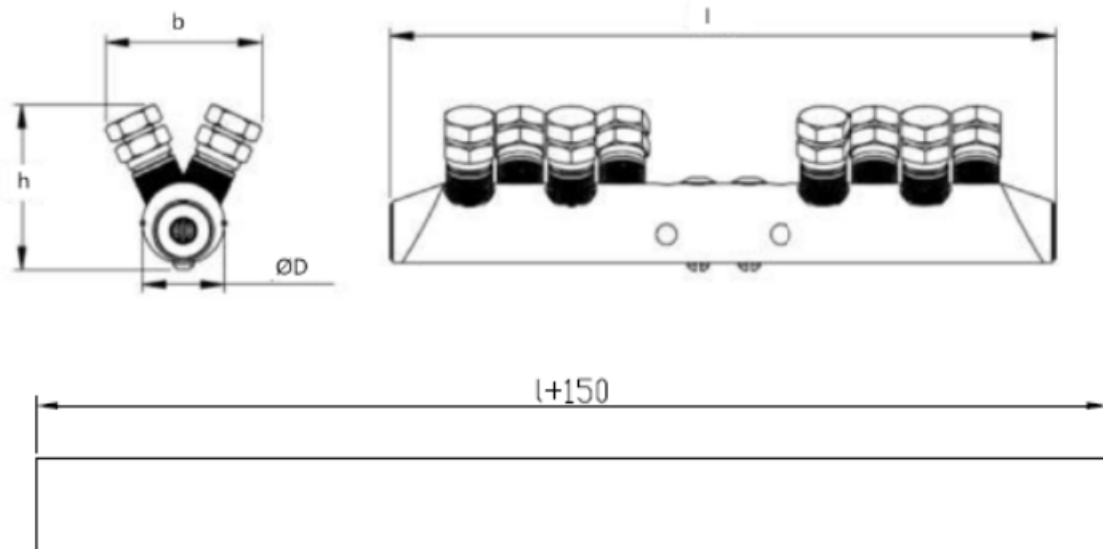
NOTE:
STANDARD: EN 50397-2
CABLE RANGE : SUITABLE COVERED CONDUCTOR
MARKING :PRODUCT REFERENCE,
MANUFACTURER LOGO,
BATCH CODE, MANUFACTURING PERIOD
General Tolerance : $\pm 5\%$

NAME OF THE CUSTOMER :
A/T . NO :
QUANTITY :
DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE		SCALE NTS	DRG. NO.
DRN			
CHD			
APPD			

9. Midspan Joints (TJ) for ACSR Covered Conductor



4	1	Heat Shrink Sleeve	UV Resistant Polymer
3	2	Pressure Pads	Steel
2	Min. 8	Shear Off Bolt	Aluminium Alloy
1	1	Body	Aluminium Alloy
REP	QUANTITY	DESCRIPTION	MATERIAL

Note 1
 STANDARD: EN 50397-2
 CABLE RANGE: SUITABLE COVERED CONDUCTOR
 MARKING: PRODUCT REFERENCE,
 MANUFACTURER LOGO,
 BATCH CODE, MANUFACTURING PERIOD
 GENERAL TOLERANCE $\pm 5\%$

NAME OF THE CUSTOMER :

A/T . NO :

QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE 01/06/2018

DRN

CHD

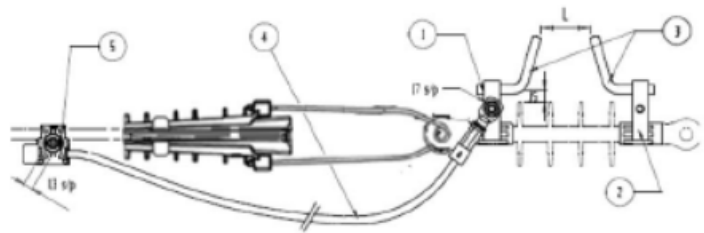
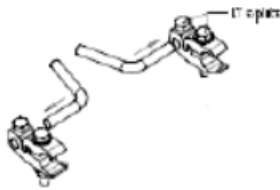
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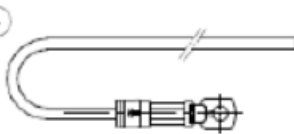
DRG. NO.

10. Arc Protection Device

① + ② + ③



④



⑤



5	1	IPC - Covered to Covered Conductor	
4	1	Cable Connector With Crimping Pad	
3	2	Arching Horn - Rod	Gavanised Steel
2	2	Arching Horn - Cap	Aluminium Alloy
1	2	Arching Horn - Body	Aluminium Alloy
REP	QUANTITY	DESCRIPTION	MATERIAL

Note :
STANDARD: EN 50397-2
CABLE RANGE: SUITABLE COVERED CONDUCTOR
MARKING: PRODUCT REFERENCE,
MANUFACTURERE LOGO,
BATCH CODE, MANUFACTURING PERIOD
GENERAL TOLERANCE: ±5%

NAME OF THE CUSTOMER :

A/T . NO :

QUANTITY :

DETAILS OF COVERED CONDUCTOR ACCESSORIES :

NAME OF THE MANUFACTURE & SYMBOL

DATE	01/06/2018		
DRN			
CHD			
APPD		SCALE	DRG. NO.
		NTS	

ANNEXURE-II - Guaranteed technical particular format

1. GTP for Dead-End / Anchoring Assembly (Dead-End Clamp with Bracket)

Sl. No.	Description	Requirement	Bidder Offer
1	Name of the Supplier		
2	Type of Design		
3	Weight		
4	Cable Range	Range in line with this specification	
5	Material		
6	Ultimate Tensile Strength	80% MBL of conductor	
7	Cable Installation (With/Without disassembly)	Ready- to-use (Without disassembling)	
8	Marking		
9	Dimensions		
10	Applicable Standard	EN 50397-2	

2. GTP for Non Metallic Alignment Tie (AT)

Sl. No.	Description	Requirement	Bidder Offer
1	Name of the Supplier		
2	Length		
3	Weight		
4	Cable Range	Range in line with this specification	
5	Material		
6	Marking		
7	Applicable Standard	EN 50397-2	

3. GTP for Suspension Clamp

Sl. No.	Description	Requirement	Bidder Offer
1	Name of the Supplier		
2	Cable Range	Range in line with this specification	
3	Material		
4	Minimum Breaking Load - Vertical	Min 5KN	
5	Installation(With/Without disassembly)	Ready- to-use (Without disassembling)	
6	Marking		
7	Dimensions		
8	Weight		
9	Applicable Standard	EN 50397-2	

4. GTP for INSULATION PIERCING CONNECTOR – COVERED TO COVERED CONNECTION

Sl. No.	Description	Requirement	Bidder Offer
1	Name of supplier		
2	Type of connection required	Covered conductor to Covered conductor	
3	Are torque limiting shear heads provided to tightening bolts		
4	Range of cable sizes accommodated for Main & Branch	Range to in line with this specification	
5	Tightening Torque		
6	Torque for establishing connection between main and Tap (Nm)	70% of min torque specified	
7	Marking and embossing on the connector		
8	Applicable Standard	EN 50397-2	

5. GTP for INSULATION PIERCING CONNECTOR – EARTHING

Sl. No.	Description	Requirement	Bidder Offer
1	Name of supplier		
2	Type of connection required	Maintanance Earthing	
3	Are torque limiting shear heads provided to tightening bolts		
4	Is Overmoulded Aluminum Bail provided for earthing		
5	Range of cable sizes accommodated for Main & Branch	Range to in line with this specification	
6	Tightening Torque		
7	Torque for establishing connection between main and Tap (Nm)	70% of min torque specified	
8	Marking and embossing on the connector		
9	Applicable Standard	EN 50397-2	

6. GTP for MECHANICAL CONNECTOR – BARE TO COVERED CONNECTION

Sl. No.	Description	Requirement	Bidder Offer
1	Name of supplier		
2	Type of connection required	Bare conductor to Covered conductor	
3	Are torque limiting shear heads provided to tightening bolts		
4	Range of cable sizes accommodated for Main & Branch	Range to in line with this specification	
5	Tightening Torque		
6	Torque for establishing connection between main and Tap (Nm)	70% of min torque specified	

7	Is heat shrink sleeve provided with the connector		
8	Marking and embossing on the connector		
9	Applicable Standard	EN 50397-2	

7. GTP for MIDPSAN JOINTS

Sl. No.	Description	Requirement	Bidder Offer
1	Name of Supplier.		
2	IS manufacturer of Accessories an ISO 9001-2000 Company?		
3	Type No & Size Range	Range to in line with this specification	
4	Is any metallic part carrying potential in operation exposed after installation		
5	Installation		
6	Applicable Standard	EN 50397-2	

TPNODL TP NORTHERN ODISHA DISTRIBUTION LIMITED (A Tata Power and Odisha Government Joint Venture)	TP NORTHERN ODISHA DISTRIBUTION LIMITED TECHNICAL SPECIFICATIONS		
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Doc. No:		Eff. Date: 02.08.2021	
Rev No:	00	Page 1 of 6	
Prepared by:	Reviewed by:	Approved by:	Issued by:

1. Scope of Work:

This specification covers design, manufacture, testing and supply of 150x150mm and 116x100mm RS Joist having per unit weight of 34.6kg and 23kg respectively. The bidder should enclose Performance Certificates from the above users, issued in favor of the Sub Vendor / manufacturer, as proof of successful operation in field.

2. Applicable Standards:

This specification covers the manufacturing, testing before dispatch and delivery of following R.S Joists.

The poles shall be provided with zinc coating of min 120 microns.

- 150 x 150 mm R.S. Joist length:-13 m, 11 m (34.6kg/m)
- 116 x 100 mm R.S. Joist length: - 9m (23kg/m)

3. Standards:

The R.S Joists shall comply with the requirements of latest issue of IS – 2062 Gr – A except where specified otherwise.

4. Climatic Conditions:

The climatic conditions at site under which the store shall operate satisfactory, are as follows.

i.	Maximum Ambient Temperature	50°c
ii.	Maximum daily average ambient temperature	40°c
iii.	Minimum Ambient Temperature	2°c
iv.	Maximum humidity	99.7%
v.	Minimum humidity	15%
vi.	Average Annual Rainfall	1800mm
vii.	Average wind speed prevailing in the area	200kmph
viii.	Average Thunderstorms prevailing in the area	70 days per annum
ix.	Average Dust storms prevailing in the area	20 days per annum
x.	Average number of rainy days per annum	160
xi.	Maximum Altitude above sea level	1200m
xii.	Rainy months	June to October

5. Rolled Steel Joists

The Rolled Steel joist (RSJ) support structures shall be fabricated from mild steel, grade A and in lengths dictated by design parameters .The joists, may include, but shall not be limited to the size i.e. 150 X 150 mm & 116 x 100mm.

Initiator		HOG (Engineering)	

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6. Dimensions and Properties:

RSJ DESIGNATION	150 x 150 mm ISHB	116 x 100 mm
Length of Joist in meter with +100mm/- 0% Tolerance	13m,11m	9m
Weight kg/m with±2.5% Tolerance	34.6	23
Sectional Area (cm ²)	44	29.29
Depth(D) of Section (mm) with +3.0mm/ -2.0mm Tolerance as per IS 1852-1985	150	116
Width (B)of Flange(mm) ±4.0mm Tolerance for 150 x 150 mm ISHB IS 1852-1985	150	100
Thickness of Flange(Tf) (mm) with±1.5mm Tolerance	9	10
Thickness of Web(Tw) (mm) with±1.0mm Tolerance	11.8	8.5
Corner Radius of fillet or root (R1) (mm)	8	15
Corner Radius of Tow (R2) (mm)	4	3
Moment of Inertia : Ixx (cm ⁴) Iyy (cm ⁴)	1640 495	643.8 143.5
Radius of Gyration (cm): Rxx Ryy	6.09 3.35	4.69 2.21
Flange Slope(α) in Degree	94	
Tolerance in Dimension	As perIS:1852	As per IS:1852
Distinct Non-Erasable Embossings to be made on each R.S. Joist	a) Name of the owner: TPNODL b) Name & Logo of the Manufacturer c) B.I.S Logo (ISI Mark)	a) Name of the owner: TPNODL b) Name & Logo of the manufacturer c) B.I.S Logo (ISI Mark)

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	d) Size	d) Size

7. MECHANICAL PROPERTIES:

Tensile Test :	Requirement as per IS:2062/ 1999 Grade-A
Yield Stress(MPa)	Min250
Tensile Strength(MPa)	Min410
Lo=(5.65VSo)Elongation%	Min23
Bend Test	Shall not Crack

Chemical Composition	Requirement as per IS:2062/ 1999 Grade-A	Permissible variation over the Specified
Grade	A	-
Chemical Name	Fe-410W A	-
Carbon (%Max.)	0.23	0.02
Manganese (%Max.)	1.5	0.05
Sulphur (%Max.)	0.050	0.005
Phosphorous (%Max.)	0.050	0.005
Silicon (%Max.)	0.40	0.03
Carbon Equivalent (%Max.)	0.42	-
Deoxidation Mode	Semi-killed or killed	-
Supply condition	As rolled	-

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- However, In case of any discrepancy between the above data & the relevant IS Standard, the values indicated in the IS shall prevail. The Acceptance Tests shall be carried out as per Relevant IS standard.
- RS Joists of Specific Weight 34.6 kg/m with length 13m,11m pole a with specified weight in MT shall have to be supplied as per IS:2062;2006 Grade "A" ,IS:808;1989/2001, IS1608:1995 & IS:12779-1989 and their latest amendment if any complying the required Dimension, Weight, Chemical & Mechanical properties. Confirming to the relevant IS, as per the Tolerance given below.

8. APPLICABLE TOLLERANCES:

1. Length of each pole = + 100mm / - 0 % As per relevant IS: 12779-1989 (With proportionate change in no of Poles)
2. Specific Weight of RS Joists = $\pm 2.5\%$ As per relevant IS:1852/1985
3. Weight for whole lot of supply for all categories = $\pm 3.0\%$ as per relevant IS: 12779-1989 for both type of RS Joists.

9. EMBOSSING ON EACH R.S JOIST:

Following distinct non-erasable embossing is to be made on each R.S Joists.

- a) Name of the owner: TPNODL
- b) Name & Logo of the Manufacturer: WO No & Dt.
- c) B.I.S Logo (ISI Mark) if applicable.
- d) Size of the R.S Joist.

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GUARANTEED TECHNICAL PARTICULAR (RS JOISTS sizes 150x150mm)
(To be submitted along with offer)

Dimensions and Properties:

PARTICULARS	Specification	Specification By the Bidder
Length of Joist in meter with +100mm/-0% Tolerance	13m ,11m	
Weight kg/m with±2.5% Tolerance	34.6	
Sectional Area (cm ²)	44	
Depth(D) of Section (mm) with +3.0mm/ - 2.0mm Tolerance as per IS 1852-1985	150	
Width (B)of Flange (mm) with ±2.5mm Tolerance for116 x 100 mm ISMB & ±4.0mm Tolerance for 150 x 150 mm ISHB IS 1852-1985	150	
Thickness of Flange (Tf) (mm) with±1.5mm	9	
Thickness of Web(Tw) (mm) with±1.0mm Tolerance	11.8	
Corner Radius of fillet or root (R1) (mm)	8	
Corner Radius of Tow (R2) (mm)	4	
Moment of Inertia: Ixx (cm ⁴) Iyy (cm ⁴)	1640 495	
Radius of Gyration (cm): Rxx Ryy	6.09 3.35	
Modulus of Section: Zxx(cm ³) Zyy(cm ³)	218 63.2	
Flange Slope(α) in Degree	94.0	
Tolerance in Dimension	As per IS: 1852	
Distinct Non-Erasable embossing to be made on each R.S. Joist	a) Name of the owner: TPNODL b) Name & Logo of the Manufacturer: WO No & Dt. c) B.I.S Logo (ISI Mark) if applicable. d) Size of the R.S Joist.	

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GUARANTEED TECHNICAL PARTICULAR (RS JOISTS sizes 116x100mm)
(To be submitted along with offer)

Dimensions and Properties:

PARTICULARS	Specification	Specification By the Bidder
Length of Joist in meter with +100mm/-0% Tolerance	9m	
Weight kg/m with±2.5% Tolerance	23	
Sectional Area (cm ²)	29.29	
Depth(D) of Section (mm) with +3.0mm/ - 2.0mm Tolerance as per IS 1852-1985	116	
Width(B) of Flange (mm) with ±2.5mm Tolerance for 116 x 100 mm ISMB & ±4.0mm Tolerance for 150 x 150 mm ISHB IS 1852-1985	100	
Thickness of Flange (Tf) (mm) with±1.5mm	10	
Thickness of Web(Tw) (mm) with±1.0mm Tolerance	8.5	
Corner Radius of fillet or root (R1) (mm)	15	
Corner Radius of Tow (R2) (mm)	3	
Moment of Inertia: Ixx (cm ⁴) Iyy (cm ⁴)	643.8 143.5	
Radius of Gyration (cm): Rxx Ryy	4.69 2.21	
Modulus of Section: Zxx(cm ³) Zyy(cm ³)	111 28.7	
Flange Slope(α) in Degree		
Tolerance in Dimension	As per IS:1852	
Distinct Non-Erasable embossing to be made on each R.S. Joist	a) Name of the owner: TPNODL b) Name & Logo of the Manufacturer: WO No & Dt. c) B.I.S Logo (ISI Mark) if applicable. d) Size of the R.S Joist.	

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1. SCOPE

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at store/ site and performance of LT AB cables for trouble free and efficient operation. The specific requirements are covered in the enclosed technical datasheet

2. APPLICABLE STANDARDS:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured, and tested in accordance with the latest editions of the following Indian, International standards and shall conform to the regulations of the local authorities:

- IS 398 (Part – IV): 1994 – Aluminum conductor for overhead transmission purposes – Part IV Aluminum Alloy Stranded conductor
- IS 5216 – Guide for safety procedures and practices in electrical works.
- IS 5831: 1984 – Specification for PVC insulation and sheath of electric cables
- IS 7098 (Part I):1988 – Specification for cross – linked polyethylene insulated PVC sheathed cables – Part I for working voltage up to and including 1100 volts
- IS 8130 :1984 – Specification for conductor for insulated electric cables & flexible cords
- IS 10418: 1982 – Specifications for drums for electric cables
- BS 5468 – Cross-linked polyethylene insulation of electric cables
- IEC 540 – Test methods for insulations and sheaths of electric cables and cords
- IEC 60228-3/2004 – Conductor for insulated cables
- IEC 60502-1/2004 – Power cables with extruded insulation and their accessories for rated voltage from 1kV (Um =1.2kV), up to 30kV (Um = 36kV)- Part I: Cables for rated voltages of 1kV (Um =1.2kV), up to 3kV (Um = 3.6kV)
- ASTM G -53 /DIN56687 – UV Testing of XLPE insulation
- SANS 1713:2004 – South African Standard for Aerial Bunched Conductor
- IS14255: 1995 – Aerial Bunched Conductors for working voltages up to and including 1100 volts

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3. CLIMATIC CONDITIONS:		
a)	Maximum Ambient Temperature	50 °C
b)	Maximum Daily Average Ambient Temperature	40 °C
c)	Minimum Ambient Temperature	2 °C
d)	Maximum Humidity	99.7 %
e)	Minimum Humidity	15 %
f)	Average Annual Rainfall	1800 mm
g)	Average Wind Speed prevailing in the area	200 km/hr.
h)	Average Thunderstorms prevailing in the area	70 days per annum
i)	Average dust storms prevailing in the area	20 days per annum
j)	Average number of rainy days per annum	160
k)	Maximum Altitude above sea level	1200 m
l)	Seismic Level	0.24g to 0.48g

Note: The atmosphere across coastal divisions of TPNODL is very saline, laden with salt, acid and dust suspended during dry months and subjected to fog in cold months.

4. GUARANTEED TECHNICAL REQUIREMENTS			
SL.NO.	DESCRIPTIONS	UNITS	REQ. PARAMETERS
1	Type of Cable		LT AB Cable with cross linked polyethylene insulated Phase & Neutral and street lighting core twisted around the bare earth cum messenger wire
2	Size of Aerial Bundled Cables	mm ²	4C x 50 + 1C x 35 + 1C x 16
3	Rated Voltage	kV	1.1
4	System Voltage	kV	0.415
5	Nominal Area of Phase conductor	mm ²	50
6	Nominal Area of Messenger	mm ²	35
7	Phase Core & Neutral		Stranded compacted circular aluminium conductor, extruded XLPE insulated
8	Messenger Wire		Stranded compacted circular aluminium alloy conductor, bare
9	Maximum conductor temperature during continuous operation	°C	90
10	Maximum conductor temperature during short circuit	°C	250
11	Phase Core RYBN insulated		
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a)	Conductor		
i	Material		EC Grade Aluminium of H4 grade to IS:8130:1984
ii	No. of Cores & Nominal Size		4C x 50
iii	Minimum no. of Wires	No. / mm ²	7/3.1
iv	Diameter		Shall be suitably selected to meet conductor DC resistance as per IS 8130
v	Max. DC Resistance of phase conductor at 20°C	Ω/km	0.641
vi	Shape of Conductor		Stranded compacted circular
vii	Short circuit current rating of conductor for 1 sec	kA	4.7
viii	Continuous current rating in air at 40°C	A	149
b)	Insulation		
i	Material		XLPE insulation as per IS 14255:1995
ii	Nominal Thickness	mm	1.5
iii	Tolerance in Insulation thickness	mm	XLPE insulation as per IS 14255:1995
12	Street Light Core		
a)	Conductor		
i	Material		EC Grade Aluminium of H4 grade to IS:8130:1984
ii	Nominal Size	mm ²	16
iii	Nominal no. of wire		7
iv	Maximum DC Resistance at 20°C	Ω/km	1.91 (As per IS 8130:1984)
v	Shape of Conductor		Stranded compacted circular
b)	Insulation		
i	Material		XLPE insulation as per IS 14255:1995
ii	Nominal Thickness	mm	1.2
iii	Tolerance in Insulation thickness	mm	XLPE insulation as per IS 14255:1995
13	Messenger Wire		
i	Material		Aluminium Alloy Wire
ii	Nominal Size	mm ²	35
iii	No. & Nominal Dia of each strand	No/mm	7/2.54
iv	Calculated Maximum resistance at 20°C	Ω/km	0.986
v	Shape of Conductor		Stranded Circular compacted
vi	Short circuit current rating for 1 sec	kA	3.29
vii	Material of Insulation		NA
viii	Thickness of Insulation	mm	NA
ix	Min Breaking Load of Messenger Wire	KN	9.8

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14	Core Identification		RIDGES for phase identification: 1 ridge for R Phase, 2 Ridges for Y Phase, 3 ridges for B phase. For Neutral core identification non - contact type laser printing or ink jet printing to be provided with 'N' printed on it at every span of 1 ft.
15	Formation of Cable		4 phases cores & 1 street lighting core XLPE insulated are laid up over bare messenger with R-H direction of lay
16	Continuous current rating in air at 40°C of phase conductor	A	149
17	Maximum conductor temperature during continuous operation (RYBN)	°C	90
18	Maximum conductor temperature during short circuit operation (RYBN)		250
19	Standard Drum Length	mtr	500
20	Tolerance in Drum Length	%	± 5%
21	Reference Standard		IS 14255
22	Embossing on XLPE Cable		Embossing on phase insulation of the cable, manufacturer name, 1100 V, Size of Cable, ISI, month & year of manufacturing, Property of TPNODL, PO number & Date, Sequential marking of length.
23	Marking on Drum		The Cable shall carry the following information either stencilled on the drum or contained in a label attached to it: a) Referenced to the standards b) Manufacturer's name c) Type of Cable d) Voltage grade e) Number of Cores f) Nominal Cross section area of the conductor g) Length of the cable on the drum h) Length of the cable per m i) Marking of PO j) Direction of Rotation of the drum k) Gross Mass l) Country of manufacturer m) Year of manufacturer n) ISI certification mark
24	Order Quantity Tolerance		To be mentioned by bidder
25	Multiplying factor considering lay ratio of cable to measure the length of cable in drum		To be mentioned by bidder

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26	Cable end sealing		To be mentioned by bidder

4. **GENRERAL CONSTRUCTION**

5.1 CONDUCTORS

- All the conductors shall be Class 2, stranded compacted circular, high electrical conductivity, aluminum grade H2/H4 as per IS 8130: 1984
- Before stranding the conductor shall be circular in cross section, uniform in quality, solid, smooth and free from scale, sharp edges and other defects
- Conductor shall conform to the standards for permissible number of joints in any one of the single wires forming every complete length of conductor, for location of joints in same layer of conductors and for method of making such joints. No joint shall be made in any conductor after it is stranded.
- All conductors shall be of high electrical conductivity Aluminum as specified, conforming to requirement of relevant standards

5.2 INSULATION

- The insulating material shall be Cross Linked Polyethylene (XLPE) applied by extrusion as per IS7098 (Part I): 1988 and its latest amendments clause no. 4.1.
- The insulation shall be both heat and moisture resistant and shall be suitable for continuous operation at conductor temperature of 90 Degree Centigrade, rising momentarily to 250 Degree Centigrade under short circuit conditions.
- It shall be free from any foreign material or porosity visible to unaided eye. The insulation shall be so applied that it fits closely to the conductor and it shall be possible to remove insulation without damaging the conductor. The XLPE insulation shall be ultraviolet protected for operation in direct sunlight.
- It shall be free from any foreign material or porosity visible to unaided eye. The insulation shall be so applied that it fits closely to the conductor and it shall be possible to remove insulation without damaging the conductor. Average thickness of the insulation shall not be less than nominal value specified in IS- 7098 (Part-I) with latest amendments. The tolerance on the thickness shall be as specified in IS-7098 (Part-I):1988.
- The insulating material shall have excellent electrical properties with regard to resistivity, dielectric constant and loss factor and shall have high tensile strength and resistance to abrasion. This shall not deteriorate at elevated temperatures or when immersed in water. The insulation shall be preferably fire resistant and resistant to chemicals like acids, alkalis, oils and ozone.

5.3 MESSENGER WIRE

- The bare messenger wire shall be of 35 mm² (nominal cross section area) for 4C x 50 mm² + 35 mm² + 16 mm² ABC respectively and shall be made of aluminum alloy, generally conforming to IS: 398(Part-IV):1994. The conductor shall be of heated aluminum-magnesium-silicon alloy wires containing approximate 0.5% magnesium and approximately 0.5% silicon conforming to IS 398(Part 4).

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5.4 CORE IDENTIFICATION

The following shall be embossed on the one side of the core:

RIDGES REQUIRED for Phase identification:

- 1 ridge for R phase
- 2 ridges for Y phase
- 3 ridges for B phase

For neutral core identification non-contact type laser printing or ink jet printing to be provided with 'N' printed on it at every span of 1 ft.

5.5 LAYING OF CORES

Cores shall be laid up with a right-hand lay, and shall have a lay length not exceeding $28(d_1+d_2)$, where; d_1 is the core diameter, including sheath, in mm. d_2 is the diameter of the messenger, including the outer protective covering where applicable, in mm.

5.6 STRANDING

The wire used in the construction of a stranded conductor shall, before and after stranding, satisfy all the relevant requirements of IS 398(Part-IV): 1994. The lay ratio of the different layers shall be within the limits given in IS 398(Part-IV): 1994. The successive layers shall have opposite directions of lay, the outermost layer being right - handed. The wires in each layer shall be evenly and closely stranded. The lay ratio of any layer shall not be greater than the lay ratio of layer immediately beneath it.

5.7 CABLE DRUM

Cables shall be furnished in the specified reels or coil lengths of 500 meters. Drums shall be of non-returnable wooden drums as per IS 10418:1982 and the drums should be free from defects such as through cracks, knots, warps and split. The ends of the cables shall be suitably sealed by means of non-hygroscopic sealing. The tolerance on the Drum length shall be +/- 5%.

6. MARKING

The cable shall carry the following information either stenciled on the drum or contained in a label attached to it:

- a) Reference to the Standards.
- b) Manufacturer's name
- c) Type of cable.
- d) Voltage grade.
- e) Number of cores.
- f) Nominal cross-section area of the conductor.
- g) Length of the cable on the drum.
- h) Length of the cable per m.
- i) Marking of PO
- j) Direction of rotation of the drum.

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- k) Gross mass.
- l) Country of manufacture.
- m) Year of manufacture.
- n) ISI Certification mark.

7. **TESTS :**

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All Routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the LT AB cables in additions to others specified in the IS/IEC/SANS Standards. Bidder shall furnish the type test report of LT AB cable for the tests as mentioned below and as per reference standards. Complete set of Type Tests shall be conducted at certified test laboratories, which are CPRI / ERDA only. Type test should have been conducted in certified test laboratories during the period not exceeding 5 years from the date of Permission.

- Tests for Phase Core are as follows:

Type tests

a) Tests on phase/street light Conductor

- i) Tensile test
- ii) Wrapping test
- iii) Resistance test

b) Tests on messenger Conductor

- i) Breaking load test
- ii) Elongation test.
- iii) Resistance test.

c) Physical Test for XLPE Insulation:

- i) Tensile strength and elongation at break
- ii) Ageing in air oven
- iii) Hot test
- iv) Shrinkage test
- v) Water absorption (gravimetric)
- vi) Carbon black: 1) Content. 2) Dispersion.
- vii) Insulation resistance (Volume resistivity) test.

d) Test for thickness insulation.

e) High voltage test.

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- Acceptance Tests
 - i) Tensile Test (for phase/street light conductor).
 - ii) Wrapping Test (for phase/street light conductor).
 - iii) Breaking load test for messenger conductor.
 - iv) Elongation test for messenger conductor.
 - v) Conductor Resistance Test for messenger and phase conductor.
 - vi) Test for thickness of insulation.
 - vii) Hot set test for XLPE insulation.
 - viii) Tensile strength and elongation at break test for insulation.
 - ix) High Voltage test
 - x) Insulation resistance (Volume resistivity) test.
 - xi) UV test for XLPE Insulation (black carbon content and dispersion test).
- Tests for the Messenger wire:
 - xii) Breaking load Test
 - xiii) Elongation test
 - xiv) Resistance test
- Routine Tests
 - i) Conductor Resistance test
 - ii) High Voltage test
- Optional Test
 - i) Bending test.

8. **TYPE TEST CERTIFICATES:**

The bidder shall furnish the type test certificates of the cable for the tests as mentioned as above as per the corresponding standards. All the tests shall be conducted by CPRI/ERDA as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e., any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPNODL.

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9. **PRE-DISPATCH INSPECTION:**

- The Material shall be subject to inspection by a duly authorized representative of the TPNODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPNODL's representatives at all times when the work is in progress. Inspection by the TPNODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPNODL.

Following documents shall be sent along with material

- Test reports
- MDCC issued by TPNODL
- Invoice in duplicate
- Packing list
- Drawings & catalogue
- Guarantee / Warrantee card
- Delivery Challan
- h) Other Documents (as applicable).

10. **INSPECTION AFTER RECEIPT AT STORE:**

The material received at TPNODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering & Contracts department.

11. **GUARANTEE:**

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 18 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is later, (the time scale of 18/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

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12. PACKING AND TRANSPORT:

The cable shall be wound on wooden drums and packed in line with requirements of IS 10418-1982. The ends of the cable shall be sealed by means of non-hygroscopic sealing material. Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

13. TENDER SAMPLE:

Bidder shall submit the sample of material with the offer (in case of first supply to TPNODL).

14. QUALITY CONTROL:

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15. MINIMUM TESTING FACILITIES:

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. SPARES, ACCESSORIES & TOOLS:

The bidder shall provide a list of complete set of accessories and tools required for erection and maintenance of LT ABC along with the installation procedure.

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18. **DRAWINGS AND DOCUMENTS:**

Following drawings and documents shall be prepared based on TPNODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- Completely filled in Technical Particulars
- General description of the equipment and all components including brochures.
- Experience List
- Type test certificates.

After the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser. All the Documents and Drawings shall be in English Language.

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.

Drawings / documents to be submitted after the award of the contract are as under:

Sl. No.	Description	For Approval	For Review Information	Final Submission
1.	Technical Parameters	✓		✓
2.	Manual / Catalogues / Drawings for all components		✓	
3.	Technical Details and test certificates of XLPE compound		✓	✓
4.	Cross – sectional area of the cable		✓	✓
5.	Installation Instructions		✓	✓
6.	Instructions for use		✓	✓
7.	Transport / Shipping dimension drawing		✓	✓
8.	QA & QC Plan	✓	✓	✓
9.	Routine, Acceptance and Type test certificates	✓	✓	✓
10.	Fault Level calculation for armor and manual	✓	✓	✓

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19. GUARANTEED TECHNICAL PARTICULARS

Bidder shall submit guaranteed technical particulars in the attached format:

SL.NO.	DESCRIPTIONS	UNITS	REQ. PARAMETERS	
1	Type of Cable		LT AB Cable with cross linked polyethylene insulated Phase & Neutral and street lighting core twisted around the bare earth cum messenger wire	To be provided by the Bidder
2	Size of Aerial Bundled Cables	mm ²	4C x 50 + 1C x 35 + 1C x 16	
3	Rated Voltage	kV	1.1	
4	System Voltage	kV	0.415	
5	Nominal Area of Phase conductor	mm ²	50	
6	Nominal Area of Messenger	mm ²	35	
7	Phase Core & Neutral		Stranded compacted circular aluminium conductor, extruded XLPE insulated	
8	Messenger Wire		Stranded compacted circular aluminium alloy conductor, bare	
9	Maximum conductor temperature during continuous operation	°C	90	
10	Maximum conductor temperature during short circuit	°C	250	
11	Phase Core RYBN insulated			
a)	Conductor			
i	Material		EC Grade Aluminium of H4 grade to IS:8130:1984	
ii	No. of Cores & Nominal Size	No. / mm ²	4C x 50	
iii	Minimum no. of Wires		7/3.1 before stranding	
iv	Diameter		Shall be suitably selected to meet conductor DC resistance as per IS 8130	
v	Max. DC Resistance of phase conductor at 20°C	Ω/km	0.641	
vi	Shape of Conductor		Stranded compacted circular	
vii	Short circuit current rating of conductor for 1 sec	kA	4.7	
viii	Continuous current rating in air at 40°C	A	149	
b)	Insulation			
i	Material		XLPE insulation as per IS 14255:1995	
ii	Nominal Thickness	mm	1.5	

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iii	Tolerance in Insulation thickness	mm	XLPE insulation as per IS 14255:1995
12	Street Light Core		
a)	Conductor		
i	Material		EC Grade Aluminium of H4 grade to IS:8130:1984
ii	Nominal Size	mm ²	16
iii	Nominal no. of wire		7
iv	Maximum DC Resistance at 20°C	Ω/km	1.91 (As per IS 8130:1984)
v	Shape of Conductor		Stranded compacted circular
b)	Insulation		
i	Material		XLPE insulation as per IS 14255:1995
ii	Nominal Thickness	mm	1.2
iii	Tolerance in Insulation thickness	mm	XLPE insulation as per IS 14255:1995
13	Messenger Wire		
i	Material		Aluminium Alloy Wire
ii	Nominal Size	mm ²	35
iii	No. & Nominal Dia of each strand	No/mm	7/2.54
iv	Calculated Maximum resistance at 20°C	Ω/km	0.986
v	Shape of Conductor		Stranded Circular compacted
vi	Short circuit current rating for 1 sec	kA	3.29
vii	Material of Insulation		NA
viii	Thickness of Insulation	mm	NA
ix	Min Breaking Load of Messenger Wire	KN	9.8
14	Core Identification		RIDGES for phase identification: 1 ridge for R Phase, 2 Ridges for Y Phase, 3 ridges for B phase. For Neutral core identification non - contact type laser printing or ink jet printing to be provided with 'N' printed on it at every span of 1 ft.
15	Formation of Cable		4 phases cores & 1 street lighting core XLPE insulated are laid up over bare messenger with R-H direction of lay
16	Continuous current rating in air at 40°C of phase conductor	A	149
17	Maximum conductor temperature during continuous operation (RYBN)	°C	90

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18	Maximum conductor temperature during short circuit operation (RYBN)		250
19	Standard Drum Length	mtr	500
20	Tolerance in Drum Length	%	± 5%
21	Reference Standard		IS 14255
22	Embossing on XLPE Cable		Embossing on phase insulation of the cable, manufacturer name, 1100 V, Size of Cable, ISI, month & year of manufacturing, Property of TPNODL, PO number & Date, Sequential marking of length.
23	Marking on Drum		The Cable shall carry the following information either stencilled on the drum or contained in a label attached to it: a) Referenced to the standards b) Manufacturer's name c) Type of Cable d) Voltage grade e) Number of Cores f) Nominal Cross section area of the conductor g) Length of the cable on the drum h) Length of the cable per m i) Marking of PO j) Direction of Rotation of the drum k) Gross Mass l) Country of manufacturer m) Year of manufacturer n) ISI certification mark
24	Order Quantity Tolerance		To be mentioned by bidder
25	Multiplying factor considering lay ratio of cable to measure the length of cable in drum		To be mentioned by bidder
26	Cable end sealing		To be mentioned by bidder

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20. SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the Purchaser's specifications:

Sl. No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those mentioned above.

Seal of the Company

Designation

Signature

Initiator		HOG (Engineering)	

33KV , 11 KV “V” CROSS ARM, BACK CLAMP FOR “V”CROSS ARM & POLE TOP BRACKET (GI) (F CLAMP)

TECHNICAL SPECIFICATIONS

6.0.1 Qualifying Criteria :-

The prospective bidder may source the above items from manufacturers /suppliers full filling the technical specification.

a) Hot Dip Galvanised Cross arms and Pole Top Brackets for both 33KV & 11KV construction at intermediate and light angle pole shall be fabricated from grade 43A mild steel of channel section and for heavy angle poles, end poles and section poles fabricated from grade 43A mild steel of angle section. The grades of structural steel shall conform to IS – 226: 1975.

b) The Back Clamp for both 33KV & 11 KV shall be made out of 50 x 8 GI Flat and shall be suitably designed to fit PSC Pole 9 Mtr x 300 Kg and 150x150 mm RS Joist.

c)The Pole Top Bracket (F Clamp) shall be made out of 100x50 mm MS Channel (GI) for 33 KV & 75x40 MS channel (GI) suitably designed to fit PSC Pole 9 Mtr x 300 Kg and 150x150 mm RS Joist.

Except where otherwise indicated all dimensions are subject to the following tolerances: dimensions up to and including 50mm: +1mm: and dimensions greater than 50mm: +2%

All steel members and other parts of fabricated material as delivered shall be free of warps, local deformation, unauthorized splices, or unauthorized bends. Bending of flat strap shall be carried out cold. Straightening shall be carried out by pressure and not by hammering.

Straightness is of particular importance if the alignment of bolt holes along a member is referred to its edges.

Holes and other provisions for field assembly shall be properly marked and cross referenced. Where required, either by notations on the drawing or by the necessity of proper identification and fittings for field assembly, the connection shall be match marked. A tolerance of not more than 1mm shall be permitted in the distance between the center lines of bolt holes.

The holes may be either drilled or punched and, unless otherwise stated, shall be not more than 2mm greater in diameter than the bolts. When assembling the components force may be used to bring the bolt holes together (provided neither members nor holes are thereby distorted) but all force must be removed before the bolt is inserted. Otherwise strain shall be deemed to be present and the structure may be rejected even though it may be, in all other respects, in conformity with the specification.

The back of the inner angle irons of lap joints shall be chamfered and the ends of the members cut where necessary and such other measures taken as will ensure that all members can

be bolted together without strain or distortion. In particular, steps shall be taken to relieve stress in cold worked steel so as to prevent the onset of embitterment during galvanizing. Similar parts shall be interchangeable.

Shapes and plates shall be fabricated and assembled in the shop to the greatest extent practicable. Shearing flame cutting and chipping shall be done carefully, neatly and accurately. Holes shall be cut, drilled or punched at right angles to the surface and shall not be made or enlarged by burning. Holes shall be clean-cut without torn or ragged edges, and burrs resulting from drilling or reaming operations shall be removed with the proper tool.

Shapes and plates shall be fabricated to the tolerance that will permit field erection within tolerance, except as otherwise specified. All fabrication shall be carried out in a neat and workmanlike manner so as to facilitate cleaning, painting, galvanizing and inspection and to avoid areas in which water and other matter can lodge.

Contact surfaces at all connections shall be free of loose scale, dirt, burrs, oil and other foreign materials that might prevent solid seating of the parts.

6.0.2 Fabrication has to be made as per drg. of „ V „ X-arm, Back clamp & „ F „ clamp.

GALVANISING

All type of cross arms back clamps, F clamps & stay clamps shall be hot dip galvanized, are as following:

All galvanizing shall be carried out by the hot dip process, in accordance with Specification IS 2629. However, high tensile steel nuts, bolts and spring washer shall be electro galvanized to Service Condition 4. The zinc coating (610 gms per sq.mt) shall be smooth, continuous and uniform. It shall be free from acid spot and shall not scale, blister or be removable by handling or packing.

There shall be no impurities in the zinc or additives to the galvanic bath which could have a detrimental effect on the durability of the zinc coating.

Before picking, all welding, drilling, cutting, grinding and other finishing operations must be completed and all grease, paints, varnish, oil, welding slag and other foreign matter completely removed.

All protuberances which would affect the life of galvanizing shall also be removed.

The weight of zinc deposited shall be in accordance with that stated in Standard IS 2629 and shall not less than 0.61kg/m² with a minimum thickness of 86 microns for items of thickness more than 5mm, 0.46kg/m² (64 microns) for items of thickness between 2mm and 5mm and 0.33kg/m² (47 microns) for items less than 2mm thick.

Parts shall not be galvanized if their shapes are such that the pickling solutions cannot be removed with certainty or if galvanizing would be unsatisfactory or if their mechanical strength would be reduced. Surfaces in contact with oil shall not be galvanized unless they are subsequently coated with an oil resistant varnish or paint.

In the event of damage to the galvanizing the method used for repair shall be subject to the

approval of the Engineer in Charge or that of his representative.

In no case the repair of galvanisation on site will be permitted.

The threads of all galvanized bolts and screwed rods shall be cleared of spelter by spinning or brushing. A die shall not be used for cleaning the threads unless specifically approved by the Engineer in Charge. All nuts shall be galvanized. The threads of nuts shall be cleaned with a tap and the threads oiled.

Partial immersion of the work shall not be permitted and the galvanizing tank must therefore be sufficiently large to permit galvanizing to be carried out by one immersion.

After galvanizing no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing. To avoid the formation of white rust galvanized materials shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization.

The galvanized steel shall be subjected to test as per IS-2633.

6.0.3

33KV/11 KV V CROSS ARM

GURANTEED TECHNICAL PARTICULARS

(To be submitted along with offer)

Sl. No.	Description Unit	Unit	Bidder's offer	
			11 KV	33 KV
1	Type of cross arm			
2	Grade of steel			
3	Steel standard			
4	Fabrication Standard			
5	Dimensions	Mm		
6	Steel section utilized			
7	Steel tensile strength	N/cm ²		
8	Working load	Kg		
9	Details of galvanizing method utilized and standard/specification conforming to?			
10	Weight of cross arm	Kg		
11	Whether drawing has been submitted with the Bid			

Signature of the bidder with Seal

6.0.4**POLE TOP BRACKETS (F CLAMP)****GURANTEED TECHNICAL PARTICULARS**

(To be submitted along with offer)

Sl. No.	Description Unit	Unit	Bidder"s offer	
			11 Kv	33 Kv
1	Type of crossarm			
2	Grade of steel			
3	Steel standard			
4	Fabrication Standard			
5	Dimensions	Mm		
6	Steel section utilized			
7	Steel tensile strength	N/cm ²		
8	Working load	Kg		
9	Details of galvanizing method utilized and standard/specification conforming to?			
10	Weight of Top bracket	Kg		
11	Whether drawing has been submitted with the bid			

Signature of the bidder with Seal**6.0.5****BACK CLAMP FOR "V" CROSS ARM****GURANTEED TECHNICAL PARTICULARS**

(To be submitted along with offer)

Sl. No.	Description Unit	Unit	Bidder"s offer	
			11 Kv	33 Kv
1	Type of Clamp			
2	Grade of steel			
3	Steel standard			
4	Fabrication Standard			
5	Dimensions	Mm		
6	Steel section utilized			
7	Steel tensile strength	N/cm ²		
8	Working load	Kg		
9	Details of galvanizing method utilized and standard/specification conforming to?			
10	Weight of back clamp	Kg		
11	Whether drawing has been submitted with the bid			

Signature of the bidder with Seal

TECHNICAL SPECIFICATION FOR 11KV AND 33KV

POLYMER PIN INSULATOR

Scope : This specification cover the design, manufacturing, testing at manufacturers works, transport to site, insurance, unloading & storage of 11 KV & 33KV Polymer Pin Insulator suitable for use in 11 KV & 33KV Overhead Lines situated in any part of under jurisdiction of TPNODL.

General Requirements:

1. The Composite insulators will be used on lines on which the conductor will be size of conductor up to 232 Sq.mm. The insulators should withstand the conductor tension, the reversible wind load as well as the high frequency vibrations due to wind.
2. Insulator shall be suitable for 3 Phase, 50 Hz effectively earthed 11KV Overhead Lines and 33 KV Impedance Grounded distribution systems in a moderately/heavily polluted atmosphere.
3. Bidder must be an indigenous manufacturer and supplier of composite insulators of rating 11KV or above or must have developed proven in house technology and manufacturing process for composite insulators of above rating. 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.
4. Insulator shall be suitable for the long Rod Type.
5. 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 commendation of IEC- 60815/ IS: 13134.
6. The tolerances on all dimensions e.g. diameter, length and creepage distance shall be allowed as follows in line with-IEC 61109: $\pm (0.04d + 1.5)$ mm when $d \leq 300$ mm
 $\pm (0.025d+6)$ mm when $d > 300$ mm

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.

7. The composite insulators including the end fitting connection shall be standard design suitable for use with the hardware fittings of any make conforming to relevant IEC/IS standards.
8. 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.

Service condition : The insulators to be supplied against this specification shall be suitable for satisfactory continuous operation under the following topical condition :

a) Max. ambient temperature	: 50 ° C
b) Min. ambient temperature	: -5 ° C
c) Relative humidity	: 10 % to 100 %
d) Avarage number of rainy days	: 100 / annum.
e) Max. Anual Rainfall	: 1500 mm
f) Max. Wind Pressure	: 150 Kg/ sq. Meter
g) Max. Wind Velocity	: 50 Km/ hour
h) Max. Altitude above MSL	: 1000 Meter.
i) Seismic level	: 0.3 g (Horizontal acceleration)
j) Avarage Thunder storm	: 45 Days per annum.
k) Climatic condition	: Moderately hot and humid tropical climate, conductive to rust and fungus groth. Polution

level is high. Some area with seashores having saline atmosphere

System Parameters:

- a) Nominal system voltage : 11 KV & 33 KV.
- b) Highest system voltage : 12 KV & 36 KV.
- c) Power frequency : 50 Hz.
- d) Number of Phases : Three.
- e) System earthing : 11 KV Solidly earthed,
33 KV Impedance earth.

Standard : The following Indian / International Standards with latest revisions and amendments shall be referred while accessing conformity of insulators with this specification.

Sl. No.	Indian 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 insulator units	IEC : 60575
6.	IS : 13134	Guide for the selection of insulators in respect of polluted conditions	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	SPR:18-2 part2
10.	IS : 8263	Methods of RI Test of HV Insulators	IEC : 60437
11.		Standard for insulators – Composite-Distribution Dead-end type	ANSI C29 13-2000
12.	IS : 4759	Hot dip zinc coatings on structural steel & other allied products	ISO : 1459 ISO : 1461
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 strands	ASTMD 578-05
18.		Standard test method for compositional analysis by Thermo-gravimetric	ASTM E 1131-03

19	IS : 4699	Specification for refined secondary zinc	

Technical Requirement:

1. Composite Insulators shall be designed to meet the light quality, safety and reliability and are capable of withstanding a wide range of environmental conditions.

- (a) Core : The internal insulating part
- (b) Housing : The external insulating part.
- (c) Metal end fittings: For attaching to hardware to support conductor.

Core: It shall be a glass-fibber reinforced epoxy resin rod of high strength (FRP rod). Glass fibbers and resin shall be optimized in the FRP rod. Glass fibbers shall be Boron free electrically corrosion resistant (ECR) glass fibber 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 shall be manufactured through Pultrusion process. The FRP rod shall be void free.

Housing (Sheath):

The FRP rod shall be covered by a seamless sheath of a silicone elastometric compound or silicone alloy compound of a thickness of 3 mm minimum. It shall be one-piece housing using injection Moulding Principle to cover the core. The elastomer housing shall be designed to provide the necessary creepage distance and protection against environmental influences, external pollution and humidity. Housing shall conform to the requirement of IEC 61109/92-93 with latest amendments.

It shall be extruded or directly moulded on 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 area shall be free from voids.

Manufacturer should furnish a description of its quality assurance programme including fabrication; testing and inspection for any material (i.e rubber) Components (i.e rod) or hardware (i.e. end filings). The manufacturer has had fabricated by others should also be included. Manufacturing methods and material composition documentation will be a part of Technical Bid to be submitted along with offer.

WEATHERSHEDS:

The composite polymer Weathersheds made of silicone elastometric compound or silicon alloy shall be firmly bonded to the sheath, vulcanized to the sheath or moulded as part of the sheath and shall be free from imperfections. The weathersheds should have silicon content of minimum 30% by weight. The strength of the weathershed 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.

METAL END FITTINGS:

End fittings transmit the mechanical load to the core. Hardware of respective specified mechanical load and shall be hot dip galvanized in Zinc coated with minimum 99.95 % purity of electrolytic high grade Zinc in accordance with IS 2629. The material used in fittings shall be corrosion resistant.

Metal end fittings shall be uniform and without sharp edges or corners and shall be free of cracks, flakes, silvers, slag, blow-holes shrinkages defects and localized porosity. They shall be connected to the rod by means of a controlled compression technique. As the main duty of the end fittings is the transfer of mechanical loads to the core the fittings should be properly attached to the core by a coaxial or hexagonal compression process and should not damage the individual fibers or crack the core.

The gap between fittings and sheath shall be sealed by flexible silicone elastometric compound or silicone alloy compound sealant, system of attached 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 shall be in accordance with the standard dimensions stated in IEC: 60120/IS:2486 Part-II/1989.

Nominal dimensions of the pin insulator shall be in accordance with the Specific Technical Particulars. No joints in pin will be allowed. Outer portion of Pin should be Zinc coated with minimum 99.95% purity of electrolytic high grade Zinc.

The finished surface shall be smooth and shall have a good performance. The surface shall not crack or get chipped due to ageing effect under normal and abnormal service conditions or while handling during transit or erection.

The design of the fittings and the insulators shall be such that there is no local corona formation or discharges likely to cause the interference to either should or vision transmission. Bottom end metal fitting (Shank) of Pin Insulator should be as per IS: 2486.

Length of thread on shank should be minimum 110 mm for 11 KV Pin and 130 mm for 33 KV Pin insulator. Shank diameter is 20 mm for 11 KV Pin Insulator & 24 mm for 33 KV Pin Insulator. Minimum Collar diameter should be 40 mm and its minimum thickness should be of 5 mm. Two number nuts as per IS 1363 (P-III) and 4 mm thick Spring Washer shall be as per IS 3063 with latest amendments if any, Nuts and spring washer shall be hot dip galvanized.

Workmanship :

- a) 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.
- b) 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.
- c) 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.
- d) The core shall be sound and free of cracks and voids that may adversely affect the insulators.
- e) Weather sheds shall be uniform in quality. They shall be clean, sound and smooth and shall be free from defects and excessive flashing at parting lines.
- f) 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 without 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.
- g) All ferrous parts shall be hot dip galvanized to give a minimum average coating of zinc equivalent to 610 gm/sq.m. or 87µm thickness and shall be in accordance with the requirement of IS:4579. 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 (1) minute duration under the standard prece test. The galvanizing shall be carried out only after any machining.

Drawing :

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) Weight of composite long rod units
- (g) Identification mark
- (h) Manufacturer's catalogue number

Marking: Each insulator shall be legibly and indelibly marked (embossing/engraved) to show the following:

- a) Name & Trade mark of the manufacturer
- b) Month & Year of manufacturing
- c) Voltage & Type
- d) Minimum Failling Load (in KN)
- e) "TPNODL" marking

N.B. Marking with sticker/written by Ink is not acceptable.

Type Test: The following Type Test shall have to be conducted on insulator unit, components, materials or complete strings;

- a) Dry Positive & Negative Lightning Impulse voltage withstand test
- b) Dry Positive & Negative Lightning Impulse Flashover voltage test
- c) Dry & Wet Power Frequency Voltage withstand test
- d) Dry & Wet Power Frequency Voltage Flashover test
- e) Mechanical Failing Load test.
- f) Radio Interference test
- g) Recovery of Hydrophobicity test
- h) Dye Penetration Test.
- i) Water Diffusion Test
- j) Chemical composition test for Silicon content
- k) Brittle fracture resistance test.

Routine Test :

- a) Identification of marking
- b) Visual inspection
- c) Mechanical routine test

Acceptance Test : The following test will be carried out at manufacturers works during inspection of the offered insulators before delivery :

- a) Visual examination
- b) Verification of dimension
- c) Galvanizing test
- d) Mechanical performance test
- e) Mechanical Failing Load test

Inspection :

All Acceptance tests shall be carried out at manufacturer's works in presence of the TPNODL's and manufacturers representatives. In addition to above, all routine tests are also to be carried on the insulator as per relevant IS / IEC. The entire cost of acceptance and routine test that to be carried out as per relevant IS / IEC shall be treated as included in the quoted price of Insulator.

The manufacturer shall give at least 15(Fifteen) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out. Routine tests on all insulators shall be carried out as per IEC / IS and test reports shall be submitted along with respective inspection offer to A G M (C&P), TPNODL.

Sampling & Rejection during inspection:

The sampling and rejection procedure for Acceptance Test shall be as per IEC 61109.

Packing :

- a) All insulators shall be packed in strong corrugated box of min. 7 ply duly palette or wooden crates. The gross weight of the crates along with the material shall not normally exceed 100 Kg to avoid handling problem. The crates shall be suitable for outdoor storage under wet climate during rainy season.
- b) The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.
- c) Suitable cushioning, protective padding or dunn age or spacers shall be provided to prevent damage or deformation during transit and handling.
- d) Each wooden case / crate / corrugated box shall have all the markings stenciled on it in indelible ink.
- e) The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

Guarantee :

In the event of any defect in the equipment / materials arising out of faulty design, materials, workmanship within a period of 24 (twelve) months of commissioning or 30(eighteen) months from the date of last despatch of any integral part of the equipment / materials whichever is earlier the supplier shall guarantee to replace or repair the same to the satisfaction of the purchaser.

If the supplier fail to do so within a reasonable time, TPNODL reserves the right to effect repair or replacement by any other agency and recover charges for repair or replacement from the supplier.

Quality Assurance Plan:

1. The successful bidder shall submit following information along with the bid.
2. Test certificates of the raw materials and bought out accessories.
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. List of manufacturing facilities available.
5. Level of automation achieved and lists of areas where manual processing exists.
6. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
7. List of testing equipments available with the bidder for final testing equipment along with valid calibration reports.
8. The manufacturer shall submit Manufacturing Quality Assurance Plan (QAP) for approval & the same shall be followed during manufacture and testing.
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.
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.
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.
12. The Supplier shall keep the Owner informed in advance of the time of starting and the progress of manufacture of material i/n their various stages so that arrangements could be made for inspection.
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.
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 materials are later found to be defective.

ANNEXURE: A**Test on Insulator units**

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 voltage of 10 kV & 30 kV for 11 kV & 33 kV class insulators respectively under dry condition. The test procedure shall be in accordance with IS: 8263/IEC: 437/CISPR 18-2.

2. Brittle Fracture Resistance Test: Brittle fracture test shall be carried out on naked rod along with end fittings by applying “1n HNO₃ acid” (63 g conc. HNO₃ 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.

3. Recovery of Hydrophobicity & Corona Test:

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 (Extract enclosed at Annexure-D) Dry the sample surface.

(ii) The sample shall be 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 1 mm above the sample surface. Tentative arrangement shall be as shown in Annexure- E. 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-2 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 hydrophobicity Measurement at several time 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.

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.

GUARANTED TECHNICAL PARTICULARS FOR 11 KV PIN INSULATOR(POLYMER TYPE)

Sl. No.	Particulars	11 KV Pin Insulator	Bidders Offer
1	Type of insulator	Polymeric composite Pin Insulator	
2	Reference Standard	IEC 61109	
3	Material of FRP Rod	Borron free ECR	
4	Material of sheds	Silicon Rubber	

5	Material of Top End Fittings	SGCI /MCI/ FORGED STEEL	
6	Material of Bottom End Fittings	FORGED STEEL	
7	Material of sealing compound	RTV Silicon	
8	Colour of sheds	Grey	
9	Rated voltage	11 KV	
10	Highest voltage	12 KV	
11	Dry Power Frequency Withstand voltage	60 KV	
12	Wet Power Frequency Withstand voltage	35 KV	
13	Dry Power Frequency Flashover Voltage	75 KV	
14	Wet Power Frequency Flashover Voltage	45 KV	
15	Dry Lightning Impulse withstand voltage	Positive : 75 KV Negative : 80 KV	
16	Dry Lightning Impulse Flashover voltage	Positive : 95 KV Negative : 100 KV	
17	RIV at 1 MHz when energised at 10 KV / 30 KV (rms) under dry condition	< 50 microvolt	
18	Creepage distance (min)	320 mm	
19	Min Failing load	5 KN	
20	Dia of FRP Rod	20 mm	
21	Length of FRP Rod (min)	165 mm	
22	Dia of weather sheds	100 mm	
23	Thickness of housing	3 mm	
24	Dry arc distance	150 mm	
25	Method of fixing sheds to housing	Injection moulding	
26	Visible Discharge Voltage (PF)	9 KV	
27	No of weather sheds (min)	Three	
28	Type of sheds	Aerodynamic	
29	Dia of bottom end fitting	20 mm	
30	Thread length of bottom end fitting	110 mm (min)	
31	Type of packing	Wooden / Corrugated box	
32	No of insulator in each pack	Thirty	
33	Guarantee	24 months from commissioning or 30 months from the date of last despatch.	

Signature of the Bidder with Seal

GUARANTEED TECHNICAL PARTICULARS FOR 33 KV PIN INSULATOR(POLYMER TYPE)

Sl. No.	Particulars	33 KV Pin insulator	Bidders Offer
1	Type of insulator	Polymeric composite Pin Insulator	
2	Reference Standard	IEC 61109	
3	Material of FRP Rod	Borron free ECR	
4	Material of sheds	Silicon Rubber	
5	Material of Top End Fittings	SGCI /MCI/ FORGED STEEL	
6	Material of Bottom End Fittings	FORGED STEEL	
7	Material of sealing compound	RTV Silicon	
8	Colour of sheds	Grey	
9	Rated voltage	33 KV	

10	Highest voltage	36 KV	
11	Dry Power Frequency Withstand voltage	95 KV	
12	Wet Power Frequency Withstand voltage	75 KV	
13	Dry Power Frequency Flashover Voltage	130 KV	
14	Wet Power Frequency Flashover Voltage	90 KV	
15	Dry Lightning Impulse withstand voltage	Positive : 170 KV Negative : 180 KV	
16	Dry Lightning Impulse Flashover voltage	Positive : 210 KV Negative : 230 KV	
17	RIV at 1 MHz when energised at 10 KV / 30 KV (rms) under dry condition	< 70 microvolt	
18	Creepage distance (min)	900 mm	
19	Min Failing load	10 KN	
20	Dia of FRP Rod	24 mm	
21	Length of FRP Rod (min)	300 mm	
22	Dia of weather sheds	110 mm	
23	Thickness of housing	3 mm	
24	Dry arc distance	300 mm	
25	Method of fixing sheds to housing	Injection moulding	
26	Visible Discharge Voltage (PF)	27 KV	
27	No of weather sheds (min)	Eight	
28	Type of sheds	Aerodynamic	
29	Dia of bottom end fitting	24 mm	
30	Thread length of bottom end fitting	130 mm (min)	
31	Type of packing	Wooden / Corrugated box	
32	No of insulator in each pack	Twenty	
33	Guarantee	24 months from commissioning or 30 months from the date of last despatch.	

Signature of the Bidder with Seal

Technical specification of Composite Disc Insulators(B&S)Polymer type

SCOPE :

This specification covers the design, manufacture, testing and supply of 11KV Composite Insulators. The composite insulators shall be of the following type:

- i) Long rod insulators for conductors in tension application at angle / cut points the insulators shall be of Ball & Socket type.
- ii) Line post insulators or pin insulators for straight line locations

2) SERVICE CONDITIONS :

The insulators to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

Maximum ambient temperature (Degree C) ... 50

Minimum ambient temperature (Degree C)	...	5
Relative Humidity (%)	...	95
Maximum Annual Rainfall (mm)	...	1450
Maximum Wind pressure (kg/m.sq.)	...	260
Maximum wind velocity (km/hour)	...	50
Maximum altitude above mean sea level (meter)	...	1000
Isoceraunic level (days/year)	...	50
Seismic level (Horizontal acceleration)	...	0.3 g
Moderately hot and humid tropical climate		
Conductive to rust and fungus growth		

3) **SYSTEM PARTICULARS:**

a) Nominal System Voltage	11 kV	22 kV	33 kV
b) Corresponding highest system Voltage	12 kV	24kV	36 kV
c) Frequency	50 Hz with 3% tolerance		
d) Number of phase	3	3	3
e) Neutral earthing	effectively grounded.		

4) **STANDARDS :**

Unless otherwise specified elsewhere in the specifications insulators shall confirm to the latest revisions of all relevant standards available at the time of placement of the order. The standards are listed in Annexure 'A'.

5) **GENERAL REQUIREMENTS**

- i) The composite insulators shall generally conform to latest Standards as listed in Annexure 'A'
- ii) The Composite Insulators will be used on lines on which the conductors will be AAA Conductor of size up to 232 sq. mm. and AAAC of any size up to Panther (0.2 sq. inch copper equivalent). The insulators should withstand the conductor tension, the reversible wind load as well as the high frequency vibrations due to wind.
- iii) Supplier must be an indigenous manufacturer and manufacturer of composite insulators of rating 33 kV 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 33kV or above. The Manufacturer shall furnish necessary evidence in support of the above, which can be in the form of certification from the utilities concerned, or any other documents to the satisfaction of the Employer.
- iv) Insulator shall be suitable for both the suspension and strain type of load & shall be of Ball & Socket type. The diameter of Composite Insulator shall be less than 200 mm. The center-to-center distance between B&S shall be max. 300 mm for 11 kV, 450 mm for 22 kV & 550 mm for 33 kV composite Insulator.
- v) 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**.

- vi) The size of Composite insulator, minimum creepage distance and mechanical strength along with hardware fittings shall be as follows:

Sr. No.	Type of Composite insulators	Nominal System Voltage kV (rms)	Highest System 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) (Heavily Polluted 25mm/kV)	Center to Center Distance Between B&S (mm)	Min. Failing load kN	Shed Diameter (mm) (min)
i.	Long Rod insulator	11	12	9	35	75	320	300	45	100
		22	24	18	55	125	600	450	70/90	100
		33	36	27	75	170	900	550	70	100
ii.	Post/Pin Insulator	11	12	9	35	75	320		5	
		22	24	18	55	125	560		10	
		33	36	27	75	170	900		10	

- vii) Dimensional Tolerance of Composite Insulators

The tolerances on all dimensions e.g. diameter, length and creepage distance shall be allowed as follows in line with-**IEC 61109**:

(0.04d+1.5) mm when $d \leq 300$ mm.

(0.025d+6) mm when $d > 300$ mm.

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.

- viii) Interchange ability:

The composite insulator together with the Ball & Socket fittings shall be of standard design suitable for use with the hardware of any other indigenous make conforming to relevant standards referred above.

- ix) Corona and RI 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.

6) **TECHNICAL DESCRIPTION OF COMPOSITE INSULATORS**

Polymeric Insulators shall be designed to meet the high quality, safety and reliability and are capable of withstanding a wide range of environmental conditions.

Polymeric Insulators shall consist of THREE parts, at least two of which are insulating parts:-

- (a) Core- the internal insulating part
- (b) Housing- the external insulating part
- (c) Metal end fittings.

- i) 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 Pultrusion process. The FRP rod shall be void free.

ii) HOUSING:

The FRP rod shall be covered by a seamless sheath of a silicone elastomeric compound or silicone alloy compound of a thickness of 3mm minimum. It shall be one-piece housing using Injection Molding Principle to cover the core. The elastomer housing shall be designed to provide the necessary creepage distance and protection against environmental influences. Housing shall conform to the requirements of IEC61109/92-93 with latest amendments

iii) WEATHERSHEDS

The composite polymer weather sheds made of a silicone elastomeric compound or silicone alloy compound shall be firmly bonded to the sheath, vulcanized to the sheath or molded as part of the sheath and shall be free from imperfections. It should protect the FRP rod against environmental influences, external pollution and humidity. 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.

iv) METAL END FITTINGS:

End fitting 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. Metal end fittings shall be suitable for Ball & Socket hard wares of respective specified mechanical load and shall be hot dip galvanized after, all fittings have been completed. The material used in fittings shall be corrosion resistant. As the main duty of the end fittings is the transfer of mechanical loads to the core the fittings should be properly attached to the core by a coaxial or hexagonal compression process & should not damage the individual fibers or crack the core. The gap between fitting and sheath shall be sealed by a flexible silicone elastomeric compound or silicone 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 shall be in accordance with the standard dimensions stated in IEC: 60120/ IS: 2486 - Part-II /1989.

7) **WORKMANSHIP**

- 7.1 All the materials shall be of latest design and conform to the best engineering practices adopted in the high voltage field. Manufacturers shall offer only such insulators as are guaranteed by them to be satisfactory and suitable for continued good service in power transmission lines.
- 7.2 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.
- 7.3 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.
- 7.4 The core shall be sound and free of cracks and voids that may adversely affect the

insulators.

- 7.5 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.
- 7.6 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 sooth and uniform so as to distribute the loading stresses uniformly.

- 7.7 All ferrous parts shall be hot dip galvanized to give a minimum average coating of zinc equivalent to 610 gm/sq.m. or 87 microm 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 (1) minute duration under the standard preece test. The galvanizing shall be carried out only after any machining.

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 five years old.

8.1 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 dimensions with the manufacturing tolerances.

Manufacturer should submit test reports for Design Tests as per IEC – 61109 (clause – 5). 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 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.

8.2.1 Following Type test shall be conducted on a suitable number of individual insulator units, components, materials or complete strings:

SI. 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)
5	Recovery of Hydrophobicity test	Revised Annexure – B This test may be repeated every 3yrs by the manufacturer
6	Chemical composition test for silicon content	Annexure – B Or any other test method acceptable to the Employer
7	Brittle fracture resistance test	Annexure – B

The Manufacturer shall submit type test reports as per IEC 61109. 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.

8.3 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 : Clause 7.3 IEC: 61109, (if applicable)
- (c) Verification of tightness of the interface : Clause 7.4 IEC: 61109
Between end fittings & Insulator housing amendment 1 of 1995
- (d) Verification of the specified mechanical load : Clause 7.4 IEC: 61109, amendment 1 of 1995
- (e) Galvanizing test : IS:2633/IS:6745

8.4 ROUTINE TESTS:

Sr.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.

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.

8.6 SAMPLE BATCH FOR TYPE TESTING :

The Manufacturer shall offer material for sample selection for type testing only after getting Quality Assurance Plan approved by Employer. The sample for type testing will be manufactured strictly in accordance with the approved Quality Assurance Plan.

9) QUALITY ASSURANCE PLAN :

9.1 The Manufacturer shall submit following information:

- i) Test certificates of the raw materials and bought out accessories.
- ii) Statement giving list of important raw material, their grades along with names of sub-Manufacturers 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 Manufacturer's representative.
- iii) List of manufacturing facilities available.
- iv) Level of automation achieved and lists 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 equipments available with the Manufacturer for final testing of equipment along with valid calibration reports.
- vii) The manufacturer shall submit Manufacturing Quality Assurance Plan (QAP) for approval
& the same shall be followed during manufacture and testing.

9.2 The Manufacturer shall submit the routine test certificates of bought out raw materials/accessories and central excise passes for raw material at the time of inspection.

9.3 The Employer'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 Manufacturer's and sub-Manufacturer's works, raw materials, manufacture of the material and for conducting necessary test as detailed herein.

9.4 The material for final inspection shall be offered by the Manufacturer only under packed condition. The Employer 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.

9.5 The Manufacturer shall keep the Employer 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.

9.6 No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested unless the Employer 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.

9.7 The acceptance of any quantity of material shall in no way relieve the Manufacturer 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

10) TEST CERTIFICATE :

The manufacturer shall furnish detailed type test reports of the offered composite Insulators as per clause 8.2 of the Technical Specifications at the NABL approved laboratories to prove that the composite Insulators offered meet the requirements of the specification. These Type Tests should have been carried out within five years prior to the date of opening of this manufacturer.

The Employer reserves right to demand repetition of some or all the Type Test in presence of Employer's representative. For this purpose, the manufacturer shall quote unit rates for carrying out each Type Test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in the Type Tests, the complete supply shall be rejected.

11) TESTING FACILITIES :

The manufacturer must clearly indicate what testing facilities are available in the works of the manufacturer and whether facilities are adequate to carry out all Routine & acceptance Tests. These facilities should be available to Employer's Engineers if deputed or carry out or witness the tests in the manufacturer works. The insulators shall be tested in accordance with the procedure detailed in IEC 61109 / 92-93 with latest amendments.

12) DRAWINGS :

- (i) The Manufacturer shall furnish full description and illustration of the material offered. (ii)

The Manufacturer shall furnish the outline drawing (3 copies) 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:

- Long rod diameter with manufacturing tolerances
- Minimum Creepage distance with positive tolerance
- Protected creepage distance
- Eccentricity of the long rod unit
- Axial run out
- Radial run out
- Unit mechanical and electrical characteristics
- Size and weight of ball and socket
- Weight of composite long rod units
- Materials Identification mark
- Manufacturer's catalogue number

- (iii) After placement of award the Manufacturer shall submit fully dimensioned insulator crate drawing for different type of insulators for approval of the Employer.

13) RETEST AND REJECTION:

- 13.1 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, E1 and 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 Employer'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.

13.2 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.

13.3 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.

13.4 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.

- (i) the surface shall be properly pre-cleaned with the cleaner ;
- (ii) the penetrant, which shall act during 20 minutes, shall be applied on the cleaned

surface;

- (iii) within 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;
- (iv) the surface shall be cleaned with the excess penetrant removed, and dried;
- (v) the developer shall be applied if necessary;
- (vi) 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.

13.5 Verification of the specified mechanical load SML

The insulators of the sample E1 shall be subjected at ambient temperature to a 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 1min withstand test at the SML.)

The insulators have passed the test at 13.4 & 13.5 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 1 min. 100 % withstand test (b).

No cracks are indicated after the dye penetration method described in 13.4 above.

The investigation of the halves described in 13.4 above shows clearly that the cracks do not reach the core.

13.6 Galvanizing test

This test shall be performed according to IS: 2633/IS: 6745 on galvanized parts.

14) MARKINGS :

14.1 Each insulator shall be legibly and indelibly marked with the following details as per IEC-61109:

- a) Name or trademark of the manufacturer.
- b) Voltage & Type
- c) Month and year of manufacturing.
- d) Min. failing load/guaranteed mechanical strength in kilo Newton followed by the word 'KN' to facilitate easy identification.
- e) Saubhagya 'Employer Name'. Marking

14.2 One 10 mm thick ring or 20 mm thick spot of suitable quality of paint shall be marked on the end fitting of each composite long rod of particular strength for easy identification. The paint shall not have any deteriorating effect on the insulator performance.

Following codes shall be used as identification mark:

For 45 KN long rod units	: Blue
For 90 KN long rod units	: Red

15) PACKING :

- 15.1 All insulators shall be packed in strong corrugated box of min. 7 ply duly palletted or wooden crates. The gross weight of the crates along with the material shall not normally exceed 100 Kg to avoid hackling problem. The crates shall be suitable for outdoor storage under wet climate during rainy season.
- 15.2 The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.
- 15.3 Suitable cushioning, protective padding, or Dunn age or spacers shall be provided to prevent damage or deformation during transit and handling.
- 15.4 All packing cases shall be marked legibly and correctly so as to ensure safe arrival at their destination and to avoid the possibility of goods being lost or wrongly dispatched on account of faulty packing and faulty or illegible markings. Each wooden case /crate/corrugated box shall have all the markings stenciled on it in indelible ink.
- 15.5 The Manufacturer shall provide instructions regarding handling and storage precautions to be taken at site.
- 16) GUARANTEE**
The Manufacturer of insulators shall guarantee overall satisfactory performance of the insulators. The manufacturer shall furnish in the form attached (Schedule 'A') all the guaranteed technical particulars.

GUARANTEED TECHNICAL PARTICULARS FOR 11 KV 70 K N DISC INSULATOR

	11 KV Disc	
Type of insulator	Polymeric composite Disc Insulator	
Reference Standard	IEC 61109	
Material of FRP Rod	Boron free ECR	
Material of sheds	Silicon Rubber	
Type of metal end fittings	Ball & Socket	
Nominal Ball Pin Diameter	16 mm	
Material of end fittings	SGCI / MCI	
Material of sealing compound	RTV Silicon	
Colour of sheds	Grey	
Rated voltage	11 KV	
Highest voltage	12 KV	
Dry Power Frequency Withstand voltage	60 KV	
Wet Power Frequency Withstand voltage	35 KV	
Dry Power Frequency Flashover Voltage	75 KV	
Visible Discharge Voltage (PF)	9 KV	
Wet Power Frequency Flashover Voltage	45 KV	
Dry Lightning Impulse withstand voltage	Positive : 75 KV Negative :80 KV	
Dry Lightning Impulse Flashover voltage	Positive : 95 KV Negative : 100 KV	

RIV at 1 MHz when energised at 10 KV / 30 KV (rms) under dry condition	< 50 microvolt	
Creepage distance (min)	320 mm	
Min Failing load	70 KN	
Dia of FRP Rod	16 mm	
Length of FRP Rod (min)	200 mm	
Dia of weather sheds	100 mm	
Thickness of housing	3 mm	
Dry arc distance	170 mm	
Method of fixing sheds to housing	Injection moulding	
No of weather sheds (min)	Three	
Type of sheds	Aerodynamic	
Type of packing	Wooden/Corrugated box	
No of insulator in each pack	Thirty	
Guarantee	24 months from commissioning or 30 months from the date of last despatch.	

Signature of the Bidder with Seal

Suspension Clamp

Dead End Clamp

Pole Clamp with Eye Hook

1.0 Scope

This specification covers the design, manufacture, assembly, testing and supply of Suspension Clamp, Dead end Clamp & Eye hook for making connections to Aerial Bunched Cables rated 1100 volts and insulated with cross-linked polyethylene.

2.0 Standard

The design, performance and test requirements shall confirm to this specification and the following standards. However in case of any conflict, the requirements of this specification shall prevail.

- 1) REC Specification 32/1984
- 2) REC Specification 84/2010 (dead end & Suspension clamp)

The devices shall also be compatible with the cables of sizes & dimensions as defined in the

cable Specifications for the cables with which they are intended to be used.

3.0 Type Test

For all accessories, the Type Test Report should be submitted from an Independent NABL Accredited Laboratory like CPRI

The Test report shall include the Model Number, Applicable size Range, and GA Drawing showing the principal parts and dimensions of the connector.

4.0 Acceptance Test

The Acceptance Tests & sampling plan to be conducted as per REC Spec. 83/ 2010 and as per relevant IS Specifications.

4.4 Drawings & Samples:

GA drawing and other particulars along with samples are to be submitted along with offer.

ANCHOR (DEAD END) & SUSPENSION CLAMPS

5.0 Scope

This specification covers the design, manufacture, assembly, testing and supply of Accessories for anchoring & suspending Aerial Bunched Cables rated 1100 volts and insulated with cross-linked polyethylene and aluminum alloy bare messenger.

	Description	Application
a)	Dead end Clamp (as per REC Construction standard E-35)	For fitting onto a pole for anchoring the end of a length of ABC, or for a major change in direction.
b)	Suspension Clamp (Bolted Type as per REC Construction standard E-34)	For supporting a length of ABC at an intermediate pole in a length, with small angle of deviation.

5.1 Cable Data

The standard sizes and characteristics of the phase and street lighting conductors, messenger wires shall be as specified in REC specification 32/1984 or IS: 14255-1995.

The strength of the messenger shall be not less than the Value shown in Table 1.

Table-1

Conductor Size (mm ² .)	Messenger Rating (as per IS 14255)
35	9.8 KN
70	17.5 KN

5.2. Marking / Embossing

Anchoring Clamp, Suspension clamp should bear

- Manufacturers trade mark and logo
- Name of Purchaser, P.O. No. & Date.
- Product Code or Reference
- Traceability Code/Batch Number

5.3. Type Test

For Dead End & Suspension clamps, the Type Test Report s should be submitted from an Independent NABL Accredited Laboratory / CPRI as per REC Spec-84/2010.

5.4 Acceptance Tests

The Acceptance Tests & sampling plan to be conducted as per REC Spec. 84/ 2010. & as per relevant IS Specifications..

5.5 Drawings & Samples:

GA drawing and other particulars along with samples are to be submitted along with offer.

6.0 EYE HOOKS

- Eye hooks shall be as per REC construction standard E-35 (Type – A)
- It should be made of forged hot dip galvanized steel as per IS-1570
- The clamp corrosion resistance should conform to standards IS 2629 & IS 2633.
- Minimum breaking Load should be 20 KN.

6.1 Type Test

For Eye hooks, the Type Test Report s should be submitted from an Independent NABL Accredited Laboratory / CPRI as REC Spec-32/1984 & 84/2010 and as per relevant IS Specifications.

6.2 Acceptance Tests

The Acceptance Tests & sampling plan to be conducted as per REC Spec. 32/ 1984. & 84/2010 and as per relevant IS Specifications.

6.2 Drawings & Samples:

GA drawing and other particulars along with samples are to be submitted along with offer.

<u>GUARANTEED TECHNICAL PARTICULARS FOR SUSPENSION CLAMP FOR BARE MESSENGER WIRE</u>		
Sl. No.	Description	Guaranteed particulars to be submitted by the Vendors along with offer
1	Name and address of the manufacturer	
2	Applicable standard	
3	Type of clamp	
4	Type of design	
5	Voltage Grade(kV)	
6	Loop anchor attachment(open/close)	
7	Installation (with/without dis-assembly)	
8	Type & grade (metallic/non-metallic material)	
9	Type of hot dip galvanizing & thickness of Zinc coating	
10	Marking	

11	Colour of non-metallic parts	
12	Dimensions	
13	Approximate weight	
14	Minimum Breaking Load (KN)	
15	Maximum allowable load(KN)	
16	Max. angle of deviation of conductor (degrees)	
17	Method of casting	
18	Are GA drawing & samples enclosed	

Signature of the bidder with Seal

<u>GUARANTEED TECHNICAL PARTICULARS FOR DEAD END CLAMP FOR BARE MESSENGER WIRE</u> <u>(To be submitted along with offer)</u>		
Sl..	Description	Guaranteed particulars to be submitted by the Vendors
1	Name and address of the manufacturer	
2	Applicable standard	
3	Type of clamp	
4	Type of design	
5	Voltage Grade(kV)	
6	Loop anchor attachment(open/close)	
7	Installation (with/without dis-assembly)	
8	Type & grade (metallic/non-metallic material)	
9	Type of hot dip galvanizing & thickness of Zinc coating	
10	Marking	
11	Colour of non-metallic parts	
12	Dimensions	
13	Approximate weight	
14	Ultimate tensile strength(KN)	
15	Maximum allowable load(KN)	
16	Slip Strength (KN)	
17 18	Method of casting Operating temperature (deg.cent) a) Continuous Operation b) Short circuit condition Are GA drawing & samples enclosed	

Guaranteed Technical Particulars of Eye Hook		
Sl. No.	Description	Guaranteed Technical Particulars submitted by Vendors
1	Name and Address of the Manufacturer	
2	Type of Hooks	
3	Maximum weight span for 4x95's Maximum weight span for 4x50's	
4	Horizontal pull out load	
5	Types of Facades for which it is suitable	
6	Stand off from Facade	
7	Method of fixing to Façade	
8	Installation(with/without disassembly)	
9	Type and grade of Metallic Material	
10	Type of Hot Dip Galvanizing Thickness of Zinc Coating	
11	Markings:- As specified in IEC - 947	
12	Dimensions	
13	Net Weight	
14	Ultimate tensile strength	
15	Acceptance tests	

Barbed Wire

TECHNICAL SPECIFICATION FOR G.I. BARBED WIRE

STANDARDS:

Unless otherwise specified elsewhere in this specification, the rating as well as performance and testing of the G.I. Barbed wire shall conform to the latest revisions available at the time of placement of order of all the relevant standards but not limited to as listed below.

- IS:280:1978 Mild steel wire for general engineering purposes (*third revision*)
IS:1340:1977 Code of practice for chromate conversion coating of zinc and cadmium coated articles and zinc base alloys (*first revision*)
IS:1521:1972 Method for tensile testing of steel wire (*first revision*)
IS:1755:1983 Method for wrapping test for metallic wire (*first revision*)
IS:2633:1986 Method for testing uniformity of coating of zinc coated articles (*second revision*)
IS:4826:1979 Hot dipped galvanized coating on round steel wires (*first revision*)
IS:12753:1989 Electro galvanized coatings on round steel wire – Specification

3. GENERAL TECHNICAL REQUIREMENTS:

GI Barbed wire shall be 2 PLY with a 2.5mm diameter. The barbs shall have a 2mm diameter and be 12.5mm in length. The barbs shall have four points and shall be formed by twisting two point wires, each two turns, tightly around both line wires making altogether four complete turns.

G.I. Barbed wire shall be of type IOWA with size and dimensions as under:-

Line wire - 2.5 mm

Point wire - 2.0 mm

Distance between two bars shall be 75 mm (+ 12 mm).

SPECIFIC TECHNICAL PARTICULARS FOR 2.5 MM X 2.0 MM G.I. BARBED WIRE

Sl.No.	Particulars	Particulars Specified	Bidders Offer
1	Size of wire- mm	Line wire- 2.5 mm + 0.08 mm Point wire- 2.0 mm + 0.08 mm	
2	Type of Barbed Wire	Iowa Type	
3	Tensile strength of line wire	390 to 590 N/mm ²	
4	Minimum breaking load of completed Barbed wire	3.7 KN	
5	Mass of complete Barbed wire (minimum)	115 gms / Mtr.	
6	Distance between two Barbs	(75 + 12) mm	
7	No. of lays between the Barbs (minimum)	4	
8	Method of Galvanising	Hot dipped according to IS:4826 /1979 with medium coating.	
9	Mass of coating (minimum)	Line wire- 110 gms/Mtr ² Point wire- 105 gms/Mtr ² (testing after barbing)	
10	No. of dips the wire is able to withstand without	(testing after barbing)	

	copper coating		
	A) For Line Wire	2 dip in Min	
	B) For Point Wire	2 dip in Min	

Signature of the bidder with Seal

SUB-STATION FENCING WITH BARBED WIRE:

For Sub-Station fencing with Barbed wire refer attached Drawing

MATERIALS HANDLING AND INSURANCE

The contractor shall deliver all equipment/materials against this contract to his site stores under cover of Transit Insurance to be taken in his name. Cost of such insurance is to be borne by the contractor.

Cost of transportation of all materials from contractor's store to the site of work as well as department supply items like Conductors, AB cables, Power cables, etc shall be borne by the contractor irrespective of mode of transportation and site condition. The contractor has to bear the cost of premiums on insurance for all materials, tower accessories and total erection cost of the line including cement, rods for foundation.

It will be the responsibility of the contractor to report to the concerned Police Station about all incidents of thefts and lodge, pursue and settle all claims with Insurance Company in case of damage/loss due to theft, pilferage, flood and fire etc. and the employer of the work shall be kept informed promptly in writing about all such incidents. The loss, if any, on this account shall be recoverable from the contractor if the claims are not lodged and properly pursued in time or if the claims are not settled by the insurance company due to lapses on the part of the contractor. The contractor shall have to replenish promptly damaged, stolen tower members and accessories conductors, earth wire, hardware's etc. and repair/re-erect the damaged lines, free of cost to the employer so as to maintain the programme of work. The employer will not be responsible in any way for such loss of materials.

TECHNICAL SPECIFICATION FOR 11 KV OUTDOOR VACUUM CIRCUIT BREAKERS

1. SCOPE

- 1.1 This specification covers design, engineering, manufacture, testing, inspection before dispatch packing, forwarding, transportation, insurance during transit, delivery to site/ stores of 11 KV Outdoor Vacuum Circuit Breakers for use the 33/11KV primary substations for feeder protection under the distribution networks of TPNODL.
- 1.2 All vacuum circuit breakers must be manufactured by ISO 9000 certified Organization and shall have been type tested at CPRI or any NABL Accredited laboratory/PHELA/KERI/KEMA/CESI laboratory within five years as on the date of bid opening and in satisfactory operation for a period not less than three years. The Bidder shall demonstrate compliance with this requirement by supplying with the bid, copies of the type test certificates together with performance certificates from purchasers/ users.
- 1.3 The scope of supply includes the provision of type tests at CPRI or any NABL Accredited laboratory/PHELA/KERI/KEMA/CESI laboratory within last five years.
- 1.4 The scope also includes the circuit breaker and current and potential transformers, supporting structures, operating mechanism, local/ remote control cabinet, relay control panel, foundation bolts, all the accessories and auxiliary equipment mandatory spares and special tools for satisfactory installation and operation.
- 1.5 The circuit breakers shall conform in all respects to the highest standards of engineering, design, workmanship, this specification and the latest revisions of relevant standards at the time of offer and the purchaser shall have the power to reject any work or materials, which, in his judgment, is not in full accordance therewith.

2. STANDARDS

Except where modified by this specification, the circuit breakers and the accessories shall be designed, manufactured and tested in accordance with latest editions of the following standards.

IEC/ISO/BS	IS	Subject
IEC: 56 IEC:62271-100& 200	IS: 13118	High voltage alternating current circuit breakers general requirement.
IEC: 694	IS: 12729	Common clauses of high voltage switch-gear and control gear standards (for voltage exceeding 1000 V).
IEC: 60	IS: 9135	High Voltage testing techniques.
IEC: 427	IS: 13516	Method of synthetic testing of HV .A.C circuit breakers.
IEC: 1233		HV. AC. Circuit breakers- inductive load switching.
IEC: 17A/CD:474		HV. AC. Circuit breakers- capacitive switching.
IEC: 529	IS: 13947	Degree of protection provided by enclosure.
IEC: 137	IS: 2099	Insulating bushing for A.C. voltages above 1000V
IEC: 233	IS : 5621	Hollow insulators for use in electrical equipment & testing.
IEC: 273	IS: 5350	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V.
IEC: 815	IS: 13134	Guide for selection of insulators in respect of polluted conditions.
IEC: 34	IS: 996	A.C motors
ISO: 1460 BS: 729	IS: 2629	Hot dip galvanizing
	IS: 2633	Method of testing uniformity of zinc coated articles.
	IS: 5	Colour for ready missed paints and enamels
	IS: 6005	Code of practice for phosphating or iron and steel.
IEC: 227	IS: 1554	P.V.C Insulated cables for voltages up to and including 1100 Volt.
IEC: 269	IS: 13703	Low voltage fuses for voltages not exceeding 1000volt.
ISO: 800	IS: 1300	Phenolic moulding materials.
	IS: 13118	Guide for uniform marking and identification of conductors and apparatus terminals.
IEC: 185	IS: 2705	Current transformers.
IEC: 296	IS: 335	Specification for unused insulating oil for transformer and switchgear.
IEC:186	IS: 3156	Potential transformers.

CBIP Technical Report No. 88 revised July, 1996 read with amendment issued (April, 99, September, 99 and also any other amendment thereafter)	Specification for AC Static Electrical Energy Meter.

This list is not to be considered exhaustive and reference to a particular standard or recommendation in this specification does not relieve the Supplier of the necessity of providing the goods and services complying with other relevant standards or recommendations.

3. REQUIREMENTS

The circuit breakers to be supplied against this specification shall be required to control the secondary side of 33/11 KV power transformers in the primary sub-stations or Bus coupler or the outgoing feeders in these sub-stations. The circuit breakers shall be suitable for 3 phase 50Hz solidly grounded neutral system and shall have normal current carrying capacity and symmetrical short circuit current breaking capability as mentioned hereunder.

The required 11 KV Vacuum Circuit Breakers suitable for outdoor installations are to be quoted by Manufacturers only with a valid ISO 9000 certification.

3.1 BASIC TECHNICAL REQUIREMENTS:

The vacuum circuit breakers are required to meet the following basic technical requirements. (Reference standards IEC: 56, IEC:62271-100&200, IS:13118 and associated standards listed in this specification.

Basic Technical Requirements

Sl. No	Particulars	Requirements
1	Service type	Outdoor
2	No. of Poles	3
3	Nominal system voltage	11 KV
4	Highest system voltage	12 KV
5	Rated normal current at 50°C	
i)	For Bus-bar of Circuit Breaker	800 A
ii)	For Interrupter	1250 A
iii)	For Outgoing Feeders/Transformer	1250 A
6	Rated short circuit breaking current (rms)	25KA
7	Rated short circuit making current (peak)	63KA
8	Rated short time current withstand capability for 3 sec.	25KA
9.	Rated insulation level:	
i)	One minute power frequency withstand voltage to earth (wet and	28 KV

	dry) rms	
ii)	Impulse withstand voltage to earth with 1.2/50µsec, wave of +ve and –ve polarity (Peak)	75 KV
10	First – pole – to clear factor	1.5
11	Rated operating sequence (for auto reclosing)	O-0.3 Sec- CO-3 min-CO
12	Maximum break time	3 cycles
13	Rated out of phase breaking current	25% of the symmetrical short circuit breaking current
14	Maximum pole scatter	10 mille seconds
15	Rated Auxiliary supply for spring charge motor, lamp & heater circuit.	230V A.C
16	Rated supply voltage for trip/close coil	24V D.C
17	Minimum creepage distance (mm)	350 mm
18	Minimum protected creepage distance (mm)	280 mm

4. SERVICE CONDITIONS:

The service conditions shall be as follows:

◆	Maximum a altitude above sea level	1,000m
◆	Maximum ambient air temperature	50 ⁰ C
◆	Maximum daily average ambient air temperature	35 ⁰ C
◆	Minimum ambient air temperature	5 ⁰ C
◆	Maximum temperature attainable by an object exposed to the sun	60 ⁰ C
◆	Maximum yearly weight average ambient temperature	32 ⁰ C
◆	Maximum relative humidity	100%
◆	Average number of thunderstorm days per annum (isokeraunic level)	70
◆	Average number of rainy days per annum	120
◆	Average annual rainfall	1500mm
◆	Maximum wind pressure	260Kg/m ²

5. 11 KV VACUUM CIRCUIT BREAKERS

5.1 General

The circuit breakers shall be structure mounted open type with vacuum as interrupting media incorporating separate interrupters of **1250 A** rating for each phase mounted on single frame. There shall be a common drive mechanism actuating the interrupters, which must work in synchronism. These breakers shall be provided with suitable local control while provision shall be made for remote control.

The circuit breakers shall be fitted with spring mechanism. The inherent design of these circuit breakers shall be such that they shall satisfactorily perform all test duties and interrupt out-of-phase current and produce very low over voltage ($<2.0p.u.$) on all switching circuits, capacitive and inductive to IEC:56, IS:13118 and other associated standards mentioned in the clause of this specification.

The terminal pads shall have silver-plating of at least 50 micron thickness. The design of the circuit breakers shall be such that inspection and replacement of contacts, coils, vacuum bottles and any worn or damaged components can be carried out quickly and with ease. The contact gaps shall be adjustable to allow for wear.

The mechanism and the connected interrupters shall satisfy the mechanical endurance requirements of IEC: 56, IS: 13118 and all additional requirements specified herein.

5.2

Porcelain Insulator

External parts of the circuit breakers, which are under continuous electrical stress, shall be of hollow porcelain. The creepage and flashover distance of the insulators shall be dimensioned and the type and profile designed in accordance with IEC:815 or IS: 13134 and shall be suitable for the worst environmental conditions specified in this specification. The creepage distance across the interrupting chambers shall suit the outdoor service conditions mentioned in the relevant standards for heavily polluted atmosphere and shall be not less than 350 mm with minimum protected creepage distance 280 mm. Internal surfaces of hollow insulators shall also be glazed. The insulators shall comply with IS:5621 and tested in accordance with IEC:233.

All porcelain whether, used on the interrupting chamber or on the support insulator shall have the following properties:

Higher strength, homogeneity, uniform glaze, free from cavities and other flaws and high quality uniform finish porcelain components and shall withstand the maximum expected static and dynamic loads to which the circuit breakers may be subjected during their service life.

5.3

Interrupting media

5.3.1

Vacuum:

In vacuum circuit breakers, facilities shall be provided for monitoring the contact erosion and any change in contact gap. The vacuum bottles shall be easily replaceable on site and the mechanism shall be conveniently adjustable to permit resetting the contact gap.

The vacuum circuit breaker poles shall be sealed to prevent contamination of the spaces surrounding the interrupters. The Bidder shall demonstrate how this is achieved by supplying technical details with the bid.

5.4

Auxiliary contacts

12 auxiliary contacts (6N.O.+6N.C.) of 24 Volt D.C grade and 10 amps DC rating shall be provided in each circuit breaker.

5.5

Indication

A mechanically operated circuit breaker position indicator of non corroding material shall be provided in a location visible from the operating side of the breaker without the necessity to open the mechanism door. The word „OFF“ in white letter on green background shall be used to indicate that the breaker is in the opening position and the word „ON“ in white letters on a red background to indicate that the breaker is in the closed position. The drive for the device shall be positive in both directions and provision shall be made for local and remote electrical indication. Indication of spring charging condition shall be provided as mentioned in this specification. Mechanical counters to record the number of closing operations shall be provided for each circuit breaker mechanism.

5.7

Operation and controls

The breaker shall normally be operated by remote electrical control with electrical tripping by shunt trip coil. Provision shall be made for local electrical operation and mechanical operation.

The following facilities shall be provided in the circuit breaker local control cabinet:

- LOCAL/ REMOTE selector switch of stay put type. The selection of „local“ operation shall inhibit the operation of the breaker from any remote source.
- ON/NEUTRAL/ OFF control switch or ON and OFF push buttons. The push buttons shall be momentary contract type with rear terminal connections. The close push button shall be of green colour and the open push button red colour.
- MECHANICAL EMERGENCY TRIP DEVICE: suitable for manual operation in the event of failure of electrical supplies. The device shall be accessible without opening any access doors and distinctly labelled. It shall be shrouded and protected against inadvertent operation.
- Means shall be provided for manual operation of these circuit breakers during failure of auxiliary power in addition to electrical operation.
- Means shall be provided to prevent the mechanism from responding to a close signal when the trip coil is energized or to reclosing from a sustained close signal either opening due to a trip signal or failure to hold in the closed position.

The circuit breaker shall be able to perform 10,000 operating cycles at no load in accordance with IEC: 17A/474/CD for circuit breakers for auto reclosing duties.

6.**CURRENT TRANSFORMERS**

Current transformers, three per circuit breaker, shall be of outdoor, single phase oil immersed dead tank type and shall comply with IEC:185 and IS:2705, suitable for operation in hot and humid atmospheric conditions described in service condition. They shall be mounted on the bracket. The CT tank should be Hot Dip galvanized as per relevant ISS to prevent corrosion of all exposed metal parts.

6.1 Core

High grade non- ageing cold rolled grain oriented (CRGO M4 or better grade) silicon steel of low hysteresis loss and permeability shall be used for the core so as to ensure specified accuracy at both normal and over currents. The flux density shall be limited to ensure that there is no saturation during normal service.

The instrument security factor of the core shall be low enough so as not to cause damage to the instruments in the event of maximum short circuit current.

6.2 Windings

The secondary windings shall be made of electrolytic copper with suitable insulation. The conductor shall be of adequate cross- section so as to limit the temperature rise even during short circuit conditions. The insulation of windings and connections shall be free from composition liable to soften coze, shrink or collapse during service.

Polarity shall be indelibly marked on each current transformer and at the lead and termination at associated terminal blocks. CTs with multi ratio winding shall be clearly tabulated to show the connections required for different ratios. Similar numbers shall be marked on terminal block arrangement and wiring diagram. Apart from the above marking and those to be provided as per IEC 185 or IS 2705, other markings shall be provided in consultation with owner.

The continuous current rating of the primary winding shall be one hundred and fifty percent of the normal rated current. Secondary windings of current transformers shall be used for metering, instrumentation and protection and shall be rated for continuous current of one hundred and fifty percent of normal rated current of primary winding.

6.3 Construction

The current transformer enclosures shall be made of high quality steel and shall be hot dip galvanized and shall be able to withstand stresses occurring during transportation and the terminal and mechanical stresses resulting from maximum short circuit current in service. The primary winding and terminals shall be in a tank and supported by a hollow porcelain insulator. The secondary connection shall be conducted through the hollow insulator and terminated in a terminal box mounted on the base plate.

6.4 Hermetic sealing

Each current transformer shall be supplied filled with insulating oil complying with IEC: 296 or IS: 335 and shall be hermetically sealed to prevent atmosphere coming in contact with oil, avoiding frequent filtration and change of oil. Nitrogen or any oil inert gas above the oil level shall be provided to permit expansion and contraction of oil without any contact with the atmosphere.

The current transformers shall have provision for draining and re-filling insulation oil after drying.

6.5 Insulating oil

The current transformer shall be complete with new insulating oil. The quantity of insulating oil for first filling of the equipment and complete specification of oil proposed to be used shall be stated in the bid. The oil shall conform to the requirements of latest issue of IEC: 296 or IS: 335.

6.6 Fittings and accessories

Fittings and accessories listed below shall be supplied with each current transformer:

- Oil level gauge;
- Oil filling hole and cap;
- Pressure relief device;
- HV terminal connectors;
- Two earthing terminals and strips with necessary nut, bolts and washers;
- Name and rating plate;
- Terminal box with LV terminal connections;
- Mounting nuts, bolts and washers;

Any other fittings deemed essential by the Supplier shall also be supplied with each current transformer.

The oil level gauge shall be mounted in such a way that the oil level can be clearly seen from ground level.

A dust, vermin and weather proof terminal box shall be provided at the lower end of the current transformer for terminating the secondary windings. The box shall have a bolted cover plate complete with gaskets. The terminal box shall have terminal blocks, cable gland plate and cable glands with shrouds suitable for different sizes of PVC insulated control cables 650/1100V grade as per IEC:227 or IS:1554. The terminal blocks shall have covering of moulded insulation materials complete with brass studs, washers, nuts and lock nuts suitable for termination of 2X2.5 sqmm wires. The termination shall be made by crimping lugs or bare wire with insulating sleeves at ends.

The terminal box enclosure shall have protection as per class IP 55 as defined in IEC: 529 or IS: 13947.

6.7 CT Junction Box/Console Box

Each set of 3 current transformers for three phase shall be provided with a common junction box mounted on the circuit breaker supporting structure at a convenient position to accommodate the secondary wire of CT and other control cables of Purchaser. Separate terminals for testing the relays and instruments and short circuiting of each current transformer secondary wires shall be provided in it. The junction box enclosure shall have the same protection features as for the terminal box. It shall be provided with terminal blocks, gland plates and glands suitable for different sizes of cables. Facilities shall be provided for earthing the CT secondary wires in the junction box.

6.8 Hollow porcelain insulators

The insulators of the current transformers shall conform to latest edition of IS: 5621 and shall be subjected to and successfully pass the tests listed in this standard and in IEC: 233. The hollow porcelain insulators shall be brown glazed and shall meet the requirements indicated in this specification. The insulators shall be cemented with Portland cement to the flanges resulting in high mechanical, tensile and breaking strength.

6.9 Insulation level

The current transformers shall be designed to withstand impulse test voltages and power frequency test voltages as specified in this specification.

6.10 Terminal connections

The CTs shall be provided with bi-metallic solderless clamp and rigid type terminal connectors on the top tank for connection to the HV terminals. The other requirements shall be same as for the terminal connectors of the circuit breaker described in this specification. They shall be universal type suitable for both horizontal and vertical connections.

Two earthing terminals complete with necessary hardware shall be provided on each CT for connecting to earth continuity conductor to be provided. The earthing terminals shall be identified by means of appropriate symbol marked in a legible and indelible manner adjacent to the terminals. The terminals shall be adequately sized to meet the full earth fault current envisaged.

Basic technical requirement

6.11

Ratings: The CTs shall conform to the following ratings and other particulars of the circuit breakers:

Technical Requirements

Sl. No	Description		Requirements		
1	Rated voltage	:	12 KV		
2	Insulation level	:			
a)	Impulse withstand voltage	:	75 KVP		
b)	One minute power frequency with voltage on	:			
i)	Primary winding	:	28KV rms		
ii)	Secondary winding	:	3KV rms		
3	Frequency	:	50Hz		
4	Rated continuous thermal current	:	120% of rated primary current		
5	Short time thermal rating and its duration	:	25KA for 3 sec.		
6	Transformation ratio of CTs				
i)	Category- A: 600-300-150-1-1-1A		Core-I	Core-II	Core-III
a)	Rated output		15VA	15VA	-
b)	Class of accuracy		0.5	5P	PS
c)	Accuracy limit factor		-	20	
d)	Purpose		Metering	Protection	Protection
e)	Maximum exciting current at $V_k/2$				30mA
f)	Max. Instrument Security Factor		10	-	-
ii)	Category- B 400-200-100/1-1 A	:	Core-I	Core-II	
a)	Rated output		15VA	15VA	
b)	Class of accuracy		5P	0.5	
c)	Accuracy limit factor		20		
d)	Purpose		Protection	Metering	
e)	Max. of Instrument security factor	:	-	10	
7	Type	:	Single phase, outdoor, Dead tank, oil filled & hermetically sealed		

6.12 Tests and inspection

The CTs shall be tested in accordance with the requirements of the type tests and routine tests as per the latest issues IEC: 185 or IS: 2705.

The tests to be conducted shall include:

6.12.1 Type Tests:

- Lightning impulse voltage;
- Power frequency wet withstand voltage;
- Temperature rise;
- Short time current;

- Composite error;
- Accuracy test (for measuring core);
- Instrument security current (for measuring core);
- Current error and phase displacement (for protection core)

6.12.2 Routine tests

- Verification of terminal marking and polarity;
- Power frequency dry withstand test on primary windings;
- Power frequency dry withstand test on secondary windings;
- Power frequency dry withstand test between sections;
- Over voltage inter-turn test;
- Composite error;
- Turn ratio;
- Accuracy test (for measuring core);
- Current error and phase displacement (for protection core);
- Knee point voltage and magnetizing current test (for PS class);
- Secondary winding resistance (for PS class).
- Insulation Resistance Test.

7.0 POTENTIAL TRANSFORMER

7.1 BASIC TECHNICAL REQUIREMENTS

The 11 KV outdoor voltage transformers are required to meet the following basic technical requirements (Reference standards: IEC:186, IS:3156 and associated standards listed in the specification):

Sl. No	Particulars	Requirements
1	Type	Single phase, outdoor, oil filled & hermetically sealed
2	Nominal system voltage, phase to phase	11 KV
3	Application	Instrumentation, Metering and Protection
4	Number of secondary windings	1
5	Rated normal burden*	100VA
6	Rated primary voltage	12 KV
7	Rated secondary voltage	110V
8	Class of accuracy	0.5
9	One min. power frequency withstand voltage for primary	70 KV (rms)
10	One minute power frequency withstand voltage of secondary winding (rms)	3 KV (rms)
11	Rated voltage factor	
i)	Continuous	1.2
ii)	For 30 seconds	1.5
12	Creepage distance to earth in mm per KV of highest phase to phase system voltage	25

* The burden indicated is the minimum acceptable to the Employer. The supplier shall ensure that the rated output of the voltage transformers is adequate to meet at least 120 percent of the connected load (burden).

7.2 GENERAL

The voltage transformers to be supplied under this specification shall be of outdoor, single phase dead tank double wound, oil immersed type, complying with IEC:185 and IS:3156 suitable for operation in hot and humid atmospheric conditions described in this document. To prevent corrosion of the exposed surfaces, the tank should be not dip galvanized. They shall have separate HV and LV windings and shall be suitable for use as bus VTs in 33/11KV primary substations.

7.3 Duty requirement

11 KV Voltage transformer for all the indicating instruments and measuring meters in the primary substation on 11 KV side.

7.4 Porcelain Insulator

External parts of the voltage transformers which are under continuous electrical stress shall be of hollow porcelain insulators complying with latest edition of IS:6521 tested as per IEC:233. The creepage and flashover distance of the insulators shall be dimensioned and the type and profile designed in accordance with IEC:815 or IS:13134 and shall be suitable for the worst environmental conditions for heavily polluted atmosphere and shall be not less than 25mm per KV of highest phase to phase system voltage.. Internal surfaces of hollow insulators shall also be glazed.

The insulators shall be cemented with Portland cement to the flanges resulting in high mechanical, tensile and breaking strength.

All porcelain used on the voltage transformers shall have the following properties high strength, homogeneity, uniform glaze, free from cavities and other flaws and a high quality uniform finish porcelain components shall withstand the maximum expected static and dynamic loads to which the voltage transformers may be subjected during their service life.

The insulation of the hollow porcelain insulators shall be coordinated with that of the voltage transformers to ensure that any flash over occurs only externally.

7.5 Core

High grade non-ageing cold rolled grain oriented silicone steel of low hysteresis loss and permeability shall be used for core so as to ensure accuracy at both normal and or over Voltages. The flux density shall be limited to 1.6 Tesla at normal voltage and frequency. There shall be no saturation at any stage during operation.

The instrument security factor of the core shall be low enough so as not to cause damage to the instruments in the event of maximum short circuit current or over voltages.

7.6 Windings

The primary and secondary windings shall be electrolytic copper of high purity and conductivity and covered with double paper insulation. The conductor shall be of adequate cross-section so as to limit the temperature rise even during maximum over voltages.

The insulation of windings and connections shall be free from composition liable to soften, ooze, shrink or collapse during service.

The current rating of the primary winding shall be one hundred and fifty percent of the normal rated burden and the windings shall be suitable to withstand continuously the maximum system voltage.

The secondary windings of the voltage transformers shall also be suitable for continuous over voltage corresponding to the maximum system voltage at the primary winding. The winding supports shall be suitably reinforced to withstand normal handling and the thermal and dynamic stresses during operation without damage.

The voltage transformer secondary circuits will be taken out to form the star point and earthed at one point outside the voltage transformers.

Both primary and secondary winding terminals shall be clearly and indelibly marked to show polarity in accordance with IEC: 186. The connections required for different secondary windings in case of multi-winding voltage transformers shall be clearly indicated in terminal blocks and the wiring diagrams.

7.7 Tank

Both expansion chamber and tank of the voltage transformers shall be made of high quality steel and shall be hot dip galvanized and shall be able to withstand the stress occurring during transit and all thermal and mechanical stresses resulting from maximum short circuit current during operation.

7.8 Insulating Oil

The voltage transformers shall be supplied filled with new insulating oil. The oil shall conform to the requirements of latest issue of IEC:296 of IS:335. The quantity of insulating oil for first filling of the equipment and complete specification of oil proposed to be used shall be stated in the bid.

7.9 Hermetic Sealing

The voltage transformers shall be supplied filled with insulating oil and shall be hermetically sealed to prevent atmosphere coming in contact with oil, avoiding filtration and change of oil. Nitrogen or other inert gas shall be provided above the oil surface to permit expansion and contraction of oil. Provision shall be made for draining and re-filling the insulating oil.

7.10 Fitting and Accessories

Fittings and accessories listed below shall be supplied with each voltage transformer:

- Oil level gauge.
- Oil drain, sampling and filling hole with cap;
- Pressure relief device;
- HV terminals;
- Two earthing terminals with necessary nuts, bolts and washers;
- Name and rating plate;
- Secondary terminal box with LV terminal connections;
- Mounting nuts, bolts and washers;
- L.V HRC cartridge fuses for the protection of secondary winding;

Any other fitting deemed essential by the contractor shall also be supplied along with each voltage transformer:

The oil level gauge shall be mounted in such a way that the oil level can be clearly seen from the ground level.

The name and rating plate shall contain all the particulars as provided in IEC:186 and also the name of the employer and year of manufacture. They shall comply with the clause termed label in this specification.

7.11 SECONDARY TERMINAL BOX

A dust, vermin and weather proof terminal box shall be provided at the lower end of each voltage transformer for terminating the secondary windings. The box shall have a bolted removable cover plate complete with gaskets. The terminal box shall have cable gland plate and cable glands with shrouds suitable for entry of 4 core x2.5mm² PVC insulated control cables as per IEC:227 or IS:1554.

The terminal box enclosure shall have protection of class IP 55 as defined in IEC:529 or IS:13947 and shall be painted or galvanized in accordance with specification of Surface Treatment.

7.12 Terminal blocks

Terminal blocks of brass studs rated for 10 Amps continuous current, 650 Volt grade enclosed in moulded insulating materials shall be provided with adequate electrical clearance for terminating the secondary wiring and outgoing connections. The terminal blocks shall be suitable for termination of 2.5mm² wires. The termination shall be made by crimping Jugs or bare wire with insulating sleeves at ends. All terminals must be marked with numbers and wire termination provided with numbered ferrules for identification.

7.13 Fuse protection

The secondary windings shall be protected by HRC cartridge fuses in fuse holder consisting of carriers and bases. The carriers and bases shall be of high grade flame retarding and non hygroscopic molded insulating materials with hard glass surface. Each fuse shall be identified with engraved plastic label.

7.14 Circuit diagram

A durable copy of the circuit wiring diagram shall be affixed to the inner side of the terminal box cover. Labels shall be provided inside the cover to describe the functions of various items of equipments.

7.15 TERMINATION

The equipment shall be supplied with HV electrical connection terminals of a size and rating appropriate for all the duties, including overload duty specified for the equipment. The terminals shall be of the bi-metallic type, suitable for connection of all aluminium alloy conductor (AAAC) or aluminium conductor steel reinforced (ACSR). In general connections using palm type solder less sockets shall be preferred. The proposed method of connections shall be stated in the offer and shall be subject to approval by the Purchaser. Where the terminals are of the clamp type, they shall be suitable for taking a range of conductors appropriate to the rating of the equipment.

All nuts, bolts, washers and spring washers required to complete the connection shall be supplied with the equipment.

7.16 EARTHING TERMINAL

Two earthing terminals complete with necessary hardware shall be provided on each voltage transformer for connecting to earth continuity conductors of the Employer. They shall be of electroplated brass and of adequate size to carry the earth fault current.

The earthing terminals shall be identified by means of appropriate symbol marked in a legible and indelible manner adjacent to the terminals.

7.17 TEST AND INSPECTIONS

The voltage transformers shall be tested in accordance with the requirements of the type tests and routine tests as provided in the latest issues of IEC: 186 or IS: 3516.

The tests to be conducted shall include;

7.17.1 Type tests:

- Lightning impulse voltage test;
- High voltage power frequency wet withstand voltage;
- Temperature rise test;
- Short circuit withstand capability test;
- **Determination of limits of voltage error and phase displacement.**

7.17.2 Routine tests:

- Verification of terminal marking and polarity;
- Power frequency withstand tests on primary winding;
- Power frequency dry withstand tests on secondary winding;
- Power frequency withstand tests between sections;
- Determination of limits of voltage errors and phase displacement;
- Partial discharge measurement.
- Insulating Resistance measurement.

7.18 TEMPERATURE RISE

The temperature rise of any part of the voltage transformer under continuous operating and exposed in the direct rays of the sun shall not exceed the permissible limits as provided in IEC publication 186 or IS: 3156. These shall not be exceeded when corrected for the difference between the ambient temperature at site and the ambient temperature specified in the standard. The correction proposed shall be stated in the bid.

PROTECTIVE RELAY & CONTROL PANEL

Outdoor control panels with protective relay and meter shall be provided by the supplier suitable for above breakers. The equipment shall have protection scheme with the following relays:

(i) Triple pole IDMTL type combined over current (2Nos) & Earth fault (1No) relay (Draw out type) preferably Non-communicable numerical relay.

Plug setting range of the over current and earth fault relays shall be 5% to 250%.

(ii) 3 elements auxiliary relay for transformer fault, trip for Buchholz, winding temperature & oil temperature.

(iii) Master trip relay for inter tripping.

(iv) Differential relay.

(v) One alarm bell scheme with bell (24V DC).

N.B:- The relays should be Areva, Easun Reyrolle, ABB or of any reputed make (subject to approval during technical evaluation)

9. METERS:

The following meters shall be provided.

i) Ammeter: - 1 No. , 0-300-600 A/ 1 Amp Preferable Make- IMP/ AE (Dial type).

ii) Volt meter: - 1 No., 0- 15 KV (size : 144mm x 144mm), make IMP/AE (Dial type).

iii) Ammeter selector switch- 1 No. Make – Kaycee or any other reputed make.

iv) Volt meter selector switch- 1No. Make- Kaycee or any other reputed make.

v) 40 watt lamp with switch- 1 No.

vi) Plug & Socket- 1 No.

vii) Fuses & Links- 1 No.

viii) Test terminal Blocks- Test terminal Block need be provided for testing relays & breakers.

ix) Indication Lamp- Red- Breaker „ON“

(24V DC LED type) Green Breaker „OFF“

Amber- Breaker “AUTO TRIP“

Blue- Spring charge indication.

White-Healthy Trip illuminated push bottom switch

10. OTHER EQUIPMENTS

10.1 Out Door Control- Relay Panel

10.1.1 1. General

The electrical controls, relays, instruments, meters, annunciation scheme shall be provided in a sheet steel enclosure conforming to IEC: 298 or IS: 3427 mounted on support base on the floor. The panel shall be free standing, dust, moisture and rodent and vermin proof suitable for outdoor installation. The panel shall have a high degree of protection for outdoor installation with relevant standard.

Each panel shall comprise of rigid welded structure frame enclosed completely by metal sheet of thickness not less than **2.5mm**. The sheets shall be cold rolled with smooth finish leveled and free from flaws. The structural frame and all load bearing members of the enclosure shall have minimum thickness of 2.5mm.

The control & relay panel board shall consist of panel, vertical independent, structure mounted with equipment mounted & wiring access on front and having double door protection (inside door to be glass covered) to prevent water entry inside the panel. Doors shall have handles with built in locking facility. All door panels and removable covers shall be gasketed all round with neoprene bonded gasket. Vewntilating louvers shall be provided to limit the temperature rise as provided in IEC: 694 and 298 or IS: 12729 and 3427. They shall be provided with filters encased in fine wire screens for non-ferrous metal or stainless steel unaffected by moisture and rain water. A 230V AC heater with auto temperature control shall be provided in the cabinet to prevent moisture condensation.

The housing shall be surface treated and painted in accordance with the clause on Surface Treatment of this specification.

10.1.2 Panel wiring and accessories.

10.1.3 Wiring

Each panel shall be supplied with all internal wiring complete.

Panel wiring shall be suitably bunched and clamped for neat appearance. The conductors used for wiring purpose shall be PVC insulated 650/1100 volt grade semi-flexible heat resistant, flame retardant and vermin proof electrolytic copper cable conforming to IEC:227, 502 or IS:1554. The wiring shall be securely supported and taken though PVC troughs. Each wire shall be continuous from end to end without any joint in between. All panel wiring shall be capable of withstanding a voltage of 2KV AC 50Hz for one minute.

Cable and wire for connections within the switchgear and between the switchgear and terminal blocks shall have a minimum temperature rating of 90 degree Celsius. The size of the conductors for panel wiring shall be not less than 2.5mm². For CT secondary wiring, two such wires shall be used in parallel.

10.1.4 Panel wiring protection

The panels shall be equipped with links and HRC cartridge fuses conforming to IEC:269 or IS:13703 in 650 Volt grade phenolic moulded fuse holder consisting of fuse carrier and base or miniature circuit breakers conforming to IEC:947-2 or IS:13947-2 at appropriate locations. The carriers and bases shall be made of high grade flame retardant and non hygroscopic phenolic moulded material with hard glass surface. Each fuse or MCB shall be identified with engraved plastic label.

In general, fuses and MCBs shall be limited to the minimum required for safety. The protection scheme shall include fuses for VT secondary circuits and DC supply to each panel and fuses for MCB for spring charging motor and incoming AC supply.

10.1.5 Terminal blocks

Terminal blocks of brass studs rated for 10 amps continuous current, 650 volt DC grade covered by moulded insulating materials with adequate electrical clearances shall be provided for terminating the panel wiring and outgoing connections. The termination shall be made by crimping lugs or bare conductor with insulating sleeves at ends. The arrangement can be horizontal or vertical as per standard practice adopted by the manufacturer. All terminals must be numbered and wire termination provided with numbered ferrules for identification. All numbering and marking including those in wiring diagram shall follow the guidelines provided in IS: 11353. All circuit breaker auxiliary contacts including spare contacts shall be wired to the terminal blocks. Ten percent spare terminals shall be provided.

10.1.6 Colour and numbering

The wiring used for 230V AC supply for illumination lamp, panel heater and other devices shall be coloured red for phase wire and black for the neutral. The colour of wires connecting directly to Earth shall be black. All other panel wires shall be of one colour to be approved.

Engraved core identification plastic ferrules marked to correspond with the panel wiring diagram shall be fixed at both ends of each wire. Ferrules shall fit tightly on the wire and shall not fall off when the wire is disconnected from the terminal block. Numbers 6 and 9, if used shall be under scored to enable differentiation.

10.1.7 Circuit diagram

A durable copy of the circuit wiring diagram shall be affixed to the inner side of the door of the switchgear compartment. Labels shall be provided inside the compartment to describe the functions of the various items of equipment.

The scope of the supply shall include the panel mounting base plate and all special equipment, bolts, nuts and washers necessary for making the supporting.

10.2 Supporting Structure

The supply of the material shall be complete with mounting structures of mild steel sections conforming to IS: 226 or equivalent ISO. The supporting structure shall be designed and constructed to withstand the maximum combined effects of the circuit breaker dead weight, its maximum dynamic load and maximum effect of wind loading. The supporting structure shall be hot dip galvanized as per IS 2629.

10.3 CT mounting bracket

The supporting structure shall be fitted with a bracket for supporting three oil filled 11 KV single phase current transformers as per enclosed GA drawing. The support bracket shall be provided opposite the circuit breaker poles and shall ensure adequate clearance between the breaker poles and the CTs as well as between the CTs. The CTs shall be supplied by the Supplier as per specification above and is included in the scope. The drawings of the structure with bracket shall be subject to Purchaser's approval before fabrication.

The CT mounting bracket shall be hot dip galvanized as per IS-2629.

10.4 Local control cabinet

The operating mechanism, local controls and monitoring shall be provided in a metal clad control cabinet fitted to the same structure supporting the breaker and mounted at a convenient height for safe operation from ground level or from platform to be supplied under the contract.

The cabinet shall be made of minimum 2.00mm sheet steel and shall be constructed as a dust, weather and vermin proof outdoor housing with protection of IP-54 class as defined in IEC:529 or IS:13947. It shall have single door and transparent windows for reading the circuit breaker ON or OFF position and spring charge position without opening the door. The door and any removable covers shall be gasketed all round with neoprene bonded gaskets. A ventilating louver shall be provided with fine wire non-ferrous metal or stainless steel screen and filter. A 230V AC heater with auto temperature control shall be provided in the cabinet to prevent moisture condensation and also a 230 volt lamp for internal illumination with door operated switch.

The local control cabinet shall be subjected to surface treatment and painting as per clause on surface treatment of this specification.

10.5 Panel wiring and accessories

Panel wiring shall be suitably bunched and clamped for neat appearance. The conductor used for wiring purpose shall be PVC insulated 650 volt/ 1100V grade semi-flexible copper cable conforming to IEC: 227 or IS: 1554, heat resistant, flame, vermin and rodent proof. The wiring shall be securely supported and taken through PVC troughs. All panel wiring shall be capable of withstanding a voltage of 2KV AC 50Hz for 1 minute. Each wire shall be continuous from end to end without any joint in between.

The sizes of the control cable for wiring in the cabinet shall be not less than 2.5mm². CT secondary wiring shall be though two such wires in parallel.

10.5.1 Fuse protection

The cabinet shall be equipped with links and HRC cartridge fuses in 650 volt grade fuse holders consisting of fuse carrier and base. The holders shall be made of high grade, flame retardant and non hygroscopic phenolic moulded material of dark brown colour with hard glass surface. Each fuse shall be identified with engraved plastic labels.

10.5.2 Terminal blocks

Terminal blocks rated for 10 amps continuous current, 650 volt grade covered by moulded insulating materials with adequate electrical clearances shall be provided for terminating the panel wiring and outgoing connections. The termination shall be made by crimping lugs or bare wire with insulating sleeves at ends. The arrangement can be horizontal or vertical as per standard practice adopted by the manufacturer. All terminals must be numbered and wire termination provided with numbered ferrule for identification. All numbering and marking include those in wiring diagram shall follow the guidelines provided in IS: 11353. Ten percent spare terminals shall be provided.

10.5.3 Colours

The wiring used for AC supply for illumination lamp and heater shall be differently coloured from control wiring so that these can be distinguished from each other. The colour of all earth wire shall be black.

10.6 Circuit diagram

A durable copy of the circuit wiring diagram shall be affixed to the inner side of the control cabinet. Labels shall be provided inside the cabinet to describe the functions of the various items of equipment.

10.7 Cable Entry

A removable gland plate shall be provided at the bottom of the cabinet for entry of Purchaser's control and auxiliary power cables in the cabinet. Required number of electroplated brass cable glands of appropriate sizes with shrouds shall be provided in consultation with the Purchaser in the gland plate for the control and power cables. Provision shall be made for earthing of the cable armours in the gland.

11 OPERATING MECHANISM

11.1 General

The operating mechanism of the circuit breaker shall be motor wound spring charged type. It shall be electrically and mechanically trip free with anti pumping device (as per IEC: 694 definitions). All working parts in the mechanism shall be of corrosion resistant material. Self lubricating, wearing resistant bearings shall be provided in the mechanism.

The mechanism shall fully close the circuit breaker and sustain it in the closed position against the forces of the rated making current and shall fully open the circuit breaker without undue contact bounce at a speed commensurate with that shown by tests to be necessary to achieve the rated breaking capacity in accordance with IEC:56 or IS:13118. The mechanism shall be capable of being locked in either the open or closed position. The mechanism shall be capable of fully closing and opening again after the auto-reclose time interval specified as 0.3 second in this specification.

11.2 Spring mechanism

The spring operating mechanism shall be with spring charging motor, opening and closing springs with limit switches and all accessories necessary for automatic charging. In normal operation, recharging of the operating springs shall commence immediately and automatically upon completion of the closing operation so that a complete sequence of closing and opening operation should be possible.

It shall be possible to hand charge the operating spring with the circuit breaker in either the open or closed position conveniently from the ground level. Closure whilst a spring charging operation is in progress shall be prevented and release of the springs shall not be possible until they are fully charged.

The state of charge of the operating springs shall be indicated by a mechanical device showing „**SPRING CHARGED**“ when closing spring is fully charged and operation is permissible and „**SPRING FREE**“ when closing spring is not fully charged and the operation is not possible. Provision shall be made for remote electrical indication of „Spring Charged“ and „Spring Free“ conditions.

The operating mechanism shall be such that the failure of any auxiliary spring shall not cause tripping or closing the circuit breaker but shall not prevent tripping against trip command.

Closing action of the circuit breaker shall charge the opening spring ready for tripping. From the close position with spring charged, one open-close-open operation shall be possible without recharging the spring.

11.3 Motor

The motor for spring charging shall be single phase 230 Volt A. C motor. Continuous motor rating shall be at least ten percent above the maximum load demand of the driven equipment. It shall remain within its rated capacity at all operating points that will arise in service. It shall be protected by H.R.C cartridge fuses or MCB. The motor shall comply with IEC: 34 or IS: 996.

12. AUXILIARY POWER SUPPLY

The operating mechanism shall be suitable to operate with the following auxiliary power supplies.

- a) 230V, 50Hz Single phase A.C- For spring charging motor
 - b) DC supply 24 Volts- For close and open coils, indication & Alarm
- (Power pack input supply: 230V & 110V AC and Output:24V DC)

The DC supply shall be from a Power Pack. The Input to Power Pack is 110V from PT and 230V from main supply. The power pack should be capable for minimum 3 Trippings even if input to power pack is failed.

The mechanism shall be designed to operate satisfactorily despite fluctuations of auxiliary power supplies as under:

AC supply:	Voltage	From 115% to 85% of normal voltage
	Frequency	From 105% to 95% of normal frequency
	Combined voltage and frequency variation	From 115% to 85% of normal
DC supply:	Voltage	From 120% to 70% of normal voltage

13. INTERLOCKS

The circuit breaker shall be capable of being mechanically and electrically interlocked with the associated line isolator so that the isolator cannot be operated with the breaker in the closed position.

All doors or shutters which give access to live parts shall be interlocked in such a way that these cannot be opened unless the circuit breaker is in the open position.

Other interlocks shall be provided as deemed necessary for safety.

15. TERMINAL CONNECTOR

Suitable terminal connectors of bi-metallic type suitable for both horizontal and vertical connection shall be provided on the terminal pad both on the incoming and the outgoing side for connection of jumpers of ACSR or AAAC conductor. The size of the conductor may vary between 50mm² and 232mm² depending upon the location of the circuit breaker. The terminal connection drawing and details are to be approved by the Purchaser before fabrication. The terminal connectors shall be bi-metallic type to avoid bi-metallic corrosion.

INSULATION AND CLEARANCE

16.

a) The insulation to ground, the insulation between open contacts and insulation between phases of the circuit breaker shall be capable of satisfactorily withstanding dielectric test voltages.

b) The minimum clearance in open air shall be as follows:

- Phase to phase spacing in - 320 mm
switchyard i.e. interpole spacing
for Breaker (min)
- Ground clearance from the - 2700mm
lowest line terminal if both the
terminals are not in same
horizontal plane (min)

17. TEMPERATURE RISE

The temperature rise and the maximum temperature of any part of the circuit breaker under continuous load condition and exposed in the direct rays of the sun shall not exceed the permissible limits as provided in Table V of IEC publication 694 or table 4 of IS:12729. These limits shall not be exceeded when corrected for the difference between the ambient temperature at site and the ambient temperature specified in the standard. The correction proposed shall be stated in the tender.

18. TESTS

18.1 Type and routine tests

The circuit breakers shall be subjected to routine and type tests in accordance with the standards listed in this specification including the following IEC and IS standards with the latest amendments:

- Circuit breaker IEC: 56 and IS:13118 and relevant other standards
- Porcelain insulator IEC: 233 and IS: 5621 and relevant other standards

The tests shall include but not limited to the following:

18.2 Short circuit tests

The circuit breaker shall satisfactorily perform the out of phase and short circuit duties specified in IEC:56, IEC:17A(Sectt.) and IEC:17A/CD/474, IS-13118 and IS:13516.

The circuit breaker shall be capable of performing at least twenty five (25) open operations at the rated short circuit current before maintenance or inspection is required.

18.3 Capacitive current switching

Capacitive switching tests shall be performed in accordance with IEC:56 or IS:13118 and IEC:17A/CD/474 at 1.3U preferably by direct test method or alternatively using synthetic method to IEC:427 or IS:13516. The test circuits shall simulate the most onerous site conditions.

18.4 Reactor Switching

In addition to the capacitive current switching tests to IEC:56 or IS:13118 and IEC:17A/CD/474, the circuit breakers shall be tested for shunt reactor switching in accordance with IEC:1233, Examination of the interrupter after the tests shall not show any evidence of surface tracking or erosion of contracts.

18.5 Dielectric tests

At zero gauge loss of vacuum inside the interrupter chamber, the open contracts shall withstand continuously, the rated phase to ground voltage and it shall be possible to break normal current in these conditions. During the dielectric type tests, no flashover external or internal shall be acceptable.

The circuit breakers shall be subjected to a power frequency AC voltage test for one minute in dry and wet conditions and there shall be no external flash over to earth.

18.6 Mechanical endurance

In addition to the requirements of IEC:56, an extended mechanical endurance test is required to show that the circuit breaker is capable of at least 10,000 operations at no load in accordance with IEC:17A/474/CD. Between the specified test series in IEC: 17A/474/CD, some maintenance such as lubrication and mechanical adjustment is allowed and shall be performed in accordance with manufacturer's instructions. Change of contracts is not permitted.

18.7 Low current switching

The circuit breakers shall produce very low over voltage (<2.0 pu) on all switching circuits inductive current including reactor switching to IEC-1233 and capacitive current switching to IEC:17A (Secretariat) 438 and IEC 17A/CD/474 the circuit breaker shall be re-ignition or re- strike free for all duties.

18.8 Duty requirement tests

Apart from auto-reclosing and the other duties mentioned above, the breakers shall be able to perform the following duties for which type tests are to be conducted as per IEC:56 or IS:13118.

1. Breaking the steady and the transient magnetising current of the transformer.
2. Breaking 25% of rated fault current at twice the rated voltage as per IEC/IS.
3. Cable charging breaking current.
4. Back-to-back capacitor bank breaking current.
5. Single capacitor bank breaking current.
6. Capacitor bank in rush making current.

Test for the resistance of the main circuit shall also be conducted.

18.9 Temperature rise test

Temperature rise test is to be conducted on the circuit breaker and the accessories in accordance with IEC:56 or IS:13118. The temperature rise shall be limited as per this specification.

19. PERFORMANCE REQUIREMENTS

The supplier shall declare the circuit breaker opening and closing times at 120 percent, 100 percent and 70 per cent of the rated voltage of the opening and closing devices when measured at the terminals of the trip and closing coils. The minimum make break time at rated voltage and total break time of the CB shall be stated. The total break time must not exceed 60m. sec.

20. EARTHING

All metal parts not intended for carrying current or not alive shall be connected to duplicate earthing system and suitable electroplated brass earthing terminals shall be provided on each circuit breaker in conformity with IEC:56 or IS:13118. Suitable identification mark for the earth terminals shall be provided adjacent to the terminal.

Earth continuity conductors shall be provided down to the ground level for earth connection to purchaser's earthing grid. It shall have sufficient cross sectional area to afford a low resistance path for the full fault current envisaged. Such conductor shall also be provided for the CTs up to the ground level.

The size of the earth continuity conductor shall be large enough to reduce the potential rise of

the metal frame of the breaker in the event of fault to minimum but in any case not more than 10V. The size of the conductor shall also be adequate to restrict the temperature rise without causing any damage to the earth connection in the case of fault. No riveted joints in the earth conducting path shall be permissible and only bolted joints of adequate size shall be provided with nuts, bolts and plain and spring washers. The surfaces to be jointed shall be perfectly flat without any unevenness to ensure that there is no contact resistance.

An earth bus bar of copper strip shall be provided inside the local control cabinet to which all earthing connections must be made. The earth bus bar shall be terminated into two electroplated brass earthing terminals of adequate size with nuts, bolts and washers for connecting to earth continuity conductor mentioned above.

TECHINICAL DATA SCHEDULE FOR 11 KV OUTDOOR VACUUM CIRCUIT BREAKER

SL NO	DESCRIPTION	As Per Specifications	UNITS	BIDDER'S OFFER
1	GENERAL			
	- Name of manufacture			
	- Manufacturer's type designation	Out-Door type		
	- Governing standards	IS : 13118, IEC-62271-100		
	- No. of poles of circuit breaker	3	no.	
	- No. of breaks per phase	1	no.	
	Type – Vacuum	Vacuum		
2.	NOMINAL VOLTAGES			
	- Rated voltage	11	KV	
	- Maximum(continuous)service rated voltage	12	KV	
3.	RATED NORMAL CURRENT			
	- Under normal condition	800	Amps	
	- Under site condition	800	Amps	
4.	SHORT CIRCUIT PERFORMANCES			
	- Rated short circuit breaking current:			
	- Symmetrical, rms	25	KA	
	- Asymmetrical including DC component	30	KA	
	- Rated short circuit making current; peak	62.5	KA	
	- Short time current withstand capability:			
	Peak value	62.5	KA	
	Rms value	25	KA	
	Duration	3	Sec	
5	MAX. TEMP. RISE OVER AMBIENT OF 50⁰C			
	- At normal continuous current	As Per IS	⁰ C	
	- After performing the operating sequence		⁰ C	
6.	MAKE AND BREAK TIMES			
	Total break times			
	- At 10% rupturing capacity	< 60	milli-sec	
	- At rated rupturing capacity	< 60	milli-sec	
	- Arcing time at rated breaking current	15 (Max)	milli-sec	

	- Make time from giving close command	< 60	milli-sec	
	- Minimum re-closing time at full rated interrupting Capacity from trip coil energisation	300	milli-sec	
	- Minimum dead time for 3 phase reclosing		milli-sec	
	- Circuit breaker opening time:			
	at 125% of rated voltage of opening device	< 60	milli-sec	
	at 100% of rated voltage of opening device	< 60	milli-sec	
	at 70% of rated voltage of opening device	< 60	milli-sec	
7	RESTRIKING VOLTAGES FOR 100% RATED CAPACITY			
	- Amplitude factor	62 KV		
	- Phase factor	3		
	- Natural frequency		Hz	
	- Rate of rise of recovery voltage		Kv/μs	
8	RATED INSULATION LEVEL			
	- Dry and wet power frequency withstand test voltage for one minute, rms:			
	- Between live terminals and grounded objects	28	KV	
	- Between terminals with breaker contacts open	28	KV	
	- 1.2/50 μs full wave impulse withstand voltage +ve and – ve polarity, peak			
	- Between live terminals and grounded object	75	KVp	
	- Between terminals with breaker contacts open	75	KVp	
	- One minute power frequency voltage of auxiliary wiring	2	KV	
9	OPERATING PERFORMANCE			
	- Rated transient recovery voltage		KVp	
	- Rated cable charging breaking current	25	Amps.	
	- Rated single capacitor bank breaking current	400	Amps	
	- Rated back-to-back capacitor bank breaking current	400	Amps	

	- Rated capacitor bank in-rush making current	20	KA	
	- Rated small inductive breaking current	25	KA	
	- First pole-to-clear factor	1.5		
	- Rated operating sequence	O-0.3sec-CO-3min-CO		
	- Rated out-of-phase breaking current		KA	
	- Re-ignition and Re-strike free	Yes/No		
10	NUMBER OF OPERATION POSSIBLE WITHOUT MAINTENANCE			
	- at full rated interrupting current	>100	no.	
	- at 50% of rated interrupting current	>100	no	
	- at 100% of full load current	>10000	no	
	- at no load		no	
11	MINIMUM CLRRANCE IN AIR			
	- Between phases	>150	mm	
	- Live parts to earth	>120	mm	
	- Live parts to ground level		mm	
12	WEIGHTS AND DIMENSIONS			
	Total weight of one complete breaker, including mounting structure		Kg	
	Mounting structure weight		Kg	
	Control cabinet weight		Kg	
	Dimensions: Height		mm	
	Width,		mm	
	Depth		mm	
	Drawings must be provided	Yes / No		
13	HOLLOW INSULATOR HOUSING			
	Type and make of insulators.			
	Power frequency withstand test voltage for one minute:			
	- Dry	28	KV	
	- Wet	28	KV	
	Flash over value			
	- Dry	75	KVp	
	- Wet	75	KVp	
	1.2/50 impulse voltage withstand capability			
	- positive polarity	75	KVp	
	- negative polarity	75	KVp	

	Creepage distance total	>300	mm	
	Creepage distance protected	>280	mm	
	Weight of assembled housing		Kg	
14	SUPPORT INSULATOR			
	Type and make of insulators			
	Power frequency withstand test voltage for one minute:			
	- Dry	28	KV	
	- Wet	28	KV	
	Flash over value			
	- Dry	75	KV	
	- Wet	75	KV	
	1.2/50 impulse voltage withstand capability			
	- positive polarity	75	KVp	
	- negative polarity	75	KVp	
	Creepage distance, total	>300	mm	
	Creepage distance, protected	>280	mm	
	Weight of assembled housing		Kg	
	Corona shield provided or not	Yes / No		
15	CONTACTS			
	- Type of main contacts			
	- Type of auxiliary contacts			
	- Material of auxiliary contacts	Copper		
	- Type of plating, if any	Silver		
	- Thickness of plating	20	Micron	
	- Contact pressure		gm/ sq.mm	
	No of auxiliary contacts provided:	6 NO + 6 NC		
	Those closed when breaker is closed	6	no	
	Those open when breaker is closed	6	no	
	Those adjustable		no	
16	OPERATING MECHANISM			
	Opening type	Shunt Trip		
	Closing type	Motor / Manual spring charge, Shunt/Magnetic actuator operation		
	Force applied by charged spring for closing		Kg / N	
	Time taken by motor for charging the spring from fully Discharged to fully charged position	<30	sec	
	Full sequence of operation	0-0.3sec-CO-3min-CO		
	Whether limit switches are provided with spring	Yes/No		

	Whether spring limit switches start stop the motor	Yes/No		
	Type and material of spring employed			
	Whether trip free	Yes/No		
	Whether anti pumping device provided	Yes		
17	AUXILIARY AND CONTROL POWER SUPPLY			
	- Normal auxiliary A.C supply voltage	230	Volts	
	- Voltage limits for proper operation			
	Maximum	115%	Volts	
	Minimum	85%	Volts	
	- Frequency limits for proper operation			
	Maximum	105%	Hz	
	Minimum	95%	Hz	
	- Normal control circuit voltage	24	Volts	
	- DC Voltage limits for proper operation			
	Maximum	120%	Volts	
	Maximum	70%	Volts	
	- Power required for trip coil	300	Watts	
	- Power required for closing coil	300	Watts	
18	LOCAL CONTROL PANEL			
	- Material			
	- Degree of protection			
	- Vermin proof provisions	Yes/No		
	- Weather proof provision	Yes/No		
	- Dust proof provision	Yes/No		
	- Ventilation provision	Yes/No		
	- Thickness of sheet materials used	3	mm	
	- Overall dimensions		mm	
	- Total weight		Kg	
	- Mounting arrangement			
19	TERMINAL CONNECTOR			
	- Material			
	- Bi-metallic or not	Yes/No		
	- Weight		Kg	
	- Dimensions		mm	
	- Size and type of conductor it can accommodate	100	sq mm	
	- Terminal pads silver plated or not	Yes/No		
	- Thickness of silver plating		microns	

20	CORROSION PREVENTION SYSTEM FOR CIRCUIT BREAKER AND CONTROL CABINET			
	- Surface preparation			
	- Rust inhibition			
	- Zinc thickness/paint thickness		Microns	
	- Treatment of fasteners			
21	CORROSION PREVENTION SYSTEM FOR SUPPORT STRUCTURE	Hot Dip Galvanized		
	Surface preparation			
	Rust inhibition			
	Zinc thickness			
	Treatment of fasteners.		Microns	
22	VACUUM CIRCUIT BREAKER SEALING			
	Degree of protection of circuit breaker pole enclosure (IEC 529, IS 13947).			
	Method of sealing the circuit breaker pole enclosure.			
23	CURRENT TRANSFORMER			
1	Category A; 600-300-150 / 1-1-1A			
	Make and type of transformer	Out type, 1 ph, Oil cooled, Dead Tank		
	Ratio	600-300-150/ 1-1-1 A		
	Core1. VA burden	15	VA	
	Accuracy class	0.5		
	Saturation factor			
	Instrument security factor	10		
	Accuracy limit factor			
	Core 2. VA burden	15	VA	
	Accuracy class	5P		
	Saturation factor			
	Accuracy limit factor	20		
	Core 3. Accuracy class	PS		
	Saturation factor			
	Accuracy limit factor			
	Knee point voltage (Vk)	> = 150	Volts	
	Magnetizing current at Vk/2	< 30 mA at 0.5 Vk	Milli Amps	
	Secondary resistance R _{ct}		Ohms	
	Short time current rating, time	25 KA for 3 sec	KA / Sec.	
	Impulse voltage withstand level	75	KV	

	Power frequency voltage withstand level			
	Primary winding	28	KV	
	Secondary winding	3	KV	
	Weight of CT complete		Kg	
2	Category B: 400-200-100/1-1A			
	Make and type of Transformer	Out type, Oil cooled, 1 ph, Dead Tank		
	Ratio			
	Core 1. VA burden	15	VA	
	Accuracy class	0.5		
	Saturation factor			
	Instrument security factor	10		
	Accuracy limit factor			
	Core 2. VA burden	15	VA	
	Accuracy class	5P		
	Saturation factor			
	Accuracy limit factor	20		
	Short time current rating: Current time	25 KA for 3 sec	KA, Sec	
	Impulse voltage withstand level	75	KV	
	Power frequency voltage withstand level			
	Primary winding	28	KV	
	Secondary winding	3	KV	
	Weight of CT complete		Kg	
24	11 KV VOLTAGE TRANSFORMER			
a.	GENERAL.			
	- Make	Out type, Oil cooled, 1 ph, Dead Tank		
	- Rated normal voltage	11 / $\sqrt{3}$	KV	
	- Rated maximum voltage	12 / $\sqrt{3}$	KV	
	- Rated primary voltage	11 / $\sqrt{3}$	KV	
	- Rated secondary voltage	110 / $\sqrt{3}$	Volts	
	- V A burden	100	VA	
	- Accuracy class	0.5		
	- Ratio error			
	- Phase displacement positive or negative		Min	
	- Saturation factor			
	- Instrument security factor			
	- Short time current rating			
	Rms value		KA	
	Period		Sec	
	Peak value		KA	

	- Impulse voltage withstand level	75	KVp	
	- One minute power frequency voltage withstand level of primary winding	28	KV	
	- Weight of core and winding		Kg	
	- Total weight		Kg	
	- Overall dimensions		Mm	
	- Rated voltage factor			
	Continuous	1.2		
	For 30 seconds	1.5		
	- Temperature rise above the ambient of 50°C	40	°C	
	- Correction factor			
	- Partial discharge level		pC	
b.	CORE			
	- Material composition (CRGO-M4 or better)			
	- Flux density at normal voltage and frequency	<1.2	Telsa	
	- Lamination thickness	0.27	mm	
c.	WINDINGS			
	- Purity of copper used	Electrolytic	Percent	
	- Type of insulation			
	- Power frequency withstand level			
	Secondary winding to earth	3	KV	
	Primary winding to earth	28	KV	
d.	SECONDARY TERMINAL BOX			
	- Degree of protection	Yes/No		
	- Vermin proof provision	Yes/No		
	- Weather proof provision	Yes/No		
	- Dust proof provision	Yes/No		
	- Thickness of metal used	3	mm	
	- Overall dimensions		mm	
	- Mounting arrangement			
e.	H V TERMINAL			
	- Material			
	- Bi-metallic or not	Yes/no		
	- Dimensions,		mm	
	- Size and type of conductor it can accommodate	100	Sq. mm	
25	<u>INSTRUMENTS & METERS</u> <u>(Ammeter , Volt Meter & Energy Meter)</u>			

A.	1. Type & make of Ammeter & voltmeter	Analogue type ,AE make		
	2. Size	144x144		
	3. Whether magnetically shielded or not	Yes		
	4. Limits or error in the effective range	$\pm 2 \%$		
	5. Scale length	90 Deg.		
	6. Whether Tropicalised			
	7. Short time overload rating	200%		
	8. V A Burden.			
	i) Current coil		VA	
	ii) Potential coil		VA	
	9. Power consumption current & potential coil		Watt	
B.	Energy Meter Type:	(3 Ph ,4 wire with Alpha numerical display)		
	Make	Secure meter/ L & T		
C.	BACK UP RELAYS			
1	Type of relay	2 O/C +1 E/F, self actuated ,1 Amp, Aux. Volt-24 V DC/ Numerical & Non Communicable Type		
	Make	AREVA, ER, ABB make		
2	Current coil rating	1	Amp	
3	Tap range	5% to 250 %		
4	V A Burden Highest tap & lowest tap	3		
5	Power consumption Highest tap & lowest tap		Watt	
6	Time of operation at maximum time dial setting at			
7	5 times tap setting current	1.6-1.9	Sec	
8	10 times tap setting current	1.3	Sec	
9	Type of characteristic	IDMTL		
10	Whether draw out type or not	Yes		
11	Trip contact ratings Amps.	5 A continuous	Amp	
12	Whether seal in contacts provided or not	Yes/No		
13	No. of contacts	2 NO+2 NC		
14	Flag/LED	Required		
D.	Three element voltage operated Aux. Relay			
	Type & make of the Relay	AREVA, ER, ABB make		
	Voltage coil rating	24 V DC	Volts	
	No. of elements	3	No.	
	Mounting	Flush		

	Aux. Contact on each pole	1 NO + 1 NC		
	Flag	Required		
	Purpose	Trf protection		
E.	High speed Tripping Relay			
	Type & make of the Relay	AREVA, ER, ABB make		
	Voltage coil rating	24 V DC	Volts	
	Contact(Hand reset)	3 NO +1 NC		
	Flag	Required		
F.	High speed Harmonic Restraint Differential Relay			
	Type & make of the Relay	AREVA, ER, ABB make		
	Voltage coil rating	24 V DC	Volts	
	Aux. Contacts(Hand reset)	2 NO		
	Mounting	Flush		
	CT secondary	1 Amp.		
	Differential current setting	15%		
	Bias setting	15-30-40 %		
	Flag	Required		
G.	<u>POWER PACKS (2 X 12 V inbuilt)</u>			
	1.Rated AC voltage.(Input 230 V AC or 110 V. AC).	230 /110 Volt AC	Volt	
	2.Single phase or three phase.	Single phase		
	3. Capacity(VA)	300		
	4. Power factor			
	5. Type of transformer used, if any, to supply input to the ctifier			
	6.Transformation ratio			
	7.Type of rectification employed, full wave or half wave	Full wave		
	8. Type of rectifier	Bridge		
	9. Ripple factor			
	10. Type of filter employed			
	11. Ratings of capacitor			
	12. Time of retention of chargeby capacitor			
	13. Value of DC constant.			
	14. Out put voltage(DC)	24 $\pm$ 15%	Volt	
	15. Capacity (Watt-sec)			
	16. No of closing & tripping taken by this pack.	>10		

Signature of the Bidder with Seal

**TECHNICAL SPECIFICATION FOR 36 KV VACUUM CIRCUIT
BREAKERS
[OUTDOOR TYPE]**

1. SCOPE

- 1.1 This specification covers design, engineering, manufacture, testing, inspection before dispatch packing, forwarding, transportation, insurance during transit, delivery to site/ stores of 33KV Outdoor Vacuum Circuit Breakers for use the 33/11KV primary substations under the distribution networks of TPNODL.
- 1.2 All vacuum circuit breakers must be manufactured by ISO 9000 certified Organization and shall have been type tested at CPRI or any NABL Accredited laboratory/PHELA/KERI/KEMA/CESI laboratory within five years as on the date of bid opening and in satisfactory operation for a period not less than three years. The Bidder shall demonstrate compliance with this requirement by supplying with the bid, copies of the type test certificates together with performance certificates from purchasers/ users.
- 1.3 The scope of supply includes the provision of type tests at CPRI or any NABL Accredited laboratory/PHELA/KERI/KEMA/CESI laboratory within last five years.
- 1.4 The scope also includes the circuit breaker with current and potential transformers, supporting structures, operating mechanism, local/ remote control cabinet, relay control panel, foundation bolts, all the accessories and auxiliary equipment mandatory spares and special tools for satisfactory installation and operation.
- 1.5 The circuit breakers shall conform in all respects to the highest standards of engineering, design, workmanship, this specification and the latest revisions of relevant standards at the time of offer and the purchaser shall have the power to reject any work or materials, which, in his judgment, is not in full accordance therewith.

2. STANDARDS

Except where modified by this specification, the circuit breakers and the accessories shall be designed, manufactured and tested in accordance with latest editions of the following standards.

IEC/ISO/BS	IS	Subject
IEC: 56 IEC:62271- 100&200	IS : 13118	High voltage alternating current circuit breakers general requirement.
IEC: 694	IS : 12729	Common clauses of high voltage switch-gear and control gear standards (for voltage exceeding 1000 V).
IEC: 60	IS : 9135	High Voltage testing techniques.
IEC: 427	IS:13516	Method of synthetic testing of HV .A.C circuit breakers.
IEC: 1233		HV. AC. Circuit breakers- inductive load switching.
IEC: 17A/CD: 474		HV. AC. Circuit breakers- capacitive switching.

IEC: 529	IS: 13947	Degree of protection provided by enclosure.
IEC:137	IS: 2099	Insulating bushing for A.C. voltages above 1000V
	IS : 5621	Hollow insulators for use in electrical equipment & testing.
IEC:233		
IEC:273	IS: 5350	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V.
IEC:815	IS: 13134	Guide for selection of insulators in respect of polluted conditions.
IEC: 34	IS : 996	A.C motors
ISO:1460 BS:729	IS:2629	Hot dip galvanizing
	IS:2633	Method of testing uniformity of zinc coated articles.
	IS: 5	Colour for ready missed paints and enamels
	IS: 6005	Code of practice for phosphating or iron and steel.
IEC: 227	IS:1554	P.V.C Insulated cables for voltages up to and including 1100 Volt.
IEC:269	IS:13703	Low voltage fuses for voltages not exceeding 1000volt.
ISO:800	IS:1300	Phenolic moulding materials.
	IS:13118	Guide for uniform marking and identification of conductors and apparatus terminals.
IEC: 185	IS: 2705	Current transformers.
IEC: 296	IS: 335	Specifcation for unused insulating oil for transformer and switchgear.
IEC:186	IS: 3156	Potential transformers.
CBIP Technical Report No. 88 revised July, 1996 read with amendment issued (April, 99, September, 99 and also any other amendment thereafter)		Specification for AC Static Electrical Energy Meter.

This list is not to be considered exhaustive and reference to a particular standard or recommendation in this specification does not relieve the Supplier of the necessity of providing the goods and services complying with other relevant standards or recommendations.

3. REQUIREMENTS

The circuit breakers to be supplied against this specification shall be required to control the primary side of 33/11 KV power transformers in the primary sub-stations (incoming 33KV feeders) or Bus coupler or the outgoing feeders in these sub-stations. The circuit breakers shall be suitable for 3 phase 50Hz solidly grounded neutral system and shall have normal current carrying capacity and symmetrical short circuit current breaking capability as mentioned hereunder.

The required 33KV Vacuum Circuit Breakers suitable for outdoor installations are to be quoted by Manufacturers only with a valid ISO 9000 certification.

3.1 BASIC TECHNICAL REQUIREMENTS:

The vacuum circuit breakers are required to meet the following basic technical requirements. (Reference standards IEC:56, IEC:62271-100&200, IS:13118 and associated standards listed in this specification.

Basic Technical Requirements

Sl. No	Particulars	Requirements
1	Service type	Outdoor
2	No. of Poles	3
3	Nominal system voltage	33KV
4	Highest system voltage	36KV
5	Rated normal current at 50°C	
i)	For Bus-bar of Circuit Breaker	1250A
ii)	For Interrupter	2000A
iii)	For Outgoing Feeders	-
6	Rated short circuit breaking current (rms)	25KA
7	Rated short circuit making current (peak)	63KA
8	Rated short time current withstand capability for 1 sec.	25KA(Panel)/ 25KA (Interrupter)
9.	Rated insulation level:	
i)	One minute power frequency withstand voltage to earth (wet and	70KV

	dry) rms	
ii)	Impulse withstand voltage to earth with 1.2/50µsec, wave of +ve and –ve polarity (Peak)	170KV
10	First – pole – to clear factor	1.5
11	Rated operating sequence (for auto reclosing)	O-0.3 Sec- CO-3 min-CO
12	Maximum break time	3 cycles
13	Rated out of phase breaking current	25% of the symmetrical short circuit breaking current
14	Maximum pole scatter	10 mili seconds
15	Rated Auxiliary supply for spring charge motor, lamp & heater circuit.	230V A.C
16	Rated supply voltage for trip/close coil	24V D.C
17	Minimum creepage distance (mm)	900mm
18	Minimum protected creepage distance (mm)	580mm

4. SERVICE CONDITIONS:

The service conditions shall be as follows:

◆	Maximum a altitude above sea level	1,000m
◆	Maximum ambient air temperature	50 ⁰ C
◆	Maximum daily average ambient air temperature	35 ⁰ C
◆	Minimum ambient air temperature	5 ⁰ C
◆	Maximum temperature attainable by an object exposed to the sun	60 ⁰ C
◆	Maximum yearly weight average ambient temperature	32 ⁰ C
◆	Maximum relative humidity	100%
◆	Average number of thunderstorm days per annum (isokeraunic level)	70
◆	Average number of rainy days per annum	120
◆	Average annual rainfall	1500mm
◆	Maximum wind pressure	260Kg/m ²

5. 33 KV VACUUM CIRCUIT BREAKERS

5.1 General

The circuit breakers shall be structure mounted open type with vacuum as interrupting media incorporating separate interrupters **of 2000 A rating** for each phase mounted on single frame. There shall be a common drive mechanism actuating the interrupters, which must work in synchronism. These breakers shall be provided with suitable local control while provision shall be made for remote control.

The circuit breakers shall be fitted with spring mechanism. The inherent design of these circuit breakers shall be such that they shall satisfactorily perform all test duties and interrupt out-of-phase current and produce very low over voltage (<2.0p.u.) on all switching circuits, capacitive and inductive to IEC:56, IS:13118 and other associated standards mentioned in the clause of this specification.

The terminal pads shall have aluminum alloy with smooth finishing. The design of the circuit breakers shall be such that inspection and replacement of contacts, coils, vacuum bottles and any worn or damaged components can be carried out quickly and with ease. The contact gaps shall be adjustable to allow for wear.

The mechanism and the connected interrupters shall satisfy the mechanical endurance requirements of IEC:56, IS:13118 and all additional requirements specified herein.

5.2 Porcelain Insulator

External parts of the circuit breakers, which are under continuous electrical stress, shall be of hollow porcelain. The creepage and flashover distance of the insulators shall be dimensioned and the type and profile designed in accordance with IEC:815 or IS: 13134 and shall be suitable for the worst environmental conditions specified in this specification. The creepage distance across the interrupting chambers shall suit the outdoor service conditions mentioned in the relevant standards for heavily polluted atmosphere and shall be not less than 900 mm with protected creepage distance 50 percent of the total. Internal surfaces of hollow insulators shall also be glazed. The insulators shall comply with IS:5621 and tested in accordance with IEC:233. All porcelain whether, used on the interrupting chamber or on the support insulator shall have the following properties:

Higher strength, homogeneity, uniform glaze, free from cavities and other flaws and high quality uniform finish porcelain components and shall withstand the maximum expected static and dynamic loads to which the circuit breakers may be subjected during their service life.

5.3 Interrupting media

5.3.1 Vacuum:

In vacuum circuit breakers, facilities shall be provided for monitoring the contact erosion and any change in contact gap. The vacuum bottles shall be easily replaceable on site and the mechanism shall be conveniently adjustable to permit resetting the contact gap.

The vacuum circuit breaker poles shall be sealed to prevent contamination of the spaces surrounding the interrupters. The Bidder shall demonstrate how this is achieved by supplying technical details with the bid.

5.4 Auxiliary contacts

12 auxiliary contacts (6N.O. + 6N.C.) of 24 Volt D.C grade and 10 amps DC rating shall be provided in each circuit breaker.

5.5 Indication

A mechanically operated circuit breaker position indicator of non corroding material shall be provided in a location visible from the operating side of the breaker without the necessity to open the mechanism door. The word „OFF“ in white letter on green background shall be used to indicate that the breaker is in the opening position and the word „ON“ in white letters on a red background to indicate that the breaker is in the closed position. The drive for the device shall be positive in both directions and provision shall be made for local and remote electrical indication. Indication of spring charging condition shall be provided as mentioned in this specification. Mechanical counters to record the number of closing operations shall be provided for each circuit breaker mechanism.

5.7 Operation and controls

The breaker shall normally be operated by remote electrical control with electrical tripping by shunt trip coil. Provision shall be made for local electrical operation and mechanical operation.

The following facilities shall be provided in the circuit breaker local control cabinet:

- LOCAL/ REMOTE selector switch of stay put type. The selection of „local“ operation shall inhibit the operation of the breaker from any remote source.
- ON/NEUTRAL/ OFF control switch or ON and OFF push buttons. The push buttons shall be momentary contract type with rear terminal connections. The close push button shall be of green colour and the open push button red colour.
- MECHANICAL EMERGENCY TRIP DEVICE: suitable for manual operation in the event of failure of electrical supplies. The device shall be accessible without opening any access doors and distinctly labeled. It shall be shrouded and protected against inadvertent operation.
- Means shall be provided for manual operation of these circuit breakers during failure of auxiliary power in addition to electrical operation.
- Means shall be provided to prevent the mechanism from responding to a close signal when the trip coil is energized or to reclosing from a sustained close signal either opening due to a trip signal or failure to hold in the closed position.

The circuit breaker shall be able to perform 10,000 operating cycles at no load in accordance with IEC:17A/474/CD for circuit breakers for auto reclosing duties.

6. CURRENT TRANSFORMERS

Current transformers, three per circuit breaker, shall be of outdoor, single phase oil immersed dead tank type and shall comply with IEC:185 and IS:2705, suitable for operation in hot and humid atmospheric conditions described in service condition. They shall be mounted on the bracket. The CT tank should be Hot Dip galvanized as per relevant ISS to prevent corrosion of all exposed metal parts.

6.1 Core

High grade non- ageing cold rolled grain oriented (CRGO M4 or better grade) silicon steel of low hysteresis loss and permeability shall be used for the core so as to ensure specified accuracy at both normal and over currents. The flux density shall be limited to ensure that there is no saturation during normal service.

The instrument security factor of the core shall be low enough so as not to cause damage to the instruments in the event of maximum short circuit current.

6.2 Windings

The secondary windings shall be made of electrolytic copper with suitable insulation. The conductor shall be of adequate cross- section so as to limit the temperature rise even during short circuit conditions. The insulation of windings and connections shall be free from composition liable to soften coze, shrink or collapse during service.

Polarity shall be indelibly marked on each current transformer and at the lead and termination at associated terminal blocks. CTs with multi ratio winding shall be clearly tabulated to show the connections required for different ratios. Similar numbers shall be marked on terminal block arrangement and wiring diagram. Apart from the above marking and those to be provided as per IEC 185 or IS 2705, other markings shall be provided in consultation with owner.

The continuous current rating of the primary winding shall be one hundred and fifty percent of the normal rated current. Secondary windings of current transformers shall be used for metering, instrumentation and protection and shall be rated for continuous current of one hundred and fifty percent of normal rated current of primary winding.

Secondary winding stud should be 6mm dia of length 15 mm. TB should be stud type with 3 nos. of nuts (min). The horizontal distance from studs should be 1.5 times the outside circular – dia of the nuts. Test tap should be with shorting arrangement.

6.3 Construction

The current transformer enclosures shall be made of high quality steel and shall be hot dip galvanized and shall be able to withstand stresses occurring during transportation and the terminal and mechanical stresses resulting from maximum short circuit current in service. The primary winding and terminals shall be in a tank and supported by a hollow porcelain insulator. The secondary connection shall be conducted through the hollow insulator and terminated in a terminal box mounted on the base plate.

6.4 Hermetic sealing

Each current transformer shall be supplied filled with insulating oil complying with IEC: 296 or IS: 335 and shall be hermetically sealed to prevent atmosphere coming in contact with oil, avoiding frequent filtration and change of oil. Nitrogen or any oil inert gas above the oil level shall be provided to permit expansion and contraction of oil without any contract with the atmosphere.

The current transformers shall have provision for draining and re-filling insulation oil after drying.

6.5 Insulating oil

The current transformer shall be complete with new insulating oil. The quantity of insulating oil for first filling of the equipment and complete specification of oil proposed to be used shall be stated in the bid. The oil shall conform to the requirements of latest issue of IEC: 296 or IS: 335.

6.6 Fittings and accessories

Fittings and accessories listed below shall be supplied with each current transformer:

- Oil level gauge;
- Oil filling hole and cap;
- Pressure relief device;
- HV terminal connectors;
- Two earthing terminals and strips with necessary nut, bolts and washers;
- Name and rating plate;
- Terminal box with LV terminal connections;
- Mounting nuts, bolts and washers;

Any other fittings deemed essential by the Supplier shall also be supplied with each current transformer.

The oil level gauge shall be mounted in such a way that the oil level can be clearly seen from ground level.

A dust, vermin and weather proof terminal box shall be provided at the lower end of the current transformer for terminating the secondary windings. The box shall have a bolted cover plate complete with gaskets. The terminal box shall have terminal blocks, cable gland plate and cable glands with shrouds suitable for different sizes of PVC insulated control cables 650/1100V grade as per IEC:227 or IS:1554. The terminal blocks shall have covering of molded insulation materials complete with brass studs, washers, nuts and lock nuts suitable for termination of 2X2.5 sqmm wires. The termination shall be made by crimping lugs or bare wire with insulating sleeves at ends.

The terminal box enclosure shall have protection as per class IP 55 as defined in IEC: 529 or IS: 13947.

6.7 CT Junction Box/Console Box

Each set of 3 current transformers for three phases shall be provided with a common junction box mounted on the circuit breaker supporting structure at a convenient position to accommodate the secondary wire of CT and other control cables of Purchaser. Separate terminals for testing the relays and instruments and short circuiting of each current transformer secondary wires shall be provided in it. The junction box enclosure shall have the same protection features as for the terminal box. It shall be provided with terminal blocks, gland plates and glands suitable for different sizes of cables. Facilities shall be provided for earthing the CT secondary wires in the junction box.

6.8 Hollow porcelain insulators

The insulators of the current transformers shall conform to latest edition of IS: 5621 and shall be subjected to and successfully pass the tests listed in this standard and in IEC: 233. The hollow porcelain insulators shall be brown glazed and shall meet the requirements indicated in this specification. The insulators shall be cemented with Portland cement to the flanges resulting in high mechanical, tensile and breaking strength.

6.9 Insulation level

The current transformers shall be designed to withstand impulse test voltages and power frequency test voltages as specified in this specification.

6.10 Terminal connections

The CTs shall be provided with bi-metallic solder less clamp and rigid type terminal connectors on the top tank for connection to the HV terminals. The other requirements shall be same as for the terminal connectors of the circuit breaker described in this specification. They shall be universal type suitable for both horizontal and vertical connections.

Two earthing terminals complete with necessary hardware shall be provided on each CT for connecting to earth continuity conductor to be provided. The earthing terminals shall be identified by means of appropriate symbol marked in a legible and indelible manner adjacent to the terminals. The terminals shall be adequately sized to meet the full earth fault current envisaged.

6.11 Basic technical requirement

Ratings: The CTs shall conform to the following ratings and other particulars of the circuit breakers.

Technical Requirements – For 3 Core CT

Sl. No	Particulars	Requirements
1	Function	To control the Primary side of 33/11 KV power transformers of ratings between 1.6MVA and 10MVA in primary substations.
2	Requirement	Core-1:Instrumentation and Metering Core-2:Combined over current and earth fault protection Core-3:Differential Protection
3	Transformation Ratio	200-100-50/1-1-1 A
4	Rated Burden (VA)	Core:1:15 Core:2:15 Core:3:PS
		Core-1: 0.5 Core- 2: 0.5P Core-3: PS
6	Instrument Security Factor	Core- 1 < 5
7	Accuracy Limit Factor	Core-2 : 20 Core-3 : 20
8	Rated Voltage	36KV
9	Short Time Rating	25KA rms for 3 seconds

10	Creepage distance Protected creepage distance	900mm minimum 450mm minimum
11	Insulation Level: -Impulse Voltage1.2/50µs wave withstand level -Power frequency 1 min voltage withstand level	170KV 70KV

Technical Requirements – For 2 Core CT

Sl. No	Particulars	Requirements
1	Function	For 33 KV Feeder control in 33/11 KV primary substations.
2	Requirement	Core-1:Instrumentation and Metering Core-2:Combined over current and earth fault protection
3	Transformation Ratio	400-200-100 /1-1 A
4	Rated Burden (VA)	Core:1:15 Core:2:15
5	Class of Accuracy	Core:1:0.5 Core- 2: .5P
6	Instrument Security Factor	Core-1 < 5
7	Accuracy Limit Factor	Core-2 : 20
8	Rated Voltage	36KV
9	Short Time Rating	25KA rms for 3 seconds
10	Creepage distance Protected creepage distance	900mm minimum 450mm minimum
11	Insulation Level: -Impulse Voltage1.2/50µs wave withstand level -Power frequency 1 min voltage withstand level	170KV 70KV

6.12 Tests and inspection

The CTs shall be tested in accordance with the requirements of the type tests and routine tests as per the latest issues IEC: 185 or IS: 2705.

The tests to be conducted shall include:

6.12.1 Type Tests:

- Lightning impulse voltage;
- Power frequency wet withstand voltage;
- Temperature rise;
- Short time current;

- Composite error;
- Accuracy test (for measuring core);
- Instrument security current (for measuring core);
- Current error and phase displacement (for protection core)

6.12.2 Routine tests

- Verification of terminal marking and polarity;
- Power frequency dry withstand test on primary windings;
- Power frequency dry withstand test on secondary windings;
- Power frequency dry withstand test between sections;
- Over voltage inter-turn test;
- Composite error;
- Turn ratio;
- Accuracy test (for measuring core);
- Current error and phase displacement (for protection core);
- Knee point voltage and magnetizing current test (for PS class);
- Secondary winding resistance (for PS class).
- Insulation Resistance Test.

7

POTENTIAL TRANSFORMER

7.1 BASIC TECHNICAL REQUIREMENTS

The 33KV outdoor voltage transformers are required to meet the following basic technical requirements (Reference standards: IEC: 186, IS: 3156 and associated standards listed in the specification):

Sl. No	Particulars	Requirements
1	Type	Single phase
2	Nominal system voltage, phase to phase	33KV
3	Application	Instrumentation, Metering and Protection
4	Number of secondary windings	1
5	Rated normal burden*	200VA
6	Rated primary voltage	33KV/ $\sqrt{3}$
7	Rated secondary voltage	110V/ $\sqrt{3}$
8	Class of accuracy	0.5
9	Rated insulation level: (Primary winding) (Phase to earth)	
i)	One minute power frequency withstand voltage to	70KV

	earth (wet and dry) rms	
ii)	Impulse withstand voltage to earth with 1.2/50 μ sec wave of +ve and –ve polarity (peak)	170KV
10	One minute power frequency withstand voltage of secondary winding (rms)	
i)	Between phase to earth	3KV
ii)	Between sections	3KV
11	Rated voltage factor	
i)	Continuous	1.2
ii)	For 30 seconds	1.5
12	Creepage distance to earth in mm per KV of highest phase to phase system voltage	25

* The burden indicated is the minimum acceptable to the Purchaser. The Supplier shall ensure that the rated output of the voltage transformers is adequate to meet at least 120 percent of the connected load (burden).

7.2 GENERAL

The voltage transformers to be supplied under this specification shall be of outdoor, single phase dead tank double wound, oil immersed type, complying with IEC:185 and IS:3156 suitable for operation in hot and humid atmospheric conditions described in this document. To prevent corrosion of the exposed surfaces, the tank should be not dip galvanized. They shall have separate HV and LV windings and shall be suitable for use as bus VTs in 33/11KV primary substations.

7.3 Duty requirement

33KV Voltage transformer for all the indicating instruments and measuring meters in the primary substation on 33KV side.

7.4 Porcelain Insulator

External parts of the voltage transformers which are under continuous electrical stress shall be of hollow porcelain insulators complying with latest edition of IS:6521 tested as per IEC:233. The creepage and flashover distance of the insulators shall be dimensioned and the type and profile designed in accordance with IEC:815 or IS:13134 and shall be suitable for the worst environmental conditions for heavily polluted atmosphere and shall be not less than 25mm per KV of highest phase to phase system voltage with protected creepage distance minimum 50 percent of the total. Internal surfaces of hollow insulators shall also be glazed.

The insulators shall be cemented with Portland cement to the flanges resulting in high mechanical, tensile and breaking strength.

All porcelain used on the voltage transformers shall have the following properties high strength, homogeneity, uniform glaze, free from cavities and other flaws and a high quality uniform finish porcelain components shall withstand the maximum expected static and dynamic loads to which the voltage transformers may be subjected during their service life.

The insulation of the hollow porcelain insulators shall be coordinated with that of the voltage transformers to ensure that any flash over occurs only externally.

7.5 Core

High grade non-ageing cold rolled grain oriented silicone steel of low hysteresis loss and permeability shall be used for core so as to ensure accuracy at both normal and or over Voltages. The flux density shall be limited to 1.6 Tesla at normal voltage and frequency. There shall be no saturation at any stage during operation.

The instrument security factor of the core shall be low enough so as not to cause damage to the instruments in the event of maximum short circuit current or over voltages.

7.6 Windings

The primary and secondary windings shall be electrolytic copper of high purity and conductivity and covered with double paper insulation. The conductor shall be of adequate cross-section so as to limit the temperature rise even during maximum over voltages.

The insulation of windings and connections shall be free from composition liable to soften, ooze, shrink or collapse during service.

The current rating of the primary winding shall be one hundred and fifty percent of the normal rated burden and the windings shall be suitable to withstand continuously the maximum system voltage.

The secondary windings of the voltage transformers shall also be suitable for continuous over voltage corresponding to the maximum system voltage at the primary winding. The winding supports shall be suitably reinforced to withstand normal handling and the thermal and dynamic stresses during operation without damage.

The voltage transformer secondary circuits will be taken out to form the star point and earthed at one point outside the voltage transformers.

Both primary and secondary winding terminals shall be clearly and indelibly marked to show polarity in accordance with IEC:186. The connections required for different secondary windings in case of multi-winding voltage transformers shall be clearly indicated in terminal blocks and the wiring diagrams.

7.7 Tank

Both expansion chamber and tank of the voltage transformers shall be made of high quality steel and shall be **hot dip galvanized** and shall be able to withstand the stress occurring during transit and all thermal and mechanical stresses resulting from maximum short circuit current during operation.

7.8 Insulating Oil

The voltage transformers shall be supplied filled with new insulating oil. The oil shall conform to the requirements of latest issue of IEC:296 of IS:335. The quantity of insulating oil for first filling of the equipment and complete specification of oil proposed to be used shall be stated in the bid.

7.9 Hermetic Sealing

The voltage transformers shall be supplied filled with insulating oil and shall be hermetically sealed to prevent atmosphere coming in contact with oil, avoiding filtration and change of oil. Nitrogen or other inert gas shall be provided above the oil surface to permit expansion and contraction of oil. Provision shall be made for draining and re-filling the insulating oil.

7.10 Fitting and Accessories

Fittings and accessories listed below shall be supplied with each voltage transformer:

- Oil level gauge.
- Oil drain, sampling and filling hole with cap;
- Pressure relief device;
- HV terminals;
- Two earthing terminals with necessary nuts, bolts and washers;
- Name and rating plate;
- Secondary terminal box with LV terminal connections;
- Mounting nuts, bolts and washers;
- L.V HRC cartridge fuses for the protection of secondary winding;

Any other fitting deemed essential by the contractor shall also be supplied along with each voltage transformer:

The oil level gauge shall be mounted in such a way that the oil level can be clearly seen from the ground level.

The name and rating plate shall contain all the particulars as provided in IEC:186 and also the name of the employer and year of manufacture. They shall comply with the clause termed label in this specification.

7.11 SECONDARY TERMINAL BOX

A dust, vermin and weather proof terminal box shall be provided at the lower end of each voltage transformer for terminating the secondary windings. The box shall have a bolted removable cover plate complete with gaskets. The terminal box shall have cable gland plate and cable glands with shrouds suitable for entry of 4 core x2.5mm² PVC insulated control cables as per IEC:227 or IS:1554.

For 33KV Voltage Transformer one 4 core 2.5mm²

The terminal box enclosure shall have protection of class IP 55 as defined in IEC:529 or IS:13947 and shall be painted or galvanized in accordance with specification of Surface Treatment.

7.12 Terminal blocks

Terminal blocks of brass studs rated for 10 Amps continuous current, 650 Volt grade enclosed in moulded insulating materials shall be provided with adequate electrical clearance for terminating the secondary wiring and outgoing connections. The terminal blocks shall be suitable for termination of 2.5mm² wires. The termination shall be made by crimping Jugs or bare wire with insulating sleeves at ends. All terminals must be marked with numbers and wire termination provided with numbered ferrules for identification.

7.13 Fuse protection

The secondary windings shall be protected by HRC cartridge fuses in fuse holder consisting of carriers and bases. The carriers and bases shall be of high grade flame retarding and non hygroscopic moulded insulating materials with hard glass surface. Each fuse shall be identified with engraved plastic label.

7.14 Circuit diagram

A durable copy of the circuit wiring diagram shall be affixed to the inner side of the terminal box cover. Labels shall be provided inside the cover to describe the functions of various items of equipments.

7.15 TERMINATION

The equipment shall be supplied with HV electrical connection terminals of a size and rating appropriate for all the duties, including overload duty specified for the equipment. The terminals shall be of the bi-metallic type, suitable for connection of all aluminium alloy conductor (AAAC) or aluminium conductor steel reinforced (ACSR). In general connections using palm type solderless sockets shall be preferred. The proposed method of connections shall be stated in the offer and shall be subject to approval by the Purchaser. Where the terminals are of the clamp type, they shall be suitable for taking a range of conductors appropriate to the rating of the equipment.

All nuts, bolts, washers and spring washers required to complete the connection shall be supplied with the equipment.

7.16 EARTHING TERMINAL

Two earthing terminals complete with necessary hardware shall be provided on each voltage transformer for connecting to earth continuity conductors of the Employer. They shall be of electroplated brass and of adequate size to carry the earth fault current.

The earthing terminals shall be identified by means of appropriate symbol marked in a legible and indelible manner adjacent to the terminals.

7.17 TEST AND INSPECTIONS

The voltage transformers shall be tested in accordance with the requirements of the type tests and routine tests as provided in the latest issues of IEC:186 or IS:3516.

The tests to be conducted shall include;

7.17.1 Type tests:

- Lightning impulse voltage test;
- High voltage power frequency wet withstand voltage;
- Temperature rise test;
- Short circuit withstand capability test;
- **Determination of limits of voltage error and phase displacement.**

7.17.2 Routine tests:

- Verification of terminal marking and polarity;
- Power frequency withstand tests on primary winding;
- Power frequency dry withstand tests on secondary winding;
- Power frequency withstand tests between sections;
- Determination of limits of voltage errors and phase displacement;
- Partial discharge measurement.
- Insulating Resistance measurement.

7.18 TEMPERATURE RISE

The temperature rise of any part of the voltage transformer under continuous operating and exposed in the direct rays of the sun shall not exceed the permissible limits as provided in IEC publication 186 or IS: 3156. These shall not be exceeded when corrected for the difference between the ambient temperature at site and the ambient temperature specified in the standard. The correction proposed shall be stated in the bid.

8 PROTECTIVE RELAY & CONTROL PANEL

Indoor control panels with protective relay and meter shall be provided by the supplier suitable for above breakers. The equipment shall have protection scheme with the following relays:

(i) Triple pole IDMTL type combined over current (2Nos) & Earth fault (1No) relay (Draw out type) preferably Non communicable numerical relay.

Plug setting range of the over current and earth fault relays shall be 5% to 250%.

(ii) 3 elements auxiliary relay for transformer fault, trip for Buchholz, winding temperature & oil temperature.

(iii) Master trip relay for inter tripping.

(iv) Differential relay.

(v) One alarm bell scheme with bell (24V DC).

N.B:- The relays should be Areva, Easun Rerolle, ABB or of any reputed make (subject to approval during technical evaluation).

9. METERS:

The following meters shall be provided.

i) Ammeter:- 1 No. , 0-100-200 A/ 1 Amp Preferable Make- IMP/ AE (Dial type).

ii) Volt meter:- 1 No., 0- 40 KV (size :144mm x 144mm), make IMP/AE (Dial type).

iii) Ammeter selector switch- 1 No. Make – Kaycee or any other reputed make.

iv) Volt meter selector switch- 1 No. Make- Kaycee or any other reputed make.

v) 40 watt lamp with switch- 1 No.

vi) Plug & Socket- 1 No.

vii) Fuses & Links- 1 No.

viii) Test terminal Blocks- Test terminal Block need be provided for testing relays & breakers.

ix) Indication Lamp-

Red- Breaker „ON“

(24V DC LED type)

Green Breaker „OFF“

Amber- Breaker “AUTO TRIP“

Blue- Spring charge indication.

White-Healthy Trip illuminated push bottom switch

10. OTHER EQUIPMENTS

10.1 In Door Control- Relay Panel

10.1.1 1. General

The electrical controls, relays, instruments, meters, annunciation scheme shall be provided in a sheet steel enclosure conforming to IEC:298 or IS:3427 mounted on support base on the floor. The panel shall be free standing, dust, moisture and rodent and vermin proof suitable for indoor installation. The panel shall have a high degree of protection for indoor installation with relevant standard.

Each panel shall comprise of rigid welded structure frame enclosed completely by metal sheet of thickness not less than 2.5mm. The sheets shall be cold rolled with smooth finish leveled and free from flaws. The structural frame and all load bearing members of the enclosure shall have minimum thickness of 2.5mm.

The enclosure shall have hinged door at the front and back for access to the low voltage wiring. All door panels and removable covers shall be gasketed all round with neoprene bonded gasket. Ventilating louvers shall be provided to limit the temperature rise as provided in IEC: 694 and

298 or IS:12729 and 3427. They shall be provided with filters encased in fine wire screens for non-ferrous metal or stainless steel unaffected by moisture and rain water. A 230V AC heater with auto temperature control shall be provided in the cabinet to prevent moisture condensation.

The housing shall be surface treated and painted in accordance with the clause on Surface Treatment of this specification.

10.1.2 Panel wiring and accessories.

10.1.3 Wiring

Each panel shall be supplied with all internal wiring complete.

Panel wiring shall be suitably bunched and clamped for neat appearance. The conductors used for wiring purpose shall be PVC insulated 650/1100 volt grade semi-flexible heat resistant, flame retardant and vermin proof electrolytic copper cable conforming to IEC:227, 502 or IS:1554. The wiring shall be securely supported and taken through PVC troughs. Each wire shall be continuous from end to end without any joint in between. All panel wiring shall be capable of withstanding a voltage of 2KV AC 50Hz for one minute.

Cable and wire for connections within the switchgear and between the switchgear and terminal blocks shall have a minimum temperature rating of 90 degree Celsius. The size of the conductors for panel wiring shall be not less than 2.5mm². For CT secondary wiring, two such wires shall be used in parallel.

10.1.4 Panel wiring protection

The panels shall be equipped with links and HRC cartridge fuses conforming to IEC:269 or IS:13703 in 650 Volt grade phenolic moulded fuse holder consisting of fuse carrier and base or miniature circuit breakers conforming to IEC:947-2 or IS:13947-2 at appropriate locations. The carriers and bases shall be made of high grade flame retardant and non hygroscopic phenolic moulded material with hard glass surface. Each fuse or MCB shall be identified with engraved plastic label.

In general, fuses and MCBs shall be limited to the minimum required for safety. The protection scheme shall include fuses for VT secondary circuits and DC supply to each panel and fuses for MCB for spring charging motor and incoming AC supply.

10.1.5 Terminal blocks

Terminal blocks of brass studs rated for 10 amps continuous current, 650 volt DC grade covered by moulded insulating materials with adequate electrical clearances shall be provided for terminating the panel wiring and outgoing connections. The termination shall be made by crimping lugs or bare conductor with insulating sleeves at ends. The arrangement can be horizontal or vertical as per standard practice adopted by the manufacturer. All terminals must

be numbered and wire termination provided with numbered ferrules for identification. All numbering and marking including those in wiring diagram shall follow the guidelines provided in IS:11353. All circuit breaker auxiliary contacts including spare contacts shall be wired to the terminal blocks. Ten percent spare terminals shall be provided.

The CT Terminal Box should be bolted Type with stud dia 6mm & length 15mm with 3nos.of nuts. The distance from stud to stud be 1.5times the outside circular dia of nuts.

10.1.6 Colour and numbering

The wiring used for 230V AC supply for illumination lamp, panel heater and other devices shall be coloured red for phase wire and black for the neutral. The colour of wires connecting directly to Earth shall be black. All other panel wires shall be of one colour to be approved.

Engraved core identification plastic ferrules marked to correspond with the panel wiring diagram shall be fixed at both ends of each wire. Ferrules shall fit tightly on the wire and shall not fall off when the wire is disconnected from the terminal block. Numbers 6 and 9, if used shall be under scored to enable differentiation.

10.1.7 Circuit diagram

A durable copy of the circuit wiring diagram shall be affixed to the inner side of the door of the switchgear compartment. Labels shall be provided inside the compartment to describe the functions of the various items of equipment.

The scope of the supply shall include the panel mounting base plate and all special equipment, bolts, nuts and washers necessary for making the supporting.

10.2 Supporting Structure

The supply of the material shall be complete with mounting structures of mild steel sections conforming to IS: 226 or equivalent ISO. The supporting structure shall be designed and constructed to withstand the maximum combined effects of the circuit breaker dead weight, its maximum dynamic load and maximum effect of wind loading. The supporting structure shall be **hot dip galvanized** as per clause on surface treatment of this specification.

10.3 CT and PT mounting bracket

The supporting structure shall be fitted with a bracket for supporting the three oil filled 33KV single phase current transformers and 3 nos. 33KV(1 Phase)PTs. The support bracket shall be provided opposite the circuit breaker poles and shall ensure adequate clearance between the breaker poles and the CTs as well as between the CTs and PTs. The CTs & PTs shall be supplied by the Supplier as per specification above and is included in the scope. The drawings of the structure with bracket shall be subject to Purchaser's approval before fabrication.

The CT and PT mounting bracket shall be hot dip galvanized as per clause on surface treatment of this specification.

10.4

Local control cabinet

The operating mechanism, local controls and monitoring shall be provided in a metal clad control cabinet fitted to the same structure supporting the breaker and mounted at a convenient height for safe operation from ground level or from platform to be supplied under the contract.

The cabinet shall be made of minimum 2.5 mm sheet steel and shall be constructed as a dust, weather and vermin proof outdoor housing with protection of IP-54 class as defined in IEC:529 or IS:13947. It shall have single door and transparent windows for reading the circuit breaker ON or OFF position and spring charge position without opening the door. The door and any removable covers shall be gasketed all round with neoprene bonded gaskets. A ventilating louver shall be provided with fine wire non-ferrous metal or stainless steel screen and filter. A 230V AC heater with auto temperature control shall be provided in the cabinet to prevent moisture condensation and also a 230 volt lamp for internal illumination with door operated switch.

The local control cabinet shall be subjected to surface treatment and painting as per clause on surface treatment of this specification.

10.5

Panel wiring and accessories

Panel wiring shall be suitably bunched and clamped for neat appearance. The conductor used for wiring purpose shall be PVC insulated 650 volt/ 1100V grade semi-flexible copper cable conforming to IEC:227 or IS:1554, heat resistant, flame, vermin and rodent proof. The wiring shall be securely supported and taken through PVC troughs. All panel wiring shall be capable of withstanding a voltage of 2KV AC 50Hz for 1 minute. Each wire shall be continuous from end to end without any joint in between.

The sizes of the control cable for wiring in the cabinet shall be not less than 2.5mm². CT secondary wiring shall be though two such wires in parallel.

10.5.1

Fuse protection

The cabinet shall be equipped with links and HRC cartridge fuses in 650 volt grade fuse holders consisting of fuse carrier and base. The holders shall be made of high grade, flame retardant and non hygroscopic phenolic moulded material of dark brown colour with hard glass surface. Each fuse shall be identified with engraved plastic labels.

10.5.2

Terminal blocks

Terminal blocks rated for 10 amps continuous current, 650 volt grade covered by moulded insulating materials with adequate electrical clearances shall be provided for terminating the panel wiring and outgoing connections. The termination shall be made by crimping lugs or bare wire with insulating sleeves at ends. The arrangement can be horizontal or vertical as per standard practice adopted by the manufacturer. All terminals must be numbered and wire

termination provided with numbered ferrule for identification. All numbering and marking include those in wiring diagram shall follow the guidelines provided in IS: 11353. Ten percent spare terminals shall be provided.

10.5.3 Colours

The wiring used for AC supply for illumination lamp and heater shall be differently coloured from control wiring so that these can be distinguished from each other. The colour of all earth wire shall be black.

10.6 Circuit diagram

A durable copy of the circuit wiring diagram shall be affixed to the inner side of the control cabinet. Labels shall be provided inside the cabinet to describe the functions of the various items of equipment.

10.7 Cable Entry

A removable gland plate shall be provided at the bottom of the cabinet for entry of Purchaser's control and auxiliary power cables in the cabinet. Required number of electroplated brass cable glands of appropriate sizes with shrouds shall be provided in consultation with the Purchaser in the gland plate for the control and power cables. Provision shall be made for earthing of the cable armours in the gland.

11 OPERATING MECHANISM

11.1 General

The operating mechanism of the circuit breaker shall be motor wound spring charged type. It shall be electrically and mechanically trip free with anti pumping device (as per IEC:694 definition). All working parts in the mechanism shall be of corrosion resistant material. Self lubricating, wearing resistant bearings shall be provided in the mechanism.

The mechanism shall fully close the circuit breaker and sustain it in the closed position against the forces of the rated making current and shall fully open the circuit breaker without undue contact bounce at a speed commensurate with that shown by tests to be necessary to achieve the rated breaking capacity in accordance with IEC:56 or IS:13118. The mechanism shall be capable of being locked in either the open or closed position. The mechanism shall be capable of fully closing and opening again after the auto-reclose time interval specified as 0.3 second in this specification.

11.2 Spring mechanism

The spring operating mechanism shall be with spring charging motor, opening and closing springs with limit switches and all accessories necessary for automatic charging. In normal operation, recharging of the operating springs shall commence immediately and automatically upon completion of the closing operation so that a complete sequence of closing and opening operation should be possible.

It shall be possible to hand charge the operating spring with the circuit breaker in either the

open or closed position conveniently from the ground level. Closure whilst a spring charging operation is in progress shall be prevented and release of the springs shall not be possible until they are fully charged.

The state of charge of the operating springs shall be indicated by a mechanical device showing „**SPRING CHARGED**“ when closing spring is fully charged and operation is permissible and „**SPRING FREE**“ when closing spring is not fully charged and the operation is not possible. Provision shall be made for remote electrical indication of „Spring Charged“ and „Spring Free“ conditions.

The operating mechanism shall be such that the failure of any auxiliary spring shall not cause tripping or closing the circuit breaker but shall not prevent tripping against trip command.

Closing action of the circuit breaker shall charge the opening spring ready for tripping. From the close position with spring charged, one open-close-open operation shall be possible without recharging the spring.

11.3 Motor

The motor for spring charging shall be single phase 230 Volt A. C motor. Continuous motor rating shall be at least ten percent above the maximum load demand of the driven equipment. It shall remain within its rated capacity at all operating points that will arise in service. It shall be protected by H.R.C cartridge fuses or MCB. The motor shall comply with IEC: 34 or IS:996.

12. AUXILIARY POWER SUPPLY

The operating mechanism shall be suitable to operate with the following auxiliary power supplies.

- a) 230V,50Hz Single phase A.C-For spring charging motor
- b) DC supply 24 Volts- For close and open coils, indication & Alarm
(Power pack input supply: 230V & 110V AC and Output: 24V DC)

The DC supply shall be from a Power Pack. The Input to Power Pack is 110V from PT and 230V from main supply. The power pack should be capable for minimum 3 Trippings even if input to power pack is failed.

The mechanism shall be designed to operate satisfactorily despite fluctuations of auxiliary power supplies as under:

- AC supply:

Voltage	From 115% to 85% of normal voltage
Frequency	From 105% to 95% of normal frequency
Combined voltage and frequency variation	From 115% to 85% of normal

- DC supply: Voltage From 120% to 70% of normal voltage

13. INTERLOCKS

The circuit breaker shall be capable of being mechanically and electrically interlocked with the associated line isolator so that the isolator cannot be operated with the breaker in the closed position.

All doors or shutters which give access to live parts shall be interlocked in such a way that these cannot be opened unless the circuit breaker is in the open position.

Other interlocks shall be provided as deemed necessary for safety.

14. PROTECTION AND METERING

Protective relays and metering will be provided in a control panel by separate agency in Purchaser's control room. The circuit breaker shall be particularly suitable for the following protection schemes:

- Inter-tripping for simultaneous tripping other circuit breaker.

15. TERMINAL CONNECTOR

Suitable terminal connectors of bi-metallic type suitable for both horizontal and vertical connection shall be provided on the terminal pad both on the incoming and the outgoing side for connection of jumpers of ACSR or AAAC conductor. The size of the conductor may vary between 50mm² and 232mm² depending upon the location of the circuit breaker. The terminal connection drawing and details are to be approved by the Purchaser before fabrication. The terminal connectors shall be bi-metallic type to avoid bi-metallic corrosion.

16. INSULATION AND CLEARANCE

a) The insulation to ground, the insulation between open contacts and insulation between phases of the circuit breaker shall be capable of satisfactorily withstanding dielectric test voltages.

b) The minimum clearance in open air shall be as follows:

- Between poles - 460mm
- Phase to earth - 400mm
- Ground clearance for live part - 3700mm

17. TEMPERATURE RISE

The temperature rise and the maximum temperature of any part of the circuit breaker under continuous load condition and exposed in the direct rays of the sun shall not exceed the permissible limits as provided in Table V of IEC publication 694 or table 4 of IS:12729. These limits shall not be exceeded when corrected for the difference between the ambient temperature at site and the ambient temperature specified in the standard. The correction proposed shall be stated in the tender.

18. TESTS

18.1 Type and routine tests

The circuit breakers shall be subjected to routine and type tests in accordance with the standards listed in this specification including the following IEC and IS standards with the latest amendments:

- Circuit breaker IEC: 56 and IS:13118 and relevant other standards
- Porcelain insulator IEC: 233 and IS:5621 and relevant other standards

The tests shall include but not limited to the following:

18.2 Short circuit tests

The circuit breaker shall satisfactorily perform the out of phase and short circuit duties specified in IEC: 56, IEC: 17A(Sect.) and IEC:17A/CD/474, IS-13118 and IS:13516.

The circuit breaker shall be capable of performing at least twenty five (25) open operations at the rated short circuit current before maintenance or inspection is required.

18.3 Capacitive current switching

Capacitive switching tests shall be performed in accordance with IEC:56 or IS:13118 and IEC:17A/CD/474 at 1.3U preferably by direct test method or alternatively using synthetic method to IEC:427 or IS:13516. The test circuits shall simulate the most onerous site conditions.

18.4 Reactor Switching

In addition to the capacitive current switching tests to IEC:56 or IS:13118 and IEC:17A/CD/474, the circuit breakers shall be tested for shunt reactor switching in accordance with IEC:1233, Examination of the interrupter after the tests shall not show any evidence of surface tracking or erosion of contacts.

18.5 Dielectric tests

At zero gauge loss of vacuum inside the interrupter chamber, the open contacts shall withstand continuously, the rated phase to ground voltage and it shall be possible to break normal current in these conditions. During the dielectric type tests, no flashover external or internal shall be acceptable.

The circuit breakers shall be subjected to a power frequency AC voltage test for one minute in dry and wet conditions and there shall be no external flash over to earth.

18.6 Mechanical endurance

In addition to the requirements of IEC:56, an extended mechanical endurance test is required to show that the circuit breaker is capable of at least 10,000 operations at no load in accordance with IEC:17A/474/CD. Between the specified test series in IEC: 17A/474/CD, some maintenance such as lubrication and mechanical adjustment is allowed and shall be performed in accordance with manufacturer's instructions. Change of contacts is not permitted.

18.7**Low current switching**

The circuit breakers shall produce very low over voltage (<2.0 pu) on all switching circuits inductive current including reactor switching to IEC-1233 and capacitive current switching to IEC:17A (Secretariat) 438 and IEC 17A/CD/474 the circuit breaker shall be re-ignition or re-strike free for all duties.

18.8**Duty requirement tests**

Apart from auto-reclosing and the other duties mentioned above, the breakers shall be able to perform the following duties for which type tests are to be conducted as per IEC:56 or IS:13118.

1. Breaking the steady and the transient magnetizing current of the transformer.
2. Breaking 25% of rated fault current at twice the rated voltage as per IEC/IS.
3. Cable charging breaking current.
4. Back-to-back capacitor bank breaking current.
5. Single capacitor bank breaking current.
6. Capacitor bank in rush making current.

Test for the resistance of the main circuit shall also be conducted.

18.9**Temperature rise test**

Temperature rise test is to be conducted on the circuit breaker and the accessories in accordance with IEC:56 or IS:13118. The temperature rise shall be limited as per this specification.

19.**PERFORMANCE REQUIREMENTS**

The supplier shall declare the circuit breaker opening and closing times at 120 percent, 100 percent and 70 per cent of the rated voltage of the opening and closing devices when measured at the terminals of the trip and closing coils. The minimum make break time at rated voltage and total break time of the CB shall be stated. The total break time must not exceed 60m.sec.

20.**EARTHING**

All metal parts not intended for carrying current or not alive shall be connected to duplicate earthing system and suitable electroplated brass earthing terminals shall be provided on each circuit breaker in conformity with IEC:56 or IS:13118. Suitable identification mark for the earth terminals shall be provided adjacent to the terminal.

Earth continuity conductors shall be provided down to the ground level for earth connection to purchaser's earthing grid. It shall have sufficient cross sectional area to afford a low resistance path for the full fault current envisaged. Such conductor shall also be provided for the CTs up to the ground level.

The size of the earth continuity conductor shall be large enough to reduce the potential rise of the metal frame of the breaker in the even of fault to minimum but in any case not more than 10V. The size of the conductor shall also be adequate to restrict the temperature rise without causing any damage to the earth connection in the case of fault. No riveted joints in the earth

conducting path shall be permissible and only bolted joints of adequate size shall be provided with nuts, bolts and plain and spring washers. The surfaces to be jointed shall be perfectly flat without any unevenness to ensure that there is no contact resistance.

TECHINICAL DATA SCHEDULE FOR 33KV OUTDOOR VACUUM CIRCUIT BREAKER

SL NO	DESCRIPTION	As Per Specification	UNITS	BIDDER's OFFER
1	GENERAL			
	- Name of manufacture			
	- Manufacturer's type designation			
	- Governing standards	IS : 13118 & IEC : 56		
	- No. of poles of circuit breaker	3	no.	
	- Total length of break per phase			
	- No. of breaks per phase	1	no.	
	Type – Vacuum	Yes, Vacuum	Yes/No	
2.	NOMINAL VOLTAGE			
	- Rated voltage	33	KV	
	Maximum(continuous)service rated voltage	36	KV	
3.	RATED NORMAL CURRENT			
	- Under normal condition	1250	Amps	
	- Under site condition	1250	Amps	
4.	SHORT CIRCUIT PERFORMANCES			
	- Rated short circuit breaking current:			
	Symmetrical, rms	25	KA	
	Asymmetrical including DC component	31.25	KA	
	- Rated short circuit making current; peak	62.5	KA	
	- Short time current withstand capability:			
	Peak value	62.5	KA	
	Rms value	25	KA	
	Duration	3 Seconds	Sec	

5.	MAX. TEMP. RISE OVER AMBIENT OF 50°C			
	- At normal continuous current		°C	
	- After performing the operating sequence		°C	
	- At 10% rupturing capacity		milli-sec	
6	Make & Break Times			
	Total break times			
	At 10% rupturing capacity	60	milli-sec	
	At rated rupturing capacity	60	milli-sec	
	Arcing time at rated breaking current	60	milli-sec	
	Make time from giving close command	60	milli-sec	
	- Minimum reclose time at full rated interrupting Capacity from trip coil energisation		sec	
	- Minimum dead time for 3 phase reclosing		milli-sec	
	- Circuit breaker opening time:			
	at 125% of rated voltage of opening device	60	milli-sec	
	at 100% of rated voltage of opening device	60	milli-sec	
	at 70% of rated voltage of opening device	60	milli-sec	
	- Circuit breaker closing time:			
	at 125% of rated voltage of closing device	60	milli-sec	
	at 100% of rated voltage of closing device	60	milli-sec	
	at 70% of rated voltage of closing device	60	milli-sec	
7	RESTRIKING VOLTAGES FOR 100% RATED CAPACITY			
	- Amplitude factor		KV	

	- Phase factor		KV	
	- Natural frequency		KHz	
	- Rate of rise of recovery voltage	0.57	kv/ μ s	
8	RATED INSULATION LEVEL			
	- Dry and wet power frequency withstand test voltage (rms) for 1 minute			
	Between live terminals and grounded objects	70	KV	
	Between terminals with breaker contacts open	70	KV	
	- 1.2/50 μ sec full wave impulse withstand voltage +ve and - ve polarity (peak)			
	Between live terminals and grounded object	170	KV	
	Between terminals with breaker contacts open	170	KV	
	One minute power frequency voltage of auxiliary wiring	2	KV	
9	OPERATING PERFORMANCE			
	- Rated transient recovery voltage	0.57	KV/ μ s	
	Rated cable charging breaking current	50	Amps.	
	Rated single capacitor bank breaking current	400	Amps.	
	Rated back-to-back capacitor bank breaking current		Amps	
	Rated capacitor bank in-rush making current		KA	
	Rated small inductive breaking current	25	KA	
	First pole-to-clear factor	1.5		
	Rated operating sequence	O-0.3 Sec-CO-3 Min-CO		
	Rated out-of-phase breaking current	25	KAmp	
	Re-ignition and Re-strike free	Yes	Yes/ No	

10	NUMBER OF OPERATION POSSIBLE WITHOUT MAINTENANCE			
	at full rated interrupting current	> 100	no.	
	at 50% of rated interrupting current	> 100	no	
	at 100% of full load current	10,000	no	
	at no load		no	
11	MINIMUM CLRRARANCE IN AIR			
	- Between phases	460	mm	
	- Live parts to earth	400	mm	
	- Live parts to ground level	3700	mm	
12	WEIGHTS AND DIMENSIONS			
	Total weight of one complete breaker, including mounting structure		kg	
	Mounting structure weight		kg	
	Control cabinet weight		kg	
	Dimensions: Height		mm	
	Width		mm	
	Depth		mm	
	Drawings must be provided			
13	HOLLOW INSULATOR HOUSING			
	Type and make of insulators.			
	Power frequency withstand test voltage for one minute:			
	- Dry	70	KV	
	- Wet	70	KV	
	Flash over value			
	- Dry	135	KV	
	- Wet	95	KV	
	1.2/50 impulse voltage withstand capability			
	- positive polarity	170	KV	
	- negative polarity	170	KV	
	Creepage distance total	900	mm	
	Creepage distance protected	450	mm	
	Weight of assembled housing		kg	

	Corona shield provided or not	Yes		
14	SUPPORT INSULATOR			
	Type and make of insulators			
	Power frequency withstand test voltage for one minute:			
	- Dry	70	KV	
	- Wet	70	KV	
	Flash over value			
	- Dry	135	KV	
	- Wet	95	KV	
	1.2/50 impulse voltage withstand capability			
	- positive polarity	170	KVp	
	- negative polarity	170	KVp	
	Creepage distance, total	900	mm	
	Creepage distance, protected	450	mm	
	Weight of assembled housing		kg	
	Corona shield provided or not	Yes		
15	CONTACTS			
	Type of main contacts	Butt		
	Type of auxiliary contacts			
	Material of auxiliary contacts	Silver Plated Brass		
	Type of plating, if any	Silver		
	Thickness of plating	20	micron	
	Contact pressure		gm/sq.mm	
	No of auxiliary contacts provided:	6 NO + 6 NC		
	Those closed when breaker is closed	6	no	
	Those open when breaker is closed	6	no	
	Those adjustable		no	
16	OPERATING MECHANISM			

	Opening type	Shunt Trip		
	Closing type	Motor / Manual spring charge, Shunt/Magnetic actuator operation		
	Force applied by charged spring for closing		kg	
	Time taken by motor for charging the spring from fully discharged to fully charged position	<30	sec	
	Full sequence of operation	O-0.3sec-CO-3min-CO		
	Whether limit switches are provided with spring	Yes	yes/no	
	Whether spring limit switches start & stop the motor	Yes	yes/no	
	Type and material of spring employed			
	Whether trip free	Yes		
	Whether anti pumping device provided	Yes		
17	AUXILIARY AND CONTROL POWER SUPPLY			
	Normal auxiliary A.C supply voltage	230	Volts	
	Voltage limits for proper operation		Volts	
	Maximum	115%	Volts	
	Minimum	85%	Volts	
	Frequency limits for proper operation			
	Maximum	+5%	Hz	
	Minimum	-5%	Hz	
	for circuit breakers :		Volts	
	Normal DC control circuit voltage	24	Volts	
	Voltage limits for proper operation			
	Maximum	120%	Volts	
	Minimum	70%	Volts	
	Power required for trip coil	300	Watts	
	Power required for closing coil	300	Watts	

18	LOCAL CONTROL PANEL			
	- Material			
	- Degree of protection			
	- Vermin proof provisions	Yes	Yes/no	
	- Weather proof provision	Yes	Yes/no	
	- Dust proof provision	Yes	Yes/no	
	- Ventilation provision	Yes	Yes/no	
	- Thickness of sheet materials used	3	mm	
	- Overall dimensions		mm	
	- Total weight		kg	
	- Mounting arrangement			
19	TERMINAL CONNECTOR			
	- Material			
	- Bi-metallic or not	Yes		
	- Weight		kg	
	- Dimensions		mm	
	- Size and type of conductor it can accommodate	100	sq mm	
	- Terminal pads silver plated or not	Yes		
	- Thickness of silver plating		microns	
20	CORROSION PREVENTION SYSTEM FOR CIRCUIT BREAKER AND CONTROL CABINET	Preferable Galvanized		
	- Surface preparation			
	- Rust inhibition			
	- Zinc thickness/paint thickness		microns	
	- Treatment of fasteners			
21	CORROSION PREVENTION SYSTEM FOR SUPPORT STRUCTURE	Hot Dip Galvanized		

	Surface preparation			
	Rust inhibition			
	Zinc thickness		microns	
	Treatment of fasteners.			
22	VACUUM CIRCUIT BREAKER SEALING	Hermetically Sealed		
	Degree of protection of circuit breaker pole enclosure. (IEC 529, IS13947)			
	Method of sealing the circuit breaker pole enclosure.			
23	33 KV CURRENT TRANSFORMER			
	Make of Manufacturer for transformer protection			
	- Make and type of transformer	Outdoor, Oil-Cooled		
(i)	- Ratio 200-100-50/ 1- 1 – 1 A			
	Core1. VA Burden	15	VA	
	Accuracy class	0.5		
	Saturation factor	NA		
	Instrument security factor	<5		
	Accuracy limit factor			
	Knee point voltage			
	Magnetizing current at $V_k/2$		Milli amps.	
	Secondary resistance R_{ct}	≤ 2 at 75 deg C	ohms	
	Core 2. VA burden	15	VA	
	Accuracy class	5P		
	Saturation factor			
	Instrument security factor			
	Accuracy limit factor	20		
	Core 3. VA burden			
	Accuracy class	PS		
	Saturation factor			
	Accuracy limit factor			
	Instrument security factor			

	Knee point voltage	≥ 150	Volts	
	Magnetizing current at $V_k/2$	≤ 30 mA at 0.5 V_k		
	Secondary resistance R_{ct}	≤ 2 at 75 deg C	OHM	
	Short time current rating:Current	25	KA	
	Time	3	Sec	
	Impulse voltage withstand level	170	KV	
	Power frequency voltage withstand level			
	Primary winding	70	KV	
	Secondary winding	3	KV	
	Specification of oil	IS : 335		
	Quantity of oil		Liters	
	Creepage distance	900	mm	
	Protected creepage distance	450	mm	
	Weight of CT complete with oil		kg	
(ii)	- Ratio 400-200-100/ 1- 1 A		I	
	Core1. VA Burden	15	VA	
	Accuracy class	0.5		
	Saturation factor			
	Instrument security factor	<5		
	Accuracy limit factor			
	Knee point voltage			
	Magnetizing current at $V_k/2$		Milli amps.	

	Secondary resistance R_{ct}	≤ 2 at 75 deg C	ohms	
	Core 2. VA burden	15	VA	
	Accuracy class	5P		
	Saturation factor			
	Instrument security factor			
	Accuracy limit factor	20		
	Short time current rating : Current	25	KA	
	time	3	Sec.	
	Impulse voltage withstand level	170	KV	
	Power frequency voltage withstand level			
	Primary winding	70	KV	
	Secondary winding	3	KV	
	Specification of oil	IS : 335		
	Quantity of oil		Liters	
	Creepage distance	900	mm	
	Protected creepage distance	450	mm	
	Weight of CT complete with oil		kg	
24	33 KV VOLTAGE TRANSFORMER			
a.	GENERAL.			
	Make			
	Type of transformer	Single-Phase Outdoor, Oil- Cooled, Dead Tank, Double Wound		
	Rated normal voltage	33 / $\sqrt{3}$	KV	
	Rated maximum voltage	36 / $\sqrt{3}$	KV	
	Rated primary voltage	33 / $\sqrt{3}$	KV	
	Rated secondary voltage	110 / $\sqrt{3}$	Volts	
	V A burden	200	VA	
	Accuracy class	0.5		
	Ratio error		Minute	
	Phase displacement positive or negative			
	- Saturation factor			
	- Instrument security factor			

	- Short time current rating			
	Rms value		KV	
	Period		Sec	
	Peak value		KA	
	- Impulse voltage withstand level	170	KV	
	One minute power frequency voltage withstand level of primary winding	70	KV	
	- Specification of oil	IS : 335		
	- Weight of oil		Kg	
	Weight of core and winding		Kg	
	- Total weight		Kg	
	Overall dimensions		Mm	
	Rated voltage factor			
	Continuous	1.2		
	For 30 seconds	1.5		
	- Temperature rise above the ambient of 50°C	40	°C	
	- Correction factor			
	- Partial discharge level		pC	
b.	TANK			
	- Composition of metal	Hot Dip Galvanized		
	- Thickness	3	mm	
c.	CORE			
	Material composition	CRGO		
	Flux density at normal voltage and frequency	< 1.2	Telsa	
	Lamination thickness	0.27	mm	
d.	WINDINGS			
	Purity of copper used	Electrolytic copper	Percent	
	Type of insulation	DPC		
	Power frequency withstand level			
	Secondary winding to earth	3	KV	
	Between sections	3	KV	
e.	SECONDARY TERMINAL BOX			
	Degree of protection			
	Vermin proof provision		Yes/no	
	Weather proof provision		Yes/no	
	Dust proof provision		Yes/no	

	Thickness of metal used		mm	
	Overall dimensions		mm	
	Mounting arrangement			
f.	H V TERMINAL			
	- Material			
	- Bi-metallic or not	Bi-Metallic	Yes/no	
	- Dimensions,		mm	
	Size and type of conductor it can accommodate		Sq. mm	
g.	CORROSION PREVENTION SYSTEM	Hot Dip Galvanized		
	(To be furnished as per clause on Surface Treatment)			
	Surface preparation			
	Rust in inhibition			
	Treatment of fasteners			
	Oil resistance varnish			
25 A.	<u>INSTRUMENTS & METERS (Ammeter & Voltmeter)</u>			
	1. Type & make of instruments & meter	Analogue, AE make		
	2. Size	144 X 144	Mm	
	3. Whether magnetically shielded or not	Yes		
	4. Limits or error in the effective range	$\pm 2 \%$		
	5. Scale length	90 ⁰	KV	
	6. Whether Tropicalised	Yes		
	7. short time overload rating	200%		
	8. V A Burden:			
	Current coil			
	Potential coil			
	9. Power consumption of current & potential coil			
B.	BACK UP RELAYS			
	1. Type of relay	2 O/C + 1 E/F, Self actuated , 1 Amp, aux. Volt-24 V DC/Numerical & Non Communicable Type		
	Make	AREVA, ER,ABB make		
	2. Current coil rating	1	Amp	

	3. Tap range	5% - 250%		
	4. VA Burden Highest tap & lowest tap	3	VA	
	5. Power consumption at highest tap & lowest tap		Watts	
	6. Time of operation at maximum time dial setting at			
	i) 5 times tap setting current	1.6-1.9	Second	
	ii) 10 times tap setting current	1.3	Second	
	7. Type of characteristic	IDMTL		
	8. Whether draw out type or not.	Yes		
	9. Trip contact ratings Amps.	5 Amp-Continuous	Amp	
	10. Whether seal In contacts provided or not	Yes		
	11. No. of contacts	2 NO+2 NC		
	12. Flag	Required		
D.	Three element voltage operated Aux. Relay			
	Type & make of the Relay	AREVA, ER,ABB make		
	Voltage coil rating	24 V DC	Volts	
	No. of elements	3	No.	
	Mounting	Flush		
	Aux. Contact on each pole	1 NO + 1 NC		
	Flag	Required		
	Purpose	Trf protection		
E.	High speed Tripping Relay			
	Type & make of the Relay	AREVA, ER,ABB make		
	Voltage coil rating	24 V DC	Volts	
	Contact(Hand reset)	3 NO +1 NC		
	Flag	Required		
F.	High speed Harmonic Restraint Differential Relay			
	Type & make of the Relay	AREVA, ER,ABB make		
	Voltage coil rating	24 V DC	Volts	
	Aux. Contacts(Hand reset)	2 NO		
	Mounting	Flush		
	CT secondary	1 Amp.		
	Differential current setting	15%		

	Bias setting	15-30-40 %		
	Flag	Required		
G.	<u>POWER PACKS (2 X 12 V inbuilt Battery)</u>			
	1. Rated AC voltage. (Input 230 V & 110 V AC)	230 V/110 V AC	Volt	
	2. Single phase or three phase.	Single phase		
	3. Capacity(VA)			
	4. Power factor			
	5. Type of transformer used, if any, to supply input to the rectifier			
	6. Transformation ratio			
	7. Type of rectification employed, full wave or half wave	Full wave		
	8. Type of rectifier connection	Bridge		
	9. Ripple factor			
	10. Type of filter employed			
	11. Ratings of capacitor			
	12. Time of retention of charge by capacitor			
	13. Value of DC constant.			
	14. Out put voltage(DC)	24 ± 15%	Volt	
	15. Capacity (Watt-sec)			
	16. No of closing & tripping taken by this pack.	>10		

Signature of the Bidder with Seal

GUARANTEED TECHNICAL PARTICULARS OF INSULATING PIERCING CONNECTOR

Sl. No.	Particulars	Specified Requirement	Details furnished by the bidder
1	Name of Manufacturer		
2	Place of manufacture		
3	Is manufacturer of accessories as ISO 9001-2000 company		
	a) copies Certificate enclosed		
	b) Are GA drawing enclosed		
4	Product designation	MV 240-95	
5	Applicable standard	As per NFC 33 020-1998	
6	Range of cable sizes: Main & Tap	Main : 95-240 (99) mm ²	
		Branch: 35-70-(99) mm ²	
7	Materials Composition		
	a) Body- Nylon		
	b) Contact plates- Tinned copper		
	c) Bolt-Steel		
	d) Seals & end caps - Elastomer		
8	Is any metallic part carrying potential in operation exposed during installation		
9	Are end caps of branch cable		
	a) Slide on type		
	b) Rigid		
10	Are torque limiting shear heads provided to tightening bolts		
11	Marking		
	a) Make		
	b) Main range		
	c) Tap range		
12	Rated current	600 A	
13	Voltage withstand under water emersion in	15 KV for 1 min	
14	Rated Tightening torque in	19 to 25 Nm	
15	Dimensions		

Signature of the bidder with Seal

GUARANTEED TECHNICAL PARTICULARS OF 11KV STRING HARDWARE

Sl. No.	Particulars	Specified Requirement	Details furnished by the bidder
1	Name of Manufacturer		
2	Address of manufacturer		
3	Voltage class	11KV	
4	Type	Single Tension	
5	Applicable standards	IS:2486	
6	Insulator Coupling	Ball & Socket type	
7	Material :		
	a. Ferrous parts	HDG	
	b. Bolts, Nuts & Washers	HDG	
	c. Spring washer	EG	
	d. Split pin		
8	e. Bolted Type Tension clamp/ Suspension clamp		
	Ultimate Strength		
	a. Complete Assembly		
	b. Anchor Shackle		
	c. Ext. Link		
9	d. 4U-Bolted type Tension clamp		
	Purity of zinc used for galvanising	%	
10	Min. No of dips in standard preece test the ferrous parts can withstand		

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GUARANTEED TECHNICAL PARTICULARS OF 11KV INDDOR/OUTDOOR TERMINATION KIT & MID SPAN JOINT

Sl. No.	Particulars	Specified Requirement	Details furnished by the bidder
1	Name of Manufacturer		
2	Applicable Standards	EN-50397-2	
3	a. Rated voltage of cable accessories		
	b. Max operating voltage of cable accessories	12 KV	
4	AC High voltage withstand		
5	Impulse voltage	170 KVp	
6	Max. load current		
7	Short circuit current		
8	Type of Tubing's & Molded parts		
9	Material of Tubing's & Molded parts		
10	Non tracking material- Termination only		

11	Type of Ferrule		
12	Type of Lug		
13	Outer Sheath replacement (in case of joint)		
14	Di-electric strength as per ESI-09-13		
	a) Insulated tubing		
	b) Anti-tracking tubing		
15	Volume Resistivity as per ESI-09-13		
	a) Insulated tubing		
	b) Anti-tracking tubing		
16	Tensile strength as per ESI-09-13		
	a) Insulated tubing		
	b) Anti-tracking tubing		
17	Ultimate Elongation as per ESI-09-13		
	a) Insulated tubing		
	b) Anti-tracking tubing		

Signature of the bidder with Seal

GUARANTEED TECHNICAL PARTICULARS OF FIRED WEDGE CONNECTOR

Sl. No.	Particulars	Specified Requirement	Details furnished by the bidder
1	Name of Manufacturer		
2	Place of manufacture		
3	Product designation		
4	Brand Name		
5	Applicable standard	IS 5561-1970	
6	Metallic Material of Connector		
	a. C Member		
	b. Wedge member		
	c. Hardware		
7	Non-metallic material of Connector		
8	Suitable Conductors for Main & Tap		
9	Installation & Application Tooling		
10	Rated Voltage in KV	Upto 220 KV	
11	Rated tensile Strength in kgf	110	
12	Dimensions		

Signature of the bidder with Seal

GUARANTEED TECHNICAL PARTICULARS FOR LT GUY STRAIN
INSULATOR (TYPE A)

Sl.	Particulars	Requirement	Bidder's offer
1	Name of Manufacturer. & Address	To be specified by the bidder	
2	Location of type testing	To be specified by the bidder	
3	Applicable standard	IS: 5300-1969 or the latest version thereof	
4	Nominal System Voltage	400/230 V	
5	Highest System voltage	440/250 V	
6	Length	90 mm	
7	Diameter	65 mm	
8	Cable hole diameter	16 ± 1.5	
9	1min. power frequency withstand Voltage (Dry)	18 KV (rms)	
10	1min. power frequency withstand Voltage (Wet)	8 KV	
11	Minimum failing load	44 KN	
12	Minimum creepage distance	41 mm	
13	Drawing	To be submitted by bidder	
14	Conforming standard	As per IS	

NB- Every insulator should bear the marking of manufacturer's name and ISI mark

Name & Signature of Agency with seal

**GUARANTEED TECHNICAL PARTICULARS FOR 11 KV
GUY STRAIN INSULATOR (TYPE C)**

Sl.	Particulars	Requirement	Bidder's offer
1	Name of Manufacturer. & Address	To be specified by the bidder	
2	Location of type testing	To be specified by the bidder	
3	Applicable standard	IS: 5300-1969 or the latest version thereof	
4	Nominal System Voltage	11 KV	
5	Highest System voltage	12 KV	
6	Length	140 mm	
7	Diameter	85mm	
8	Cable hole diameter	25 ± 1.5	
9	1min. power frequency withstand Voltage (Dry)	27 KV (rms)	
10	1min. power frequency withstand Voltage (Wet)	13 KV	
11	Minimum failing load	88 KN	
12	Minimum creepage distance	57 mm	
13	Drawing	To be submitted by bidder	
14	Conforming standard	As per IS	

NB- Every insulator should bear the marking of manufacturer's name and ISI mark

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with seal**

GURANTEED TECHNICAL PARTICULARS OF LT STAY SETS

Sl No.	Item Description	Specified Parameters		Material	Bidder's offer
		Section Tolerances	Fabrication Tolerances		
	Manufacture's Name & Address		To be specified by the bidders		
1.	Anchor Plate	6mm thick +2.5%-5%	200x200mm+1%	GS Plate 6 mm thick	
2.	Anchor Rod	16mm dia +5%- 3%	Length 1800mm + 0.5%	GS Round 16mm dia	
			Rounded Eye 40 mm inside dia +3% Threading 40mm+ 11%-5%	GS Round 16mm dia	
3.	Turn Buckle Bow	16mm dia +5%-3%	995mm+1%	GS Round 16mm dia.	
			Length180mm +1%	GS Angle 50x50x6 mm	
4.	Eye Bolt Rod	16mm dia +5%-3%	Length 450mm + 1%	GS Round 16 mm dia	
			Threading 300mm +1% Round Eye 40mm inside dia+3%		
5	Galvanisation thickness	All galvanization shall be carried out in accordance with IS: 2629 . The weight of Zinc deposited shall be in accordance with IS: 2629 and shall not less than 0.61 kg/m ² with a minimum thickness of 86 microns for items of thickness more than 5 mm, 0.46kg/m ² (64 microns) for items of thickness between 2 mm & 5 mm& 0.33kg/m ² (47 microns) for items less than 2 mm thickness.			
a	Anchor Plate				
b	Anchor Rod				
c	TurnBuckle Bow				
d	Eye Bolt Rod				
6	Thimble	2 nos. to be made of 1.5 mm thick G.S Sheet into a size 75x22x40 mm & shape as per standard.			
7	Hexagonal Nut	One G.S Hexagonal Nut confirming to IS:1363 & 1367 with one square washer of size 50x50x6 mm (G.S) along with Anchor Rod.			
8		Two G.S Hexagonal Nuts of suitable size along with Eye Bolt Rod.			

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GURANTEED TECHNICAL PARTICULARS OF 11KV HT STAY SETS

Sl No.	Item Description	Specified Parameters		Material	Bidder's offer
		Section Tolerances	Fabrication Tolerances		
	Manufacture's Name & Address		To be specified by the bidder		
1	Anchor Plate	8 mm thick +2.5%-5%	300x300mm+1%	GS Plate 8 mm thick	
2	Anchor Rod	18 mm dia +5%- 3%	Length 1800mm + 0.5%	GS Round 18mm dia	
			Rounded Eye 40 mm inside dia +3% Threading 40mm+ 11%-5%	GS Round 18mm dia	
3.	Turn Buckle Bow	18mm dia +5%-3%	995mm+1%	GS Round 18mm dia.	
			Length200mm +1%	GS Channel 100x50x4.7mm	
4.	Eye Bolt Rod	18 mm dia +5%-3%	Length 450mm + 1%	GS Round 18 mm dia	
			Threading 300mm +1% Round Eye 40mm inside dia+3%		
5	Galvanisation thickness	All galvanization shall be carried out in accordance with IS: 2629 . The weight of Zinc deposited shall be in accordance with IS: 2629 and shall not less than 0.61 kg/m² with a minimum thickness of 86 microns for items of thickness more than 5 mm, 0.46kg/m²(64 microns) for items of thickness between 2 mm & 5 mm& 0.33kg/m²(47 microns) for items less than 2 mm thickness.			
a	Anchor Plate				
b	Anchor Rod				
c	TurnBuckle Bow				
d	Eye Bolt Rod				
6	Thimble	2 nos. to be made of 1.5 mm thick G.S Sheet into a size 75x22x40 mm & shape as per standard.			
7	Hexagonal Nut	One G.S Hexagonal Nut confirming to IS:1363 & 1367 with one square washer of size 50x50x6 mm (G.S) along with Anchor Rod.			
8		Two G.S Hexagonal Nuts of suitable size along with Eye Bolt Rod.			

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GURANTEED TECHNICAL PARTICULARS STAY WIRE (7/8 SWG)

Sl. No.	Description	Specified	Bidder's offer
1.	Manufacturer's name & address	To be specified by the Bidder	
2	Nominal diameter of wire in mm	4.0	
3	Tolerance in diameter in mm	$\pm 2.5\%$	
4	Minimum breaking load in Kg	5960.26	
5	Tensile strength Kg/mm ²	71.40	
6	Overall diameter of stranded wire in mm	12.0	
7	Sectional Area (in mm ² .)	113.14	
8	Coating Test		
a	Type of zinc coating whether heavy or light	Heavy	
b	Weight of coating in g/m ²	476	
9 a	Length of wire in each coil in mtr.	117	
b	Tolerance	$\pm 5\%$	
10	No. of dips the coating is able to withstand as $18 \pm 20^\circ\text{C}$	3 dip in min.	
11	Adhesion Test (Wrap Test at 1 turn per second coiling while stress not exceeding % nominal tensile strength)		
a	Min. complete turn of wrap	To be specified by bidder	
b	Dia of mandrel on which wrapped	- do -	
12	Bend Test		
a	Angle	- do -	
b	Dia round a format to be bent	- do -	
13	Freedom from defect	- do -	
14	Chemical composition the MS Wire used shall not exceed		
a	Sulphur 0.060%	- do -	
b	Phosphorous 0.065%	- do -	
15 a	Weight of each coil in Kg	70 to 100	
b	Tolerance	$\pm 5\%$	
16 a	Weight of wire in Kg/Km	750	
b	Tolerance	$\pm 5\%$	
17	Standard according to which the solid wire is manufactured and tested	ISS: 2141/1992 & ISS: 4826/1979	

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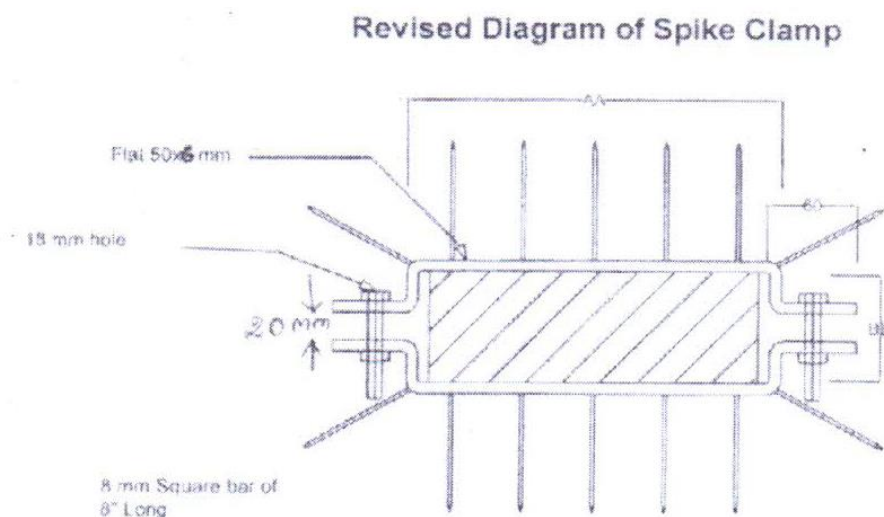
GURANTEED TECHNICAL PARTICULARS STAY WIRE (7/12 SWG)

Sl. No.	Description	Specified	Bidder's offer
1.	Manufacturer's name & address	To be specified by the Bidder	
2	Nominal diameter of wire in mm	2.50	
3	Tolerance in diameter in mm	$\pm 2.5\%$	
4	Minimum breaking load in Kg	2331.07	
5	Tensile strength Kgf/mm ²	71.40	
6	Overall diameter of stranded wire in mm	7.50	
7	Sectional Area (in mm ² .)	44.19	
8	Coating Test		
a	Type of zinc coating whether heavy or light	Heavy	
b	Weight of coating in g/m ²	476	
9 a	Length of wire in each coil in mtr.	298	
b	Tolerance	$\pm 5\%$	
10	No. of dips the coating is able to withstand as $18 \pm 20^{\circ}\text{C}$	3 dip in min.	
11	Adhesion Test (Wrap Test at 1 turn per second coiling while stress not exceeding % nominal tensile strength)		
a	Min. complete turn of wrap	To be specified by bidder	
b	Dia of mandrel on which wrapped	- do -	
12	Bend Test		
a	Angle	- do -	
b	Dia round a format to be bent	- do -	
13	Freedom from defect	- do -	
14	Chemical composition the MS Wire used shall not exceed		
a	Sulphur 0.060%	- do -	
b	Phosphorous 0.065%	- do -	
15 a	Weight of each coil in Kg	70 to 100	
b	Tolerance	$\pm 5\%$	
16 a	Weight of wire in Kg/Km	310	
b	Tolerance	$\pm 5\%$	
17	Standard according to which the solid wire is manufactured and tested	ISS: 2141/1992 & ISS: 4826/1979	

Name & Signature of Agency with seal

TECHNICAL SPECIFICATION OF SPIKE :

Each G.I spike clamp made up 50x6 mm flat and 8 mm square bar (solid type) 8" long . 2 nos. spikes clamp per Set for one pole . One no. spike clamp means one pair of spike clamp and 2 pairs of spike clamp to be used per pole , details of spike clamp diagram as follows:



1 No. (One pair) Spike Clamp (GI)

Size of Pole	Spike Clamp	AA in mm	BB in mm	No. of Spike
150x150 mm RS Joist	1 st point at 2ft from concrete level	150	150	12
	2 nd point at 7ft height from GL	150	150	
9 mtr. 300Kg PSC pole	1 st point at 2ft from concrete level	320	100	14
	2 nd point at 7ft height from GL	292	100	

The vendor shall provide and install Spike clamp on all 11 KV DP Structures, and at all poles as per CEA guide lines. The spike clamp to be fitted with pole by bolting and welding in such a way to avoid theft.

TPNODL	TP NORTHERN ODISHA DISTRIBUTION LTD	
	WORK INSTRUCTION /OPERATING GUIDELINES	
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Prepared By Imran Ahmad/ Swetaraj Parida	Reviewed By Vipin Chauhan	Approved By Sunil Bhattar

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1.0 ORGANIZATIONAL VALUES

The Tata Group has always been a value driven organization. These values continue to direct the Group's growth and businesses. The Six core Tata Values underpinning the way we do business are:

Integrity - We must conduct our business fairly, with honesty and transparency. Everything we do must stand the test of public scrutiny.

Understanding - We must be caring, respectful, compassionate and humanitarian towards our colleagues and customers around the world and always work for the benefit of India.

Excellence - We must constantly strive to achieve the highest possible standards in our day to day work and in the quality of goods and services we provide.

Unity - We must work cohesively with our colleagues across the group and with our customers and partners around the world to build strong relationships based on tolerance, understanding and mutual co-operation.

Responsibility - We must continue to be responsible and sensitive to the countries, communities and environments in which we work, always ensuring that what comes from the people goes back to the people many times over.

Agility - We must work in a speedy and responsive manner and be proactive and innovative in our approach.

2. Tata Code of Conduct

The Business Associate and TPNODL shall be bound by the provisions/ clauses mentioned in Tata Code of Conduct (TCoC) in all their dealings with stakeholders. The Associate is advised to go through the TCoC document available as Annexure-P.

3.0 CONTRACT PARAMETERS

3.1 Issue/Award of Contract

TPNODL awards the contract to the Associate in writing in the form of Purchase order or Rate Contract (RC) hereafter referred as Contract, through in any or all of following modes- physical handover / post / e-mail / web document / fax with all the attachments/enclosures which shall be part of the contract document

On receipt of the contract, the associate shall return to TPNODL copy of the contract document duly signed by legally authorized representative of associate, within two days of Effective Date of Contract for contracts having contract execution time less than 30 days and within five days for all other contracts.

Note- In case of RC though, further Release Orders (RO) shall be issued by TPNODL on RC rates and terms & Conditions as per the requirement of TPNODL.

3.2 Contract Commencement Date

The date of issue/award of contract shall be the Effective Date of Contract or Contract Commencement date.

3.3 Contract Completion Date

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The date of expiry of Guarantee Period (detailed in section 12 of this document) shall be deemed as the Contract Completion Date.

3.4 Contract Period/Time

The period from Contract Commencement Date to Contract Completion Date shall be deemed as the Contract Period/Time.

3.5 Contract Execution Completion Date

The stipulated date for completing the execution of all items in the schedule of quantities (Supply, Service and or both as applicable) shall be deemed as the Contract Execution Completion Date.

3.6 Contract Execution Period/Time

The Period from Contract Commencement Date to Contract Execution Completion Date shall be the Contract Execution Period/Time. Timely Completion of Works/Timely Delivery of Materials is the essence of the contract. The period from effective date of contract to the date stipulated for completion of delivery of all items/completion of all the works/services, as per schedule of quantities of the contract is defined as contract execution completion time. The Delivery of Materials /The Completion of Works, as applicable, should be achieved in all respects as per schedules of quantities and all the terms and conditions of the contract, in the contract execution time.

Any revision/amendment in the originally stipulated contract execution time has to be approved by authorized representative of TPNODL.

3.7 Contract Price /Value

The total all-inclusive price/value mentioned in the LOI/PO/RC of the contract document is the Contract Price/Value and is based on the quantity, unit rates and prices quoted and awarded and shall be subject to adjustment based on actual quantities supplied/actual measurement of work done and accepted and certified by the authorized representative of the company unless otherwise specified in schedule of quantities or in contract documents.

3.8 Contract Document

The Contract Document shall mean and include but not limited to the following:

- NIT/Tender Enquiry, QR, Instruction to Bidders, Special Condition of Contract (SCC) of tender, GCC, Technical & Commercial Specifications including relevant annexure and attachments).
- Bids & Proposals Received from Associate including relevant annexure/attachments.
- Letter of Intent (LOI/RC/PO) with agreed deviations from the tender/bid documents.
- All the Inspection and Test reports, Detailed Engineering Drawings.
- Material Dispatch Clearance Certificate (MDCC).
- Minutes of Meeting (MoM)

3.9 Contract Language

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All documents, instructions, catalogues, brochures, pamphlets, design data, norms and calculations, drawings, operation, maintenance and safety manuals, reports, labels, on deliveries and any other data shall be in English Language.

The Contract documents and all correspondence between the TPNODL, Third Parties associated with the contract, and the Associate shall be in English language.

However, all signboards required indicating "Danger" and/or security at site and otherwise statutory required shall be in English, Hindi, and local languages.

3.10 Reverse Auction

TPNODL reserves the right to conduct the reverse auction (instead of public opening of price bids) for the products / services being asked for in the tender. The terms and conditions for such reverse auction events shall be as per the Acceptance Form attached in Annexure J. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form as mentioned in the Annexure J as a token of acceptance for the same.

In addition to this TPNODL reserve the rights for manual negotiation even after the Reverse Auction.

4.0 SCOPE OF WORK

All the activities that are to be undertaken by the Associate to realize the contractual deliverables in completeness form Scope of Work. Following clauses list, but not limited to, major requirements of the scope of work.

The associate shall satisfy himself and undertake fully the technical/commercial requirements of items to be supplied as listed in the Schedule of Quantities together with the tests to be performed /test reports to be furnished before dispatch, arrangement of stage and final inspections during manufacturing as per terms and conditions of contract, technical parameters & delivery terms and conditions including transit insurance to be met in order to fully meet TPNODL's requirements.

Completeness: Any supplies and services which might have not been specifically mentioned in the Contract but are necessary for the scope mentioned in Special Terms & Conditions and/or completeness of the works at the highest possible level, including any royalties, license fees & compensation to be paid, whether incurred by the associates or by a third party for the work covered in the scope, regardless of when incurred, shall be supplied/provided by the associate without any extra cost and within the time schedule for efficient, smooth and satisfactory operation and maintenance of the works at the highest possible level under Indian conditions (but according to international standards for facility of this type), unless expressly excluded from the scope of supplies and services in this Contract.

TPNODL have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the supplies and services stipulated in the Contract by submitting a request in writing to the Associate. The Associate shall, within fifteen days of receipt of such request from the TPNODL, provide Purchaser with a reasonably detailed estimate of the cost of the change outlined in the request.

In the event, TPNODL requests a change, the Contract price and time shall be adjusted upwards or downwards, as the case may be and shall be mutually agreed to. The associate

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shall not be entitled to any extension of time unless such changes adversely affect the time schedule.

The Associate shall not proceed with the changes as requested till adjustment of contract price and time schedule where so applicable in terms of or otherwise directed by the TPNODL.

4.1 Bid Evaluation- Commercial, Technical and Safety Evaluation

TPNODL reserves the right to evaluate the bid in the following manner on the below parameters as per the requirement:

- **Safety Evaluation:** Business Associates may be required to submit a separate Safety Bid along with their Technical & Price Bids at the time of bidding, especially in cases where the expected contract value $\geq$ Rs. 1 Cr. and which fall in high risk category as detailed in Annexure-N. In such cases, TPNODL shall also do a Safety Bid Evaluation along with Technical Evaluation to declare the Qualified Bidders.
- **Technical Evaluation:** The bid shall be evaluated on the parameters and not limited to Bidder Experience, Bidder Performance with other utility/company, internal performance feedback, Technical Specification, General Technical Parameters (GTP), Layout, Drawings etc.

TPNODL reserves the right to carry out Factory Evaluation of Manufacturer along with the Visit to executed Sites for further evaluation to ascertain bidder's manufacturing capability, quality procedures & Performance of executed works.

- **Commercial Evaluation:** The bid shall be evaluated on the basis of Qualifying Requirement parameters and other commercial parameters as mentioned in tender.

4.2 Indemnity

Associates shall undertake to fully indemnify TPNODL (also referred to as the Company in the GCC) against all kinds of liabilities or damages, of whatsoever nature, including compensation arising from any accident to the person or property of those in Associate's employment or to any other person or properties including those of TPNODL, arising due to reasons attributable to any, act, omission or negligence of the Associate the Associates, for the entire period of contract including period of guarantee.

Within 7 days of award of work, the Associates shall submit Indemnity Bond in the format as per Annexure-E to Order Issuing Authority.

Contract having value more than Rs 2 Cr per Annum, Associates shall submit Indemnity Bond on Rs 100/- Non Judicial Stamp Paper in the format as per Annexure- E to Order Issuing Authority.

4.3 Display of Notice Boards at Work Sites

The Associate shall put up display notice board at each project site where the works are in progress indicating the information given below:

- Name of the Project.
- Estimated Cost of Project.
- Date of Commencement.
- Expected date of completion.

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- Name of Associate and his telephone number.
- Name of Engineer-in-Charge and his telephone number.

4.4 Disposal of Waste at Site

Significant quantities of waste are generated during the execution of project and an integrated approach for effective handling, storage, transportation and disposal of the same shall be adopted. This would ensure the minimization of environmental and social impact in order to combat the climate change.

The associates shall follow the below criteria for disposal of waste at site during the execution of project.

- Associate shall ensure that the detailed project plan include the waste management, segregation of all designated waste material (Recyclable/ Non-Recyclable), collecting, storing, disposing and transferring the same to pre-arranged facility/destination in timely and safe manner as per environmental legislations during the execution of project. The project plan shall also include the innovative construction practice to eliminate or minimize waste, protect surface/ground water, control dust and other emissions to air and control noise during the execution of project. The copy of same shall be given to EIC before the commencement of project.
- The purchase policy of BA shall encourage the procurement of material with recycled and minimum packaging of goods during delivery. Associate shall provide the appropriate means for site to site transportation of materials to avoid damage and litter generation.
- Associate shall educate and inform to its project team about the requirement and responsibilities for waste minimization and disposal in general and provide training of practices that support this. Waste management should be treated like a safety program.
- In the event that area of contaminated or biological hazard is identified, Associate shall ensure that plant, equipment, personnel and any activity associated with the work is carried out in consultation with EIC of TPNODL.
- Associate shall ensure that the residents living near the site are kept informed about proposed working schedule and shall informed timings and duration of any abnormal noise full activity that is likely to happen.
- Associate shall ensure the regular maintenance and monitoring of vehicles and equipment for efficient fuel use so that emissions and noise are within acceptable limits to avoid air pollution.

4.5 Deployment of Work Force

Associate shall deploy adequate labour, as considered necessary by TPNODL for execution of the contract including Sundays and Holidays whenever required to do so with no extra cost to TPNODL. However, prior permission shall be taken from the site Engineer to carry out the work beyond normal working hours or on Sundays and Holidays. Female employees shall not be deployed beyond normal working hours/days and no child labour shall ever be deployed. Associate shall depute full time qualified and experienced engineers to supervise the work at site. All such staff shall be maintained from commencement to completion of all works to the entire satisfaction of the Engineer-in-Charge. Associate's employees deployed for the works under this contract will not be considered in Company's employment at any

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time. Associate shall continue to be responsible for all such employees, their safety, all types of statutory compliances related thereto and in any other manner whatsoever. The company will stand indemnified by the Associate in respect of all the above. At the same time Company upon noticing any breach or default on any statutory compliances, may at their sole discretion, decide to act in a manner as deemed fit at the risks and costs of the Associate.

TPNODL shall have the right to instruct the Associate to change the Sub- Associates or skilled /unskilled workers in case the conduct, the workmanship or speed of the work is not satisfactory.

Associates shall submit duly signed undertaking regarding engagement of competent staff / employee commensurate to the nature of job to Engineer-in-charge in the format attached as Annexure – H.

4.6 Damages to Properties

The Associates shall take necessary steps to ensure that the equipment and installations of the Company, Third parties, including other utility services like water supply pipelines; open drains telephone cables etc. are not damaged during execution of the works. The Associates shall be responsible for all such damages and shall have to repair/ replace and/or compensate for the entire claims in respect of such damages at its own cost.

4.7 Issuance of Material

The material issued to the Associate shall be in the custody of the Associates who shall be fully responsible for the same. After completion of the works, the Associates will reconcile the material. Any cost of material which is short or damaged/lost will be deducted from Associate bill/ deposits.

4.8 Company's Right To Use Works

If Taking Over Certificate is delayed for any reason, for which TPNODL's decision shall be final and binding upon the Associate, the Company shall be entitled to use the works or portion thereof without affecting Associate's responsibility and liability to complete the balance works as per company's directives from time to time, though Associate shall be afforded reasonable opportunity by the company to enable Associates to complete all balance works required for issuance of 'Taking Over Certificate' by the company.

4.9 Rights of TPNODL to vary the scope work

TPNODL shall have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the supplies and services stipulated in the Contract by communicating the intent to do so in writing to the Associate. On receipt of such communication the Associate shall, within the time frame specified in the contract shall provide TPNODL with a reasonably detailed estimate of the cost of the change in scope outlined in the TPNODL communication. The change in the Contract price and time shall be revised upwards or downwards, as the case may be, and shall be mutually agreed to. The Associate shall not be entitled to any extension of time unless such changes adversely affect the time schedule.

The Associate shall not proceed with the changes in the scope of work till such time revision of Contract price and time schedule are approved and communicated to the associate by TPNODL.

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Any change in the Scope of Work and/or Terms & Conditions of the order shall be intimated by TPNODL through an amendment to the contract. The amendment shall be treated valid only if signed by the authorized signatory of the original contract.

5.0 PRICES/ RATES/ TAXES

5.1 For Supply part of Contract

Unless specified elsewhere in the contract document, the prices/rates are inclusive of cost of finished product for which MDCC will be issued by TPNODL, packaging and forwarding charges, freight and transit insurance charges covering loading at Associate's works, transportation to TPNODL store/site & unloading & delivery at TPNODL stores/TPNODL site, cost of documentation including all the relevant test certificates and other supportive documents to be furnished.

The Prices/Rates are inclusive of all taxes, levies, cesses and duties, particularly Goods and Services Tax as applicable. All government levy / taxes shall be paid only when the invoice is submitted according to the relevant act.

The prices/rates shall remain firm till actual completion of entire supply of goods/material/equipment as per contract is achieved and shall remain valid till the completion of the contract.

The prices shall remain unchanged irrespective of TPNODL making changes in quantum in all or any of the schedules of items of contract.

5.2 For Service part of Contract

The Prices and Rates are inclusive of cost of materials supplied as per contract terms and for which MDCC is issued by TPNODL and to the extent required for completion of works, cost of service executed as per schedule of quantities, cost of testing as per contract terms, cost of documentations including all relevant test certificates and other supportive documents to be furnished as per contract terms. The rates shall remain firm till actual completion of contract.

The Prices/Rates are inclusive of all taxes, levies, cesses and duties, particularly Goods and Services Tax as applicable. All government levy / taxes shall be paid only when the invoice is submitted according to the relevant act.

The prices shall remain unchanged irrespective of TPNODL making changes in quantum in all or any of the schedules of items of contract.

5.3 Changes in Statutory Tax Structure

If rate of any or all of the statutory taxes and duties applicable to the contract changes, such changes shall be incorporated by default if the changes occur within the contract execution time and shall be applicable if the contract is executed by the Associate within the Contract Execution Time.

For execution of contracts beyond contract execution time, where the delay is not attributable to TPNODL no upward revision in tax /duties shall be considered irrespective of changes in the statutory tax structure either within the contract execution time or beyond. However, in such cases, benefits due to any downward revisions in statutory tax rates shall be passed on to TPNODL.

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6.0 TERMS OF PAYMENT

- A. 5% of the Release Order/ Purchase Order price shall be paid as initial interest free advance on fulfillment of the following by the Associate:
 - a) Acceptance of PO/ LOI.
 - b) Submission of advance payment BG (APBG) of 15% of the Release Order/ Purchase Order price which shall remain valid till the advance is fully adjusted.
 - c) Submission of Contract Performance Bank Guarantee (CPBG) of 5/10% of the RC/ PO price valid till 30 days after taking over of the works.
- B. 10% of the Release Order/ Purchase Order price shall be paid as interest free advance against approval of drawings under Category-1 of major drawings, Quality Plans, Pert Chart, Field Quality Plan, posting of Project Manager and commencement of the first mile stone of the work mutually agreed including C-3 Form, and submission of a true copy of 'Erection All Risk Insurance Policy' taken for the awarded jobs. The drawing list shall be mutually agreed at the time of award of work.
- C. 50% on account payment of the total of item wise cost of material Release Order/ Purchase Order shall be paid against receipt of material at site in good condition and certification by TPNODL along with bills complete in all respects viz. MDCCs etc.
- D. 20% on account payment of the actual executed value shall be paid against mechanical completion of erection on prorata basis against monthly bills and 70% on account of the actual executed value shall be paid against the service line item including composite line item. In case this milestone is not completed beyond 120 days for reasons attributable to TPNODL, the payment corresponding to supply part shall be released subject to submission of BG of equivalent amount by the BA valid for a period of further 12 months. If required, it shall be extended by the BA on request of TPNODL.
- E. 15% payment of the actual executed Release Order/ Purchase Order shall be paid after completion of acceptance test and Taking Over of the complete systems specified in the enquiry, including clearance of Electrical Inspection, compliance of final punch point and after reconciliation & adjustment of payments, if any, towards Quantities of materials issued from purchaser's stock and consumed by the contractor for expeditious completion of the job. In case this milestone is not completed beyond 120 days beyond schedule for reasons attributable to TPNODL, the payment corresponding to supply part shall be released subject to submission of BG of equivalent amount by the BA valid for a period of further 12 months. If required, it shall be extended by the BA on request of TPNODL.

The Contractor shall submit all Operation & Maintenance manuals and "As Built Drawings" etc. and shall also submit Equipment Warranty Bank Guarantee (EWBG) equivalent to 5/10% of actual executed contract price before the release of this last payment and return of CPBG. The validity of EWBG shall be for a period of 15 months from the date of taking over of the works or specified guarantee period in drawing/tender/technical specification documents etc. whichever is later. The

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associate shall also submit 'No Demand Certificate' at the time of receipt of full and final payment.

6.1 Pre-Requisites for Payment

- Associate should have completed execution of that part of contract, for which payment is sought, to the satisfaction of TPNODL's Engineer-in-Charge responsible for the contract and obtained certification for execution of the work.
- Associate has undertaken joint measurement of the work executed along with TPNODL's Engineer-in-charge
- Associate's bills/invoices submitted have been certified by Engineer-In-Charge.

6.2 Bills & Invoices

Unless specified otherwise in the special conditions of contract, Associate shall raise not more than one invoice/contract per month for the services rendered in the prescribed Tax Format and the invoice shall be submitted within 15 days of the following month at TPNODL.

All Bills shall be supported by joint measurement of work done, quality test report and a copy of wage sheet, if applicable (showing proof of having disbursed wages as per applicable law), e-Way challan (if applicable) and a copy of statement substantiating that statutory payments having been affected.

Bills/ invoices shall mention Associate's GST Number, PAN number as applicable.

Final bill submission after completion of project or execution of job must be within 30 days from the actual date of completion/execution of work awarded.

6.3 Payment & Statutory Deductions

Payment shall be released within 30 days from the submission of the bills. The associate shall submit "No Demand Certificate" in the format as per Annexure-D at the time of receipt of full and final payment. In case any non-compliance to contract conditions comes to TPNODL's notice, TPNODL will be entitled to deduct 30% of estimated wages plus 20% of wages as TPNODL's overheads. Associates would be obliged to provide the copy of monthly wage sheet in any case, failing which no payment shall be made. TPNODL at their sole discretion may deposit the PF etc. with statutory authorities. TPNODL will deduct the amounts of TDS as per statutory requirement under the income tax act and the DVAT Act and certificates (wherever applicable) will be issued to associate accordingly.

In case of non-submission of PAN No TDS @ 20% shall be deducted from all payable amounts for which no TDS certificate shall be issued. TDS once deducted as above shall not be revised in any condition.

6.3.1 Statutory Deductions

TPNODL will deduct the amounts of TDS, TCS as per statutory requirement under the income tax act, the Goods and Services tax act, BOCW Act, or any other applicable tax act and certificates (wherever applicable) will be issued to associate accordingly. For consumption of TPNODL's Water and Electricity by Associate for execution of Contract, Associate shall pay 0.5% & 1.0% respectively of contract value and it shall be deducted from the running bills. The Engineer-in-Charge as stated in the Order shall be responsible for

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certification of the work executed and the bills. Bills (including original) shall be submitted in triplicate at Finance office, Balasore.

6.4 Guidelines for Raising Running/Final Bills

Contract Value Up to 5 Lakhs	One Final Bill
Contract Value More than 5 lakhs	Monthly Running Bill & One Final Bill

All Bills shall be processed only when all bank Guarantees are in place and before payments of Final Bill Associate have to furnish NDC.

6.5 Quantity Variation

Payment will be made on the basis of actual quantity of supplies/actual measurement of works accepted by TPNODL and not on the basis of contract quantity.

6.6 Full and Final Payment

Full & Final Payment in all contracts shall be made subject to the associate submitting "No Demand Certificate" in the format as per Annexure-D.

6.7 Erection All –Risk Insurance Policy

Associate shall obtain an Erection All Risk (EAR) Policy as a comprehensive insurance solution designed to cover broad spectrum of risks to which a project is exposed to - from arrival of construction material at site till the completion of project, including but not limited to the following, the copy of Insurance Policy shall be submitted to E-I-C/ Finance department of TPNODL before starting the work.

- a. Earthquake
- b. Terrorism
- c. Escalation Cost (10% of sum insured on annual basis)
- d. Extended Maintenance cover for defect liability period-24 months
- e. Design Defect
- f. 50-50 Clause
- g. 72 Hours Clause
- h. Loss minimization clause
- i. Offsite storage/ fabrication
- j. TPL (INR 50 lac per occurrence)
- k. Theft, pilferage
- l. Cross liability
- m. Malicious damage
- n. Contractor's plant & equipment (value 25 lakh)
- o. Waiver of Subrogation clause
- p. STFI- Storm, Tempest, Flood, Fire and Inundation

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EAR policy is mandatory document for processing the invoices. Business Associate needs to ensure that the All- Risk Insurance Policy is obtained as per the terms of contract, failing which:

- Penalty @1% of contract value would be charged.
- In case of expiry of policy before handing over the project, TPNODL Engineer-In-Charge shall reserve the right to deduct the penalty upto a maximum of 1% of contract value.

7.0 MODE OF PAYMENT

Payment shall be made through RTGS/ NEFT/ Online Net banking mode for which Business Associate shall submit the details of Bank Account and other details as per annexure J. Further, for any payments made, TPNODL is not responsible for any consequences/disputes Associate have among the owners channel partners, sub-Associates and all such dispute/concerns shall be settled solely by the Associate.

The quantities of items indicated are estimated and preliminary. However, payments shall be made on the basis of actual quantity of work carried out and measured jointly by the Company and the Associate. Associates shall be responsible to organize joint measurements of works with TPNODL Engineer-in-Charge before raising any bill of work done. In the event Associate fails to do so, TPNODL at their sole discretion, may take measurements of work done and proceed as deemed fit and in such an event Associate's right to lodge any subsequent claim shall stand forfeited.

8.0 SECURITY CUM PERFORMANCE DEPOSIT

Associates shall submit within 15 days from the effective date of issue of PO/RC, Security cum Performance Guarantee (SPBG) in the format as per Annexure B of this document from banks acceptable to TPNODL for:

- (a) 5% of the PO value if purchase order value is more than Rs 5 Crores.
- (b) 10% of the PO value if purchase order value is less than Rs 5 Crores.

This shall remain valid till the end of the Guarantee Period of contract, plus one month.

- (c) 5% of the RC value in case of Rate Contract. This shall remain valid till the Guarantee period plus one month.

- For PO/RC values less than Rs. 5 lacs, Associate may request for deduction of amount equivalent to SPBG value from their first invoice. Such amount shall be withheld by TPNODL while processing the invoice and shall be released after completion of Guarantee Period plus one month.
- For PO/RC values less than Rs. 3 lacs, the clause (8.0) for Security cum Performance Bank Guarantee (SPBG) shall not be applicable.
- In case of RC (Rate Contract) after the expiry of RC validity, Associate shall have to submit SPBG. However, the Associate has the option to re-submit the SPBG as per actual RO (Release Order) value issued against the RC, valid for Guarantee Period plus one month. The Guarantee Period shall be considered as per the last RO issued against the said RC. The original SPBG as submitted against the RC shall be released on submission of the new SPBG to TPNODL. Alternatively, Associate may extend the

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validity of original SPBG only till the requisite period, i.e. Guarantee Period plus one month.

9.0 STATUTORY COMPLIANCE

9.1 Compliance to Various Acts

Associate should ensure adherence to the Anti-Lobbying, Debarment, Drug-Free, Child Labour, Factories Act and Shop and Establishment Workplace Certification, Registration details under GST, Sales Tax and Works Contract Tax Act.

Associate shall bear the entire responsibility, liability and risk relating to coverage of its workforce under different statutory regulations including Workman's Compensation Act, ESI Act, Factories Act, 1948, the Contract Labour (Regulation and abolition) Act 1970, and any other relevant regulations as the case may be. Associate shall also be solely responsible for the payment of all benefits such as Provident Fund, ESI, Bonus, Leave compensation and other benefits as may be applicable under applicable labour laws, etc. as per the various statutory regulations. The Associate shall compulsorily bear the cost of medical treatment and payment of monetary compensation to the families of the victims in case of injury or death, while on duty during his/her engagement with the Associate and shall keep TPNODL indemnified in this regard against any such claim and provide documentary evidences of the same to TPNODL. TPNODL shall be entitled to, if necessary, make such payment and recover the amount from Associate.

Associate should ensure adherence to all applicable laws, rules and regulation applicable under this contract from time to time. In case of violation any risk, costs etc. shall be in associates account and keep TPNODL indemnified always till completion of contracts.

9.2 SA 8000

Further being TPNODL is SA 8000 complied and expects its Associates to follow guidelines of SA8000: 2014 on the following aspects

1. Child Labour
2. Forced or Compulsory Labour
3. Health & Safety
4. Freedom of Association & Right to Collective Bargaining
5. Discrimination
6. Disciplinary Practices
7. Working Hours
8. Remuneration
9. Management System

Business Associate is expected to ensure adherence to all statutory laws and requirements as applicable. The Associate needs to obtain Form C-3 before commencement of work and No Objection Certificate (NOC) on completion of work from BA-Relations Cell/ HR.

In case any non-compliance is observed, TPNODL shall reserve the right to penalize the bidder as per direction of E-I-C. The penalty shall be 1% of total all-inclusive contract value for such cases. Also, TPNODL reserves the right to reject such bidder in future tenders.

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9.3 Affirmative Action

TPNODL appreciate and welcome the engagement/employment of persons from SC/ST community or any other deprived section of society by their business associates.

Relaxation in Contract Clauses under Affirmative Action for SC/ ST Business Associates**

TPNODL believes that inclusive growth is the key to sustainable development, and to promote the same Policy on Affirmative Action for Scheduled Caste & Scheduled Tribe Communities has been adopted across the company.

Under the same pre-text, and to promote entrepreneurship among SC/ST community TPNODL has taken initiative by proposing relaxations in contract clauses as per below:

S. No.	Initiative	for SC/ ST BA's	Guideline Document
1	Tender Fees	100% waiver for SC/ST community	All Open Tenders
2	Earnest Money Deposit	50 % relaxation of estimated EMD value	All limited and Open Tenders
3	Performance Bank Guarantee	25% relaxation in PBG for order value above 50 lacs else 50% relaxation	All limited and Open tenders
4	Turnover	25% relaxation in company turnover under qualifying requirement criteria	All Open Tenders

****Classification of BA s under SC/ST shall be governed under following guidelines:**

- Proprietorship/ Single Ownership Firm: Proprietor of the firm should be from SC/ST community. Governing document shall be duly audited balance Sheet for the last FY bearing the name of proprietor.
- Partnership Firm: Only such firms shall qualify which have SC/ST partners holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Partnership Deed and audited balance sheet/ ITR for last FY.
- Private limited company: Only such firms shall qualify which have SC/ST directors holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).

Certification from SC/ST commission shall be required for deciding upon SC/ST status of a person.

9.4 Compliance to Labor Laws

Bidder needs to ensure compliance to applicable labor laws including timely disbursement of wages. In case wages are not disbursed as per the stipulated timelines, then TPNODL shall pay the wages to BA employees on behalf of BA. Apart from deducting the amount of wages paid, TPNODL shall deduct an additional service charge equivalent to 25% of the wages paid from the payment due to BA.

9.5 Compliance to Construction and Demolition Waste Management Rules & Environment (Protection) Amendment Rules

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BA is liable to follow the Construction and Demolition Waste Management Rules- 2016, Environment (Protection) Amendment Rules- 2018 and Guidelines on dust mitigation measures in handling construction material and C&D wastes issued by CPCB.

Following are some main points of above Rules/Guidelines for Construction work, cable laying jobs etc.

1. Barricading to be provided at site to cover complete area.
2. Construction material and waste should be inside the closed area made by using barricading.
3. Water sprinkling/fine spray from nozzles to be done to suppress the dust.
4. The board of Dust mitigation measures shall be displayed at site for public viewing with required details.
5. Loose sand or soil and construction material that causes dust shall be covered.
6. Transport material that are easily wind borne need to be covered by a sheet made of either jute, tarpaulin, plastic or any other effective material.
7. All areas for storing C&D waste/construction material to be demarcated and preferably barricaded particularly those materials that have potential to be dust borne.
8. Grinding and cutting of building materials in open area shall be prohibited.
9. Construction material and waste should be stored only within earmarked area and road side storage of construction material and waste shall be prohibited.
10. No uncovered vehicles carrying construction material and waste shall be permitted.
11. Construction and demolition waste processing and disposal site shall be identified and required dust mitigation measures to be notified at the site.

9.6 Special Terms & Conditions for BAs engaged under PLPBC or Service Contracts

1. The Business Associate will abide by the rules & regulations and various process requirements of TPNODL which may get amended from time to time based on business needs.
2. The Business Associate shall ensure submission of required information to TPNODL as required by TPNODL or any government authorities (with a copy to TPNODL), as and when required within the stipulated time frame.
3. The business associate shall, before start of work, obtain and submit to TPNODL a copy of
 - ✚ PF Code allotment letter issued to him/them by the EPF organization.
 - ✚ ESIC Code allotment letter issued to him/them by the ESI authorities.
 - ✚ valid insurance documents under Employees' Compensation Act, for its employees not eligible for coverage under ESIC
4. The Business Associate shall, in case of his/engagement in any construction activities falling under the purview of the Building and Other Construction Workers (BOCW) Act, apply for registration under the said BOCW Act before start of work and obtain the said registration within a month of starting such work. Business Associate shall also ensure compliance to all other applicable provisions including payment of applicable cess under the Act.
5. The Business Associate shall comply with all applicable provisions under Inter State Migrant Workmen (ISMW) Act.

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6. The Business Associate shall ensure its employees enter and work at respective place of work or premises of TPNODL in fulfilment of contractual obligations of the Business Associate, only with due authorization and valid IDENTITY. Issue of such authorization cum identity passes to its workers would be facilitated by the Business Associate, by submitting relevant information, documents, authorizations and complying to TPNODL's processes including safety training and medical checkup procedures as laid down from time to time for issue of authorization cum identity-passes. Business Associate shall not engage any of its workers for work without a valid authorization cum identity pass or with a VISITOR GATE PASS. Violation of the above may lead to termination of the contract.
7. The Business Associate shall comply with the following under various statutes, statutory requirement or any other requirement as may be applicable from time to time :
 - i) Submit an application for obtaining Form-V, required for applying for Labour License.
 - ii) Submit a copy of valid Labour License with reference to the work order, without which authorization cum identity passes would not be issued to the employees of respective Business Associate.
 - iii) Temporary authorization cum identity passes are issued only for seven days, hence the Business Associate will be required to arrange for issuance of permanent authorization cum identity passes within said timeline, by submitting required documents/information. With special permission from user and HR/IR department the validity of temporary authorization cum identity passes can be extended upto 15 days. Under no circumstances shall temporary authorization cum identity passes be issued for more than 15 days.
 - iv) Business Associate is required to complete the process of Medical fitness certificate and police verification certificate within these seven days, unless exempted by the TPNODL management. Any delay due to reasons beyond control of the vendor, needs to be approved by TPNODL HR/IR department.
 - v) Business Associate shall apply for Authorisation cum Photo identity pass as per Company's security procedure.
 - vi) In case of renewal of authorization cum identity passes, the application should be initiated at least seven days in advance.
 - vii) Business Associate shall submit the Register of Workmen in Form-XIII, duly filled in all respects, within 15 days of starting the job.
 - viii) Business Associate shall provide employment card (Form-XIV) to all his/their workers.
 - ix) Business Associate shall disburse wages to its employees by 7th of the subsequent month under intimation to TPNODL, through bank transfer with submission of a copy of bank statement to TPNODL. TPNODL expects its associate vendors/ Business Associates to facilitate opening of bank account by all its employees and pay wages through bank transfers.
 - x) Wage notification should be given by the Business Associate at least one week ahead. A copy of the same to be forwarded to TPNODL for information necessary confirmation of payments.
 - xi) Wages Slip (Form-XIX) to be provided by the Business Associate to all its workers before disbursement of wages.
 - xii) PF contribution to be deposited on or before 15th of the subsequent month and proof thereof need to be submitted to TPNODL by 25th of the month.
 - xiii) Business Associate to facilitate transfer of PF/EPS accumulations in respect of its employees from their previous employer, if any.
 - xiv) ESI contribution to be deposited on or before 21st of the subsequent month and proof thereof need to be submitted to TPNODL by 25th of the month.

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- xv) Muster roll, Wage Register, Combined Challan & ECR of PF deposition and Challan / Contribution history of ESIC to be submitted to TPNODL HR/IR Department on or before 25th of the subsequent month.
 - xvi) Business Associate shall be required to arrange for applicable welfare measures under applicable statutes for its employees in consultation with TPNODL order manager.
 - xvii) Business Associate has to submit all the relevant returns under all applicable enactments on or within the scheduled date and a copy of the same need to be submitted to TPNODL HR/IR department within seven days of the scheduled date of submission.
8. Business Associate shall not be allowed to work for TPNODL without possessing a
*** Valid PO *Valid Labour License * Valid Authorisation cum Identity Pass**
 9. NO BILLS OF THE VENDOR/BUSINESS ASSOCIATE SHALL BE RELEASED IN CASE OF FAILURE TO COMPLY WITH THE ABOVE PROVISIONS.
 10. Above requirement not being exhaustive, vendors/ Business Associate will be liable to comply with the provisions of any other enactment as notified or would be applicable to them from time to time.
 11. An additional overhead charge of 25% of the wage bill value will be charged to the Business Associate in case the BA fails to pay the wages of its workers in time and TPNODL as principle employers is compelled to make the payment on their behalf. The total amount, including the overhead charge, will be recovered from the subsequent bill payable to the Business Associate.
 12. Continuous default in wage payment to its employees within stipulated date as mentioned above, for three months, will lead to termination of the contract and may also lead to blacklisting of the Business Associate/ cancel vendors' registration.
 13. After completion of work and before or at the time of submission of final bills, the Business Associate must ensure the following and submit proof thereof to TPNODL enabling TPNODL release its final bills. In absence of the same no such bills would be released by TPNODL :
 - a. All wage payments are made to its workers till the last day of their work in TPNODL
 - b. Compensation towards Leave with wages are disbursed to its employees till the last day of their work.
 - c. Statutory bonus is paid to its employees for the period of their work.
 - d. Retrenchment compensation, where applicable, is paid to its employees as per eligibility.
 - e. Notice is given to the workers regarding retrenchment and in absence; notice pay is given to the workers as per the enactment, where applicable.
 - f. Along with final payments, full & final statement is issued to all its employees engaged by them for their work in TPNODL
 - g. No dues certificate is obtained from all its employees and copy submitted to TPNODL
 - h. Ensure withdrawal or transfer formalities in respect of PF/EPS accumulation of all its employees and submit proof thereof to TPNODL HR/IR dept.
 - i. Submit Form VI-A to TPNODL and surrender Labour License, wherever issued, to concerned labour department in case the license is no more required for work in TPNODL, and obtain clearance thereof from the Licensing Authority for submission to TPNODL.

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- j. Ensure intimation to PF & ESI authorities regarding completion of work and closure of contract with TPNODL. Proof of such intimation need to be submitted to TPNODL.
 - k. Indemnify TPNODL from any future liability on account of statutory compliance or failure on part of the vendor/Business Associate for their work in TPNODL in respect of their employees or employees of their sub vendors/Business Associates, by submitting an Indemnity Bond on Rs.100/- non judicial stamp paper executed by its Director/Proprietor, authorized for the purpose, and duly notarized.
 - l. Return back the Authorization cum Photo Identity passes to Administration representative or HR/IR department and submit proof thereof to TPNODL HR/IR team.
14. Penalty of up to Rs.1,00,000/- per month will be applicable to Business Associates defaulting on compliances as mentioned below, at the sole discretion of TPNODL management.
- a. Any complaint received from the workmen of the Business Associate of non-payment / less payment or payment after the due date i.e. the stipulated date for such payment as per law, will attract penalty
 - b. Non submission of any or all of the documents listed below (as applicable), in proof of all required statutory compliance (other than wage/payment register), within stipulated time for which it is due, will attract penalty.

List of documents:

1. Copy of valid Labour License.
2. Registers & records under applicable enactments.
3. PF Challan & ECR File.
4. ESI Challan & Contribution History.
5. Undertaking regarding non engagement of migrant workmen at TPNODL Site.
6. Details of wage payment through Bank.
7. Compliance w.r.t. BOCW Act (if applicable)
8. Submission of Applicable returns.

Our Business Associates are our business partners who we expect to be law abiding and complying to all statutory requirements, thereby not necessitating us to invoke the penalty clause mentioned in this GCC

15. The Business Associate will be required to take an appropriate insurance coverage for all its employees engaged by them in TPNODL against any accidental death anywhere in India, for a sum insured value of Rs.15 Lacs. In absence of having such coverage and in an unfortunate event of any accidental death of any of its workers, the BA will be required to pay such amount of Rs.15 Lacs to the victim's family/ legal heirs. This will be payable by the BA over & above the compensation, if any, payable under the Employees' State Insurance Act for covered employees or compensation payable by BA under the Employees' Compensation Act.

The Business Associate will also be required to take an appropriate insurance coverage for all its employees engaged by them in TPNODL against any death due to Covid-19 irrespective of place, type & days of treatment anywhere in India, for a sum insured value of Rs.10 Lacs. In absence of having such coverage and in an unfortunate event of any death of any of its workers due to Covid-19, the BA will be required to pay such amount of Rs.10

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Lacs to the victim's family/ legal heirs. The BA is free to have this coverage for their employees against Covid-19 death through a mutually agreed contributory scheme and may recover up to 50% of the average premium payable per insured, from its employees.

9.6 MSME Development ACT 2006

Provisions for Firms falling in The Micro, Small and Medium Enterprise Development Act 2006:-

- Business Associate is requested to inform the TPNODL if they fall under provisions of The Micro, Small and Medium Enterprises Development Act, 2006 legislation, and provide necessary documents to TPNODL. The Associate also needs to mention the relevant details on their invoice/ bill.
- Business Associate shall submit the self-undertaking of registration in MSME category at the time of bidding as well as on an annual basis to TPNODL, enabling them to avail the consequent benefits, failing which TPNODL may take appropriate action against such defaults.
- Business Associates falling in MSME category shall submit the Tender Fee when participating in TPNODL tenders. However, they are eligible to submit concessional EMD at 50% of the EMD otherwise applicable.

9.6 ISO 14001

The vendor to confirm whether their organization is ISO 14001 certified. If not, the Vendor must certify that the handling, use and disposal of their product/ by-products conform to practices consistent with sound environment management and local statues. The Vendor shall ensure that all the wastes are disposal in environmental friendly way with strict compliance to applicable laws including adherence to MoEF guidelines with respect to the disposal of batteries, lead waste, copper cables, ash, waste oil, e-waste etc. which shall be disposed through MoEF approved parties only. The vendor shall also dispose off the e-waste generated at the end of the product life cycle at its own costs and risk as per the MoEF guidelines/ Orders

10.0 QUALITY

10.1 Knowledge of Requirements

The Associate shall be deemed to have carefully examined and to have knowledge of the equipment, the general and other conditions, specifications, schedules, drawings, etc. forming part of the Contract and also to have satisfied himself as to the nature and character of the work to be executed and the type of the equipment and duties required including wherever necessary of the site conditions and relevant matters and details. Any information thus procured or otherwise obtained from TPNODL/Consultants shall not in any way relieve the Associate from his responsibility and executing the works in accordance with the terms of contract.

10.2 Material/Equipment/Works Quality

The items / works under the scope of the Associate shall be of the best quality and workmanship according to the latest engineering practice and shall be manufactured from materials of best quality considering strength and durability for their best performance and, in any case, in accordance with the specifications set forth in this Contract. All material shall be new. Substitution of specified material or variation from the process of

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fabrication/construction/manufacture may be permitted but only with the prior written approval of the TPNODL.

10.3 Adherence to Rules & Regulations

The Associate shall procure and/or fabricate/erect all materials and equipment in accordance with all requirements of Central and State enactment, rules and regulations governing such work in India and at site. This shall not be construed as relieving the Associate from complying with any requirement of TPNODL as enumerated in the Contract which may be more rigid than and not contrary to the above mentioned rules, nor providing such construction as may be required by the above mentioned rules and regulations. In case of variance of the Technical Specification from the laws, ordinance, rules and regulations governing the work, the Associate shall immediately notify the same to the TPNODL. It is the sole responsibility of the Associate, however, to determine that such variance exists. Wherever required by rules and regulations, the Associate shall also obtain the statutory authorities' approval for the plant, machinery and equipment to be supplied by the Associate.

10.4 Specifications and Standards

The Associate shall follow all codes and standards referred in the Contract Document. Codes and standards of other may be followed by the Associate with the prior written approval of TPNODL, provided materials, supplies and equipment according to the standard are equal to or better than the corresponding standards specified in the Contract.

Brand names mentioned in the Contract documents are for the purpose of establishing the type and quality of products to be used. The Associate shall not change the brand name and qualities of the bought out items without the prior written approval of the TPNODL. All such products and equipment shall be used or installed in strict accordance with original manufacturer's recommendations, unless otherwise directed by the TPNODL. In any circumstances the codes, specimen and standards prescribed by any government agency should not be violated.

11.0 SAFETY

All Associates shall strictly abide by the guidelines provided in TPNODL's Contractor Safety Management System (CSMS) as applicable at all stages during the contract period. Associate shall execute the contracts ensuring the following in and as order of priority:

- Safety of Human Beings.
- Safety of equipment/Assets.
- Timely Completion of Contract.

Safety related requirements as mentioned in our Contractor Safety Management System is attached as annexure K and is an integral part of this GCC.

12.0 INSPECTION/PARTICIPATION

12.1 Right to Carry Out Inspection

TPNODL reserves the right to send its representatives for inspection or participation at various stages of contract execution listed below, applicable as per contract construction.

- During basic design and detail engineering of material/ Equipment carried out by Associate /Outsourced Agencies.

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- During manufacturing stages of the product at Associate's/Associate's Outsourced Agency's Plant/Facility.
- During Pre-dispatch Inspection and Testing of finished/manufactured product at Associate's/Associate's outsourced Agency's Plant/Facility.
- During Installation & Commissioning Activities/Stages.
- Prior to Clearing of the completed installation for commissioning.
- Any other stage as find appropriate by TPNODL during contract execution time.

All inspections and participations shall be carried out within maximum of two weeks of TPNODL giving written intimation to the Associate or receiving appropriate advance written inspection call from the Associate, unless otherwise specified elsewhere in the contract document.

MDCC request shall be submitted by BA to TPNODL at least 7 days before inspection date.

12.2 Facilitating Inspection

The Associate shall provide all opportunities and information to TPNODL's engineers to get acquainted with the technical know-how and the methods and practices adopted by the Associate in basic and detail engineering. The Associate shall provide documents, drawings, calculations etc. as may be required by TPNODL's Engineers.

The Associate shall provide free of charge office accommodation, office facilities, secretarial services, communication facilities, general and drawing office stationary, etc. as may be reasonably required by the TPNODL's engineers. Similarly, facilities shall also be provided by Associate's outsource agencies/partners/authorized dealers (collectively termed as sub-associates) if such basic and detail engineering activities are carried out in the design offices of sub-Associates.

The Associate shall be responsible for the safety of employees of TPNODL/Third Party Agency when they are at the Associate's /Associate's outsource agency's plant or facility for carrying out/witnessing inspection/testing. All statutory safety precautions as applicable shall be followed by the Associate during Inspection Testing. If TPNODL inspectors are not satisfied with the safety arrangements at the plant, TPNODL have the right to call off inspection till such time corrective action is taken by the Associate.

Before raising the call for pre-dispatch final inspection and testing, the Associate shall conduct all the tests—type tests, routine tests etc-as specified in the contract document and submit copies of the test certificates to TPNODL along with the inspection call, for scrutiny of TPNODL.

The Associate and TPNODL shall jointly document all the observations, comments and action points after completion of inspection and it shall be binding on the Associate to provide compliance on all the points requiring compliance and furnish the compliance report to the designated authority of TPNODL for receiving clearance for dispatch of materials.

12.3 Third Party Nomination

TPNODL also may nominate a third party for the purpose of carrying out the inspection and such an agency shall be entitled to all the rights and privileges of TPNODL as far as conducting the inspection.

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12.4 Waiver of Inspections

TPNODL on its own discretion shall chose to waive off any inspection and ask the Associate to submit all the test reports as applicable as per contract specifications, related to inspection and testing of the goods ordered for scrutiny and clearance for dispatch.

12.5 Incorrect Inspection Call

In case it is observed that the material offered for inspection is not ready at the time of TPNODL inspection visit rendering it as futile, all costs towards such inspection shall be recovered from the BA. Taxes as applicable on such recoveries shall be borne by the BA.

13.0 MDCC & DELIVERY OF MATERIALS

13.1 Material Dispatch Clearance Certificate

Associate shall deliver material/goods/equipment against Supply Contracts or Supply Part of Composite/Service Contracts only after receiving Material Dispatch Clearance Certificate (hereafter termed as MDCC) issued by designated authority of TPNODL. Material delivered at TPNODL stores or at project site without a valid MDCC issued by the designated official of TPNODL shall be rejected. MDCC shall be issued to associate furnishing compliance report on the action points documented during pre-dispatch inspection and testing at Associate's/ Sub-Associate's plant/ facility. In case Pre-dispatch inspection is waived at the discretion of TPNODL, then, MDCC shall be issued on receiving all the test reports-routine& type-from the Associate and finding them in order.

The associate shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during handling and transport by air, sea, rail and road or any other means.

All such packing shall allow to the extent possible for easy removal and checking at Site. The associate shall take special precautions to prevent rusting of steel and iron parts during transit by sea. Gas seals or other materials shall be utilised by the associate for protection against moisture during transit of all Plant and Equipment.

Each Equipment or parts of Equipment shall be tagged with reference to the assembly drawings and corresponding part numbers. Each bale or package shall contain a packing note quoting specifically the name of the associate, item description, quantity, item / package identification.

All packing cases, containers, packing and other similar materials shall be new and supplied free by the associate and it shall not be required to be returned to the associate.

Notwithstanding anything stated in this clause, the associate shall be entirely responsible for loss, damage or depreciation or deterioration to the materials and supplies due to faulty and/or insecure packing or otherwise during transportation to the Site until otherwise provided herein.

In case of the consignments dispatched by road, the associate shall ensure that it or its sub-contractors:

- i) Identify and obtain the correct type of trucks/trailers, keeping in view the nature of consignments to be dispatched.

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ii) Take such actions as may be necessary to avoid all possible chances of damages during transit and to ensure that all packages are firmly secured.

Timelines for inspection and MDCC is as below:

S. No.	Inspection	MDCC issuance time including inspection time (max.)
1	Outside Odisha	12 days
2	Within Odisha	5 days
3	Waiver*	3 working days

* Associate is expected to raise the inspection call assuming that Inspection shall be carried out by TPNODL. The decision for waiver of inspection shall be on sole discretion of TPNODL.

13.2 Right to Rejection on Receipt

Goods/Material/Equipment delivered in condition physically damaged & incomplete as a product ordered, or not packed and transported as per the terms and conditions of the contract is liable to be rejected. Such item shall be lifted back by Associates within 15 days from receipt of rejection note from TPNODL and have to supply back the material within next 30 days or within the timeframe mutually decided by Associate and TPNODL.

If delivery of the material is beyond the agreed time, Liquidated damage clause, mentioned in this GCC separately shall be applicable; but the period for levy of LD shall be considered as per the original delivery schedule and not from the agreed timelines for material rectification.

13.3 Consignee

Unless otherwise specified in the Contract Document, Materials/Goods/Equipment shall be consigned to "Stores-In-Charge", TPNODL.

13.4 Submission of mandatory documents on Delivery

Following documents shall be mandatorily submitted by BA along with supply of material to TPNODL stores/site:

S. No.	Documents	Requisite
1	Invoice copy in original	With all consignments
2	LR copy	Wherever required
3	Packing list	With all consignments
4	MDCC	With all consignments
5	Purchase order / Release order	Signed copy
6	Test certificates	With all consignments
7	Inspection/JVR report	In case pre-dispatch inspection is conducted
8	Device data in CD as per template for metering items	Wherever applicable

13.5 Dispatch and Delivery Instructions

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S. No.	Instructions
1	Purchase order/ Release order no. shall be mentioned on invoice and on material
2	TPNODL material code and material description shall be mentioned in invoice and on material.
3	“Property of TPNODL” shall be embossed on material.
4	The material shall be properly sealed and packed in standard packing as per purchase order terms & conditions.
5	The weight and quantity of material shall be mentioned wherever applicable
6	The material supplied shall be co-related with the packing list.
7	The name plate detail on equipment shall include Material code, Material description, specification detail of material [as applicable], Serial No. Year of manufacturing, PO/RO no. and date, “PROPERTY OF TPNODL, Odisha”, Guarantee period and Associate’s name.
8	In case of manual unloading, supplier / transporter shall deploy sufficient Labour for unloading the material at TPNODL central store. For heavy item(s), crane will be provided by TPNODL [unloading cost will be recovered from the associate].
9	The driver should have valid License and one helper in truck. All the documents of truck like registration papers, PUC etc should be available in Truck.
10	BA representative should accompany the material and get it unloaded / stacked in his presence wherever possible.

14.0 GUARANTEE

30.0 Guarantee of Performance

Associates shall stand guarantee that the equipment and material supplied/service or work rendered under the contract is free from design, manufacturing, material, construction, erection & installation and workmanship & quality defects and is capable of its due, rated and intended quality performance, as an integrated product delivered under the contract. For a specific period termed as Guarantee Period (as elaborated elsewhere in this clause) The Associate should also guarantee that the equipment/material is new and unused except for the usage required for the tests and checks required as part of quality assurance.

14.2 Guarantee Period

The Guarantee Period will be equipment/service/work specific and shall be as specified in the Standard Specifications of TPNODL for the equipment/material/service/work and where standard specifications are not part of contract documents or guarantee period is not specified in the standard specifications,, the guarantee period shall be as per the Special Terms and Conditions of the Contract. In case of no mention of the guarantee period in standard specifications or SCC Guarantee Period will be 15 Months from the Date of Commissioning or 24 months from the date of delivery of final lot of supplies made, whichever is earlier.

14.3 Failure in Guarantee Period (GP)

If the equipment and material supplied/service or work rendered under the contract fails to perform its due, rated & intended quality performance, during the Guarantee period, the associate is liable to undertake repair/rectify/replace the equipment and material

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supplied/service or work rendered under the contract within time frame specified in the SCC or elsewhere in the contract documents at associate's cost to make the equipment and material supplied/service or work rendered under the contract of performing its due, rated and intended quality performance. If Associate fails to repair/rectify/replace the equipment or material supplied/service or work rendered under the contract, failed in Guarantee Period, TPNODL will be at liberty to get the same done at Associate's risks and costs and recover all such expenses plus the TPNODL's own charges (@ 20% of expenses incurred), from the Associate or from the "Security cum Performance Deposit" as the case may be.

If during the Warranty/ Guarantee period some parts of the supplies are replaced owing to the defects/ damages under the Warranty, the Warranty period for such replaced parts shall be until the expiry of twelve months from the date of such replacement or renewal or until the end of original Guarantee period, whichever is later.

Any repairs during the Guarantee Period shall be carried out by the Associate within 30 days of reporting the issue to Associate by TPNODL. However, if replacement of the Equipment is required, Associate shall notify the same to TPNODL within 7 days of reporting the issue by TPNODL. Thereafter, the total time for supply of new equipment/ material shall be equal to the original delivery period of that equipment/ material as specified in the Contract. In case the Associate is not able to rectify/ replace the faulty equipment/ material within the stipulated timelines as mentioned above, penalty shall be levied as per the Liquidated Damages clause mentioned in this document. The penalty amount shall be recovered from the payment due to the vendor or by encashment of the SPBG as the case may be.

14.4 Cost of repairs on failure in GP

The cost of repairs/rectification /replacement, apart from the actual cost of repairs/rectification/replacement is also inclusive of all associate costs of required transportation, site inspection /mobilization/dismantling and re-installation costs as applicable, to be borne by the Associate. The Associate has to ensure that the interruption in the usage of intended purpose of the equipment is minimized to the maximum extent In lieu of the time taken for repairs/rectification/replacement.

14.5 Guarantee period for Goods Outsourced

If the Associate outsources partly equipment/materials/services from third party as mutually agreed upon at the pre award stage of contract, TPNODL shall have the benefit of any additional guarantee period if provided by the third party for the part supplied/executed by them.

14.6 Latent Defect

Hidden defects in manufacturing or design of the product supplied and which could not be identified by the tests conducted but later manifested during operation of the equipment are termed as latent defects. Associates shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Company.

14.7 Support beyond the Guarantee Period

The Associate shall ensure availability of spares and necessary support for a period of at least 10 years post completion of guarantee period of equipment supplied against the contract.

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15.0 LIQUIDATED DAMAGES

Liquidated damages @1% of the total executed contract value per week or part thereof, for the period of delay in integrated completion, subject to maximum 10% of the value of the contract shall become leviable without prejudice to other rights of the TPNODL. This amount shall be recoverable from any amount due or becoming due to the Business Associates under this or any other contract. In specific cases, TPNODL reserves the right to apply LD only on the unexecuted portion of the supply and works for standalone use, provided full quantity is executed within a maximum 30% additional time. Deduction of LD shall be on landed cost i.e contract value inclusive of taxes and in pursuant statutory compliance GST would be applicable at the stipulated rate and the same shall be borne by Business Associate. In case of LD deduction, a GST invoice shall be issued by TPNODL as a proof of deduction/ recovery.

31.0 LD Waiver Request

Any request of LD waiver shall be submitted within thirty (30) days of deducting LD. Request submitted beyond the timeline shall not be entertained.

15.2 Material Recovery

In case of any recoveries for materials or services (for material free issued by TPNODL and not reconciled by BA or for services claimed and paid in excess at the time of running bills), the total cost which shall be recovered from the BA, shall be the gross amount of material or services (i.e. including taxes) plus applicable taxes as prevailing at the time of such recoveries.

16.0 ASSIGNMENT OR SUBCONTRACTING

Associates shall not assign/subcontract/outsource the schedule of activities of contract TPNODL enters with the associate, in part or full, without TPNODL's prior written approval. However outsourcing of materials/equipment/services by Associate to make the integrated product for which TPNODL's has placed the contract with the associate from suppliers, makes and agencies which have been mutually agreed upon during contract pre-award stage is permitted subject to following conditions.

In such cases where outsourcing is done by the Associate

- Shall ensure that outsourced suppliers comply with the technical and financial qualification requirements specified by TPNODL in the contract document
- Shall furnish all particulars about the proposed outsourcing agencies and the details of the goods/services/work outsourced to the Associate while seeking approval of TPNODL for inclusion for outsourcing. The Associate shall give approval or shall refuse approval in writing within thirty (30) days of receipt of such request. However the Associate shall not be entitled for any additional contract execution time whatsoever in lieu of the process for approval for outsourcing agencies, and shall be held responsible for any delay in the project execution time.
- Shall remain jointly and severally liable for any action, deficiency, and/or negligence on the part of his outsourcing agencies. The approval extended by the Associate to outsourcing agencies recommended by the Associate shall not discharge the later from his Contract obligations.

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Shall submit to the Associate unpriced copies of purchase orders with technical specifications included in the orders, placed on outsourcing agencies as soon as the respective orders have been placed by the Associate.

17.0 UNLAWFUL ACTIVITIES

The Associate shall have to ensure that none of its employees are engaged in any unlawful activities (whether covered under the scope of the present GCC or not) subversive of the TPNODL's interest failing which appropriate action (legal or otherwise) may be taken against the Associate by the TPNODL, in accordance with the terms of the present GCC.

18.0 CONFIDENTIALITY

Associate and its employees or representatives thereof shall strictly maintain the confidentiality of various information they come across while executing the contract as detailed below.

32.0 Documents

All maps, plans, drawings, specifications, schemes and other documents or information related to the Contract/Project and the subject matter contained therein and all other information given to the Associate by the TPNODL in connection with the performance of the contract shall be held confidential by the Associate and shall remain the property of the TPNODL and shall not be used or disclosed to third parties by the Associate for any purpose other than for which they have been supplied or prepared. The Associate may disclose to third parties, upon execution of confidentiality agreements, such part of the drawings, specifications or information if such disclosure is necessary for the performance of the Work provided such third parties agree in writing to keep such information confidential to the same extent and degree as provided herein, for the benefit of the TPNODL.

18.2 Geographical Data

Maps, layouts and photographs of the unit/plant including its surrounding regions showing vital installation for national security of country or those of TPNODL shall not be published or disclosed to the third parties or taken out of the country without prior written approval of the TPNODL and upon execution of confidentiality agreements satisfactory to the TPNODL with such third parties prior to disclosure.

18.3 Associate's Processes

Title to secret processes if any developed by the Associate on an exclusive basis and employed in the design of the equipment shall remain with the Associate. TPNODL shall hold in confidence such processes and shall not disclose such processes to the third parties without prior approval of the Associate and execution by such third parties of secrecy agreements satisfactory to the Associate prior to disclosure. Upon completion of contract, such processes shall become the property of the TPNODL. Title to technical specifications, drawings, flow sheets, norms, calculations, diagrams, interpretations of test results, schematics, layouts and such other information, which the Associate has supplied to the TPNODL under the Contract shall be passed on to the TPNODL. The TPNODL shall have the right to use these for construction, erection, start-up, Trial Run, operation, maintenance, modifications and/or expansion of the works including for the manufacture of spare parts.

18.4 Exclusions

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The provision of Clauses 16.1 to 16.3 shall not apply to information:

- Which at the time of disclosure are in the public domain which later on become part of public domain through no fault of the party concerned, or
- Which were in the possession of the party concerned prior to disclosure to him by the other party, or
- Which were received by the party concerned after the time of disclosure without restriction on disclosure or use, from a third party who did not acquire such information directly or indirectly from the other party or has no obligation of confidentiality for such information.

18.5 Violation

In case of violation of this clause, the Associate is liable to pay compensation and damages as may be determined by the competent authority of TPNODL.

19.0 INTELLECTUAL PROPERTY RIGHTS

If, in the course of performance of its functions and duties as envisaged by the scope of the present GCC, the Associate acquires or develops, any unique knowledge or information which would be covered, or, is likely to be covered within the definition of a trademark, copyright, patent, business secret, geographical indication or any other form of intellectual property right, it shall be obliged, under the terms of this present GCC, to share such knowledge or information with the TPNODL. All rights, with respect to, or arising from such intellectual property, as afore mentioned, shall solely vest in TPNODL.

Moreover, the Associate undertakes not to breach any intellectual property right vesting in a third party/parties, whether by breach of statutory provision, passing off, or otherwise. In the event of any such breach, the Associate shall be wholly liable to compensate, indemnify or make good any loss suffered by such third party/parties, or any compensation/damages arising from any legal proceeding/s, or otherwise. No liability of TPNODL shall arise in this respect, and any costs, damages, expenses, compensation payable by TPNODL in this regard to a third party/parties, arising from a legal proceeding/s or otherwise, shall be recoverable from the Associate.

20.0 INDEMNITY

The Associate shall at all times indemnify, keep indemnified and hold harmless the TPNODL and its officers, directors, employees, affiliates, agents, successors and assigns against all actions, claims, demands, costs, charges and expenses arising from or incurred by reason of any infringement of patent, trade mark, registered design, copy rights and/or industrial property rights by manufacture, sale or use of the equipment supplied by the Associate whether or not the TPNODL is held liable for by any court judgement. In this connection, the TPNODL shall pass on all claims made against him to the Associate for settlement.

The Associate assumes responsibility for and shall indemnify and save harmless the TPNODL from all liability, claims, costs, expenses, taxes and assessments including penalties, punitive damages, attorney's fees and court costs which are or may be required to be paid by the TPNODL and its officers, directors, employees, affiliates, agents, successors and assigns arising from any breach of the Associate's obligations under the Contract or for which the Associate has assumed responsibilities under the Contract including those imposed under any local or national law or laws, or in respect to all salaries, wages or other

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compensation for all persons employed by the Associate or his Sub-Associates or suppliers in connection with the performance of any work covered by the Contract. The Associate shall execute, deliver and shall cause his Sub-Associate and suppliers to execute and deliver, such other further instruments and to comply with all the requirements of such laws and regulation as may be necessary there under to conform and effectuate the Contract and to protect the TPNODL.

The TPNODL shall not be held responsible for any accident or damages incurred or claims arising, due to the Associate's error there from prior to completion of work. The Associate shall be liable for such accidents and after completion of work for such accidents as the case may be due to negligence on his part to carry out Work in accordance with Indian laws and regulations and the specifications set forth herein.

21.0 LIABILITY & LIMITATIONS

21.1 Liability

Except for any specific liability which may be identified in the Contract and which may be payable hereunder, Associate shall not be liable for any special, incidental, indirect, or consequential Damages or any loss of business Contracts, revenues or other financial loss (or equivalents thereof no matter how claimed, computed or characterized) arising out of or in connection with the Performance of the Work or supply of Goods ***unless caused by Associate's negligence, willful misconduct or breach of contract.***

TPNODL shall have no liability or any special, incidental, indirect or consequential Damages for any loss of Business Contracts, revenues or other financial loss arising out of this Contract.

21.2 Limitation of Liability

The total liability of Associate against any contract shall be limited to the Total All Inclusive Contract Value.

22.0 FORCE MAJEURE

Force Majeure applies if the performance by either Party ("the Affected Party") of its obligations under Contract is materially and adversely affected.

"Force Majeure" shall mean any event or circumstance or combination of events or circumstances referred below and their consequences that wholly or partly prevents or unavoidably delays any Party in the performance of its obligations under this Agreement, but only and to the extent that such events and circumstances are not within the reasonable control, directly or indirectly, of the Affected Party and could not have been avoided even if the Affected Party had taken reasonable care:

- Act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, embargo, blockade, revolution, riot, bombs, religious strife or civil commotion, etc.
- Politically motivated sabotage, or terrorism, etc.
- Action or Act of Government or Governmental agency for which remedy is beyond the control of the affected parties.
- Any act of God.

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Note: Causes like power breakdown/ shortages/fire/strikes, accidents etc do not fall under Force Majeure.

Time being the essence of the Contract, if either party is prevented from the performance of its obligations in whole or in part due to an event of Force Majeure, then provided Notice of happening of any event by the Affected Party is given to the other party within seven (7) days from the date of occurrence of such event, which DIRECTLY has impact on works and submitted details and quantum of resulting effect, but at the same time had made all possible efforts to mitigate and overcome effects thereof, the Affected Party's performance under this Contract shall be suspended until such event ceases and the Scheduled Completion shall be delayed accordingly.

If Force Majeure event(s) continue for a period of more than three months, the parties shall hold consultation to discuss the further course of action.

Neither party shall be considered to be in default or in breach of its obligation under the Contract to the extent that performance of such obligation by either party is prevented by any circumstances of Force Majeure which arise after effective date of Contract.

Neither party can claim any compensation from the other party on account of Force Majeure.

23.0 SUSPENSION Of CONTRACT

33.0 Suspension for Convenience

TPNODL may, at any time and at its sole option, suspend execution of all or any portions of the schedule of items of contract to be supplied/work to executed by Associate under the contract by providing to the Associate atleast two business days written notice for contracts having contract completion period less than sixty days and atleast seven business days' notice for all other contracts.

Upon receipt of any such notice, the Associate shall respond as follows as applicable as per contract construction.

- Immediately discontinue further supply of material/goods specified in the suspension notice for supply contracts
- Immediately discontinue further service/work and supply of materials of those services/materials/work specified in the suspension notice for service /composite contract
- Promptly make every reasonable effort to obtain suspension, upon terms satisfactory to TPNODL, of all orders, outsourcing arrangements, and rental Contracts to the extent that they relate to performance of the portion of Work suspended by the notice.
- Protect and maintain the portion of the service/Work already completed, including the portion of the Work suspended hereunder, unless otherwise specifically stated in the notice.
- Continue delivering/carrying out the supply/service/work items as per contract conditions, which do not fall under purview of the suspension notice.

On receipt of resumption notice from TPNODL, the Associate shall resume execution of contract as specified in the resumption notice, within the time frame specified in the resumption notice,

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23.2 Suspension for Breach of Contract conditions.

TPNODL shall suspend execution of whole/or part thereof the contract till such time Associate complies with the conditions stipulated under section clause 27 for breach/default of contract conditions.

23.3 Compensation in lieu of Suspension

If the suspension of the contract in whole or in part is for convenience of TPNODL and not due to any breach of contract conditions by the associate, TPNODL at its discretion shall consider compensating all reasonable additional costs incurred by Associate in lieu of suspension of whole or part of contract, on representation of the Associate providing justified estimates of such additional costs and such estimates are found acceptable and approved by competent authority of TPNODL.

If the suspension of contract in whole or part thereof is due to breach of contract conditions (refer clause 24.3) by the Associate, Associate shall not be entitled for any compensation for any cost incurred in lieu of suspension of whole or part of contract and also shall be liable for compensating all the losses arising to TPNODL in lieu of suspension of contract. Resumption notice shall be subject to the Associate taking corrective action for the breach of contract conditions within the time frame and as per the terms specified in the suspension notice.

24 TERMINATION OF CONTRACTS

24.1 Termination for Default/Breach of Contract

The contract / PO shall be subject to termination by TPNODL in case of breach of the contract by the Associate which shall include but not be limited to the following:

- a. Withdrawal or intimation by the Associate of its intent to withdraw or surrender the execution / completion of the contracted work /PO or failure in ensuring adherence to any delivery schedules, in deviation of the contract/ PO.
- b. Refusal or neglect on the part of the Associate to supply material/equipment of quantity or quality as specified by TPNODL and within the timeframe as specified in the contract document or refusal or neglect to execute the services/work in terms of the agreed standards of quantity or quality and/or within the timeframe specified in the contract/PO.
- c. Failure in any respect to perform any portion of the Work contracted with promptness, diligence, or in accordance with the terms of the contract.
- d. Failure to furnish guarantees as specified and /or failure to comply with the terms thereof.
- e. Failure to furnish such relevant documents or information within the time specified which may be necessary for due execution / completion of the works and documentation.
- f. Liquidation, bankruptcy either voluntary or involuntary OR entering into any composition or compromise with its creditors, or Insolvency.
- g. In case any reasonable information has been received by TPNODL that Associate has adopted/ or attempted to adopt any unethical conduct, action in award of the contract /PO or at any time thereafter.

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- h. Failure to comply with applicable statutory provisions as contained in the contract or failure to comply with the applicable laws.
- i. Failure to comply with safety regulations/clauses stipulated in the contract or as may be generally instructed by TPNODL.

If the default or breach as specified under clause 24 (except sub clause g thereof) be committed by the associate for the first time, TPNODL shall issue, along with notice of default or breach, a warning notice instructing the associate to take remedial/corrective action within the time frame stipulated in the warning notice and not to repeat the same in future. The timeframe for corrective action by the associate shall be specific to the nature of breach of contract and the same shall not be objected to by the Associate. If the Associate fails to comply with the instructions in the warning notice or in taking corrective action to the satisfaction of TPNODL then TPNODL may terminate the entire or part of contract at its discretion by issuing termination notice without incurring any liability on this ground.

In case the contract is terminated for any breach of the nature specified in clause 24 g stated above, TPNODL shall have the right to terminate all the contracts TPNODL is having with the Associate by issuing termination notice which shall be without prejudice to the other rights of TPNODL available to it under law.

Without prejudice to its right to terminate for breach of contract, TPNODL may, without assigning any reason, terminate the Contract in whole or in part at any time at its discretion while the contract is in force by serving a written notice of two weeks to the Associate.

In the event of TPNODL having proceeded with termination of the contract the associate shall comply and proceed further in the following manner:

34.0 Associate shall discontinue the supply, on the expiry of the said period of two weeks.

ii) Associate shall ensure that no further steps are being taken towards discharge of the obligations, terms and conditions as contained in the contract/PO. This shall include initiation of actions not limited to discontinuation of other allied and associated arrangements which the associate might have entered into with third parties for due discharge of its obligations under the contract with TPNODL.

iii) The Associate shall perform thereafter such tasks as may be necessary to preserve and protect the terminated portion of the material/service/work in progress and the materials and equipment at TPNODL sites or in transit thereto. However the associate shall continue to fulfill its contractual obligations with regard to the part of contract not terminated.

iv) It shall be open for TPNODL to conduct a joint assessment with the associate of the material, supplies, equipment, works or in general as to the subject matter of the contract in regard to which the associate claims having completed its obligations before or during such termination.

v) It shall be open to TPNODL to seek invocation of the performance bank guarantee or any other guarantee or other security deposit by whatever name called submitted by the associate, which shall not be objected to or protested against by the associate.

In case of termination of the contract the parties agree to be governed inter alia by the following:

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a) In case TPNODL exercises its right of termination as stated above the associate shall not dispute or object to the same.

b) The Associate shall be entitled to receive and claim only such payments OR sums of money from TPNODL as may be found payable to it in regard to works executed by it under the terms of the contract and no other claim of any nature whatsoever shall be made by the Associate.

c) All such provisions which the parties have agreed to survive and prevail even after termination of the contract shall remain effective despite the termination.

In the event of such termination, TPNODL may finish the Work by whatever method it may deem expedient, including the hiring of services and /or purchase of material equipment from such third parties as TPNODL may deem fit or may itself provide any labor or materials and perform any part of the Work. The associate undertakes to bear the incremental costs if any paid by TPNODL in such a case attributable to failure on the part of the associate. The Associate in such a case shall not be entitled to receive any further payments and any sums found payable to it may be adjusted by TPNODL against the amount recoverable from him on this ground. The same shall be without prejudice to other rights available to TPNODL under law against the associate.

Upon the termination of any of the contract due to occurrence of any circumstances provided in clauses stated above and constituting repeated breach or misconduct, TPNODL shall be entitled to bar the associates its agents, affiliates from undertaking any negotiation / tendering, bidding, participation activities concerning TPNODL for a period of two years from date of such termination. The same shall be without prejudice to other rights available to TPNODL.

24.2 Termination for convenience of Associate

Associate at its convenience may request for termination of contract, clearly assigning the reason for such request. TPNODL has full right to accept, reject or partially accept such request. This convenience will be available to associate only after one year from the contract effective date. For this purpose, associate will provide a notice period of 90 days to TPNODL, Associate will have to pay TPNODL a 'termination convenience fee' equivalent to 5% of unexecuted contract value.

24.3 Termination for Convenience of TPNODL

TPNODL at its sole discretion may terminate the contract by giving 30 days prior notice in writing or through email to the Associate. TPNODL shall pay the Associate for all the supplies/ services rendered till the actual date of contract termination against submission of invoice by the Associate to that effect.

25.0 DISPUTE RESOLUTION & ARBITRATION

In case of any dispute or difference the parties shall endeavor to resolve the same through conciliatory and amicable measures within 15 Days failing which the matter may be referred by either party for resolution by the sole arbitrator to be appointed mutually by both the parties. The arbitral proceedings shall be conducted in accordance with Arbitration and Conciliation Act 1996 and the place of arbitration shall be Bhubaneswar. The language to be used at proceedings shall be English and the award of the arbitrator shall be final and binding on the parties. The parties shall bear their respective costs of arbitration. The

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associate shall continue to discharge its obligations towards due performance of the works as per the terms of the contract during the arbitration proceedings unless otherwise directed in writing by TPNODL or suspended by the arbitrator. Further, TPNODL shall continue making such payments as may be found due and payable to the associate for such works.

35.0 Governing law and jurisdiction

The parties shall be subject to the jurisdiction of the courts of law in Bhubaneswar and any matter arising here from shall be subject to applicable law in force in India.

26.0 ATTRIBUTES OF GCC

26.1 Cancellation

The Company reserves the right to cancel, add, delete at its sole discretion, all or any terms of this GCC or any contract, order or terms agreed between the parties in pursuance without assigning any reasons and without any compensation to the Associates.

26.2 Severability

If any portion of this GCC is held to be void, invalid, or otherwise unenforceable, in whole or part, the remaining portions of this GCC shall remain in effect.

26.3 Order of Priority

In case of any discrepancies between the stipulations in General Conditions of the Contract (GCC) and Special Conditions of Contract (SCC), the GCC shall stand superseded by the SCC to the extent stipulated hereinabove while balance portion of respective clauses of GCC shall continue to be applicable.

36.0 INSURANCE

The Associate shall arrange accident insurance policy for his foreign experts/specialists/personnel deputed to Site and Associate's/his sub-Associates' manufacturing works as well as for his Indian engineers and supervisory staff. The Associate shall also take out for his Indian workmen, where applicable, a separate policy as required under Workmen's Compensation Act.

Associates shall be responsible to suitably insure their entire work-force (to the extent of at least meeting requirements under Workmen Compensation Act) Tools, Plant, Third party liability at the project site, All Risk comprehensive insurance for the entire works (insurance for free issue items will be in TPNODL scope) for total contract (PO/RO) value or any other such risks during execution of works, till the works are handed over to the company, in consultation with TPNODL and shall submit copies of such insurances to the Engineer-in-Charge for review / acceptance before commencing the work. Engineer-in-charge must ensure compliance to insurance requirement by Associate before commencement of works. TPNODL shall stand fully indemnified in this respect.

28.0 ERRORS AND OMISSIONS

The Associate shall be responsible for all discrepancies, errors and omissions in the drawings, documents or other information submitted by him, irrespective of whether these have been approved, reviewed or otherwise accepted by the TPNODL or not. However any error in design/drawing arising out of any incorrect data/written information from TPNODL will not be considered as error and omissions on part of the Associate.

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29.0 TRANSFER OF TITLES

The title of ownership and property to all equipment, installations, erections, constructions materials, drawings & documents shall pass to the TPNODL after Commissioning and complete handing over-taking over.

However, such passing of title of ownership and property to the TPNODL shall not in any way absolve, dilute or diminish the responsibility and obligations of the Associate under this Contract including loss or damages and all risks, which shall vest with the Associate.

The Associate shall take all corrective measures arising out of discrepancies, errors and omissions in drawings and other information within the time schedule and without extra cost to the TPNODL.

The Associate shall also be responsible for any delay and/or extra cost if any, in carrying out engineering, and site works by other agencies arising out of discrepancies, errors and omissions stated in as well as of any late revision/s of drawings and information submitted by the Associate.

37.0 SUGGESTIONS & FEEDBACK

We welcome all our Business Associates to write to us about their experience with TPNODL; be it our Company, our services or our people. Each and every concern, issue, query and suggestion from you will help us to become a better company to work with and shall help us develop a strong bonding of trust and a long term relationship with you.

You may send your feedback by filling up our Business Associate Feedback Form enclosed herewith as Annexure-Q. You can also log on to our website www.tpnodl.com to provide your feedback according to the guidelines mentioned below:

38.0 CONTACT POINTS

In case Business Associate needs information with respect to payments or has any grievances, same may be submitted by log on to our website www.tpnodl.com

32.0 LIST OF ANNEXURES

S. No.	Subject	Annexure
1.	Performa for Bid Security Bank Guarantee	A
2.	Performa for Advance Payment Bank Guarantee	B
3.	Performa for Performance Bank Guarantee (CP cum EP)	C
4.	Performa for No Demand Certificate by Associate	D
5.	Performa for Indemnification on Statutory Compliance	E
6.	Performa For Application For Issuance of Consolidated TDS Certificate	F
7.	HR Service Level Agreement	G
8.	Under taking for competence of workmen	H
9.	Acceptance Form For Participation In Reverse Auction Event	I

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10.	NEFT or RTGS payment request form	J
11.	Contractor Safety Management System	K
12.	Vendor Appraisal Form	L
13.	Manufacturers Authorization Form	M
14.	Safety Bid Document	N
15.	Tata Code of Conduct	P
16.	Vendor Feedback Form	Q

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ANNEXURE-A

PROFORMA FOR BID SECURITY BANK GUARANTEE

TP Northern Odisha Distribution Ltd

Balasore

WHEREAS, (Name of the Bidder) _____ (hereinafter called "the BIDDER") has submitted his bid dated _____ for the (Tender No. & Name of Contract) _____ (hereinafter called "the BID").

KNOW ALL men by these presents we (Name of the Bank) _____ of (Name of the Country) _____ having our registered office at _____ (hereinafter called "the BANK) are bound unto TP Northern Odisha Distribution Ltd (TPNODL) in the sum of _____ for which payment well and truly to be made to the TPNODL the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20_____.

The CONDITIONS of this obligation are:

i) If the Bidder withdraws his Bid during the period of bid validity specified in the Proforma of Bid

or

ii) If the Bidder having been notified of the acceptance of his Bid by the TPNODL during the period of bid validity fails or refuses to furnish the Contract Performance Bank Guarantee, in accordance with the Instructions to Bidders.

We undertake to pay the TPNODL upto the above amount upon receipt of its first written demand, provided that in its demand the TPNODL will note that amount claimed by it is due to it owing to the occurrence of one or both conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force upto and including the date (No of days as mentioned in tender enquiry) days after the closing date of submission of bids as stated in the Invitation to Bid or as extended by you at any time prior to this date, notice of which extension to the Bank being hereby waived, and any demand in respect thereof should reach the Bank not later than the above date.

DATE.....

SIGNATURE

OF

THE

BANK.....

WITNESS.....

SEAL.....

(Signature, Name & Address)

(At least 2 witnesses)

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ANNEXURE-B

PROFORMA FOR ADVANCE PAYMENT BANK GUARANTEE

(On Rs.100/- Stamp Paper)

Note:

- (a) Format shall be followed in toto
- (b) Claim period of six months must be kept up
- (c) The guarantee to be accompanied by the covering letter from the bank confirming the signature to the guarantee

TP Northern Odisha Distribution Ltd

Balasore

Advance Payment B.G.No.....

Contract No.....dated.....

1. You have entered into a Contract No _____ with M/s. _____ (hereinafter referred to as "the Vendor") for the supply and delivery of _____ (hereinafter referred to as "the said Equipment") for the price and on the terms and conditions contained in the said contract.
2. In accordance with the terms of the said contract, you have agreed to make an advance payment of Rs. _____ (Rupees _____ only) being _____% (_____ percent) of the total value of the contract on "the Vendor" furnishing you with an irrevocable, unconditional and acceptable bank guarantee to be valid till the date of receipt of "the said equipment" covered by your above mentioned contract. For this purpose you have agreed to accept our guarantee.
3. In consideration thereof, we, _____ hereby irrevocably and unconditionally guarantee to pay to you on demand but in any case before the end of five working days from the date of the claim and without demur and without reference to "the Vendor" such amount or amounts not exceeding the sum of Rs. _____ (Rupees _____ only) being _____% (_____ percent) of the total value of the contract on receipt of your intimating that "the Vendor" has not fulfilled his contractual obligations. You shall be the sole judge for such non-fulfillment and "the Vendor" shall have no right to question such judgment.
4. You shall have the right to file / make your claim on us under the guarantee for a further period of one months from the date of expiry.
5. This guarantee shall not be revoked without express consent and shall not be affected by your granting time or any other indulgence to "the Vendor", which shall include but

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not be limited to, postponement from time to time of the exercise the same in you or any right which you may have against "the Vendor" and to exercise the same in any covenant contained or implied in the said contract or any other course or remedy or security available to you, and our Bank shall not be released from its obligations under this guarantee by your exercising any of your rights with reference to matters aforesaid or any of them or by reasons of any other act or forbearance or other acts of omission or commission on your part or any other indulgence shown by you or by any other matter or thing whatsoever which under the law would, but for this provision have the effect of relieving our bank from its obligation under this guarantee.

6. We also agree that you shall be entitled at your option to enforce this guarantee against our bank as a principal debtor, in the first instance, notwithstanding any other security or guarantee that you may have in relation to "the Vendor's" liabilities in respect of the premises
7. This guarantee shall not be affected by any change in the constitution of our Bank or "the Vendor" or for any other reason whatsoever.
8. Any claim / extension under the guarantee can be lodge-able at outstation banks or at Mumbai branch and claim will also be payable at Mumbai Branch **(to be confirmed by Balasore Branch by a letter to that effect)**
9. Notwithstanding anything herein contained, our liability under this guarantee is limited to Rs. _____
(Rupees _____ only) and the guarantee will remain in force upto and including _____ (Date) and shall be extended from time to time for such period or period as may be desired by "the Vendor".
10. Unless a demand or claim under this guarantee is received by us in writing within one month from _____ (expiry date) i.e. on or before _____ (claim period end date), we shall be discharged from all liabilities under this guarantee thereafter.

Dated at _____ this _____ day of _____ 200_____

Witness

1. _____

Bank's rubber stamp

Banks full address

2. _____

Designation of Signatory

Bank official number

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ANNEXURE- C

PROFORMA FOR PERFORMANCE BANK GUARANTEE (CP cum EP)

(On Rs.100/- Stamp Paper)

Note:

- (a) Format shall be followed in toto
- (b) Claim period of one month must be kept up
- (c) The guarantee to be accompanied by the covering letter from the bank confirming the signature to the guarantee

TP Northern Odisha Distribution Ltd

Balasore

CP cum EP BG No.....

Order/Contract No.....dated.....

- You have entered into a Contract No _____ with M/s. _____ (hereinafter referred to as "the Vendor") for the supply cum erection / civil work of _____ (hereinafter referred to as "the said Equipment") for the price and on the terms and conditions contained in the said contract.
- In accordance with the terms of the said contract, "the Vendor" agreed to furnish you with an irrevocable, unconditional and acceptable bank guarantee for 10% of the value of contract and to be valid till the end of Guarantee period plus one month towards "Contract cum Equipment performance". For this purpose you have agreed to accept the guarantee.
- In consideration thereof, we, _____ hereby irrevocably and unconditionally guarantee to pay to you on demand but in any case before the end of five working days from the date of the claim and without demur and without reference to "the Vendor" such amount or amounts not exceeding the sum of Rs. _____ (Rupees _____ only) being _____ % (_____ percent) of the total value of the contract on receipt of your intimating that "the Vendor" has not fulfilled his contractual obligations. You shall be the sole judge for such non-fulfillment and "the Vendor" shall have no right to question such judgment.
- You shall have the right to file / make your claim on us under the guarantee for a **further period of one month** from the date of expiry.
- This guarantee shall not be revoked without express consent and shall not be affected by your granting time or any other indulgence to "the Vendor", which shall include but not be limited to, postponement from time to time of the exercise the same in you or any right which you may have against "the Vendor" and to exercise the same in any covenant contained or implied in the said contract or any other course or remedy or security available to you, and our Bank shall not be released from its obligations under this guarantee by your exercising any of your rights with reference to matters aforesaid or

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any of them or by reasons of any other act or forbearance or other acts of omission or commission on your part or any other indulgence shown by you or by any other matter or thing whatsoever which under the law would, but for this provision have the effect of relieving our bank from its obligation under this guarantee.

6. We also agree that you shall be entitled at your option to enforce this guarantee against our bank as a principal debtor, in the first instance, notwithstanding any other security or guarantee that you may have in relation to "the Vendor's" liabilities in respect of the premises
7. This guarantee shall not be affected by any change in the constitution of our Bank or "the Vendor" or for any other reason whatsoever.
8. Any claim / extension under the guarantee can be lodge-able at outstation banks or at Mumbai branch and claim will also be payable at Mumbai Branch (to be confirmed by Mumbai Branch by a letter to that effect in case BG is from the branch outside Mumbai)
9. Notwithstanding anything herein contained, our liability under this guarantee is limited to Rs. _____ (Rupees _____) only and the guarantee will remain in force upto and including _____ (Date) and shall be extended from time to time for such period or period as may be desired by "the Vendor".
10. Unless a demand or claim under this guarantee is received by us in writing within one months from _____ (expiry date) i.e. on or before _____ (claim period end date), we shall be discharged from all liabilities under this guarantee thereafter.

Dated at _____ this _____ day of _____ 200__

Witness

1. _____

Bank's rubber stamp

Banks full address

2. _____

Designation of Signatory

Bank official number

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ANNEXURE-D

PROFORMA FOR “NO DEMAND CERTIFICATE” BY ASSOCIATE

(On Company's Letter head or with Company Seal)

(To be submitted by the Associate to TPNODL Accounts Department at the time of receipt of full and final payment)

(Certificate No. CCP/002)

Name of the Project

Order/ Contract No.

Dated

Name of the Associate

Scheme No. / Job No.

We, M/s. _____ (Associate) do hereby acknowledge and confirm that we have received the full and final payment due and payable to us from TPNODL, in respect of our aforesaid Order No _____ dated _____ including amendments, if any, issued by TPNODL to our entire satisfaction and we further confirm that we have no claim whatsoever pending with TPNODL under the said contract / W.O.

Notwithstanding any protest recorded by us in any correspondence, documents, measurement books and / or final bills etc., we waive all our rights to lodge any claim or protest in future under this contract.

We are issuing this “NO DEMAND CERTIFICATE” in favour of TPNODL, with full knowledge and with our free consent without any undue influence, misrepresentation, coercion etc.

Dated

Signature

Place

Name

Designation

(Company Seal)

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ANNEXURE – E

PROFORMA FOR “INDEMNIFICATION ON STATUTORY COMPLIANCES”

(To be submitted by the successful Bidder within seven days of award of work)

(Certificate No. CCP/001)

Name of the Project

Letter of Award / Contract No.

Dated

Name of the Associate

Scheme No. / Job No.

By this confirmation we, _____
(Associate) are formally bound to M/s. TPNODL towards any sum which may be imposed, levied or hereinafter recovered by the Provident Fund Organization under the provisions of the Employees of the Provident Fund and Miscellaneous Provisions Act 1952 in respect of employees employed by us.

We well and truly bind ourselves and our heirs executors administrators and representatives jointly severally and respectively for the above payment only to be paid to M/s. TPNODL.

AND WHEREAS we, _____ (Associate)
is making compliance of the Employees Provident Fund and Miscellaneous Provisions Act 1952, have entered into the above written bond for the indemnity to M/s. TPNODL against all losses from the acts or default of the said Associate in respect of compliance of the Provident Fund Act.

Similarly we hereby confirm that we have complied with all statutory and local laws and nothing is outstanding with regard to Local Sales Tax, Labour Laws, Local Municipal dues, Electricity dues etc. We have entered into the above written bond for the indemnity to M/s. TPNODL against all losses from the acts or default of the said Associate in respect of compliance of the Local Sales Tax Laws, Local Laws, Labour Laws, Local Municipal Dues, Electricity dues etc.

NOW THE CONDITION, of the above written bond is as such that if the Associate during the period of this contract commits any default or fails to make payment of Contributions in respect of his employees to the Employees Provident Fund Organization, he shall indemnify the Principal Employer M/s. TPNODL from all and every loss and damage caused to them from any act, omissions or negligence of the said Associate in respect of compliances under the Employees Provident Fund and Miscellaneous Provisions Act, 1952.

IN WITNESS to the above written bond we have here to set our hands, with our free consent.

Dated

Signature

Place

Name

Designation (Company Seal)

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ANNEXURE-F

**PROFORMA FOR APPLICATION FOR ISSUANCE OF CONSOLIDATED TDS
CERTIFICATE**

To be printed on the letterhead

To,

TP Northern Odisha Distribution Ltd,

Bhubaneswar

Sub: Application for issuance of Consolidated TDS Certificate for the FY _____

Dear Sir,

I / we hereby request / authorize you to issue me / us a consolidate TDS Certificate for the financial year _____ against tax deducted at source by you from my / our payments / bills during the said year from time to time under Chapter XVII – B of the Income Tax Act, 1961.

For and on behalf of

Signature

Name

Address

Contact No. (Land Line)

(Mobile)

PAN #

Assessing authority

ATTACH THE COPY OF PAN CARD

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ANNEXURE - G

SERVICE LEVEL AGREEMENT

(To be adhered to by Business Associates (BAs) in TPNODL on Human Resource Issues)

1.0 The following shall be adhered to by the Business Associates during his / its association with TPNODL:

Shall Abide by TPNODL Core Values:

- a) **Integrity** – We must conduct our business fairly, with honesty and transparency. Everything we do must stand the test of public scrutiny.
- b) **Understanding** – We must be caring, show respect, compassion and humanity to our colleagues and customers and always work for the benefit of the communities we serve.
- c) **Excellence** – We must constantly strive to achieve the highest possible standards in our day to day work and in the quality of services we provide.
- d) **Unity** – We must work cohesively with our colleagues across the group and with our customers and partners to build strong relationships based on tolerance, understanding and mutual co-operation.
- e) **Responsibility** – We must continue to be responsible and sensitive to the communities and environments in which we work and always ensuring that what comes from the people; goes back to the people many times over.
- f) **Agility**- We must work in a speedy and responsive manner and be proactive and innovative in our approach.

2.0 The Business Associate / his manager / supervisor who is responsible for managing the project site / performance contract etc. in TPNODL would also ensure adherence of these values by his employees / persons deployed by him in connection with his works undertaken in TPNODL.

3.0 TPNODL is a signatory to the United Nation Global Compact as an integral part of its Governance principles / business. The Business Associates are required to:

- a) Support and respect the protection of human rights and make sure that they are not complicit in human right abuses.
- b) Respect freedom of association and effective recognition of the right to collective bargaining.
- c) Not to resort to any form of forced and compulsory labour.
- d) Shall ensure abolition of child labour in his area of work.
- e) There is no discrimination in respect of employment and occupation in respect of his employees.
- f) Support precautionary approach to environmental challenges.
- g) Promote greater environmental responsibility by himself and his employees in his areas of work.
- h) Deploy and defuse environmental friendly technologies while carrying out the works.
- i) Work against corruptions in all its form including extortion and bribery by himself and his employees.

4.0 The Business Associates are required to adhere to all applicable Labour Laws with special reference to the following:

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- a) No person below the age of 18 years and no child labour will be engaged directly or indirectly for executing the work connected with the business of TPNODL.
- b) Minimum wages along with other statutory dues like PF, ESI, etc. as applicable to the workers shall be made within the prescribed period of 7th / 10th day of the following month.
- c) Deduction / deposit / record keeping and all other requirements under Employees PF Act 1952, Employees State Insurance Act 1948 and other applicable acts (if any) shall be adhered to.
- d) Only statutorily authorized deductions (if any) shall be made in accordance with the relevant statutes.
- e) All the provisions of Contract Labour (R&A) Act 1970 shall be complied with in respect of the workers engaged for TPNODL work. The work will be commenced only after completing necessary formalities for obtaining Labour License (if applicable).
- f) Necessary registers / records, filing of returns etc. shall be maintained for verification by Statutory / TPNODL authorities.
- g) Payment of wages shall be made only in presence of and with certification of authorized representative of TPNODL or shall be made in the form of cheque / bank transfer to the employee.
- h) During the period of contract, the Business Associate will arrange for deployment of his supervisor / manager for total supervision and control of the work and their manpower. All the activities related to their manpower e.g. attendance, leave, wage disbursement etc. will be done under the supervision & control of Business Associates, While adhering to the prescribed standard / norms of production / productivity & quality. During execution of the work, Business Associate shall engage only such qualified / skilled manpower as may be envisaged / required for ensuring level of production / service into the contract / work order.
- i) Clearances as follows shall be obtained from IR & Welfare Group:
 - i. Clearance for commencement (before start of the work).
 - ii. No Objection Certificate (after completion / before final settlement).
 - iii. Copies of PF / ESI Challans shall be deposited with IR & Welfare Group every month
- j) The Business Associate shall indemnify TPNODL from any liabilities under applicable Labour Statutes.
- k) The Business Associate shall ensure safety and health of his employees and shall also maintain hygienic working environment / condition in his area of work.
- l) The Business Associate and his employee shall abide by Laws of Land and shall not violate any applicable provisions.
- m) The Business Associate appreciates with and acquiesces to the right of TPNODL as principal employer to fulfil any of his legal obligations, if he fails to do so under applicable labour laws and deduct the same from his running bills / final payments / encashing security deposit / Bank Guarantee as the case may be. If there is any further shortfall TPNODL has the right to recover the same from the Business Associate.
- n) The Business Associate ensures that person employed by him adhere to the moral and legal conduct and shall not violate any standard conduct envisaged in the premise of

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TPNODL by all such as, Transparency, Safety, Discipline, Integrity etc. The Business Associate or his employees should refrain from corrupt practices, giving or taking bribe in connection with any TPNODL business.

5.0 The 'Statutory Compliance Enforcement System' in TPNODL is detailed below for adherence by all concerned. Corporate IR & Welfare Group will be the process owner for implementation of the system with the help of concerned Engineer I/c or Officer I/c.

- a) Statutory Compliance being a professed value in TPNODL Code of Conduct, the concerned Engineer / Officer in charges are requested to adhere to the provisions and advise respective Business Associates in their domain to comply in letter and spirit.
- b) Immediately after issuance of letter of intent, the authorized representative of the Business Associate will report to Corporate IR & Welfare group for completion of statutory requirements.
- c) Normally, the work will be started only after 'Clearance for Commencement of Work (CCW)' is issued by IR & W group to the Business associate. However in exceptional exigencies in engineer I/c / Officer I/c may direct the Business Associate to start the work and inform IR & W group about the same. Statutory requirements in this case may be completed parallelly.
- d) First monthly bill will be released only after producing CCW to the finance department. Similarly closure of work and final settlement will be affected after issuance of no objection certificate from IR & W group.

6.0 Requirements for 'Clearance for Commencement of Work' (CCW):

- a) Submission of filled up Form 'A' for database (Annexure-1).
- b) Copy of PF Code allocation letter.
- c) Copy of ESI Code allocation letter.
- d) Submission of duly filled up Form IV CL(R&A) act (In case more than or equals to 20 workers during the period of contract).
- e) Submission of duly filled up Form VI A (Notice of Commencement).
- f) Copy of insurance cover note under WC Act 1923 (if applicable).
- g) Copy of Contract Agreement.
- h) Copy of indemnity bond (if applicable).
- i) Affidavit with regard to payment of wages through cheque / bank transfer only.

7.0 Requirements during execution of work:

- a) Copy of receipt of application for license / license (if applicable).
- b) Copy of PF Challan (latest by 26th day of every Month).
- c) Copy of ESI Challan (latest by 26th day of every Month).
- d) Copy of Wage disbursement sheet / Bank statement.
- e) Filing / Maintenance of all statutory registers / reports / returns for inspection by Statutory/ TPNODL authorities.
- f) Certification of wage disbursement by authorized representative of TPNODL.
- g) Copy of 'Labour Welfare Fund' deposit certificate / Challan.
- h) Insuring safe working practices at the work place.

8.0 Requirements for 'No Objection Certificate' (NOC) for closure of work:

- a) Submission of duly filled up Form VI A (Notice of Completion).

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- b) Copy of Half yearly / Annual return for ESI / PF / CL(R&A).
- c) Consolidated copy of wage sheet of last month indicating full & final settlement of all dues like retrenchment benefit, bonus, leave encashment etc. Copy of individual declaration by employees in Form X regarding termination of employment.
- d) Confirmation certificate regarding filling up of form for transfer / withdrawal of PF by the concerned workers.

In case any of the above are deviated / not complied with the Letter of Award/Order shall be liable to be withdrawn / cancelled.

Enclosure:

- 1) Form A
- 2) Form X
- 3) Form XI
- 4) Form VI A
- 5) Form XXIV

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FORM (A)

[To be submitted by the Business Associate to the Principal Employer within a week from LoA issuance]

A. Details of the Agency

1. Name of Agency :
2. Nature of work :
3. Local Address with Ph.No. :
(With Father's name) :
4. Permanent Address (Full) :
5. PF code no. & Place :
6. ESI Code no. & Place :
7. Name and address of :
Sub-contractor (if any)

B. Details of Work

8. Name of work (as specified in LOI/LOA) :
9. LOI/LOA Nos. & Dates :
10. Period of contract (Specify Dates) :
[Including Extension period, if any] :
11. Work Area [Department / Location] :
12. Name / Cell no. of Officer I/c :
13. Maximum No. of workers and staff to be engaged on any day during the year.
➤ Supervisory Staff :
➤ Workers :
14. Do you have any other contract in TPNODL : Yes/No
If yes, furnish details:

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15. Details of Workmen's compensation Policy, if applicable

Name of Insurance Company
Policy No Number of persons
 covered Period of coverage: From To

If no, I hereby undertake the liability arising out of Workmen's Compensation Act and Rules made there under.

C. Details of workers to be engaged

No. of Workers

S. No.	Unskilled*	Semi-skilled*	Skilled*	Clerical / Supervisory

*** Number to be indicated**

I/We shall fulfill all obligations arising from and under all relevant law in force from time to time. I/We undertake to keep the TPNODL indemnified against any loss or liability arising out of failure of my / our abiding the relevant laws.

The name of my / our representatives is to enter the TPNODL Premises on my behalf.

Date:

**(Signature of the Business Associate
 or his Authorized Representative)**

This Business Associate is / will be engaged in TPNODL.

(Signature and seal of

Officer I/c of the Work)

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Form X

Undertaking

I _____ hereby undertake that all the dues in respect of my employment with M/s _____ for the period of _____ to _____ have been settled and final payments including retrenchment benefit have been made to me in full.

(_____)

Date:

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Form XI

Undertaking

With reference to the contract job awarded by M/s TPNODL to M/s _____ vide work order No. _____ dated _____

I _____ on behalf of

M/s _____ hereby undertake:

1. that the dues in respect of the workmen/ employee(s) engaged by us for the said contract, payable as per the provisions of relevant statute pertaining to
 - i. wages/ salary
 - ii. PF & ESI, Bhubaneswar Labour Fund
 - iii. All other statutory obligation
 has been paid /settled in full and no amount/ compliance is due/ pending.
2. That in case any dispute / claim is raised by the concerned workers i.r.o. any dues / payments, M/s _____ will settle the same on it's own and such liability will be borne by M/s _____
3. That M/s _____ hereby indemnify M/s TPNODL from any future liability i.r.o. any statutory obligation in respect of said contract.

Date:

()

Authorized Signatory

For M/s _____

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FORM- VI A

Notice for Commencement /Completion of contract work

I/We, Sh. / M/s _____ (Name and Address of the Contractor) hereby intimate that the contract work _____ (name of work) in establishment of the _____ (name and address of the Principal Employer) for which License No. _____ dated _____ has been issued to me/us by the Licensing Officer _____ (name of the Headquarters), has been commenced / completed with effect from _____ date / on date.

Signature of Contractor

With Office Seal

The Inspector

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FORM XXIV

[See Rule 82(1)]

Return to be sent by the Contractor to the licensing Officer (in duplicate)

Half -Yearly Ending _____

1. Name and address of the Contractor
2. Name and address of the Establishment
3. Name and address of the Principal Employer
4. Duration of Contract: From _____ to _____
5. No. of days during the half year on which
 - (a) the establishment of the principal employer had worked
 - (b) the contractor's establishment had worked
6. Maximum No. of contract labour employed on any day during the half –year:

Men	Women	Children	Total

7.
 - (i) Daily hours of work and spread over
 - (ii) (a) whether weekly holiday observed and on what day
 - (b) if so, whether it was paid for
 - (iii) No. of man – hours of overtime worked

8. No. of man days worked by

Men	Women	Children	Total

9. Amount of wages paid

Men	Women	Children	Total

10. Amount of deductions from wages, if any

Men	Women	Children	Total

Whether the following have been provided –

- (i) Canteen : _____
- (ii) Rest rooms : _____

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(iii) Drinking water : _____

(iv) Crèches : _____

(v) First Aid : _____

Signature of contractor

Place _____

Date _____

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ANNEXURE – H

UNDERTAKING FOR COMPETENCE OF WORKMEN

Name of Associate :

Tender No. :

Item :

With reference to the tender mentioned above, I/We _____,
 hereby undertake that the workmen/ employee(s) engaged by M/s
 _____ for the job against said tender shall be competent in all
 respect, commensurate to the nature of job.

Date:

 ()

Authorized Signatory

For M/s

Seal

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ANNEXURE-I

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder prior to participation in the auction event)

In a bid to make our entire procurement process more fair and transparent, TPNODL intends to use the reverse auctions through SAP-SRM/ ARIBA tool as an integral part of the entire tendering process. All the bidders who are found as technically qualified based on the tender requirements shall be eligible to participate in the reverse auction event.

The following terms and conditions are deemed as accepted by the bidder on participation in the bid event:

1. TPNODL shall provide the user id and password to the authorized representative of the bidder. *(Authorization Letter in lieu of the same shall be submitted along with the signed and stamped Acceptance Form).*
2. TPNODL will make every effort to make the bid process transparent. However, the award decision by TPNODL would be final and binding on the supplier.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of TPNODL, bid process, bid technology, bid documentation and bid details.
4. The bidder is advised to understand the auto bid process to safeguard themselves against any possibility of non-participation in the auction event.
5. In case of bidding through Internet medium, bidders are further advised to ensure availability of the entire infrastructure as required at their end to participate in the auction event. Inability to bid due to telephone line glitch, internet response issues, software or hardware hangs, power failure or any other reason shall not be the responsibility of TPNODL.
6. In case of intranet medium, TPNODL shall provide the infrastructure to bidders. Further, TPNODL has sole discretion to extend or restart the auction event in case of any glitches in infrastructure observed which has restricted the bidders to submit the bids to ensure fair & transparent competitive bidding. In case an auction event is restarted, the best bid as already available in the system shall become the start price for the new auction.
7. In case the bidder fails to participate in the auction event due any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid as submitted by the bidder as a part of the tender shall be considered as the bidder's final no regret offer. Any offline price bids received from a bidder in lieu of non-participation in the auction event shall be outrightly rejected by TPNODL.
8. The bidder shall be prepared with competitive price quotes on the day of the bidding event.
9. The prices as quoted by the bidder during the auction event shall be inclusive of all the applicable taxes, duties and levies and shall be FOR at TPNODL site.
10. The prices submitted by a bidder during the auction event shall be binding on the bidder.
11. No requests for time extension of the auction event shall be considered by TPNODL.
12. The original price bids of the bidders shall be reduced on pro-rata basis against each line item based on the final all-inclusive prices offered during conclusion of the auction event for arriving at Contract amount.

Signature & Seal of the Bidder

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send payment information)

Name of the Authorized Signatory :

Contact Person's Name :

Official Correspondence Address :

We confirm that we will bear the charges, if any, levied by our bank for the credit of NEFT/RTGS amounts in our account. Any change in above furnished information shall be informed to TPNODL well in time at our own. Further, we kept TPNODL indemnified for any loss incurred due to wrong furnishing of above information.

Thanking you,

For _____

(Authorized Signatory)

(Signature with Rubber Stamp)

Certification from Bank:

We confirm that we are enabled for receiving NEFT/RTGS credits and we further confirm that the account number (specify Bank a/c no.) of (Please mention here name of the account holder), the signature of the authorized signatory and the MICR and IFSC Code of our branch mentioned above are correct.

This also is certified that the above information is correct as per Bank record

(Manager's/ Officers Signature under Bank Stamp)

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ANNEXURE-L
VENDOR APPRAISAL FORM

TO BE SUBMITTED BY VENDOR (To be filled as applicable)		
Part A		
1.0	DETAILS OF THE FIRM	
	1.1	NAME (IN CAPITAL LETTERS)
	1.2	TYPE OF CONCERN (PROPRIETARY) PARTNERSHIP PVT.LTD., PUBLIC LTD. ETC.
	1.3	YEAR OF ESTABLISHMENT
	1.4	LOCATION OF OFFICE POSTAL ADDRESS
	1.5	CONTACT DETAIL OF BA's REPRESENTATIVE NAME E-MAIL ID CELL NO.
	1.6	LOCATION OF MANUFACTURING UNITS
		i) UNITS 1
		ii) OTHER UNITS
2.0	PRODUCTS / SERVICES BEING OFFERED	
3.0	TURNOVER DURING THE LAST 3 YEARS (TO BE VERIFIED WITH THE LATEST PROFIT & LOSS STATEMENT).	
4.0	AVAILABILITY OF STATUTORY DOCUMENTS I.E. COPY OF PAN CARD	
5.0	AVAILABILITY OF STATUTORY DOCUMENTS I.E. COPY OF GST REGISTRATION	
6.0	APPLICABILITY UNDER MSME CERTIFICATION	

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7.0	BA BELONGS TO AA COMMUNITY (SC/ST)		:	
8.0	DOCUMENTS VERIFYING ADDRESS PROOF (SUPPORTED BY ANY GOVT. ISSUED DOCUMENT)		:	
9.0	TECHNICAL			
	9.1	NO.OF DESIGN ENGINEERS (INDICATE NO.OF YEARS EXPERIENCE IN RELATED FIELDS)	:	
	9.2	NO.OF DRAUGHTSMEN	:	
	9.3	COLLABORATION DETAILS (IF ANY)	:	
		9.3.1 DATE OF COLLABORATION	:	
		9.3.2 NAME OF COLLABORATOR	:	
		9.3.3 RBI APPROVAL DETAILS	:	
		9.3.4 EXPERIENCE LIST OF COLLABORATOR	:	
		9.3.5 DURATION OF AGREEMENT	:	
	9.4	AVAILABILITY OF STANDARDS / DESIGN PROCEDURES / COLLABORATOR'S / DOCUMENTS (CHECK WHETHER THESE ARE LATEST/CURRENT)	:	
	9.5	TECHNICAL SUPPORT, BACK-UP GUARANTEE, SUPERVISION, QUALITY CONTROL BY COLLABORATOR (WHEREVER ESSENTIAL). (THIS CLAUSE IS RELEVANT WHEN VENDOR'S EXPERIENCE IS INADEQUATE)	:	
	9.6	QUALITY OF DRAWINGS	:	
10.0	MANUFACTURE			
	10.1	SHOP SPACE, LAYOUT LIGHTING, VENTILATION, ETC.	:	
	10.2	POWER (KVA)	:	

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		MAINS INSTALLED	:	
		UTILISED	:	
		STANDBY POWER SOURCE	:	
	10.3	MANUFACTURING FACILITIES (ATTACH LIST OF EQUIPMENTS AS APPLICABLE)	:	
		10.3.1 MATERIAL HANDLING	:	
		10.3.2 MACHINING	:	
		10.3.3 FABRICATION	:	
		10.3.4 HEAT TREATMENT	:	
		10.3.5 BALANCING FACILITY	:	
		10.3.6 SURFACE TREATMENT PRIOR TO PAINTING/ COATING, POLISHING, PICKLING, PASSIVATION, PAINTING, ETC.	:	
	10.4	SUPERVISORY STAFF	:	
	10.5	ADEQUACY OF SKILLED LABOURS (MACHINISTS, WELDERS, ETC.)	:	
	10.6	NO. OF SHIFTS	:	
	10.7	TYPE OF MATERIAL HANDLED (SUCH AS CS, SS, ETC.)	:	
	10.8	WORKMANSHIP	:	
	10.9	MATERIAL IN STOCK AND VALUE	:	
	10.10	TRANSPORT FACILITIES	:	
	10.11	CARE IN HANDLING	:	
11.0	INSPECTION / QC / QA / TESTING			

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	11.1	NUMBER OF PERSONNEL (INDICATE NO.OF YEARS OF EXPERIENCE)	:	
	11.2	INDEPENDENCE FROM PRODUCTION	:	
	11.3	AVAILABILITY OF PROCEDURAL WRITE UP/QUALITY PLAN	:	
	11.4	INCOMING MATERIAL CONTROL AND DOCUMENTATION	:	
	11.5	RELIABILITY/REPUTATION OF SUPPLY SOURCES	:	
	11.6	STAGE INSPECTION AND DOCUMENTATION	:	
	11.7	SUB-ASSEMBLY & DOCUMENTATION	:	
	11.8	FINAL INSPECTION AND DOCUMENTATION	:	
	11.9	PREPARATION OF FINAL DOCUMENTATION PACKAGE	:	
	11.10	TYPE TEST FACILITIES	:	
	11.11	ACCEPTANCE TEST FACILITIES	:	
	11.12	CALIBRATION OF INSTRUMENTS AND GAUGES (WITH TRACEABILITY TO NATIONAL STANDARDS) (ATTACH LIST)	:	
	11.13	STATUTORY APPROVALS LIKE BIS, IBR, ETC.(AS APPLICABLE)	:	
	11.14	SUB-VENDOR APPROVAL SYSTEM AND QUALITY CONTROL	:	
	11.15	DETAILS OF TESTS CARRIED OUT AT INDEPENDENT RECOGNISED LABORATORIES	:	

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	i)	FURNISH LIST OF TESTS CARRIED OUT AND THE NAME OF THE LABORATORY WHERE THE TESTS WERE CONDUCTED	:	
	ii)	CHECK AVAILABILITY OF CERTIFICATES AND REVIEW THESE WHEREVER POSSIBLE	:	
12.0		EXPERIENCE (INCLUDING CONSTRUCTION / ERECTION / COMMISSIONING) TO BE FURNISHED IN THE FORMAT INDICATED IN APPENDIX)	:	
13.0		SALES, SERVICE AND SITE ORGANISATIONAL DETAILS	:	
14.0		CERTIFICATE FROM CUSTOMERS (ATTACH COPIES OF DOCUMENTS)	:	
15.0		POWER SITUATION	:	
16.0		LABOUR SITUATION	:	
17.0		APPLICABILITY OF SC/ST RELAXATION (Y/N) IF YES, SUPPORTING DOCUMENTS TO BE ATTACHED	:	
Part C Supporting Documents				

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18.0	DOCUMENTS TO BE ENCLOSED: 1. Factory License 2. ISO Certificate 3. Registration of Central Excise 4. Income Tax Clearance. 5. PF Registration 6. ESI Registration 7. Insurance for Workman Compensation Act No. 8. Electrical Contract LIC No. 9. PAN No. 10. GST Registration 11. MSME Certification 12. WC Tax Registration 13. Organogram of Co. having organogram of Design, safety, quality, production and other teams. 14. Details of subscription of BIS, IEC, IEE, ASTM or other. 15. Details of the team in Design, Quality, Safety, Production. 16. List of manufacturing equipment as per Part C. 17. List of calibrated equipment as per Part C. 18. List of clients and order executed in past two years. 19. Complaint escalation matrix. 20. Performance Certificates of same product from Minimum two utilities. 21. e-Payment Form as per enclosed Annexure-J	

*** Classification of BAs under SC/ST shall be governed under following guidelines:**

- **Proprietorship/ Single Ownership Firm:** Proprietor of the firm should be from SC/ST community. Governing document shall be Proprietorship Deed.
- **Partnership Firm:** Only such firms shall qualify which have SC/ST partners holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Partnership Deed.
- **Private Limited Company:** Only such firms shall qualify which have SC/ST directors holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).
- The relaxation available for BAs under SC / STs shall be as per GCC for Tender Fees, EMD, PBG and Turnover criteria.

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- Certification from SC/ST Commission shall be required for deciding upon SC/ST status of a person.
- Annexure-J (e-Payment detail form) must be filled by Associate along with this form.

ANNEXURE-M

MANUFACTURER AUTHORIZATION FORM

(To be submitted on OEM's Letter Head)

Date:

Tender Enquiry No.:

To,

Chief (Procurement & Stores)

TP Northern Odisha Distribution Ltd,
Mumbai

Sir,

WHEREAS M/s. *[name of OEM]*, who are official manufacturers of having factories at *[address of OEM]*, do hereby authorize M/s *[name of bidder]* to submit a Bid in relation to the Invitation for Bids indicated above, the purpose of which is to provide the following Goods, manufactured by us

.....

and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with the Special Conditions of Contract or as mentioned elsewhere in the Tender Document, with respect to the Goods offered by the above firm in reply to this Invitation for Bids.

We hereby confirm that in case, the channel partner fails to provide the necessary services as per the Tender Document referred above, M/s *[name of OEM]* shall provide standard warranty on the materials supplied against the contract. The warranty period and inclusion / exclusion of parts in the warranty shall remain same as defined in the contract issued to their channel partner against this tender enquiry.

Yours Sincerely,

For

Authorized Signatory

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Annexure-P

TATA CODE OF CONDUCT (TCoC)

Introducing Tata Code of Conduct (TCoC) in GCC, the following clause is proposed for inclusion as per suggestions from Chief Ethics Counsellor -

“TCoC is the overarching policy framework that applies to all TATA Group companies including TPNODL. TCoC provides for stakeholder-wise approach in each of the seven chapters.

The chapter “Our Value Chain Partners” states the policy as follows:

1. We shall select our suppliers and service providers fairly and transparently.
2. We seek to work with suppliers and service providers who can demonstrate that they share similar values. We expect them to adopt ethical standards comparable to our own.
3. Our suppliers and service providers shall represent our company only with duly authorized written permission from our company. They are expected to abide by the Code in their interactions with, and on behalf of us, including respecting the confidentiality of information shared with them.
4. We shall ensure that any gifts or hospitality received from, or given to, our suppliers or service providers comply with our company’s gifts and hospitality policy.
5. We respect our obligations on the use of third party intellectual property and data.

To effectively implement TCoC, there is a 3-tier framework comprising of Ethics Management Apex Team headed by the CEO, who is also the Principal Ethics Officer (PEO), TPNODL; Locational Ethics Counsellors (LECs) who cover various locations/offices of TPNODL; and LECs are assisted by 4-5 Ethics Champions (ECs).

In case any Ethical Concern is faced during the course of your business dealings with TPNODL, one may utilize any one or more of the following avenues:

1. Ethics Portal on website – www.tpnodl.com
2. Ethics Box
3. IVRS No. 19124 and then press 7
4. Locational Ethics Counsellor (LEC)
5. **Third Party Ethics Helpline – 1800-22-7697 (Toll Free) ***
6. Chief Ethics Counsellor

TPNODL is committed to follow Core Values and Core Principles mentioned in TCoC, cited below, in carrying out various activities as well as in discharge of bi-lateral and multi-lateral obligations involving other entities/organizations:

Core Values:

All six core values are already mentioned in GCC.

Core Principles:

1. **Zero tolerance to bribery or corruption** in any form.
2. Committed to **good corporate citizenship**
3. Contribute to the **economic development of the communities** of the countries & regions we operate in.

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4. No compromise on **Safety**
5. Our conduct shall be **fair & transparent**
6. Respect the **human rights & dignity** of our stakeholders
7. **No unfair discrimination** of any kind
8. Statements made to stakeholders shall be **truthful** & made in **good faith**
9. Not engage in any restrictive or **unfair trade practice**
10. Provide avenues for our stakeholders to **raise concerns in good faith**
11. Environment **free from fear** of retribution to deal with concerns that are raised
12. Expect the leaders to be **role model**
13. **Comply with the laws** of the countries in which we operate

Gift Policy:

Principles for acceptance of gifts/benefits –

A gift or benefit may be accepted only if it complies with all of the following principles:

- ✓ it does not influence,
- ✓ does not have the potential to influence, an employee in such a way as to compromise or appear to compromise integrity and impartiality
- ✓ does not create a conflict of interest or perception of conflict of interest;

Principles for non-acceptance of gifts/benefits -

The gift or benefit may not be accepted or given if any of the following principles apply:

- ✓ causes the recipient or donor **to act in partial manner** in the course of duty
- ✓ apprehension of the recipient becoming **obligated to the donor**
- ✓ it is **not offered openly**
- ✓ if is an **offer of money** or something readily convertible to money (e.g. Shares)

Violation –

1. Not abiding with this policy would constitute violation of “Our Employees” Stakeholder group Clause “Gifts and Hospitality” of the Tata Code of Conduct (TCoC) 2015. Prompt action will be taken against violations.
2. Any deviation from this policy must be supported by appropriate rationale and must be duly approved by CEO who is also the Principal Ethics Officer. In any case, in dealing with such deviations, the spirit of the TCoC should in no case be compromised.
3. If it is determined that an employee / associate has violated this policy, appropriate action including termination of the employee’s / associate’s employment or association with TPNODL may be decided upon.

ANNEXURE-Q

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BUSINESS ASSOCIATE FEEDBACK FORM

With an objective to improve our internal processes and systems, and serve you better, we solicit your valuable feedback & suggestions. It is estimated that it will take about 10 minutes to complete this survey. We assure you that your feedback shall be kept confidential. Please send the duly filled feedback form in the "TPNODL addressed - attached envelop"

You are associated with us as

☐ OEMs ☐ Service Contractor ☐ Material Suppliers ☐ Material & Manpower Supplier

You are associated with us for

☐ Less than 1 year ☐ More than 1 year but less than 3 years ☐ More than 3 years

Your office is located at

☐ Bhubaneswar ☐ Within 200 kms from Bhubaneswar ☐ More than 200 kms from Bhubaneswar

Your nearly turnover with TPNODL

☐ Less than 25 Lacs ☐ 25 Lacs to 1 Crore ☐ More than 1 Cr.

Additional information

Your Name	
Your Designation	
Your Organization	
Contact Nos.	
Email	

We once again thank you for your participation in this survey. Please spare 10 minutes to give your feedback on following pages (Section A to E)

SECTION - A

(Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement.).

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S. No.	Parameters	1	2	3	4	5	Remarks/ Suggestion
		Do Not Agree	Slightly in Agreement	In Fair Agreement	Mostly in Agreement	Fully Agree	
1	You receive all relevant queries / tenders from us in timely manner.						
2	We provide you enough lead time to respond to our queries / tenders.						
3	We provide you adequate support (drawings, documents, clarifications, briefing etc.) to enable you meet our requirements.						
4	All following elements of our contract / purchase order are rational :						
4.1	Scope of Work						
4.2	Delivery / Execution Schedule						
4.3	Payment Terms						
4.4	Liquidated Damages						
4.5	Performance Guarantee						
5	Our purchase orders / contracts are simple, specific & easy to understand						
6	TPNODL demonstrate willingness to be flexible in administration of Contract / Purchase Order						
7	We provide timely responses / clarifications to your queries						
8	TPNODL representative you interact / coordinate with is adequately empowered to support you in meeting contractual obligations						
9	TPNODL provide you all necessary infrastructure support for timely and quality completion of work (including AMC)						
10	TPNODL Engineer-in-Charge timely certifies the jobs executed/ material supplied						
11	TPNODL Engineer-in-Charge efficiently supervises the job execution for timely completion of job						
12	BIRD (Bill Inward Receipt Desk) initiative has improved payment						

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S. No.	Parameters	1	2	3	4	5	Remarks/ Suggestion
		Do Not Agree	Slightly in Agreement	In Fair Agreement	Mostly in Agreement	Fully Agree	
	disbursement process						
13	Our approach for Inspection and Quality Assurance effective to expedite project completion?						
14	TPNODL never defaults on contractual terms						
15	In TPNODL Contracts closure is done within set time limit						
16	Our material receiving procedures are well defined and efficiently deployed to reduce mutual inconvenience						
17	Bank Guarantees are released in time bound manner						
18	Our processes related to payment / account settlement are effective.						
19	You get payments on time						
20	TPNODL Employees follow Ethical behavior						

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SECTION - B

SECTION – B (Please rate the following parameters on a scale of 1 to 5, where 1 - Minimum; 5 - Maximum)

SN	Parameters	1	2	3	4	5	Remarks/ Suggestion
1	How do you rate courtesy/ empathy/ attitude level and warmth of TPNODL employees you interact with from following team?						
1.1	Project Engineering						
1.2	District / Zones						
1.3	Projects/HOG (TS &P)						
1.4	Inspection & Quality Assurance						
1.5	Stores						
1.6	Metering & Billing						
1.7	Accounts / Finance						
1.8	Administration						
1.9	IT & Automation						
2	How would you rate TPNODL in comparison to your other clients in terms of fairness of treatment and transparency with its Business Associates?						
3	How would you rate TPNODL in comparison to your other clients in terms of processes and systems to manage partnership with its Business Associates						
4	How would you rate TPNODL in comparison to your other clients in terms of building long term & mutually relationship with its Business Associates						

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SECTION – C

Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement.

S. No.	Parameters	Certainly NO	Probably NO	Probably YES	Certainly YES	Remarks/ Suggestion
1	Based on your experience with TPNODL, would you like to continue your relationship with TPNODL?					
2	If someone asks you about TPNODL, would you talk “positively” about TPNODL?					
3	Would you refer TPNODL name to others in your community, fraternity and society as a professional & dynamic organization?					

SECTION - D

If we ask you to rate us on a scale of 1 to 10, how will you rate TPNODL, that truly represents your overall satisfaction with us (please tick appropriate box) –

1	2	3	4	5	6	7	8	9	10

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SECTION – E

Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement.

Please spare your thoughts for TPNODL's improvement in particular areas of weaknesses, particularly relating to some great practices, attitudes that you have seen elsewhere in Indian and International Organizations, which you recommend TPNODL to adopt. Please give your valuable salient recommendations.

Please spare your thoughts for TPNODL's improvement in particular areas of major concerns for you. We also welcome your suggestions to adopt any best practices, altitudes that you have observed / experienced elsewhere in Indian/ International organization.

Recommendation	<i>Please tick (✓) your top 5 expectations out of the following 10 points listed below -</i>	
(Please list down improvement you expect from TPNODL)	<i>Timely payment</i>	
1	<i>Flexibility in Contracts/PO</i>	
	<i>Clarity in PO,s & Contracts</i>	
2	<i>Timely response to quarries</i>	
	<i>Timely certification of works executed</i>	
3	<i>Clarity in Specs, drawings, other docs etc.</i>	
	<i>Adequate information provided on website for tender notification, parties qualified etc.</i>	
4	<i>Timely receipt of material at site for execution</i>	
	<i>Performance Guarantee/EMD released in time</i>	
5	<i>Inspection & quality assurance support for timely job completion</i>	

We thank you for your time and courtesy!!

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