

OPEN TENDER NOTIFICATION

FOR

**RATE CONTRACT FOR SUPPLY OF LT XLPE AB
CABLE , AAA CONDUCTOR AND HT/ LT POWER
CABLE**

**Tender Enquiry No.: TPNODL/OT/2021-22/014
Dtd.22.06.2021**

Due Date for Bid Submission: 05.07.2021 [15.00 Hrs.]

**TP NORTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)**

**Contracts & Material Management Department
Corporate office: Januganj, Balasore, Odisha-756019**

VERY VERY IMPORTANT FOR THE PROSPECTIVE BIDDERS TO NOTE PRIOR TO GOING THROUGH THE TENDER DOCUMENT

The bidders have to pay the requisite tender fees prior to submission of Pre-Bid queries (if any). The queries of the bidders who have paid the tender fees will be considered for clarification only. The queries of un-paid bidders shall not be considered for clarification. The queries are to be submitted in editable format of MS-Excel through e-mail only.

INFORMATION TO THE BIDDERS TO PARTICIPATE IN E-TENDER SYSTEM OF TPNODL
:- Steps for E-tender submission: -

Step 1:

The bidder can get primary information about the tender from the NEWS PAPER advertisement / TPNODL website (in case of open tender) / invitation through e-mail (in case of limited tenders)

Step 2:

First the prospective Bidder who intends to participate in an open tender should deposit the requisite tender fee (Non-Refundable) as mentioned in the tender document through NEFT/ RTGS in the a/c of TPNODL as mentioned hereunder. Deposit of the Tender fee should be made within the scheduled time for such deposit as indicated in the Tender document.

TPNODL Bank Details:

Beneficiary Name – TP Northern Odisha Distribution Limited
Bank Name – Union Bank of India
Branch Name – Balasore Branch
Account No – 500601010280332
IFSC Code – UBIN0550060

Step 3:

After deposit of the tender fee, the bidder should furnish the following information through e-mail to the contact person indicated in the tender document.

Sl No .	Description	Bidder's Response
1	Tender Enquiry No.	
2	Description of materials / Works Tendered	
3	Name of the bidding company	
4	Place & Detail Address of the Company	
5	Postal Code (PIN Code)	
6	Name of the authorized contact person of the Bidder	
7	Contact No./Mobile No. authorized person	
8	E-mail Id of the contact person	
9	Tender Fee details (Bank Name / Amount / NEFT-RTGS UTR No / Date) (E Receipt also to be furnished)	
10	GST No.	

E-mail with necessary attachment as above to be sent to email as mentioned in the contact information clause no 3.2 of Submission of bid documents.

Step 4:

Bids are to be submitted only through online e-procurement platform, ARIBA. Any other form bid submission will not be accepted. **Link for bidding through ARIBA e-procurement platform will be mailed to bidder once letter received as mentioned above.**

CONFIDENTIAL

CONTENTS OF THE ENQUIRY

S. NO.	PARTICULARS
1.	Event Information
2.	Evaluation Criteria
3.	Submission of Bid Documents
4.	Bid Opening & Evaluation process
5.	Award Decision
6.	Order of Preference/Contradiction
7.	Post Award Contract Administration
8.	Specifications and Standards
9.	General Conditions of Contract
10.	Safety
Annexures	
I.	Annexure I – Schedule of Items
II.	Annexure II – Technical Specifications
III.	Annexure III – Schedule of Deviations
IV.	Annexure IV – Schedule of Commercial Specifications
V.	Annexure V – Document Check List
VI.	Annexure VI – Acceptance Form for Participation in Reverse Auction Event
VII.	Annexure VII – General Condition of Contract

1.0 Event Information

1.1 Scope of work

Bids are invited against the Open Tenders through e-tender bidding process from interested Bidders for entering into a Rate Contracts valid for a period of **01 Year** as per the details mentioned below:

Group	Line Item Sl. No.	Name of materials	Qty. in Km	EMD Amount (Rs.)	Tender Fee (in Rs.)
Group-A	1	1 x35 + 1x 25 mm2 LT XLPE AB cable	100	8,60,000	5000
	2	3 x35 + 1x 25 mm2 LT XLPE AB cable	10		
	3	3x35+1x25+1x16mm2 LT XLPE AB Cable	10		
	4	3x50+1x35 LT XLPE AB Cable	30		
	5	3x50+1x35+1x16 LT XLPE AB Cable	400		
	6	3x95+1x70+1x16 LT XLPE AB Cable	25		
Group-B	7	33KV 300 mm ² single core XLPE cable (Armoured)	5	10,20,000	5000
	8	33KV 185 mm ² 3 core XLPE cable (Armoured)	10		
	9	11KV 300 mm ² 3 core XLPE cable (Armoured)	10		
	10	11KV 185 mm ² single core XLPE cable (Armoured)	5		
	11	LT 300 mm ² 3.5 core XLPE cable (Un-armoured)	30		
	12	LT 185 mm ² 3.5 core XLPE cable (Un-armoured)	40		
Group-C	13	232 mm ² AAA Conductor	10	2,15,000	5000
	14	100 mm ² AAA Conductor	200		
	15	80mm ² AAA Conductor	100		
	16	55mm ² AAA Conductor.	200		

1.2 Availability of Tender Documents

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

1.3 Calendar of Events

(a)	Last Date of receipt of Tender Fee	28.06.2021 ; 15.00 Hrs
(b)	Last date and time of receipt of Bids	05.07.2021 ; 15.00 Hrs
(c)	Date & Time of opening technical bids & EMD	05.07.2021 ; 17.00 Hrs
(d)	Date & Time of opening of Price of qualified bids	Will be notified to the successful bidders 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, 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 along with a sample of each 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 A , Annexure-I B & Annexure-I C
- 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

- a) The bidder should have its own production facility to manufacture the materials of same or higher grade level for which he submits his offer with furnishing the poof of documents.
- b) The bidder has to quote full quantity of any Line item under specified Group. The bidder should have experience on supply of same rating or higher rating for 100% of the tender quantity of offered items during immediate last 3 financial years. Order copies /completion certificates to be submitted .

- c) The bidder should have performance certificates from at least 2 reputed companies for similar or higher voltage rating of similar supply. The supply against these issued certificates should be completed in last five years from the date of bid submission. In case the bidder has a previous association with TPNODL for similar products and services, the performance feedback for that bidder by TPNODL's User Group shall only be considered irrespective of performance certificates issued by any third organization. Copy of performance certificates to be submitted in this regard.
- d) The offered materials should have been Type Tested at certified test laboratories which are CPRI/ ERDA only. The type test report should have same rating or higher rating of similar category of quoted materials. The bid shall be accompanied with such Test Reports which should be conducted within five years before the date of opening of the tender.
- e) The bidder should have average annual turnover of Rs. 10 Crore for Group-A & Group-B each and Rs. 3 Crore for Group-C or above for last consecutive Three Finance Year. If the bidder shall be quoted for multiple group, the turnover will be calculated cumulatively. Bidders have to submit copy of audited Balance Sheet and P&L Account in this regard.
- f) Bidder should have the In-house testing facilities for acceptance test as per TPNODL specifications. Self-undertaking to be submitted in this regard. TPNODL reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter.
- g) The Bidder should have valid ISI certification for all the sizes of the cables

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 behavior 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 will be evaluated commercially on the overall all-inclusive lowest cost for the **individual Line Item** under mentioned Group –A/B/C as defined in tender BOQ as calculated in Schedule of Items [Annexure IA/IB/IC]. TPNODL reserves the right to split the order line item wise and / or quantity wise among more than one Bidder. Hence all bidders are advised to quote their most competitive rates against each line item.

- Bidder has to quote against selected Line Item as Scheduled under mentioned Group [Annexure IA/IB/IC]. Failing to do so, TPNODL may reject the bids.

NOTE: In case of a new bidder not registered, 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" as applicable shall be submitted. The EMD shall be valid for 210 days from the due date of bid submission in the form of BG / online NEFT/ RTGS transfer / Bank Draft / Bankers Pay Order (issued from a scheduled Bank) favoring "TP NORTHERN ODISHA DISTRIBUTION LIMITED", payable at Balasore only. 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.

TPNODL Bank Details for transferring Tender Fee and EMD is as below:

Beneficiary Name – TP Northern Odisha Distribution Limited
Bank Name – Union Bank of India
Branch Name – Balasore Branch
Account No – 500601010280332
IFSC Code – UBIN0550060

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

- Documentary evidence in support of qualifying criteria
- Technical literature/GTP/Type test report etc. (*if applicable*)
- Qualified manpower
- Testing facilities (*if applicable*)
- No Deviation Certificate as per the Annexure III – Schedule of Deviations
- Acceptance to Commercial Terms and Conditions viz Delivery schedule/period, payment terms etc. as per the Annexure IV – Schedule of Commercial Specifications.
- 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 IA/IB/IC 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.

FOR BIDS INVITED THROUGH E-PROCUREMENT PORTAL:

The interested bidders are requested to obtain user name and password for purpose of bid submission through e-procurement portal of TPNODL.

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 EMD in the form of Bank Draft / BG / Bankers Pay Order shall be submitted in original hard copy and then placed in sealed envelope which shall be clearly marked as below:

EMD for Line items under Group-A/ B /C

“Supply of Different Size 1.1KV grade Aerial Bunched Cable”

“Supply of Different Size HT/LT Power Cable (U/G)”

“Supply of Different Size All Aluminium Alloy Conductor”

Please mention our Enquiry Number:- TPNODL/OT/2021-22/014 Dtd.22.06.2021 on the Tender and drop the same at **TP NORTHERN ODISHA DISTRIBUTION LIMITED, (A Tata Power and Odisha Government Joint Venture), General Manager - Contracts, Corporate office: Januganj, Balasore, Odisha-756019.**

The envelope shall be addressed to:

**General Manager -Contracts
TP NORTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)
Corporate office: Januganj, Balasore, Odisha-756019**

The envelope shall also bear the Name and Address of the Bidder along with our Tender No. and subject.

The Bid prepared by the Bidder, and all correspondence and documents relating to the Bid exchanged by the Bidder and the TPNODL, shall be written in the English Language. Any printed literature furnished by the Bidder may be written in another Language, provided that this literature is accompanied by an English translation, in which case, for purposes of interpretation of the Bid, the English translation shall govern.

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:

AGM (Elect.)-Contracts

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

GM (Elect.)- Contracts

Name: Mr. Nirmal Kumar Das
Contact No: 9438906007
E-Mail ID: nirmal.das@tpnodl.com

Chief - Contracts & Material Management:

Name: Mr. Sunil Bhattar
E-Mail ID: sunil.bhattar@tpnodl.com

Note: Any query/ clarification, plz. contact on Office hour only

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 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:

- Banker's Cheque/ Demand Draft/ Pay order drawn in favour of 'TP NORTHERN ODISHA DISTRIBUTION LIMITED', payable at Balasore only
- 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 rate contract / 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 delivery requirement or nullify the award decision without assigning any reason thereof.

In case any supplier's services or quality of material is / are found unsatisfactory during the delivery process, the award will be cancelled and TPNODL reserves the right to award other suppliers 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 IA/IB/IC)
2. Post Award Contract Administration (Clause 7.0)

3. Submission of Bid Documents (Clause 3.0)
4. Scope of Work and SLA (if any)
5. Technical Specifications (Annexure II)
6. Inspection Test Plan (if any)
7. Acceptance Form for Participation in Reverse Auction (Annexure VI)
8. General Conditions of Contract (Annexure VII)

7.0 Post Award Contract Administration

7.1 Special Conditions of Contract

- After finalization of tender, Rate Contract shall be issued on successful bidder with a validity period of **01 Year**. Prices shall remain firm till validity of issued rate contract. Within the validity of rate contract and as per requirement of material, release order shall be issued time to time.
- Post award of rate contract, Business Associate (BA) shall submit applicable Performance Bank Guarantee as per GCC within 15 days. PBG applicable shall 5% of Rate Contract Value. PBG submitted, shall be released after completion of applicable guarantee period plus one month.
- Guarantee period shall be as per technical specifications.
- **Within 15 days of Rate Contract issuance by TPNODL, it is the responsibility of BA to get manufacturing clearance and CAT-A issued from TPNODL.** In case BA does not get necessary approvals for issuance of CAT-A within mentioned timelines, then TPNODL reserve the right to cancel issued rate contract / release order and also reserve the right to forfeit EMD / PBG.
- BA will ensure & co-ordinate with TPNODL team for approval of CAT-A / drawing / GTP within 15days from issue of RC.
- Delivery period shall be 4-6 weeks + 15 days (considering the approval of CAT-A / drawing / GTP) from date of receipt of release order for the first lot however for remaining lots the delivery period will be 4-6 weeks from RO date.
- TPNODL reserves the rights to short close the issued Release Order / Rate contract, in case of any quality issues.
- Any change in statutory taxes, duties and levies during the contract period shall be borne by TPNODL. However, in case of delay in work execution owing to reasons not attributable to TPNODL, any increase in total liability shall be passed on the Bidder, whereas any benefits arising owing to such statutory variation in taxes and duties shall be passed on TPNODL.
- All other terms and conditions of TPNODL GCC -composite 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

On delivery of the materials in good condition and certification of acceptance by certified official, Associate shall submit the Bills/ Invoices in original in the name of TP NORTHERN ODISHA DISTRIBUTION LIMITED to AGM (Elect.) / Executive Engineer (Elect.), ESD, TPNODL, Balasore. The payment shall be released within 45 days from the date of submission of certified bills/ invoices.

In-Case the BA fails to furnish required Performance Bank Guarantee (PBG) as per TPNODL GCC format before raising their Invoice then the PBG amount shall be deducted and retained by TPNODL from the first bill submitted by the BA and the balance amount due will be released. However, in such a case the amount retained towards PBG shall be paid to BA either on submission of the required PBG or on expiry of the guarantee period of material supplied/services provided, whichever is earlier.

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 VII for more information.

Any ethical concerns with respect to this tender can be reported to the following e-mail ID: ceoffice@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-VII

10.0 Safety

Safety related requirements as mentioned in our safety Manual is put in the Company's website and same shall be strictly followed.

<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 IA

GROUP-A
Schedule for Items

Sr. No.	Description	HSN Code	UoM	Qty.	Unit Price (Rs.)	GST (Rs.)	All incl. Unit Price (Rs)	Amount All incl. (Rs.)
	1	2	3	4	5	6	7=5+6	8=7x4
1	1 x35 + 1x 25 mm2 LT XLPE AB cable		Km	100				
2	3 x35 + 1x 25 mm2 LT XLPE AB cable		Km	10				
3	3x35+1x25+1x16mm2 LT XLPE AB Cable		Km	10				
4	3x50+1x35 LT XLPE AB Cable		Km	30				
5	3x50+1x35+1x16 LT XLPE AB Cable		Km	400				
6	3x95+1x70+1x16 LT XLPE AB Cable		Km	25				
TOTAL AMOUNT								

NOTE:

- The quantity mentioned above is for evaluation purpose only and may vary during the execution. Release Orders against this Rate Contract shall be issued by TPNODL as per actual requirement.
- The overall period of the rate contract shall be for a period of **01 year** and price shall be firm till the validity of contract.
- The unit price with GST in column no. 7, is landed price FOR TPNODL Odisha Locations. Exact delivery location shall be specified in the Release Order.
- 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 be inclusive of loading, unloading & delivery at Central Store, TPNODL Balasore / Jajpur Road, Odisha.

Signature & Seal of the Bidder

ANNEXURE IB

GROUP-B
Schedule for Items

Sr. No.	Description	HSN Code	UoM	Qty.	Unit Price (Rs.)	GST (Rs.)	All incl. Unit Price (Rs)	Amount All incl. (Rs.)
	1	2	3	4	5	6	7=5+6	8=7x4
1	33KV 300 mm ² single core XLPE cable (Armoured)		Km	5				
2	33KV 185 mm ² 3 core XLPE cable (Armoured)		Km	10				
3	11KV 300 mm ² 3 core XLPE cable (Armoured)		Km	10				
4	11KV 185 mm ² single core XLPE cable (Armoured)		Km	5				
5	LT 300 mm ² 3.5 core XLPE cable (Un-armoured)		Km	30				
6	LT 185 mm ² 3.5 core XLPE cable (Un-armoured)		Km	40				
TOTAL AMOUNT								

NOTE:

- The quantity mentioned above is for evaluation purpose only and may vary during the execution. Release Orders against this Rate Contract shall be issued by TPNODL as per actual requirement.
- The overall period of the rate contract shall be for a period of **01 year** and price shall be firm till the validity of contract.
- The unit price with GST in column no. 7, is landed price FOR TPNODL Odisha Locations. Exact delivery location shall be specified in the Release Order.
- 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 be inclusive of loading, unloading & delivery at Central Store, TPNODL Balasore / Jajpur Road, Odisha.

Signature & Seal of the Bidder

ANNEXURE IC

GROUP-C
Schedule for Items

Sr. No.	Description	HSN Code	UoM	Qty.	Unit Price (Rs.)	GST (Rs.)	All incl. Unit Price (Rs)	Amount All incl. (Rs.)
	1	2	3	4	5	6	7=5+6	8=7x4
1	232 mm ² AAA Conductor		Km	10				
2	100 mm ² AAA Conductor		Km	200				
3	80mm ² AAA Conductor		Km	100				
4	55mm ² AAA Conductor.		Km	200				
TOTAL AMOUNT								

NOTE:

- The quantity mentioned above is for evaluation purpose only and may vary during the execution. Release Orders against this Rate Contract shall be issued by TPNODL as per actual requirement.
- The overall period of the rate contract shall be for a period of **01 year** and price shall be firm till the validity of contract.
- The unit price with GST in column no. 7, is landed price FOR TPNODL Odisha Locations. Exact delivery location shall be specified in the Release Order.
- 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 be inclusive of loading, unloading & delivery at Central Store, TPNODL Balasore / Jajpur Road, Odisha.

Signature & Seal of the Bidder

ANNEXURE II

Technical Specifications

Aattached separately with the tender.

CONFIDENTIAL

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:

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.

Signature:

Name:

Seal of the Bidder:

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	----- %
1c.	Inclusive of Excise Duty	Yes / No (If Yes, indicate % rate)
1d.	Sales tax applicable at concessional rate	Yes / No (If Yes, indicate % rate)
1e.	Octroi payable extra	Yes / No (If Yes, indicate % rate)
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.)

Signature:

Name:

Seal of the Bidder:

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/ organogram	
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 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 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

Annexure VII
General Conditions of Contract

CONTENTS	
CLAUSE NO.	DESCRIPTION
1.0	ORGANIZATIONAL VALUES
2.0	ETHICS
2.1	Tata Code of Conduct
3.0	CONTRACT PARAMETERS
3.1	Issue/Award of Contract
3.2	Contract Commencement Date
3.3	Contract Completion Date
3.4	Contract Period/ Time
3.5	Contract Execution Completion Date
3.6	Contract Price /Value
3.7	Contract Document
3.8	Contract Language
3.9	Reverse Auction
4.0	SCOPE OF WORK
4.1	Bid Evaluation- Commercial & Technical
5.0	PRICES/RATES/TAXES
5.1	Changes in statutory Tax Structure
6.0	TERMS OF PAYMENT
6.1	Quantity Variation
6.2	Full and Final Payment
7.0	MODE OF PAYMENT
8.0	SECURITY CUM PERFORMANCE DEPOSIT
9.0	STATUTORY COMPLIANCE
9.1	Compliance to Various Acts
9.2	SA 8000
9.3	Affirmative Action
9.4	ISO 14001
10.0	QUALITY
10.1	Knowledge of Requirements
10.2	Material/Equipment/Works Quality

CONTENTS	
CLAUSE NO.	DESCRIPTION
10.3	Adherence to Rules & Regulations
10.4	Specifications and Standards
11.0	INSPECTION/PARTICIPATION
11.1	Right to Carry Out Inspection
11.2	Facilitating Inspection
11.3	Third Party Nomination
11.4	Waiver of Inspections
11.5	Incorrect Inspection Call
12.0	MDCC & DELIVERY OF MATERIALS
12.1	Material Dispatch Clearance Certificate
12.2	Right to Rejection on Receipt
12.3	Consignee
12.4	Submission of Mandatory Documents on Delivery
12.5	Dispatch and Delivery Instructions
13.0	GUARANTEE
13.1	Guarantee of Performance
13.2	Guarantee period
13.3	Failure in Guarantee period (GP)
13.4	Cost of repairs on failure in GP
13.5	Guarantee Period for Goods Outsourced
13.6	Latent Defect
13.7	Support beyond the Guarantee Period
14.0	LIQUIDATED DAMAGES
14.1	LD Waiver Request
15.0	UNLAWFUL ACTIVITIES
16.0	CONFIDENTIALITY
16.1	Documents
16.2	Geographical Data
16.3	Associate's Processes
16.4	Exclusions
16.5	Violation
17.0	INTELLECTUAL PROPERTY RIGHTS
18.0	INDEMNITY
19.0	LIABILITY & LIMITATIONS

CONTENTS	
CLAUSE NO.	DESCRIPTION
19.1	Liability
19.2	Limitation of Liability
20.0	FORCE MAJEURE
21.0	SUSPENSION OF CONTRACT
21.1	Suspension for Convenience
21.2	Suspension for Breach of Contract Conditions
21.3	Compensation in lieu of Suspension
22.0	TERMINATION OF CONTRACT
22.1	Termination for Default/Breach of Contract
22.2	Termination for Convenience of Associate
22.3	Termination for Convenience of TPNODL
23.0	DISPUTE RESOLUTION AND ARBITRATION
23.1	Governing Laws and jurisdiction
24.0	ATTRIBUTES OF GCC
24.1	Cancellation
24.2	Severability
24.3	Order of Priority
25.0	ERRORS AND OMISSIONS
26.0	TRANSFER OF TITLES
27.0	INSURANCE
28.0	SUGGESTIONS & FEEDBACK
29.0	CONTACT POINTS
30.0	LIST OF ANNEXURES

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.

2.0 ETHICS

In our effort towards Excellence and in Management of Business Ethics at TPNODL, an Ethics Management Team is constituted.

The main objective of the Ethics Management Team is to:

1. Record, address and allay the issues and concerns on ethics raised by different stakeholders like employees, consumers, vendors, Associates etc. by initiating immediate corrective actions.
2. Ensure proper communication of the ethics policies and guidelines through prominent displays at all offices of TPNODL and through printed declarations in all concerned documents where external stakeholders are involved.
3. Ensure proper framework of policies as preventive measures against any ethics violation recorded by them.
4. Prepare and submit MIS of all issues and concerns, corrective and preventive actions on monthly basis to the top management for their information.

All Associates and Stakeholders are requested to register any grievance on ethics violation our website www.tpnodl.com

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 (PO) 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

The date of expiry of Guarantee Period 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 supply as per schedule of quantities shall be deemed as the Contract Execution Completion Date.

3.6 Contract Price /Value

The total all inclusive price/value mentioned in the PO/RC 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 and accepted and certified by the authorized representative of the company unless otherwise specified in schedule of quantities or in contract documents.

3.7 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.
- 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)

3.8 Contract Language

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.

3.9 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 F. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form as mentioned in the Annexure F as a token of acceptance for the same.

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 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

TPNODL reserves the right to evaluate the bid on below parameters as per the requirement:

Commercial Evaluation: The bid shall be evaluated on the basis of Qualifying Requirement parameters and other commercial parameters as mentioned in tender.

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.

5.0 PRICES/RATES/TAXES

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, cess 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.

5.1 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.

6.0 TERMS OF PAYMENT

On delivery of the materials in good condition and certification of acceptance by TPNODL official, Associate shall submit the Bills/Invoices in original in the name of “TP Northern Odisha Distribution Ltd” to invoice desk, complete with all required documents as under:

- Test Reports (4 sets).
- MDCC issued by TPNODL.
- Packing List.
- Drawing and Catalogue.
- Guarantee/Warrantee Card.
- Delivery Challan.
- O&M Manual.
- Copy of Order.
- Minutes of Meeting.
- E-Way challan (if applicable)

Bills/ invoices shall mention Supplier’s GST Number. TPNODL will make 100% payment within 45 days of submission of the Bill/Invoice complete in all respects and along with all the requisite documents mentioned above, subject to condition that Associate has furnished the requisite Security-cum-Performance Guarantee as stipulated in the contract.

6.1 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.

6.2 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-C.

7.0 MODE OF PAYMENT

Payment shall be made RTGS / NEFT whichever of the two modes chosen by the Associate, in favour of Associate’s Bank Account on TPNODL records, on whose name Contract has been issued. Those Associates opting for the RTGS mode shall submit the details of Bank Account and other details as per annexure G. 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.

8.0 SECURITY CUM PERFORMANCE DEPOSIT

Associates shall submit within 15 days from the effective date of issue of PO/RC, Security Performance Bank Guarantee (SPBG) in the format as per Annexure B of this document from banks acceptable to TPNODL for:

- 5% of the RC value as per prevailing Govt. Orders however same can be change or enhanced in case of any change in Govt. direction. BA is supposed to pay the difference of PBG amount as and when demanded by TPNODL.

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 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 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 TDPPL indemnified always till completion of contracts.

9.2 SA 8000

As TPNODL is SA 8000 compliant, it expects its Associates to follow guidelines of SA 8000:2014 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

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	50% relaxation in PBG for order value above 50 lacs else 25% relaxation	All limited and Open tenders
4	Turnover	25% relaxation in company turnover under qualifying requirement criteria	All Open Tenders

****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 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).

Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).

Note: Certification from SC/ST commission shall be required for deciding upon SC/ST status of a person.

9.4 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 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 INSPECTION/PARTICIPATION

11.1 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.
- 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 by 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.

11.2 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

11.3 Third Party Nomination

TPNODL may also 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.

11.4 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.

11.5 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.

12.0 MDCC & DELIVERY OF MATERIALS

12.1 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 utilized 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 subcontractors:

- i) Identify and obtain the correct type of trucks/trailers, keeping in view the nature of consignments to be dispatched.
- 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.

12.2 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.

12.3 Consignee

Unless otherwise specified in the Contract Document, Materials/Goods/Equipment shall be consigned to “SDO (Elect.), Central Store, TPNODL, Sovarampur, Balasore, Odisha-756001”

12.4 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
---	--	---------------------

12.5 Dispatch and Delivery Instructions

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, Balasore”, 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.

13.0 GUARANTEE

13.1 Guarantee of Performance

Associates shall stand guarantee that the equipment and material supplied 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.

13.2 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 as specified against each group of items in the technical specification from the date of delivery of final lot of supplies made, whichever is earlier.

13.3 Failure in Guarantee Period (GP)

If the equipment and material supplied 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 supplied 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 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.

13.4 Cost of repairs on failure in GP

The cost of repairs / rectification / replacement, required transportation, site inspection / mobilization / dismantling and re-installation costs as applicable, to be borne by 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.

13.5 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.

13.6 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.

13.7 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.

14.0 LIQUIDATED DAMAGES

- a) For supplies which are of standalone use, multiple in quantities and having a single final delivery schedule, Liquidated damages shall be levied without prejudice to any of the other contractual rights of TPNODL, as described below:

For delay of each week and part thereof from the delivery schedule specified in the contract, 1% of contract value corresponding to undelivered quantity, provided full quantity is supplied within 130% of the original contract time. If full contractual quantity is not delivered within 130% of contract time for delivery, TPNODL has the right to levy LD on the entire contract value, subject to a maximum of 10% of the total contract value.

- b) For Supplies having phased delivery schedule as per contract terms, standalone use and multiple in quantities, Liquidated damages shall be levied without prejudice to any of the other contractual rights of TPNODL, as described below:

For the purpose of calculating and applying LD, each delivery lot shall be considered separately. For delay of each week and part thereof, from the delivery schedule specified for the lot, 1% of the contract value corresponding to the undelivered quantity of the lot subject to a maximum of 10% of the total contract value of the subject lot. However, if full contractual quantity is not delivered within 130% of contract time for delivery, TPNODL has the right to levy LD on the entire contract value, subject to a maximum of 10% of the total contract value. 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.

14.1 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. The TPNODL management will review on the LD Waiver Request on the facts and will decide about the LD Waiver which may be part or the % of the LD imposed, however the TPNODL's management decision will be full and final.

15.0 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.

16.0 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.

16.1 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.

16.2 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.

16.3 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.

16.4 Exclusions

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.

16.5 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.

17.0 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.

18.0 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 judgments. 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 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.

19.0 LIABILITY & LIMITATIONS

19.1 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.*

If the Associate is a joint venture or consortium, all concerned parties shall be jointly and severally bound to the TPNODL for the fulfillment of the provisions of the Contract. The consortium or the joint venture shall designate one party as their leader, who will be the coordinator between the parties and TPNODL. The constituents & leader of the consortium or joint venture shall not be changed without the prior consent of TPNODL.

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.

19.2 Limitation of Liability

The total liability of Associate against any contract shall be limited to the Total All Inclusive Contract Value.

20.0 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 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.

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.

21.0 SUSPENSION OF CONTRACT

21.1 Suspension for Connivance

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 be executed by Associate under the contract by providing to the Associate at least two business days written notice for contracts having contract completion period less than sixty days and at least 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.

21.2 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 22.1 for breach/default of contract conditions.

21.3 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 22.1) 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.

22 TERMINATION OF CONTRACT

22.1 Termination for Default/Breach of Contract

The contract / PO /RC 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.
- 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 22 (except sub clause g thereof) be committed by the associate for the first time, TPNODL shall issue, along the 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 22 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 preceded with termination of the contract the associate shall comply and proceed further in the following manner:

- a) Associate shall discontinue the supply, on the expiry of the said period of two weeks.
- b) 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.
- c) 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.
- d) 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.
- e) 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:

- 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.

22.2 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. However, associate shall continue its supply as per contract till final approval is given to associates for such termination.

22.3 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.

23.0 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 Balasore. 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 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.

23.1 Governing Laws and Jurisdiction

The parties shall be subject to the jurisdiction of the courts of law in Balasore & the writ jurisdiction of Hon'ble High Court of Odisha at Cuttack and any matter arising here from shall be subject to applicable law in force in India.

24.0 ATTRIBUTES OF GCC

24.1 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.

24.2 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.

24.3 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.

25.0 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.

26.0 TRANSFER OF TITLES

The title of ownership and property to all equipment, materials, drawings & documents shall pass to the TPNODL on acceptance of material by store/site after Inspection.

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.

27.0 INSURANCE

The Associate shall take out the Insurance Policies which shall cover all risks including the following, as applicable:-

- a) The value of the policy shall cover the total value of all the items till they are handed over to TPNODL.
- b) TPNODL shall be the principal holder of the policy. The Associate shall be the loss payee under the policy. Associate / Sub-contractor of the Associate shall not be holders or beneficiaries in the policy nor shall they be named in the policy. TPNODL reserves the exclusive right to assign the policy.

- c) While the payment of premium may be phased in agreement with the insurance company, at no time shall goods and services required to be provided by the associate shall remain uninsured in accordance with (a) above.
- d) A copy of the Insurance policy shall be made available to TPNODL prior to first dispatch lot of any Equipment and policy shall be kept alive and valid at all times up to the stage of final acceptance.
- e) TPNODL reserves the right to take out whatever policy that is deemed necessary by him if the associate fails to keep the said policy alive and valid at all times and/or causes lapses in payment of premium thereby jeopardizing the said policy. The cost of such policy(s) shall be recovered / deducted from the amount payable to the associate.
- f) The policy shall ensure that the TPNODL's decision regarding replacement of goods damaged, lost or rendered unusable shall be final.

In all cases, the associate shall lodge the claims with the underwriters and also settle the claims and shall also notify TPNODL of any filed claims. However, the associate shall proceed with the repairs and/or replacement of the equipment/components without waiting for the settlement of the claims. In case of seizure of materials by concerned authorities, the associate shall arrange prompt release against bond, security or cash as required. TPNODL, upon request by the associate, will extend all reasonable assistance to the associate in such a case.

All the insurance claims shall be processed and settled by the associate and the missing/damaged items shall be replaced / repaired by them without any extra cost to TPNODL and without affecting the completion time.

28.0 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-E*. You can also provide your feedback to E-Mail at sunil.bhattar@tpnodl.com

- Suggestions for us
- Feedback form
- Knowledge Sharing/ Experience with TPNODL
- Any issues with TPNODL.

Submission of feedback form is mandatory before the release of final payment to the BA.

29.0 CONTACT POINTS

In case Business Associate needs information with respect to payments or has any grievances, same may be E-Mail to purchase@nescoodisha.com

30.0 LIST OF ANNEXURES

S. No.	Subject	Annexure
1.	Performa for Bid Security Bank Guarantee	A
2.	Performa for Performance Bank Guarantee (CP cum EP)	B
3.	Performa for No Demand Certificate by Associate	C
4.	Performa For Application For Issuance of Consolidated TDS Certificate	D
5.	Business Associate Feedback Form	E
6.	Acceptance Form For Participation In Reverse Auction Event	F
7.	Form for RTGS Payment	G
8.	Vendor Appraisal Form	H
9.	Manufacturer Authorization Form	I
10.	Tata Code of Conduct	I

ANNEXURE-A

PROFORMA FOR BID SECURITY BANK GUARANTEE

TP Northern Odisha Distribution Ltd
Balasure, Odisha

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 up to 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 up to 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)

ANNEXURE- B

PROFORMA FOR PERFORMANCE BANK GUARANTEE (CP cum EP)

(On Rs.100/- Stamp Paper) Note:

- Format shall be followed in to
- Claim period of one month must be kept up
- The guarantee to be accompanied by the covering letter from the bank confirming the signature to the guarantee

TP Northern Odisha Distribution Ltd
Balasore, Odisha

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.

4. 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.
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 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.
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 Balasore branch and claim will also be payable at Balasore Branch (to be confirmed by Balasore Branch by a letter to that effect in case BG is from the branch outside Balasore).
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 _____ 20__

Bank’s rubber stamp

1. Banks full address

Designation of Signatory

2. Bank official number

ANNEXURE-C

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.

Place

Name

(Company Seal)

ANNEXURE-D

PROFORMA FOR APPLICATION FOR ISSUANCE OF CONSOLIDATED TDS CERTIFICATE

To be printed on the letterhead

To,
TP Northern Odisha Distribution Ltd
Balasore, Odisha

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

ANNEXURE-E

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 Contractor		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

Balasore		Within 200 Kms from Balasore		More than 200 Kms from Balasore	
----------	--	------------------------------	--	---------------------------------	--

Your nearly turnover with TPNODL

Less than 25 Lacs		25 Lacs to 1 Crore		More than 1 Crore	
-------------------	--	--------------------	--	-------------------	--

Additional Information

Your Name	
Your Designation	
Your Organization	
Contact Nos.	
Email	

SECTION – A

(Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement).

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	Are you satisfied with the overall payment release mechanism of TPNODL						

S. No.	Parameters	1	2	3	4	5	Remarks/ Suggestion
		Do Not Agree	Slightly in Agreement	In Fair Agreement	Mostly in Agreement	Fully Agree	
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						

SECTION – B

(Please rate the following parameters on a scale of 1 to 5, where 1 - Minimum; 5 - Maximum)

S. No.	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	Division / Sub-division						
1.3	Projects						
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						

SECTION – C

Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement.

S. No.	Parameters	Certainly No	Probably No	Certainly Yes	Probably 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
---	---	---	---	---	---	---	---	---	----

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, attitudes that you

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!!

ANNEXURE-F

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 online mechanism (Ariba) 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 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.

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

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 _____

(Authorised 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 authorised 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)

ANNEXURE-H
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	AVALABILITY OF STATUTORY DOCUMENTS I.E. COPY OF PAN CARD		:
5.0	AVALABILITY OF STATUTORY DOCUMENTS I.E. COPY OF GST REGISTRATION		÷
6.0	BA BELONGS TO AA COMMUNITY (SC/ST)		÷
7.0	DOCUMENTS VERIFYING ADDRESS PROOF (SUPPORTED BY ANY GOVT. ISSUED DOCUMENT)		÷
8.0	TECHNICAL		
	8.1	NO.OF DESIGN ENGINEERS (INDICATE NO.OF YEARS EXPERIENCE IN RELATED FIELDS)	:
	8.2	NO.OF DRAUGHTSMEN	:
	8.3	COLLABORATION DETAILS (IF ANY)	:
		8.3.1 DATE OF COLLABORATION	:

	8.3.2	NAME OF COLLABORATOR	:
	8.3.3	RBI APPROVAL DETAILS	:
	8.3.4	EXPERIENCE LIST OF COLLABORATOR	:
	8.3.5	DURATION OF AGREEMENT	:
8.4		AVAILABILITY OF STANDARDS / DESIGN PROCEDURES / COLLABORATOR'S / DOCUMENTS (CHECK WHETHER THESE ARE LATEST/CURRENT	:
8.5		TECHNICAL SUPPORT, BACK-UP GUARANTEE, SUPERVISION, QUALITY CONTROL BY COLLABORATOR (WHEREVER ESSENTIAL). (THIS CLAUSE IS RELEVANT WHEN VENDOR'S EXPERIENCE IS INADEQUATE)	:
8.6		QUALITY OF DRAWINGS	:
9.0	MANUFACTURE		
9.1		SHOP SPACE, LAYOUT LIGHTING, VENTILATION, ETC.	:
9.2		POWER (KVA)	:
		MAINS INSTALLED	:
		UTILISED	:
		STANDBY POWER SOURCE	:
9.3		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.	:
9.4		SUPERVISORY STAFF	:
9.5		ADEQUACY OF SKILLED LABOURS (MACHINISTS, WELDERS, ETC.)	:
9.6		NO. OF SHIFTS	:
9.7		TYPE OF MATERIAL HANDLED (SUCH AS CS, SS, ETC.)	:
9.8		WORKMANSHIP	:
9.9		MATERIAL IN STOCK AND VALUE	:
9.10		TRANSPORT FACILITIES	:
9.11		CARE IN HANDLING	:
10.0	INSPECTION / QC / QA / TESTING		

	10.1	NUMBER OF PERSONNEL (INDICATE NO.OF YEARS OF EXPERIENCE)	:
	10.2	INDEPENDENCE FROM PRODUCTION	:
	10.3	AVAILABILITY OF PROCEDURAL WRITE UP/QUALITY PLAN	:
	10.4	INCOMING MATERIAL CONTROL AND DOCUMENTATION	:
	10.5	RELIABILITY/REPUTATION OF SUPPLY SOURCES	:
	10.6	STAGE INSPECTION AND DOCUMENTATION	:
	10.7	SUB-ASSEMBLY & DOCUMENTATION	:
	10.8	FINAL INSPECTION AND DOCUMENTATION	:
	10.9	PREPARATION OF FINAL DOCUMENTATION PACKAGE	:
	10.10	TYPE TEST FACILITIES	:
	10.11	ACCEPTANCE TEST FACILITIES	:
	10.12	CALIBRATION OF INSTRUMENTS AND GAUGES (WITH TRACEABILITY TO NATIONAL STANDARDS) (ATTACH LIST)	:
	10.13	STATUTORY APPROVALS LIKE BIS, IBR, ETC.(AS APPLICABLE)	:
	10.14	SUB-VENDOR APPROVAL SYSTEM AND QUALITY CONTROL	:
	10.15	DETAILS OF TESTS CARRIED OUT AT INDEPENDENT RECOGNISED LABORATORIES	:
		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	:
11.0		EXPERIENCE (INCLUDING CONSTRUCTION / ERECTION / COMMISSIONING) TO BE FURNISHED IN THE FORMAT INDICATED IN APPENDIX)	:
12.0		SALES, SERVICE AND SITE ORGANISATIONAL DETAILS	:
13.0		CERTIFICATE FROM CUSTOMERS (ATTACH COPIES OF DOCUMENTS)	:
14.0		POWER SITUATION	:
15.0		LABOUR SITUATION	:
16.0		APPLICABILITY OF SC/ST RELAXATION (Y/N) IF YES, SUPPORTING DOCUMENTS TO BE ATTACHED	:
Part C Supporting Documents			

18.0	<p>DOCUMENTS TO BE ENCLOSED:</p> <ol style="list-style-type: none"> 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. WC Tax Registration 12. Organogram of Co. having organogram of Design, safety, quality, production and other teams. 13. Details of subscription of BIS, IEC, IEE, ASTM or other. 14. Details of the team in Design, Quality, Safety, Production. 15. List of manufacturing equipment as per Part C. 16. List of calibrated equipment as per Part C. 17. List of clients and order executed in past two years. 18. Complaint escalation matrix. 19. Performance Certificates of same product from Minimum two utilities. 20. e-Payment Form as per enclosed Annexure-G 	
------	--	--

*** 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 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.

NOTE: Certification from SC/ST Commission shall be required for deciding upon SC/ST status of a person.

Annexure-G (e-Payment detail form) must be filled by Associate along with this form.

ANNEXURE-I

MANUFACTURER AUTHORIZATION FORM

(To be submitted on OEM's Letter Head)

Date:

Tender Enquiry No.:

To,
General Manager (Contracts)
TP Northern Odisha Distribution Ltd,
Balasore, Odisha

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

Annexure-J

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 shall be 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 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 e mail at: ceooffice@tpnodl.com

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.
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 II

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION OF LT XLPE AB CABLE

1. SCOPE:

This specification covers the design, manufacturing, testing, supply, delivery and performance requirements of LV overhead **ISI marked 1ph & 3Ph XLPE insulated Aerial Bunched Cable (ABC)** indicated in our Schedule of Requirements for use in the LV network of TPNODL.

The materials offered should have been successfully type tested at any CPRI/ERDA Testing Laboratory within a period of five years on the date of bid opening. Compliance shall be demonstrated by submitting with the bid (i) authenticated copies of the type test reports and (ii) performance certificates from the users.

The Aerial Bunched Cable shall conform in all respects to 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 material, which, in his judgment is not in full accordance therewith.

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 electric 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	Specification 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 voltages from 1kV(Um=1.2kV),up to 30kV(Um=36kV)-Part 1:Cables for rated voltages of 1kV (Um=1,2kV) and 3kV(Um=3.6kV)
ASTM G-53/DIN 56687	UV testing of XLPE insulation
IS14255:1995	Aerial Bunched conductors for working voltages up to and including 1100

	volts
--	-------

3.0 SERVICE CONDITIONS:

The service conditions shall be as follows:

- Maximum altitude above sea level 500m
- Maximum ambient air temperature 5⁰C
- Maximum temperature attainable by an object exposed to sun 60⁰C
- Average number of thunderstorm days per annum 70
- Average number of rainy days per annum 120
- Average annual rainfall 150cm
- Wind pressure as per IS:5613(Part-I/Sec.I) 1985

Wind Zones IS:5613 Part-I/Sec-I	Light	Medium	Heavy
Terrain Category	100 Kg/m ²	150 Kg/m ²	200 Kg/m ²

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. SYSTEM CONDITIONS:

The materials shall be suitable for installation in supply systems of the following characteristics.

- Frequency 50Hz
- Nominal System Voltage 400/230V
- Maximum System Voltage LV System 440/250 V
- Minimum LV Voltage 370 V
- Power frequency one minute withstand 2KV (set & dry)
- Neutral Earthing arrangement LV System Solidly earthed

5.0 GENERAL/ TECHNICAL

The design of Aerial Bunched Cable offered shall comprise a compacted, standard, hard drawn H2 / H4 grade aluminum phase conductor as applicable under IS-8130 / 84 with cross linked polyethylene (XLPE) insulation 0.65 to 1.1. KV class, having of **carbon black content 2.5% ±0.5%**.

The sizes and number of cores required are: i) **1x35mm² +1x25 mm²** , ii) **3x35mm² + 1x25mm² mm²** , iii) **3x35mm² + 1x25mm² +1x16 mm²** , iv) **3x50mm² + 1x35mm²** , v) **3x50mm² + 1x35mm² +1x16 mm²** & vi) **3x95mm² + 1x70mm² +1x16 mm²** **Aerial**

Bunched XLPE insulated LT Cable (ABC).

The type of Bunched Cables shall be three phase insulated bundled. All Aluminum Conductors combined with a neutral and catenaries (bare) which shall be of heat treated aluminum magnesium silicon alloy wires containing approximately 0.5% each of magnesium and silicon respectively. The catenaries must have an ultimate tensile stress of not less than that specified in the table of technical requirements.

The Bidder shall specify the standard to which this bundle shall be manufactured.

The conductor bundle offered shall be designed to meet the requirements set out in this specification taking note of safety factors pertaining to conductor or catenary tensioning and TPNODL specification: General Technical Requirements for LV overhead lines.

However, a bid of Aerial Bunched Cables shall not be considered, unless it is accompanied by a list of all special tools and equipments necessary to complete the installation.

6.0 CONDUCTORS:

(a) The phase conductors shall be of multi-stranded aluminum of compacted circular cross section. The aluminum shall comply with IS 8130:1984. The messenger conductor shall be of multi-stranded Aluminum Alloy conforming to IS 398 (Part 4) – 1994. In addition to meeting all requirement of relevant ISS the LT XLPE AB Cables supplied shall satisfy following general requirements.

(b) FOR PHASE CONDUCTORS:

Sl. No.	Specified Cross Section Area (mm ²)	No. of strands	Min. Dia of each strand in mm	Min. overall dia. of conducting part	Maxm. D.C Resistance at 20 degree centigrade.(Ohm / Km)	Nominal Insulation thickness (mm)
1	1	7	1.7	5.25	As per ISS/GTP As per ISS/GTP	1.2
	2	7	2.1	6.42		1.2
	3	7	2.5	7.6		1.2
	5	7	3.0	9.15		1.5
	7	19	2.1	10.9		1.5
	9	19	2.5	12.7		1.5

(a) FOR MESSANGER CONDUCTORS

Sl. No.	Phase conductor size of LT AB Cable in mm ²	Specified Cross Section Area (mm ²) of the Messenger conductor	No. of strands	Nominal dia. of each strand	Min overall dia. Of conducting part of the compacted conductor(mm)	Maxm. D.C Resistance of the messenger at 20 degree centigrade.(Ohm / Km)	Approx. Mass (Kg/Km) for the messenger
1	35	25	7	2.14	6.	As per ISS/GTP	65
2	50	35	7	2.54	7.		95
3	70	50	7	3.05	9.		136
4	95	70	7	3.6	1		191.8

6.0 (b) The bidder must take required precaution to ensure that the average diameter of each strand of conductor shall be ascertained through physical measurement of dimensions of finished cables at ambient temperature during pre-dispatch inspection or / and verification at TPNODL Store by consignee and the value so obtained shall have a tolerance limit with reference to the nominal diameter of each strand of conductor as stated in the tables above.

7.0 TOLERANCES:

The measurement of strand diameter of the finished AB Cable shall not be less 0.03mm for strands up to and including 3.00mm diameter. For strands above that size, measurement of strand diameter shall not be less than 1% of the nominal strand diameter.

For the purpose of checking compliance with the above requirement, the diameter shall be determined by two measurements at right angles taken at the same cross section. The physical measurement of strands shall be conducted after opening the strands of a finished AB Cable offered for inspection.

8.0 SPLICES IN WIRES:

Splices in Wires shall generally comply with requirements of IEC 1089.

The aluminum alloy rods may be spliced by cold pressure but welding before drawing provided the manufacturer can guarantee that the splice can develop 90% of the tensile strength of the un sliced rod. Wires which break during stranding may be sliced by cold pressure butt-welding provided that:

No two splices in the completed conductor occur within 15m of each other and no two splices in any individual wire are less than 150m apart.

The splice shall be done with high skilled workmanship. The finished splice shall be smooth and at no point shall the cross sectional area be less than that of the un sliced wire.

Splicing of the alloy wires on the stranding machine in order to utilize lengths of wires on

reels shall not be permitted.

9.0 STRANDING AND CORE LAY:

The conductor cores shall be stranded and the direction of lay must be as defined in IEC: 1089.

10.0 INSULATION:

The Aerial Bunched Cables shall be insulated for a voltage class of 0.65/1.1 KV and shall be capable of operating permanently at 1.2KV.

The insulation wall thickness shall be determined in accordance with Table-4 (Clause-7.2 and Clause 7.3) of IS: 14255/1995.

The insulating material shall be black and suitable to resist ultra violet radiation, salt laden sprays, chemical pollution, ageing effects, abrasion and mechanical shocks and mechanical and electrical stress at temperature up to 90°C in normal operation and 250°C under short circuit conditions per IEC: 502/1994.

The carbon black content in the XLPE insulation shall be **2.5% ± 0.5%**

11.0 PHASE IDENTIFICATION:

The individual insulated conductors within a bundle shall be identified by means of longitudinal projections.

The three phase conductors shall be marked by one, two or three longitudinal projections, indicating the R,Y,B phases respectively.

The projections shall have the following dimensions.

- The distance between the tips of two adjacent projections, where there is more than one, shall be between 1.0 and 1.5m.
- The width of the projection at the base shall be 1.0mm; and
- The height of the projections shall be 0.5mm.

12.0 INSULATION MARKINGS:

Each individual conductor comprising a bundle shall have the range of non-erasable distinct markings listed below legibly printed on the insulation surface at one meter intervals. The embossing should be very clear & easily visible to naked eye.

- ISI Mark, IS 14255-95, Manufacturer's B.I.S License No. legibly embossed on the insulation.
- Name of the Purchaser.: TPNODL
- P.O No. & Date

- Manufacturer's trademark identification for example "UCXLPE50"
- Year of manufacture:
- Designation of conductor type
- Size: for example "3x50"
- Shape of conductor.
- Rated voltage class: 0.65/1.1KV
- Back up conductor identification: conductors with one, two and three projections shall be marked R, Y and B respectively. The conductor with no projection shall be marked N and
- The height of the printed lettering shall be not less than 20% of the overall diameter of the conductor

13.0 TWIST:

The direction of lay of the conductors comprising the bundle shall be left-handed and the lay ration shall comply with IEC: 1089.

With a bare catenaries configuration the insulated phase cables together shall be twisted round the neutral catenaries to form the ABC. This cable bundle is then strung directly onto the distribution poles supported by the catenaries with standard approved hardware.

14.0 CABLE DRUM LENGTH:

The cable shall be supplied in 500m or 1000 m Drum Lengths as the case may be for different sizes of LT XLPE AB Cable.

15.0 TESTS:

15.1 General

Where not specified, all tests and test results shall conform to the requirements of IEC 502/1994 or IS 7098 (Part-I) 1998, IS 10810/1984, IS: 398(Part-IV) and IS: 14255/1955.

Unless expressly stated otherwise, the ambient temperature for routine tests as well as voltage tests shall be $20 \pm 15^{\circ}\text{C}$ and for all other tests be $20 \pm 15^{\circ}\text{C}$.

The frequency of the alternating test voltage shall be 49 Hz to 51Hz. The voltage wave form should be sinusoidal.

15.2 Type Tests

The test sample shall be 10m to 15m in length. All cores of the bundles shall be tested.

- Insulation resistance at ambient temperature.
- Insulation resistance at operating temperature.
- AC voltage test.

The insulation resistance test at ambient temperature shall be carried out in a water bath at

ambient temperature.

The insulation resistance test at a operating temperature shall be conducted in a water bath at 90°C.

The longitudinal projections used for phase identification shall be ignored. The results of this test shall be used to calculate the volume receptivity and the results conform to the requirements of IEC: 502/1994 or IS 10810 (Part-43).

The AC voltage test shall be carried out by applying 1.95KV (3U₀) for four hours to the sample, which shall be submerged in a water bath at ambient temperature, having been steeped for a period not less than one hour. The test shall only be deemed to have been passed if no breakdown occurs.

Furthermore, the following non-electrical type tests shall also be carried out:

- Insulation wall thickness: the longitudinal projections used for phase 1 identifications shall be ignored as per IS 10810 (Part-6);
- Ageing test, consisting of an evaluation of the retention of the mechanical properties of the insulation after ageing.
- Wrapping test: as per IS 10810 (Part-3);
- Tests for bleeding and blooming of pigment as per IS 10810 (Part-9)
- Thermal expansion of insulation.
- Measurement of carbon black content as per IS 10810 (Part-32).
- Water absorption by the XLPE insulation, shrinking of the XLPE insulation.
- Tensile test: adhesion between conductor and insulation.

The adhesion test requires a tensile testing machine. A sample of at least 300mm length shall be selected and straightened out. The insulation shall be removed for a length of 150mm. The insulated end shall be held in the upper grip head and the bare conductor on the lower grip head. Tension shall be applied at a speed of 500mm/ min until the conductor first begins to slide within the insulation. The test shall have been passed if the conductor and insulation combination can stand 75N/mm² without slippage occurring.

The neutral conductor/catenaries shall be type tested in accordance with the requirements of IS 398 (Part-IV) 1994.

15.3 Routine Tests

The following measurement or tests shall be carried out on all drums and coils of Bunched cable:

- Conductor resistance test
- High Voltage test.

Optional Test

Bending test.

The conductor to be tested for conductor resistance shall be stored for at least 12 hours in a room at particular constant temperature. If it cannot be established that the conductors

have reached the room temperature, the test should be postponed for a period of further 12 hours. Alternatively, the test can be carried out on short sample after remaining one hour in a temperature controlled water bath. The test shall be carried out and the conversion factors used to

convert the resistance value to a base of 200°C and one Km. The DC resistance of each conductor shall not exceed the appropriate maximum values specified in IEC:228/IS:6474.

The voltage test shall be conducted by applying to each core 3.5KV AC ($2.5 U_0$ plus 2 KV) or 8.4 KV DC for 5 minutes with the specimen lying in a water bath at ambient temperature. The conductor shall pass the test if no electrical breakdown occurs.

15.4 Acceptance Tests

The following sample check, measurements and test shall be carried out in addition to the Acceptance Tests as per IS 14255 – 1955, IS : 398 (Part – IV) 1994, IS 8130 / 1984

- 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 on drums immersed in water(apply voltage 3.5 KV AC for 5 min)
- x) Insulation resistance (Volume resistivity) test.
- xi) UV test for XLPE Insulation (black carbon content and dispersion test).

These tests should be carried out on one length form each production batch of the same sample.

The thickness of the insulation wall shall be measured on a piece removed from each end of the sample length. If either means or minimum values are not met, two further samples shall be removed at 0.5m form the end corresponding to the failed specimen. If these samples do not satisfy the mean and minimum thickness requirements, the test shall be deemed to have been failed.

The longitudinal projections used for phase identifications shall be ignored. The thermal expansion test need only be carried out on one core.

In relation to the tensile test, the tensile strength of the aluminum wires before stranding and that of the finished conductor shall comply with IEC: 1089.

15.5 Test on the Catenary (messenger) Conductor

Breaking load, elongation and resistance tests shall be completed on the aluminum alloy catenaries conductor in accordance with the requirements of IS:398 (Part-IV)/1994 or IEC:1089.

15.6 Bending Test on a complete cable

This test shall be performed on a sample of completed cable. The sample shall be bent around a test mandrel at room temperature for at least one turn. It shall then be unwound and the process shall be repeated after turning the cable sample around its axis by 180° . This process shall be repeated twice more. There shall be no signs of breaking or cracking of the cable insulation during this test.

The diameter of the mandrel shall be: $10(D+d)$

Where D = Actual diameter of the
cable (mm)

d = Actual diameter of the
conductor (mm)

15.7 Rejection and Retests

Should any one of the test pieces first selected fail to pass the tests, two further samples from the same batch shall be selected for testing, one of which shall be from the length from which the original test sample was taken unless the length has been withdrawn by the supplier.

Should the test pieces from both of these additional samples satisfy the requirements of the tests, the batch represented by these samples shall be deemed to comply with the standard. Should the test pieces from either of the two additional samples fail, the batch represented shall be deemed to have failed.

16.0 COMPLIANCE WITH SPECIFICATION:

The Aerial Bunched Cable shall comply in all respects with the requirements of this specification. However, any minor departure from the provisions of the specification shall be disclosed at the time of bidding in the Non-compliance Schedule of this document.

17.0 COMPLIANCE WITH REGULATIONS:

All the cables shall comply in all respects with the Indian Regulations and Acts in force. The cables and connections shall be designed and arranged to minimize the risk of fire and any damage, which might be caused in the event of fire.

18.0 NON-CONFORMING PRODUCT:

The Purchaser reserves the right for decisions regarding acceptance, modification or rejection of non-conforming items.

19.0 INSPECTION AND TESTING:

The Purchaser or his authorized representative has free entry at all times, while work on the contract is being performed, to all parts of the manufacturer's works which concerns the processing of the cables ordered. The manufacturer shall afford the purchaser or his authorized representatives without charge, all reasonable facilities to ensure that the cable being furnished is in accordance with these specifications.

The cables shall successfully pass all the routine tests & acceptance Tests referred to in the section on tests and those listed in the most recent edition of the standards given in the specification.

The Purchaser reserves the right to reject any of the cables if the test results do not comply with the values specified or with the date given in the Technical data schedule.

Type Test Certificates for the tests conducted earlier shall be submitted with the bid for evaluation. The requirements of additional type tests will be at the discretion of the Purchaser

The Purchaser shall witness routine tests .In order to facilitate this, the contractor shall give the purchaser of 15days notice that the material is ready for inspection & testing. The supplier shall extend all assistance to the representative of the Purchaser during his inspection & testing of samples at his works. The materials shall be dispatched only after approval of such Test Reports and issue of Dispatch clearance by the Purchaser. **However the Purchaser reserves the right to retest the materials after delivery at any NABL Accredited Testing Laboratory in case of any disputes regarding size & quality of supplied materials at a later date during guarantee period. The cost of such retesting shall be borne by the supplier.**

All costs in connection with the testing, including any necessary retesting shall be borne by the Contractor, who shall provide the Purchaser with all the test shall have the right to select the samples for test and shall also have the right to ensure that the testing apparatus is correct. Measuring apparatus for routine tests shall be calibrated at the expense of the contractor at an approved laboratory and shall be approved by the purchaser before testing.

The Contractor shall be responsible for the proper testing of the materials supplied by sub- Contractor to the same extent as if the materials were completed or supplied by the contractor.

Any cost incurred by the Purchaser in connection with inspection or retesting as a result of failure of the equipment under test or damaged during transport or off loading shall be to the account of the Contractor.

The Third Party Independent Evaluation Agency (TPIEA) if required may be engaged by TPNODL who shall have right to conduct pre & post despatch inspection jointly with TPNODL / independently of the equipment / materials procured by the Purchaser.

The Contractor shall submit to the Purchaser three signed copies of the test Certificates, giving the results of the tests as required. No materials shall be dispatched until the Purchaser has received the test certificate and the contractor has been informed that they are acceptable.

The test certificate must show the actual values obtained from the tests, in the units used in this specification, and must merely confirm that the requirements have been met.

In the case of components for which specific type tests or routine tests are not given in this specification, the Contractor shall include a list of the tests normally required for these components. All materials used in the Contract shall withstand and shall be certified to have satisfactorily passed such tests.

No inspection or lack of inspection or passing by the Purchaser's representative of equipment or materials whether supplied by the Contractor or sub- Contractor, shall relieve the contractor from his liability to complete the contract works in accordance with contract or exonerate him from any of his guarantees.

20.0 GUARANTEE:

The contractor shall guarantee the following:

- Quality and strength of materials used.
- Satisfactory operation during the guarantee period of **24 months** from the date of Commissioning or **30 months** from the date of receipt of the cables at TPNODL store whichever is earlier.
- Performance figures as supplied by the bidder in the technical data sheet.

21.0 PACKING AND SHIPPING:

The cable shall be wound on strong drums or reels capable of withstanding all normal transportation and handling.

Each length of cable shall be durably sealed before shipment to prevent ingress of moisture. The drums reels or coils shall be lagged or covered with suitable material to provide physical protection for the cable during transit or during storage and handling operations.

In the case of steel drums adequate precautions shall be taken to prevent damage being caused by direct contact between the cable sheath and the steel. These precautions shall be subject to the approval of the Purchaser.

If wooden drums are used then the wood shall be treated to prevent deterioration from

attack by termites and fungi.

Each drum or reel shall carry or be marked with following information:

- Individual serial number
- Standard ISI Mark, 14255-95,
- Manufacturer's B.I.S License No.
- Name of the Purchaser : TPNODL
- Destination
- Purchase Order No. & Date
- Manufacturer's name
- Year of manufacturing
- Cable size and type
- Length of conductor (meters)
- Net and Gross mass of conductor (Kg)
- All necessary slinging and stacking instructions
- Destination
- Country of origin

The direction of rolling as indicated by an arrow shall be marked on a flange.

22.0 STORAGE:

The site selected for the storage of cable drums shall be well drained and preferably have a concrete/ firm surface which will prevent the drums sinking into the ground or being subjected to excess water thus causing flange rot.

All drums shall stand on battens, in the upright position and in such a manner to allow sufficient space between them for adequate air circulation. During storage the drums shall be rotated 90⁰ every three months. In no instances shall be the drums be stored "flat" on their flanges or one on top of each other.

23.0 SHIPPING:

The Contractor shall be responsible for the shipping of all cables, drums and reels supplied from abroad to the ports of entry and for the transport of all goods to various specified destinations including customs clearance, off loading, warehousing and insurance.

The Contractor shall inform himself fully as to all relevant transport facilities and requirements and loading gauges and ensure that the equipment as packed for transport shall conform to these limitations.

The contractor shall also be responsible for verifying the access facilities specified.

The contractor shall be responsible for transportation of all the loads associated with the contract and shall take all reasonable steps to prevent damage of any highway or bridges by his vehicles by selecting routes, choosing proper vehicles for use and restricting and distributing loads to avoid the risk of damage. The Contractor shall immediately report to the Purchaser any claims made against the contractor arising out of alleged damage to a

highway or bridge.

All items of equipments shall be securely clamped against movement to ensure safe transit from the manufacturer's facilities to the specified destinations.

24.0 HAZARDOUS SUBSTANCES:

The Contractor shall submit safety data sheets for all hazardous substance used with the equipment. The contractor shall give an assurance that there are no other substances classified as hazardous in the equipment supplied. He shall also take responsibility for the disposal of such hazardous substances that may be found for any injuries resulting from those substances.

25.0 SUBMITTALS:

The following shall be required in duplicate along with the bid:

- Completed technical data sheets;
- Descriptive literature giving full technical details of equipment offered.
- Outline dimension drawing for each type of conductor, for each bundle showing the conductor strand, composition and the bundle twist;
- Type test certificates, where available, and sample routine test reports;
- Detailed reference list of customers already using equipment offered during the last five years with particular emphasis on units of similar design and rating;
- Performance reports from the customers for the supplied LT XLPE AB Cables.
- Details of manufacturer's quality assurance standards and programme and ISO 9000 series or equivalent national certificates;
- Deviations from this specification to be submitted as per Non-Compliance. Only deviations approved in writing before award of contract shall be accepted;
- List of recommended spare parts for five years of operation with prices and spare parts catalogue with price list for future requirements.
- Any other documents to establish qualifying & credibility requirements as specified in this Tender Document.

26.0 PERMANENT EMBOSSING:

All materials supplied under this tender shall bear distinct mark of 'TPNODL, and Purchase Order No. & Date, Size of cable, length marking, voltage grade, Manufacturer, Trade mark, ISI mark, Phase marking, MR Work' by way of embossing /enamel painting etc. including other information mentioned in GTP. This should be clearly visible to naked eye.

GUARANTEED TECHNICAL PARTICULARS FOR 1x35+1x25 mm² LT XLPE AB CABLES

Sl.No	Description	Requirement	Bidders' Offer
	AB Cable	1X 35 + 1X25mm²	
1.	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV	
2.	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS8130/84 / XLPE insulation (IS 14255/95)	
3.	Material of Neutral Catenary	Aluminum alloy as per IS 398 Pt	
4.	Voltage Class	0.65/1.1 KV	
5.	No. of Strands of Phase conductor	7	
6.	No. of strands/ Average Strand Dia. in mm. (Finished Phase conductor.)	7/2.54	
7.	Minimum Overall Dia. of compacted phase conductor after removal of insulation. (in mm.)	7.62	
8.	No. of Strands / Average Strand Dia. in mm. (Neutral Catenary.)	7/2.14	
9.	Minimum Overall Dia. Of compacted Bare Neutral Catenary (in mm.)	6.42	
10.	Minimum average thickness of insulation of phase Cond. (mm)	1.2	
11.	Minimum thickness of insulation of Phase Cond. at any point (mm)	0.98	
12.	Maximum DC resistance of Phase conductor at 20 o C ohm/ KM	0.868	
13.	Maximum DC resistance of Neutral conductor ohm/ KM	1.38	
14	Ultimate tensile strength of neutral conductor(KN)	7	
15	Maximum temperature(Continuous)	90°C for phase and 75 °C for neutral	
16	on insulation at each one meter interval	Distinct Non-erasable ISI Mark, IS 14255-95, Manufacturer's B.I.S License No., Name of the Purchaser, Name of the manufacturer, Size of cable, voltage Grade along with sequential marking of length.	
17	Cable drum length	1000/2000m	
18	Volume Resistivity of insulation at 27°C	1X10 ¹³ Ω– cm min.	
19	Volume Resistivity of insulation at 70°C	1X10 ¹¹ Ω– cm min.	

N.B:

- 1) For values not available in relevant ISS, values indicated in our GTP/ Tender Specification shall be valid.
- 2) In case of discrepancies between values of ISS & GTP, better will prevail.

3) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.

Signature of the Bidder with Seal

GUARANTEED TECHNICAL PARTICULARS FOR 3X35+1X25 MM² LT XLPE AB CABLE.

Sl No	Description	Specified	Bidder's Offer
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV	
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation (IS 14255/95)	
3	Material of Neutral Catenary	Aluminum alloy as per IS 398 Pt - IV	
4	Voltage Class	0.65/1.1 KV	
5	No. of Strands of Phase Conductor	7	
6	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	7/2.54	
7	Approximate Overall Dia. Of compacted phase conductor after removal of insulation.(in mm.)	7.62	
8	No. of Strands / Average Strand Dia. In mm.	7/2.14	
9	Minimum Overall Dia. Of compacted Bare Neutral Catenary .(in mm.)	6.42	
10	Minimum average thickness of insulation of phase Cond. (mm)	1.2	
11	Minimum thickness of insulation of Phase Cond. At any point (mm)	0.98	
12	Maximum DC resistance of Phase conductor at 20 °C	0.868	
13	Maximum DC resistance of neutral cond. Ω / Km	1.38	
14	Ultimate tensile strength of neutral conductor	7	
15	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral	
16	Embossing on insulation at each one meter interval	Distinct Non-erasable ISI Mark, IS 14255-95, Manufacturer's B.I.S License No., Name of the Purchaser, Name of the manufacturer, Size of cable, voltage Grade along with sequential marking of length, Phase identification mark,	
17	Cable drum length	500 / 1000m	
18	Volume Resistivity of insulation at 27°C	1X10 ¹³ Ω - cm min.	

19	Volume Resistivity of insulation at 70°C	1X10 ¹¹ Ω - cm min.	
----	--	--------------------------------	--

N.B:

- 1) For values not available in relevant ISS, values indicated in our GTP/ Tender Specification shall be valid.
- 2) In case of discrepancies between values of ISS & GTP, better will prevail.
- 3) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.

Signature of the Bidder with Seal

GUARANTEED TECHNICAL PARTICULARS FOR 3X35+1X25 +1x16 MM² LT XLPE AB CABLE.

Sl No	Description	Specified	Bidder's Offer
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV	
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation (IS 14255/95)	
3	Material of Neutral Catenary	Aluminum alloy as per IS 398 Pt - IV	
4	Voltage Class	0.65/1.1 KV	
5	No. of Strands of Phase Conductor	7	
6	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	7/2.54	
7	Approximate Overall Dia. Of compacted phase conductor after removal of	7.62	
8	No. of Strands / Average Strand Dia. In mm.	7/2.14	
9	Minimum Overall Dia. Of compacted Bare Neutral Catenary .(in mm.)	6.42	
10	No. of Strands / Average strand dia. / Overall dia./Nominal cross sectional area of conducting	7 /1.75/5.25 / 16mm ²	
11	Minimum average thickness of insulation of phase Cond. (mm)	1.2	
12	Minimum thickness of insulation of Phase Cond. At any point (mm)	0.98	
13	Minimum thickness of insulation at any point in street light conductor (mm)	0.98	
14	Maximum DC resistance of Phase conductor at 20 ° C	0.868	
15	Maximum DC resistance of street light conductor Ω /Km	1.91	
16	Maximum DC resistance of neutral cond. Ω / Km	1.38	

17	Ultimate tensile strength of neutral conductor	7	
18	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral	
19	Embossing on insulation at each one meter interval	Distinct Non-erasable ISI Mark, IS 14255-95, Manufacturer's B.I.S License No., Name of the Purchaser, Name of the manufacturer, Size of cable, voltage Grade along with sequential marking of length, Phase identification mark.	
20	Cable drum length	500 / 1000m	
21	Volume Resistivity of insulation at 27°C	1X10 ¹³ Ω - cm min.	
22	Volume Resistivity of insulation at 70°C	1X10 ¹¹ Ω - cm min.	

N.B:

- 1) For values not available in relevant ISS, values indicated in our GTP/ Tender Specification shall be valid.
- 2) In case of discrepancies between values of ISS & GTP, better will prevail.
- 3) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.

Signature of the Bidder with Seal

GUARANTEED TECHNICAL PARTICULARS FOR 3X50+1X35 MM² LT XLPE AB CABLE.

SI No	Description	Specified	Bidder's Offer
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV	
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation (IS 14255/95)	
3	Material of Neutral Catenary	Aluminum alloy as per IS 398 Pt - IV	
4	Voltage Class	0.65/1.1 KV	
5	No. of Strands of Phase Conductor	7	
6	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase	7/3.05	
7	Approximate Overall Dia. Of compacted phase conductor after removal of	9.15	
8	No. Of Strands / Average Strand Dia. In mm.	7/2.54	
9	Minimum Overall Dia. Of compacted Bare Neutral Catenary .(in mm.)	7.62	

10	Minimum average thickness of insulation of phase Cond. (mm)	1.5	
11	Minimum thickness of insulation of Phase Cond. At any point (mm)	1.25	
12	Maximum DC resistance of Phase conductor at 20 ° C	0.64	
13	Maximum DC resistance of neutral cond. Ω	0.986	
14	Ultimate tensile strength of neutral	10.8	
15	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral	
16	Embossing on insulation at each one meter interval	Distinct Non-erasable ISI Mark, IS 14255-95, Manufacturer's B.I.S License No., Name of the Purchaser, Name of the manufacturer, Size of cable, voltage Grade along with sequential marking of length, Phase identification mark.	
17	Cable drum length	500 / 1000m	
18	Volume Resistivity of insulation at 27°C	$1 \times 10^{13} \Omega$ - cm min.	
19	Volume Resistivity of insulation at 70°C	$1 \times 10^{11} \Omega$ - cm min.	

N.B:

- 1) For values not available in relevant ISS, values indicated in our GTP/ Tender Specification shall be valid.
- 2) In case of discrepancies between values of ISS & GTP, better will prevail.
- 3) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.

Signature of the Bidder with Seal

GUARANTEED TECHNICAL PARTICULARS FOR 3X50+1X35+1X16 MM² LT XLPE AB CABLE.

SI No	Description	Specified	Bidder's Offer
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV	
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation (IS 14255/95)	
3	Material of Neutral Catenary	Aluminum alloy as per IS 398 Part IV	
4	Voltage Class	0.65/1.1 KV	
5	No. of Strands of Phase Conductor	7	
6	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	7/3.05	
7	Approximate Overall Dia. Of compacted phase conductor after removal of insulation.(in mm.)	9.15	

8	No. Of Strands / Average Strand Dia. In mm. (Neutral Catenary.)	7/2.54	
9	Minimum Overall Dia. of compacted Bare Neutral Catenary .(in mm.)	7.62	
10	No. of Strands / Average strand dia. / Overall dia./Nominal cross sectional area of conducting part In No / mm/mm ² . St. Light Conductor)	7 /1.75/5.25 / 16mm ²	
11	Minimum average thickness of insulation of phase Cond. (mm)	1.5	
12	Minimum thickness of insulation of Phase Cond. At any point (mm)	1.25	
13	Minimum thickness of insulation at any point in street light conductor (mm)	0.98	
14	Maximum DC resistance of Phase conductor at 20 °C ohm/ KM	0.64	
15	Maximum DC resistance of street light conductor Ω /Km	1.91	
16	Maximum DC resistance of neutral cond. Ω / Km	0.986	
17	Ultimate tensile strength of neutral conductor (KN)	10.8	
18	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral	
19	Embossing on insulation at each one meter interval	Distinct Non-erasable ISI Mark, IS 14255-95, Manufacturer's B.I.S License No., Name of the Purchaser, Name of the manufacturer, Size of cable, Phase identification, voltage Grade along with sequential marking of length..	
20	Cable drum length	500 / 1000m	
21	Volume Resistivity of insulation at 27°C	1X10 ¹³ Ω - cm min.	
22	Volume Resistivity of insulation at 70°C	1X10 ¹¹ Ω - cm min.	

NB:

- 1) In case of discrepancies between values of ISS & GTP, better will prevail.
- 2) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.

Signature of the bidder with Seal

GUARANTEED TECHNICAL PARTICULARS FOR 3X95+1X70+1X16 MM² LT XLPE AB CABLE.

SI No	Description	Specified	Bidder's Offer
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV	
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation (IS 14255/95)	
3	Material of Neutral Catenary	Aluminum alloy as per IS 398 Pt - IV	
4	Voltage Class	0.65/1.1 KV	
5	No. of Strands of Phase Conductor	19	
6	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	19/2.54	
7	Approximate Overall Dia. Of compacted phase conductor after removal of	12.7	
8	No. Of Strands / Average Strand Dia. In mm. (Neutral Catenary.)	7/3.6	
9	Minimum Overall Dia. of compacted Bare Neutral Catenary .(in mm.)	10.8	
10	No. of Strands / Average strand dia. / Overall dia./Nominal cross sectional area of conducting part In No / mm/mm ² . St. Light	7 /1.75/5.25 / 16mm ²	
11	Minimum average thickness of insulation of phase Cond. (mm)	1.5	
12	Minimum thickness of insulation of Phase Cond. At any point (mm)	1.25	
13	Minimum thickness of insulation at any point in street light conductor (mm)	0.98	
14	Maximum DC resistance of Phase conductor at 20 °C ohm/ KM	0.32	
15	Maximum DC resistance of street light conductor Ω /Km	1.91	
16	Maximum DC resistance of neutral cond. Ω / Km	0.44	
17	Ultimate tensile strength of neutral conductor (KN)	21.5	
18	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral	
19	Embossing on insulation at each one meter interval	Distinct Non-erasable ISI Mark, IS 14255-95, Manufacturer's B.I.S License No., Name of the Purchaser, Name of the manufacturer, Size of cable, Phase identification, voltage Grade along with sequential marking of length.	
20	Cable drum length	500 m	
21	Volume Resistivity of insulation at 27°C	1X10 ¹³ Ω - cm min.	
22	Volume Resistivity of insulation at 70°C	1X10 ¹¹ Ω - cm min.	

NB:

- 1) In case of discrepancies between values of ISS & GTP, better will prevail.
- 2) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.

Signature of the bidder with Seal

CONFIDENTIAL

TECHNICAL SPECIFICATION OF 55/80/100/232 MM² ALL ALUMINIUM ALLOY CONDUCTOR (AAAC)

1. SCOPE

This specification covers design, Engineering, Manufacture, Testing, Inspection before dispatch, forwarding, packing, transportation to sites, Insurance (both during transit & storage), storage, erection, supervision testing & commissioning of all sizes of All Aluminum Alloy Conductors of the aluminum – magnesium- silicon type for use in the distribution overhead power lines of TPNODL.

The equipment offered shall have been successfully type testes and the design shall have been satisfactory operation for a period not less than five years on the date of bid opening. Compliance shall be demonstrated by submitting with the bid, (i) authenticated copies of the type test reports and (ii) performance certificates from the users.

The scope of supply includes the provision of type test, Rates of type tests shall be given in the appropriate price schedule of the bidding document and will be considered for evaluation. The Purchaser reserves the right to waive type tests as indicated in the section on Quality Assurance, Inspection and Testing in the specification.

The Aluminum Alloy Conductor shall conform in all respects to 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.

STANDARDS

Except where modified by the specification, the Aluminum Alloy Conductor shall be designed, manufactured and tested in accordance with latest editions of the following standards.

IEC/ISO/ Other International Standard	IS	Subject
IEC :1089		Round wire concentric lay overhead electrical standard conductors
	IS 398	Aluminum Alloy Stranded Conductors
	IS 9997	Aluminum Alloy redraw rods for electrical purposes
IEC 502 : 1994		Extruded solid dielectric insulated power cables for rated voltages 1.0 KV up to 30 KV
IEC 104		Aluminum Magnesium Silicon alloy wire for overhead
	IS 1778	line conductors Reels and drums of bare conductor.
BS : 6485-1971		PVC covered conductors for overhead power lines.

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

3. GENERAL

The wires shall be of heat treated aluminum, magnesium silicon alloy containing approximately silicon-0.5 to 0.9 %, magnesium-0.6 % to 0.9%, Fe-0.5% (maximum) , Copper- 0.1% (max), mn- 0.03% , Cr-0.03%, Zn-0.1%, B-0.06%, and having the mechanical and electrical properties specified in the table and be smooth and free from all imperfections, such as, spills, splits and scratches.

Neutral grease shall be applied between the layers of wires. The drop point temperature of the grease shall not be less than 120⁰ C.

3.1 Mechanical and Electrical Characteristics of Aluminium Alloy Wires used in the Construction of Stranded Aluminium Alloy Conductors

Nominal Diameter	Minimum Diameter	Max. Diameter	Cross Sectional Area	Mass	Minimum Breaking Load		Maximum Resistance at 20 ⁰ C
					Before stranding	After stranding	
1	2	3	4	5	6	7	8
mm	mm	mm	mm ²	Kg/km	KN	KN	ohms/ km
3.15	3.12	3.18	7.793	21.04	2.37	2.29	4.290
3.81	3.77	3.85	11.40	30.78	3.52	3.34	2.938
4.26	4.22	4.30	14.25	38.48	4.40	4.18	2.345

Maximum resistance values given in column 8 have been calculated from the maximum values of the resistivity as specified and the cross sectional area based on the minimum diameter.

The minimum breaking load is calculated on nominal diameter at ultimate tensile strength of 0.309 KN / mm² for wire before stranding and 95% of the ultimate tensile strength after stranding.

4. PHYSICAL CONSTANTS FOR ALUMINIUM ALLOY WIRES

4.1 Resistivity:

For the purpose of this specification, the standard value of resistivity of aluminum alloy wire which shall be used for calculation is to be taken as 0.0325 ohm mm² /m at 20⁰ C. the maximum value of resistivity of any single wire shall not , however, exceed 0.0328 ohm. mm²/m at 20⁰ C.

4.2 Density :

At a temperature of 20⁰ C, the density of aluminum alloy wire is to be taken as 2700 kg/m³.

4.3 Temperature Coefficient of Linear Expansion :

The temperature coefficient of linear expansion of aluminum alloy wire is to be taken as 23x10⁻⁶/⁰C

4.4 Constant – Mass Temperature Coefficient

At a Temperature of 20⁰ C, the constant – mass temperature coefficient of resistance of aluminum alloy wires, measured between two potential points rigidly fixed to the wire, is taken as 0.00360/⁰ C

5. STANDARD SIZES

5.1 Nominal Sizes of Wires

The aluminum alloy wires for standard constructions covered by this specification shall have the diameters as specified in the table and a tolerance of $\pm 1\%$ shall be permitted on the nominal diameter.

5.2 Standard Conductors

The sizes, resistance and masses (excluding the mass of grease) of stranded aluminum alloy conductors shall be as given in table.

5.3 Mechanical and Electrical Characteristics of Aluminum Alloy Stranded Conductors

Sl. No.	Actual Area	Stranding and Wire Dia	Approx. Overall Dia	Approx. Mass	Calculated Maximum Resistance at 20 ⁰ C	Approx Calculated Breaking Load
1	2	3	4	5	6	7
	mm ²	mm	mm	kg/km	ohms/km	KN
1	55	7/3.15	9.45	149.20	0.621	16.044
2	80	7/3.81	11.43	218.26	0.425	23.41
3	100	7/4.26	12.78	272.86	0.339	29.344
4	232	19/3.94	19.70	636.67	0.1471	68.05

5.3.1 Increase in Length due to Stranding

When straightened out, each wire in any particular layer of a stranded conductor, except the central wire, is longer than the stranded conductor by an amount depending on the lay ratio of that layer.

5.3.2 Resistance and Mass of Conductor

The resistance of any length of stranded conductor is the resistance of the same length of any one wire multiplied by a constant as set out in the table below.

The mass of each wire in any particular layer of the stranded conductor, except the central wire, will be greater than that of an equal length of straight wire by an amount depending on the lay ratio of that layer. The total mass of any length of an aluminum stranded conductor is, therefore, obtained by multiplying the mass of an equal length of straight wire by an appropriate constant as mentioned below. In calculating the stranding constants as mentioned in the table below, the mean lay ratio, that is the arithmetic mean of the relevant minimum and maximum values in table for lay ratio has been assumed for each layer.

5.3.3 Calculated Breaking Load of Conductor

- For a conductor containing not more than 37 wires, 95% of the sum of strength of the individual wires calculated from the values of the minimum breaking load

given in this specification.

- For a conductor containing more than 37 wires, 90% of the sum of the strengths of the individual wire calculated from the values of the minimum breaking load given in this specification.

5.3.4 Calculated Area and Maximum Resistance of Conductor

The actual area of a stranded conductor has been taken as the sum of the cross-sectional areas of the individual wires of nominal diameter.

Maximum resistance values of stranded conductor have been calculated on the basis of maximum resistivity and the cross-sectional area based on the minimum diameter of wires.

5.3.5 Stranding Constants

Number of Wires in Conductor	Stranding Constants	
	Mass	Electrical Resistance
(1)	(2)	(3)
7	7.091	0.1447
19	19.34	0.05357

6. JOINTS IN WIRES

6.1 Conductor containing seven wires

There shall be no joint in any wire of a stranded conductor containing seven wires, except those made in the base rod or wire before final drawing.

6.2 Conductors containing more than seven wires

In stranded conductors containing more than seven wires, joints in individual wires are permitted in any layer except the outermost layer (in addition to those made in the base rod or wire before final drawing) but no two such joints shall be less than 15 m apart in the complete stranded conductor. Such joints shall be made by cold pressure butt welding. They are not required to fulfill the mechanical requirements for unjointed wires.

6.2 Conductors containing more than seven wires

In stranded conductors containing more than seven wires, joints in individual wires are permitted in any layer except the outermost layer (in addition to those made in the base rod or wire before final drawing) but no two such joints shall be less than 15 m apart in the complete stranded conductor. Such joints shall be made by cold pressure butt welding. They are not required to fulfill the mechanical requirements for unjointed wires.

7. STRANDING

The wire used in the construction of a stranded conductor shall, before and after stranding, satisfy all the relevant requirements of this standard.

The lay ratio of the different layers shall be within the limits given in the table for lay ratio.

In all constructions, the successive layers shall have opposite directions of lay, the

outermost layer being righ-handed. The wires in each layer shall be evenly and closely stranded.

Unless otherwise agreed between the Employer and the Contractor, stranded aluminum alloy conductors shall be supplied in the manufacturer's usual production lengths to be indicated in the bid Schedule. The Employer reserves the right to specify particular lengths of conductor such that certain drum lengths will be shorter than others. There will in both cases be a permitted variation of $-0 + 5\%$ in the length of any one conductor length.

8. LENGTHS AND VARIATIONS IN LENGTHS : Unless otherwise agreed

9. TESTS

9.1 Type Tests

The following tests shall be carried out as per relevant ISS once on samples of completed line conductor during each production run of up to 500 kms of the conductor from each manufacturing facility.

9.1.1 Ultimate Tensile Strength Test

This test is intended to confirm not only the breaking strength of the finished conductor but also that the conductor has been uniformly stranded.

A conductor sample of minimum 5 m length fitted with compression dead end clamps at either end shall be mounted in a suitable tensile test machine. Circles perpendicular to the axis of the conductor shall be marked at two places on its surface. Tension on the conductor sample shall be increased at a steady rate upto 50% of the minimum UTS specified and held for one minute. The circles drawn shall not be distorted due to relative movement of the individual strands. Thereafter the load shall be increased at a steady rate to the specified minimum UTS and held at that load for one minute. The conductor sample shall not fail during this period. The applied load shall then be increased until the failing load is reached and the value recorded.

9.1.2 D.C Resistance Test On a conductor sample of minimum 5 m length two contact clamps shall be fitted with a pre-determined bolt torque. The resistance between the clamps shall be measured using a Kelvin double bridge by initially placing the clamps at zero separation and subsequently one meter apart. The test shall be repeated at least five times and the average value recorded. The value obtained shall be corrected to the value at 20^0 C, which shall conform to the requirements of this specification.

9.2 Routine Tests

Measurement of Physical Dimensions: The samples should meet the desired dimensional requirements before conducting following Routine Tests as per relevant ISS.

9.2.1 Selection of Test Samples

Samples for the tests specified in this specification shall be taken by the manufacturer before stranding, from not less than 10% of the individual

lengths of aluminium alloy wire included in any one final heat-treatment batch and which will be included in any one consignment of the stranded conductors to be supplied.

Alternatively, if desired by TPNODL at the time of placing an order, that the tests be made in the presence of his representative, samples of wire shall be taken from length of stranded conductor.

Samples shall then be obtained by cutting 1.2 meters from the outer end of the finished conductor from not more than 10% of the finished reels or drums.

Tests for electrical and mechanical properties of aluminum alloy wire shall ordinarily be made before stranding since wires unlaidd from conductors may have different physical properties from those of the wire prior to stranding because of the deformation brought about by stranding and by straightening for test.

Spools offered for inspection shall be divided into equal lots, the number of lots being equal to the number of samples to be selected, a fraction of a lot being counted as a complete lot. One sample spool shall be selected at random from each lot.

The following test shall be carried out once on samples of completed line conductor during each production run of up to 500 kms of the conductor from each manufacturing facility.

9.2.2 Breaking Load Test

The breaking load of one specimen, cut from each of the samples taken shall be determined by means of a suitable tensile testing machine. The load shall be applied gradually and the rate of separation of the jaws of the testing machine shall be not less than 25 mm / min and not greater than 100mm /min.

9.2.3 Elongation Test

The elongation of one specimen cut from each of the samples taken shall be determined as follows:

The specimen shall be straightened by hand and an original gauge length of 200 mm shall be marked on the wire. A tensile load shall be applied as described above and the elongation shall be measured after the fractured ends have been fitted together. If the fracture occurs outside the gauge marks, or within 25 mm of either mark, and the required elongation is not obtained, the test shall be disregarded and another test should be made.

When tested before and after stranding, the elongation shall not be less than 4% on a gauge length of 200 mm.

9.2.4 D.C Resistance Test

The electrical resistance test of one specimen cut from each of the samples taken shall be measured at ambient temperature. The measured resistance shall be corrected to the value at 20⁰ C by means of the formula :

$$R_{20} = R_T \left[\frac{1}{1 + \alpha (T-20)} \right]$$

where ,

R₂₀ = resistance corrected at 20⁰ C

R_T = resistance measured T⁰C

α = constant – mass temperature coefficient of resistance, 0.0036, and

T = ambient temperature during measurement.

The resistance corrected at 20⁰ C shall not be more than the maximum values specified.

9.2.5 Chemical Analysis of Aluminum Alloy

Samples taken from the alloy coils / strands shall be chemically / spectrographically analyzed. The results shall conform to the requirements stated in this specification. The contractor shall make available material analyses, control documents and certificates from each batch as and when required by the **Purchaser**.

Test should be conducted at the independent test house by the purchaser in the case of absence Of facility at manufacturer. However the cost of such testing shall be borne by the manufacturer.

9.2.6 Dimensional and Lay Length Check

The individual strands of the conductors shall be dimensionally checked and the lay lengths checked to ensure that they conform to the requirements of this specification.

Ten percent drums from each lot shall be rewound in the presence of the Purchaser or his representative to allow visual checking of the conductor for joints, scratches or other surface imperfections and to ensure that the conductor generally conforms to the requirements this specification. The length of conductor wound on the drum shall be re-measured by means of an approved counter / meter during the rewinding process.

9.2.7 Visual and dimensional Checks on the Conductor Drums.

The drums shall be visually and dimensionally checked to ensure that they conform to the requirements of this specification and of IS 1778: Specification for reels and drums of bare conductors. For wooden drums, a suitable barrel batten strength test procedure is required. The Bidder shall state in his bid the tests to be carried out on the drums and shall include those tests in the Quality Assurance Programme.

9.2.8 Acceptance Tests :

All tests required to confirm enclosed Guaranteed Technical Particulars (GTP) requirements of this specification needs to be conducted as Acceptance Tests.

9.3 Test Reports.

- a) Copies of type test reports shall be furnished in at least six copies along with one original. One copy will be returned duly certified by the Owner only after which the commercial production of the material shall start.
- b) Record of routine test reports shall be maintained by the Supplier at his works for periodic inspection by the Owner's representative.
- c) Test certificate of tests during manufacture shall be maintained by the Contractor. These shall be produced for verification as and when desired by the Owner.

10. Guarantee: The bidder shall confirm for guarantee towards design, material, workmanship & quality of process/ manufacturing for integrated product delivered under the contract.

In the event any defect is found by TPNODL , up to a period of at least 24 months from the date of commissioning or 30 months from the date of last supplies made under the contract whichever is earlier , bidder shall be liable to undertake to replace / rectify such defect at its own costs, within mutually agreed time frame, and to the entire satisfaction of TPNODL, failing which TPNODL will be at liberty to get it replaced/ rectified at Bidder's risk and costs and recovery all such expenses plus the TPNODL's own charges (@20% of expenses incurred) , from the Bidder of from 'Security cum Performance Deposit' as the case may be.

Free Replacement: 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 TPNODL..

11. Packing.

- a) The conductor shall be supplied in returnable, strong, wooden drums provided with lagging of adequate strength, constructed to protect the conductor against any damage and displacement during transit, storage and subsequent handling and stringing operations in the field. The Contractor shall be responsible for any loss or damage during transportation handling and storage due to improper packing. The drums shall generally conform to IS: 1778-1980, except as otherwise specified hereinafter.

- b) The drums shall be suitable for wheel mounting and for letting off the conductor under a minimum controlled tension of the order of 5 KN.
- c) The Contractor should submit their proposed drum drawings along with the bid.
- d) The Contractor may offer more than one length of the conductor in a single drum.
- e) All wooden components shall be manufactured out of seasoned soft wood free from defects that may materially weaken the component parts of the drums. Preservative treatment shall be applied to the entire drum with preservatives of a quality, which is not harmful to the conductor.
- f) The flanges shall be of two ply construction with a total thickness of 64 mm with each ply at right angles to the adjacent ply and nailed together. The nails shall be driven from the inside face flange, punched and then clenched on the outer face. Flange boards shall not be less than the nominal thickness by more than 2mm. There shall not be less than 2 nails per board in each circle. Where a slot is cut in the flange to receive the inner end of the conductor the entrance shall be in line with the periphery of the barrel.
- g) The wooden battens used for making the barrel of the conductor shall be of segmental type. These shall be nailed to the barrel supports with at least two nails. The batten shall be closely butted and shall provide a round barrel with smooth external surface. The edges of the battens shall be rounded or chamfered to avoid damage to the conductor.
- h) Barrel studs shall be used for the construction of drums. The flanges shall be holed and the barrel supports slotted to receive them. The barrel studs shall be treaded over a length on either end, sufficient to accommodate washers, spindle plates and nuts for fixing flanges at the required spacing.
- i) Normally, the nuts on the studs shall stand protruded of the flanges. All the nails used on the inner surface of the flanges and the drum barrel shall be counter sunk. The ends of barrel shall generally be flushed with the top of the nuts.
- j) The inner cheek of the flanges and drum barrel surface shall be painted with bitumen based paint.
- k) Before reeling, card board or double corrugated or thick bituminous water proof bamboo paper shall be secured to the drum barrel and inside of flanges of the drum by means of a suitable commercial adhesive material. The paper should be dried before use. After reeling the conductor, the exposed surface of the outer layer of conductor shall be wrapped with water proof thick bituminous bamboo paper to preserve the conductor from dirt, grit and damage during transport and handling.
- l) A minimum space of 75 mm for conductor shall be provided between the inner surface of the external protective lagging and outer layer of the conductor. Outside the protective lagging, there shall be minimum of two binders consisting of hoop iron/galvanized steel wire. Each protective lagging shall have tow recesses to accommodate the binders.
- m) Each batten shall be securely nailed across grains as far as possible to the flange, edges with at least 2 nails per end. The length of the nails shall not be less than twice the thickness of the battens. The nails shall not protrude above the general surface and shall not have exposes sharp, edges or allow the battens to be released due to corrosion.
- n) The nuts on the barrel studs shall be tack welded on the one side in order to fully secure them. On the second end, a spring washer shall be used.

- o) A steel collar shall be used to secure all barrel studs. This collar shall be located between the washers and the steel drum and secured to the central steel plate by welding.
- p) Outside the protective lagging, there shall be minimum of two binders consisting of plain/ galvanized steel wire. Each protective lagging shall have two recesses to accommodate the binders.
- q) The conductor ends shall be properly sealed and secured with the help of U-nail on the side of one of the flanges to avoid loosening of the conductor layers during transit and handling.
- r) As an alternative to wooden drum Contractor may also supply the conductors in non- returnable painted steel drums. After preparation of steel surface according to IS: 9954, synthetic enamel paint shall be applied after application of one coat of primer. Wooden/Steel drum will be treated at par for evaluation purpose and accordingly the Contractor should quote in the package.

11.0 Marking.

Each drum shall have the following information stenciled on it in indelible ink along with other essential data:

- (a) Contract/Award letter number
- (b) Name and address of consignee.
- (c) Manufacturer's name and address.
- (d) Drum and lot number
- (e) Size and type of conductor
- (f) Length of conductor in meters
- (g) Arrow marking for unwinding
- (h) Position of the conductor
- (i) Number of turns in the outer most layer.
- (j) Gross weight of the drum after putting lagging.
- (k) Average weight of the drum without lagging.
- (l) Net weight of the conductor in the drum
- (m) Month and year of manufacture of conductor

The above should be indicated in the packing list also.

12.0 Verification Conductor Length

The Owner reserves the right to verify the length of conductor after unreeling at least five (5) percent of the drums in a lot offered for inspection. For the balance drums, length verification shall be done by the owner based on report/certification from Manufacturer/ Contractor.

13.0 REJECTION AND RETESTS

13.1 Type Tests

Should the conductor fail any of the type tests specified above, the Purchaser will not accept any conductor manufactured from the material, nor conductor

made by the manufacturing methods used for the conductor which failed the test.

The manufacturer shall propose suitable modifications to his materials and techniques in order that he can produce conductor which will satisfactorily pass the type test requirements.

13.2 Routine Tests

Should any one of the test pieces first selected fail the requirements of the tests, two further samples from the same batch shall be selected for testings, one of which shall be from the length from which the original test sample was taken unless that length has been withdrawn by the manufacturer.

Should the test pieces from both these additional samples satisfy the requirements of the tests, the batch represented by these samples shall be deemed to comply with the standard. Should the test pieces from either of the two additional samples fail, the batch represented shall be deemed not to comply with the standard.

If checks on individual strand diameters, conductor lay lengths and conductor surface condition indicate non-compliance with the requirements of the specification, the particular drum will be rejected. Inspection will then be carried out on two further drums within the same batch. If the conductor on either of the drums is non-complaint, the complete batch will be rejected.

GURANTEED TECHNICAL PARTICULARS FOR 55 MM² ALL ALUMINIUM ALLOY CONDUCTOR

Sl. No.	Particulars	Specified Requirement	Details furnished by the bidder
1	Nominal Aluminium Alloy area of conductor in Sq.mm	: 55	
2	No. of stands	: 7	
3	Wire dia. in mm		
	i. Nominal	: 3.15	
	ii. Minimum	: 3.12	
	iii. Maximum	: 3.18	
4	Approximate Over all diameter of conductor in mm	: 9.45	
5	Cross sectional area in Sq.mm		
	i. Individual wire	: 7.793	
	ii. Standard Conductor	: 55	
6	Minimum breaking load in KN		
	i. Individual wire	: 2.37	
	ii. Standard Conductor (U.T.S)	: 16.044	
7	Approximate mass in Kg. Per Km of Aluminium Alloy conductor		
	i. Individual wire	: 21.04	
	ii. Standard Conductor	: 149.2	
8	Calculated maximum DC resistance at 20 ⁰ C in Ohm/Km		
	i. Individual wire	: 4.29	
	ii. Standard Conductor	: 0.621	
13	Modulus of Elasticity of Aluminium Alloy conductor Kg/Sq.mm	: To be specified by bidder	
14	Co-efficient of linear expansion per degree centigrade for		
	i. Individual ⁰ C	: 23x10 ⁻⁶	
	ii. Standard conductor/ ⁰ C		
15	Standard length (Mtr.)	: 2000 ±5%	
16	Lay ratio for 7 wire conductor	Min Max	
		: To be specified by bidder	
17	Direction of Lay	: Right hand	
18	Standard according to which the conductor will be manufactured and tested	: IS : 398 (Part-4) – 1994	
19	Size of the drum in mm (as per IS-1778/80 with Amendment I /1989	: To be offered by the Bidder	
20	Length of conductor in each drum in Km	: To be offered by the Bidder	

Bidders Signature with Seal

GURANTEED TECHNICAL PARTICULARS
FOR 80 MM² ALL ALUMINIUM ALLOY CONDUCTOR

Sl. No.	Particulars		Specified Requirement	Details furnished by the bidder
1.	Nominal Aluminium Alloy area of conductor in Sq.mm	:	80	
2.	No. of stands	:	7	
3.	Wire dia. in mm			
	a) Nominal	:	3.81	
	b) Minimum	:	3.77	
	c) Maximum	:	3.85	
4.	Approximate Over all diameter of conductor in mm	:	11.43	
5.	Cross sectional area in Sq.mm			
	i) Individual wire	:	11.40	
	ii) Standard Conductor	:	80	
6.	Minimum breaking load in KN			
	i) Individual wire	:	3.52	
	ii) Standard Conductor (U.T.S)	:	23.41	
7.	Approximate mass in Kg. Per KM of Aluminium Alloy conductor			
	i) Individual wire	:	30.78	
	ii) Standard Conductor	:	218.26	
8.	Calculated maximum DC resistance at 20 ⁰ C in Ohm/Km			
	i) Individual wire	:	3.34	
	ii) Standard Conductor	:	0.4250	
13.	Modulus of Elasticity of Aluminium Alloy conductor Kg/Sq.mm	:		
16.	Co-efficient of linear expansion per		23×10^{-6}	

	degree centigrade for	:		
	a) Individual $^{\circ}\text{C}$:		
	b) Standard conductor $^{\circ}\text{C}$:		
17.	Standard length (Mtr.)	:	2000 \pm 5%	
18.	Lay ratio for 7 wire conductor	:	Min Max To be specified by bidder	
19.	Direction of Lay	:	Right hand	
20.	Standard according to which the conductor will be manufactured and tested	:	IS : 398 (Part-4) – 1994	
21.	Size of the drum in mm (as per IS-1778/80 with Amendment I /1989	:	To be offered by the Bidder	
22.	Length of conductor in each drum in Km	:	To be offered by the Bidder	

Bidders Signature with Seal

GURANTEED TECHNICAL PARTICULARS
FOR 100 MM² ALL ALUMINIUM ALLOY CONDUCTOR

Sl. No.	Particulars		Specified Requirement	Details furnished by the bidder
1.	Nominal Aluminium Alloy area of conductor in Sq.mm	:	100	
2.	No. of stands	:	7	
3.	Wire dia. in mm			
	d) Nominal	:	4.26	
	e) Minimum	:	4.22	
	f) Maximum	:	4.30	
4.	Approximate Over all diameter of conductor in mm	:	12.78	
5.	Cross sectional area in Sq.mm			
	iii) Individual wire	:	14.25	
	iv) Standard Conductor	:	100	
6.	Minimum breaking load in KN			
	iii) Individual wire	:	4.40	
	iv) Standard Conductor (U.T.S)	:	29.344	
7.	Approximate mass in Kg. Per KM of Aluminium Alloy conductor			
	iii) Individual wire	:	38.48	
	iv) Standard Conductor	:	272.86	
8.	Calculated maximum DC resistance at 20 ⁰ C in Ohm/Km			
	iii) Individual wire	:	4.18	
	iv) Standard Conductor	:	0.339	
13.	Modulus of Elasticity of Aluminium Alloy conductor Kg/Sq.mm	:		

16.	Co-efficient of linear expansion per degree centigrade for c) Individual /°C d) Standard conductor/°C	: : :	23×10^{-6}	
17.	Standard length (Mtr.)	:	$2000 \pm 5\%$	
18.	Lay ratio for 7 wire conductor	:	Min Max To be specified by bidder	
19.	Direction of Lay	:	Right hand	
20.	Standard according to which the conductor will be manufactured and tested	:	IS : 398 (Part-4) – 1994	
21.	Size of the drum in mm (as per IS-1778/80 with Amendment I /1989	:	To be offered by the Bidder	
22.	Length of conductor in each drum in Km	:	To be offered by the Bidder	

Bidders Signature with Seal

GURANTEED TECHNICAL PARTICULARS
FOR 232 MM² ALL ALUMINIUM ALLOY CONDUCTOR

Sl. No.	Particulars		Specified Requirement	Details furnished by the bidder
1.	Nominal Aluminium Alloy area of conductor in Sq.mm	:	232	
2.	No. of stands	:	19	
3.	Wire dia. in mm (strands)			
	a) Nominal	:	3.94	
	b) Minimum	:	3.90	
	c) Maximum	:	3.98	
4.	Approximate Over all diameter of conductor in mm	:	19.70	
5.	Cross sectional area in Sq.mm			
	i) Individual wire	:	12.19	
	ii) Standard Conductor	:	232	
6.	Minimum breaking load in KN			
	i) Individual wire	:	3.58	
	ii) Standard Conductor (U.T.S)	:	68.05	
7.	Approximate mass in Kg. Per KM of Aluminium Alloy conductor			
	i) Individual wire	:	32.92	
	ii) Standard Conductor	:	636.67	
8.	Calculated maximum DC resistance at 20 ⁰ C in Ohm/Km			
	iii) Individual wire	:	2.746	
	iv) Standard Conductor	:	0.1471	
	13.	Modulus of Elasticity of Aluminium Alloy conductor Kg/Sq.mm	:	
16.	Co-efficient of linear expansion per		23×10^{-6}	

	degree centigrade for	:		
	j) Individual /°C	:		
	k) Standard conductor/°C	:		
17.	Standard length (Mtr.)	:	2000 ±5%	
18.	Lay ratio for 7 wire conductor	:	Min Max 10 14	
19.	Direction of Lay	:	Right hand	
20.	Standard according to which the conductor will be manufactured and tested	:	IS : 398 (Part-4) – 1994	
21.	Size of the drum in mm (as per IS-1778/80 with Amendment I /1989	:	To be offered by the Bidder	
22.	Length of conductor in each drum in Km	:	To be offered by the Bidder	

Bidders Signature with Seal

TECHNICAL SPECIFICATION
OF
HT/LT POWER CABLES

CONFIDENTIAL

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION OF 33 KV 300 SQ.MM / 185 SQ.MM

XLPE ARMoured CABLE :

1. **SCOPE**

This specification covers design, manufacture, inspection, testing and supply of 33KV, 300 Sq. mm. 185 Sq. Mm Single Core / Three Core , Aluminium Conductor Cross-linked polyethylene (XLPE) insulated, PVC sheathed, Armoured, screened Power Cables to destination Station anywhere in the jurisdiction of TPNODL for use with effectively earthed distribution system.

2. **STANDARDS**

- 2.1 The materials shall conform in all respects to the relevant International / Indian Standard Specifications with latest amendments thereto.

Title	Indian Standard No.	International Standard
Specification for Cross linked Polyethylene Insulated PVC Sheathed Cable for working voltages from 3.3 kV up to and including 33 kV	IS:7098 Part II/1985	IEC : 502 (1983)
PVC insulation and sheath of electric cables.	IS:5831/1984	IEC :502 (1983)
Conductors for insulated electric Cables and Flexible cords	IS: 8130/1984	IEC : 228 (1978)
Specification for cable drum	IS : 10418/1982	

Equipment conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above, would also be acceptable.

3.0 **PRINCIPAL PARAMTERS:**

- 3.1 The material shall conform to the following specific parameters.

S.I. No.	Item	Specification
1.	Type of Installation	Outdoor
2	System Voltage	33 kV (+10% - 15%)
3	System Frequency	50 Hz. + 5%
4	No. of Phases	Three
5	System of earthing	Solidly grounded

4.0 **TECHNICAL REQUIREMENT**

The cable shall be 33 kV Grade, high conductivity stranded compacted circular aluminium conductor, tinned with semi conducting, 1 core or 3 core, XLPE insulated, inner PVC sheathed, galvanized steel strip armoured with overall separate extruded PVC outer sheath, conforming generally to IEC-60502/IS: 7098 (Part-II) - 1985 and amendment thereof suitable for 33 kV 3 phase 50 Hz earthed system.

- 4.1 Two distinct sheaths i.e. inner and outer shall be provided. Outer sheathing shall be designed to afford high degree of mechanical protection and shall also be heat, oil, chemicals and weather resistant, common acids, alkalies and saline solution shall not have adverse effect on the material used for PVC outer sheathing.
- 4.2 The cable should be suitable for lying in covered trenches and/or buried direct underground.

5. **CONDUCTOR**

The conductor shall be made from stranded very well compacted, round conductor shall be made of aluminium wires complying the requirement as specified in Table-2 of IS: 8130 /1984 and any amendment thereof.

6 **CONDUCTOR SHIELD**

The conductor shall have a semi-conducting screen, which will ensure perfectly smooth profile to avoid stress concentration. The conductor screen shall be extruded in the same operation as the insulation.

7. **INSULATION**

The XLPE insulation shall be suitable for specified 33 kV system voltages. The manufacturing process shall ensure that insulation shall be free from voids. The insulation shall withstand mechanical and thermal stresses under steady state and transient operating conditions. The extrusion method shall give very smooth interface between semi-conducting screen and insulation. The insulation of the cables shall be of high standard quality and conform to Clause-11 of IS: 7098 (Part-II)/1985 or latest amendment thereof.

8. **INSULATION SHIELD**

To confine electrical field to the insulation, insulation screening consisting of two parts, namely metallic (non-magnetic) and non-metallic (semi conducting) shall be provided. The non-metallic semi-conducting shield shall be put over the insulation of each core. The insulation shield shall be extruded in the same operation as the conductor shield and the insulation by triple extrusion process. The insulation shield shall be bonded and Strippable, on adequate heat treatment. Metallic shield shall be provided over non- metallic portion as per provision of clause 12.4 of IS: 7098 (Part-II)/1985 and amendment thereof.

9. **INNER SHEATH**

The sheath shall be suitable to withstand the operating conditions and the desired temperature rating of the cable. It shall be of adequate thickness, consistent quality and free from all defects.

10 **ARMOUR**

Galvanized steel strip armouring shall be provided. The dimensions of steel strip shall be as per table 4 of IS: 7098 (Part-II)/1985 and its latest amendment and strip shall conform to latest provisions of IS: 3975 - 1988 and amendment thereof.

11. **OUTER SHEATH**

Extruded PVC outer sheath of type ST-2 as per IS: 5831/1984 and its latest

amendment shall be applied over armouring with suitable additives to prevent attack by rodent and termite and its thickness shall be in accordance with Clause -17.32 of IS:7098 (Part-III)/1985 and latest amendment thereof.

12 **CONSTRUCTION**

- 12.1 The cable shall have suitable PVC fillers laid up with insulated cores to provide substantially circular cross section before the inner sheath is applied. The fillers shall be suitable for operating temperature of the cable and compatible with the insulating material.
- 12.2 All materials used in the manufacture of cable shall be new, unused and of finest quality. All materials shall comply with the applicable provisions of the tests of the specification, IS, Indian Electricity Rules, Indian Elect. Act and any other applicable statutory provisions, rules and regulations.
- 12.3 The PVC material used in the manufacture of cable shall be of reputed make. No recycling of the PVC is permitted. The purchaser reserves the right to ask for documentary proof of the purchase of various materials to be used for the manufacture of cable and to check that manufacturer is complying with quality control.

13. **WORKMANSHIP AND QUALITY ASSURANCE**

The workmanship shall be neat, clean and of highest grade/quality

- (v) Voltage grade and size of cores.

The cable shall also be embossed (clearly visible) for the verification of its length at intervals of 1 m say 1,2,3 up to full length on outer sheath

19.0 **TEST CERTIFICATE**

The tenderer shall furnish an authenticated copy of results of successful type tests. The tests as carried out at any CPRI/ NABL accredited lab and Test certificates shall not be later than 5 years on the date of bid opening..

20. **INSPECTION & TESTING**

- 20.1 However, the purchaser reserves the right to get the cable type tested at any stage during pendency of contract at its own expenses in any reputed test house mentioned in Clause-19. The transportation and arrangement of testing of sample to test laboratory shall be the responsibility of the contractor.
- 20.2 Routine and Acceptance tests as laid down in IS: 7098 (Part-II) 1985 with latest amendment thereof shall be carried out by the representative/ inspecting officers on sample selected at random as per relevant ISS.

In addition to above, length check on one drum per inspection lot shall also be carried out by the inspecting officer(s) for which contractor shall make all necessary arrangements and provide all necessary facilities at its own cost.

21.0 ACCEPTANCE TEST:

- 20.1 The sampling plan for acceptance test shall be as per IS 7098 part-II, Appendix 'A'
- 20.2 The following shall constitute the acceptance test.

- a) Tensile test for aluminum
- b) Wrapping test for aluminum
- c) Conductor resistance test
- d) Test for thickness of insulation
- e) Test for thickness of inner and other sheath
- f) Hot-set test for insulation
- g) Tensile strength and elongation at break test for insulation and outer sheath.
- h) Partial discharge test (on full drum length).
- i) High voltage test.
- j) Insulation resistance (volume resistivity test).

22.0 ROUTINE TEST:

22.1 The following shall constitute routine tests :

- a) Conductor resistance test
- b) Partial discharge test on full drum length
- c) High voltage test.

23. GUARANTEE:

The bidder shall confirm for guarantee towards design, material, workmanship & quality of process/ manufacturing for integrated product delivered under the contract.

In the event any defect is found by TPNODL , upto a period of at least 60 months from the date of commissioning or 72 months from the date of last supplies made under the contract whichever is earlier , bidder shall be liable to undertake to replace / rectify such defect at its own costs, within mutually agreed time frame, and to the entire satisfaction of TPNODL, failing which TPNODL will be at liberty to get it replaced/ rectified at Bidder's risk and costs and recovery all such expenses plus the TPNODL's own charges (@20% of expenses incurred) , from the Bidder of from 'Security cum Performance Deposit' as the case may be.

Free Replacement: 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 TPNODL.

24.0 PACKING:

24.1 The cables, as per specified delivery lengths, shall be securely wound/packed in non-returnable, well seasoned sturdy wooden drums, with strong reinforcement so as so to withstand rough handling during transport by rail, Roads etc., The packing should withstand storage conditional in open yards. The cable drums shall conform to IS 10418 1982 or equivalent standard.

24.2 The drawings of the cable drums with full detail shall be furnished, and got approved before dispatch.

25.0 SEALING OF CABLE ENDS ON DRUMS:

25.1 The cable ends shall be sealed properly so that Ingress of moisture is completely prevented. The individual core endings shall be sealed effectively with water resistant compound applied over the core and provided with a heat shrinkable or push-on or Tapex or cold shrinkable type cap of sufficient length with adequate cushion space so that the conductor does not puncture the cap in case of movement of the core during unwinding or laying. Before sealing, the semi conducting layer on the cores may be removed for about 2 mm at each end, to facilitate checking the insulation resistance from one end, without removing the sealing cap at the other end.

25.2 The three cores should have an overall heat shrinkable or push-on or Tapex or cold shrinkable type cap with adequate end clearance, and sufficient cushioning to prevent puncturing of the overall sealing cap due to stretching of the cores. The sealing cap shall have sufficient mechanical strength and shall prevent ingress of moisture into the cable.

The ends of single core cable shall also be sealed on the same lines to prevent entry of moisture.

26.0 CABLE LENGTHS:

26.1 The cables shall be supplied in continuous lengths of 200M-500M in case of 3 core/ 1 Core cable with tolerance of + or – 5% of drum length. It is preferable to manufacture the cable to required lengths as required by the field conditions to have minimum joints. The turn key contractor will furnish the required drum lengths in advance

27.0 MARKING:

27.1 The packed cable drum shall carry the following information, clearly painted or stencilled

- a) Purchaser: TPNODL
- b) Reference to Standard and ISI mark
- c) Manufacturer's Name or trade mark.
- d) Type of cable & voltage grade
- e) Number of cores
- f) Nominal cross-sectional area of conductor.
- g) Cable code
- h) Length of cable on the drum
- i) Direction of rotation
- j) Gross weight

- k) Country of Manufacture
- l) Year of Manufacture
- m) Purchase order and date
- n) Address of consignee

28.0 GUARANTEED TECHNICAL PARTICULARS:

Guaranteed technical particulars of the cables to be furnished with the Bid as per format is given below .

29.0 DRAWINGS & INSTRUCTION MANUAL

The tenderer shall supply the following drawings with the tender: -

- i) Detailed drawing of the cable showing conductor, screening insulation, Armouring, outer sheath etc.
- ii) Detailed drawing showing jointing of cable and sealing of end boxes.

Copies of instruction manuals for testing, installation jointing operation and maintenance of cables, shall also be submitted with the offer for reference of the purchaser.

GURANTEED TECHNICAL PARTICULARS OF 33KV 300 MM² SINGLE CORE XLPE CABLE (ARMOURED)

(TO BE FURNISHED BY THE BIDDER)

Sl. No.	Particulars	Bidder's Offer
	CABLE SIZE	33kv 1 core x300 mm² XLPE Cable
1	CABLES	
a)	Manufacturer	
b)	Trade Name	
2	Type of Cable	
3	Applicable specification & Standards	
4	Voltage Class	
5	Whether suitable for extrusion technique is employed in the manufacture of conductor screen	
6	Whether triple extrusion technique is employed in the manufacture of conductor screen	
7	Permissible voltage and frequency variation for satisfactory operation	
8	Continuous Current Rating for standard conditions indicated in specifications:	
a)	Air (450 C Ambient)	
b)	In Ground (350 C)	

c)	In Duct	
d)	In Trench	
9	De-rating factors for various laying conditions	
10	Conductor	
a)	Material	
b)	Shape of conductor	
c)	Nominal area of cross section	
d)	Number of strands per core	
e)	Diameter of Wire (before compacting and stranding)	
f)	Diameter and size of conductor	
11	Conductor Screening	
a)	Type	
b)	Material	
c)	Nominal thickness	
d)	Continuous working temperature	
e)	Maximum allowable temperature at the termination of short circuit	
12	Insulation	
a)	Material	
b)	Thickness of Insulation	
c)	Thickness of Insulation between cores	
d)	Thickness of Insulation between cores and inner sheath	
e)	Tolerance of thickness in insulation	
f)	Diameter of core over insulation	
13	Specific Insulation Resistance at 900C	
14	Process of curing	
15	Whether XLPE Insulation filled or unfilled	
16	Insulation Screening:	
a)	Material	
b)	Thickness	
c)	Thickness of semi conducting part	
d)	Thickness of metallic part	
e)	Size of copper tape	
f)	Whether overlapping provided	
g)	Current carrying capacity for continuous rating	
h)	Current carrying capacity for short circuit rating for 1 minutes	
i)	Diameter of cable over screening	
j)	Whether insulation screen is removable without the application of heat	
17	Inner Sheath	
a)	Material	

b)	Extruded	
c)	Minimum thickness	
d)	Diameter of cable over inner sheath	
18	Armoring:	
a)	Material	
b)	Type of Armouring	
c)	Diameter of wire	
d)	Whether galvanized	
e)	Diameter of cable over Armouring	
f)	Current carrying capacity of Armor	
19	Outer Sheath:	
a)	Material	
b)	Minimum thickness of sheath	
c)	Tolerance over thickness of sheath	
d)	Overall diameter of cable	
20	Scheme for identification of cable	
21	Allowable/attainable maximum conductor temperature when carrying rated current continuously	
22	Cable constants:	
a)	DC Resistance per core 200 C	
b)	AC Resistance per core at operating temperature	
c)	Reactance	
d)	Capacitance	
e)	Insulation Resistance at 270C	
f)	Loss tangent	
g)	Dielectric constant – Maximum cable charging current at normal operating voltage	
23	Factory Tests (Enumerate in detail for each type of cable)	
24	Is the offered cable guaranteed to safely withstand continuous conductor temperature at 900C and also safely withstand temperature upto 1300C for a duration of one hundred hours per year.	
25	Are the offered Three core cable guaranteed to perform satisfactorily under installation conditions specified? If 'Yes' furnish relevant calculations in support including the following data:	
a)	Induced voltage in the Amour when a 500 mtr long cable is carrying current	
b)	Induced voltage and the circulating current in the copper tape	

Name & Signature of Bidder with seal

GURANTEED TECHNICAL PARTICULARS OF 33KV 185 MM² 3 CORE XLPE CABLE (ARMOURED)

(TO BE FURNISHED BY THE BIDDER)

Sl. No.	Particulars	Bidder's Offer
	CABLE SIZE	33kv 3 core x185 mm² XLPE Cable
1	CABLES	
a)	Manufacturer	
b)	Trade Name	
2	Type of Cable	
3	Applicable specification & Standards	
4	Voltage Class	
5	Whether suitable for extrusion technique is employed in the manufacture of conductor screen	
6	Whether triple extrusion technique is employed in the manufacture of conductor screen	
7	Permissible voltage and frequency variation for satisfactory operation	
8	Continuous Current Rating for standard conditions indicated in specifications:	
a)	Air (450 C Ambient)	
b)	In Ground (350 C)	
c)	In Duct	
d)	In Trench	
9	De-rating factors for various laying conditions	
10	Conductor	
a)	Material	
b)	Shape of conductor	
c)	Nominal area of cross section	
d)	Number of strands per core	
e)	Diameter of Wire (before compacting and stranding)	
f)	Diameter and size of conductor	
11	Conductor Screening	
a)	Type	
b)	Material	
c)	Nominal thickness	
d)	Continuous working temperature	
e)	Maximum allowable temperature at the termination of short circuit	
12	Insulation	
a)	Material	
b)	Thickness of Insulation	

c)	Thickness of Insulation between cores	
d)	Thickness of Insulation between cores and inner sheath	
e)	Tolerance of thickness in insulation	
f)	Diameter of core over insulation	
13	Specific Insulation Resistance at 900C	
14	Process of curing	
15	Whether XLPE Insulation filled or unfilled	
16	Insulation Screening:	
a)	Material	
b)	Thickness	
c)	Thickness of semi conducting part	
d)	Thickness of metallic part	
e)	Size of copper tape	
f)	Whether overlapping provided	
g)	Current carrying capacity for continuous rating	
h)	Current carrying capacity for short circuit rating for 1 minutes	
i)	Diameter of cable over screening	
j)	Whether insulation screen is removable without the application of heat	
17	Inner Sheath	
a)	Material	
b)	Extruded	
c)	Minimum thickness	
d)	Diameter of cable over inner sheath	
18	Armoring:	
a)	Material	
b)	Type of Armouring	
c)	Diameter of wire	
d)	Whether galvanized	
e)	Diameter of cable over Armouring	
f)	Current carrying capacity of Armor	
19	Outer Sheath:	
a)	Material	
b)	Minimum thickness of sheath	
c)	Tolerance over thickness of sheath	
d)	Overall diameter of cable	
20	Scheme for identification of cable	
21	Allowable/attainable maximum conductor temperature when carrying rated current continuously	
22	Cable constants:	
a)	DC Resistance per core 200 C	

b)	AC Resistance per core at operating temperature	
c)	Reactance	
d)	Capacitance	
e)	Insulation Resistance at 270C	
f)	Loss tangent	
g)	Dielectric constant – Maximum cable charging current at normal operating voltage	
23	Factory Tests (Enumerate in detail for each type of cable)	
24	Is the offered cable guaranteed to safely withstand continuous conductor temperature at 900C and also safely withstand temperature upto 1300C for a duration of one hundred hours per year.	
25	Are the offered Three core cable guaranteed to perform satisfactorily under installation conditions specified? If 'Yes' furnish relevant calculations in support including the following data:	
a)	Induced voltage in the Armour when a 500 mtr long cable is carrying current	
b)	Induced voltage and the circulating current in the copper tape	

Name & Signature of Bidder with seal

TECHNICAL SPECIFICATION FOR 1.1 KV XLPE HEAVY DUTY UN-ARMOURED PVC SHEATHED UG LT CABLE

1.0 SCOPE:

The scope of this specification covers the design, manufacture, stage inspection at work, inspection and testing of finished cables at manufacturers works, testing at independent test house, packing, transport and delivery at Store/Site of 1.1 KV stranded aluminum, XLPE insulated heavy duty un-armoured and sheathed power cable for working voltages up to and including 1100 volts underground cables as per specified construction.

2.0 TECHNICAL REQUIREMENT:

The Cable shall be of 1.1kV grade, 90° C rating, heavy duty, power cable with stranded circular shaped aluminum conductor, cross linked polyethylene insulated, inner sheath of extruded PVC and PVC ST-2 overall sheathed. The cable should be suitable for use in solidly earthed system.

3.0 STANDARDS :

3.01 The 1.1 KV UG cable shall, in general meet the requirements of the latest edition of the Bureau of Indian Standards (Generally referred as IS), IS: 7098 (Part-I) 1988.

3.02 The cables and components in general shall meet the requirements of the following standards with latest amendments or equivalent international standards.

IS:7098 (Part-I)/ IEC:502	1988	Specification for cross linked polyethylene insulated PVC sheathed cables
IS:8130	1984	Specification for conductors for insulated Electric Cable
IS:3975	1988	Specification for mild steel wires, strips and tapes for armouring of cables
IS:10810 (Part 1 to 55)	1984	Specification for test on cables
IS: 398/ ISO:9000	1994	All Aluminum Alloy Conductors, Quality Management Systems
IS:5831	1984	Specification for PVC insulation and sheath of electric cables
IS:10418	1982	Specification for drums for electric cables
IS:10462	1983	Fictitious calculation method for determination of dimensions of protective coverings of cable: part 1 elastomeric and thermoplastic insulated cable

3.03 The 1.1 KV underground cables shall be manufactured to the highest standard quality, best workmanship with scientific material management and quality control. The bidder shall furnish the quality plan, giving in detail the quality control procedures/management system.

3.04 The successful bidder shall give sufficient advance notice to the purchaser of not less than fifteen days to arrange for stage inspection of quality assurance program during manufacture, at the works.

3.05 Cable complying with other internationally accepted standards such as IEC, VDE, IPCEA

etc., will also be considered in case they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the Bidder shall clearly indicate the standard/standards adopted and furnish a copy of English version of the latest revision of standard(S) along with the tender and shall clearly bring the salient features for comparison.

3.06 In case of any conflict between the referred specification code or standards and this technical specification, the latter shall prevail to the extent of such difference.

3.07 1.1 KV Grade Power Cables to be supplied under this package shall be ISI approved and marked as such. Non compliance of above shall not be accepted.

3.08 However, if cable to be supplied under this specification are manufactured outside India and conform to other internationally accepted equivalent or superior standards the above clause shall not be applicable.

4.0 SERVICE CONDITIONS:

The service conditions shall be as follows:

- Maximum altitude above sea level 500m
- Maximum ambient air temperature 50⁰C
- Maximum daily average ambient air temperature 35⁰C
- Maximum ambient air temperature 5⁰C
- Maximum temperature attainable by an object exposed to sun 60⁰C
- Maximum yearly weighted average ambient temperature 32⁰C
- Maximum relative humidity 100%
- Average number of thunderstorm days per annum 70

- Average number of rainy days per annum 120
- Average annual rainfall 150cm
- Wind pressure as per IS:5613(Part-I/Sec.I) 1985

Wind Zones IS:5613 Part-I/Sec-I	Light	Medium	Heavy
Terrain Category	100 Kg/m ²	150 Kg/m ²	200 Kg/m ²

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.

5.0 SYSTEM CONDITIONS:

The materials shall be suitable for installation in supply systems of the following characteristics.

Frequency	50Hz
Nominal System Voltage	400/230V
Maximum System Voltage LV System	440/250 V
Minimum LV Voltage	370 V
Power frequency one minute withstand & dry)	2KV (set
Neutral Earthing arrangement LV System	Solidly earthed

6.0 DESIGN CRITERIA:

6.01 The cables that are covered in these specifications are intended for use in the jurisdiction of Power distribution system of TPNODL, under the climatic conditions and installation conditions described in the Technical Specification.

6.02 Any technical feature, not specifically mentioned here, but is necessary for the good performance of the product, shall be incorporated in the design. Such features shall be clearly brought out under Technical Deviations Schedule only, in the offer made by the bidder, giving technical reasons and justifying the need to incorporate these features.

6.03 For continuous operation of the cables, at specified rating, the maximum conductor temperature shall be limited to the permissible value as per the relevant standard, generally not exceeding 90° C under normal operation and 250° C under short-circuit conditions.

- 6.04 The cables in service will be subject to daily load cycles of two peaks during day – morning peak and evening peak, with reduced loading during the nights.
- 6.05 The materials used for sheaths shall be resistant to all effects of North Eastern region, oils, acids, alkalis, and chemicals.
- 6.06 The cables shall have the mechanical strength required during handling and laying.
- 6.07 The cables shall be designed to withstand the thermo-mechanical forces and electrical stresses during normal operation and transient conditions.
- 6.08 The cables shall be designed to have a minimum useful life span of forty years.

7.0 CORE IDENTIFICATION:

- 7.01 The core identification for cables shall be provided, by suitable means, like, by application of colored stripes or any numerals or by printing on the cores as per Clause-10 of IS: 7098
- 7.02 For identification colored stripes, red, yellow & blue colors shall be used to identify the phase conductors & black to identify reduced neutral conductor.

7.0 MANUFACTURE PROCESS, CROSS LINKING OF INSULATION:

- 7.01 Cross linking of the insulation material (Pre compounded polyethylene) shall be conforming to IS: 7098 (Part-I).
- 7.02 The conductor shall be of extruded semi conducting compound. The insulation screen shall consist of the non-magnetic metallic part. The XLPE insulation and the shields for conductor and insulation shall be extruded in one operation.

8.0 MATERIALS:

- 8.01 Conductor: the conductor shall be of stranded Construction. The material for conductor shall consist of plain aluminum of H2 or H4 grade as per Clause-3 of IS: 8130/1984. The No. of wires in the conductor shall be not less than the appropriate minimum number given in Table-2 of IS: 8130/1984.
- 8.02 INSULATION: The insulation shall be cross linked polyethylene conforming to the requirements given in Table-1 of IS: 7098 Part-I.
- 8.03 For multicore cables, the interstices at the Centre shall be filled with a non-hygroscopic material. The interstices around the laid up cores shall be covered with PVC compound type S.T.2. This will form the inner sheath for multicores.
- 8.04 OUTER SHEATH: The outer sheath shall consist of Poly Vinyl Chloride (PVC) compound, conforming to the requirements of Type ST-2 of IS: 5831 suitable additives shall be added to give anti termite protection.

9.0 CONSTRUCTION:

- 9.01 The general construction features of the cables shall be as follows:

- a) Stranded circular shaped Aluminium conductor. Cross linked polyethylene insulation, cross linked shall be conforming to IS: 7098 (Part-I) 1988 with its latest amendment. Extruded PVC inner sheath. Outer PVC sheath with anti-termite treatment.
- b) Cables with reduced neutral conductor shall have sizes as given in table-2 of IS: 7098 Part-I.

10.0 CONDUCTOR:

- 10.01 The conductor shall be stranded circular shaped Aluminium wires of H2 and H4 grade plain aluminium wires.
- 10.02 The conductor shall be clean, uniform in size and shape smooth and free from harmful defects.
- 10.03 Forming every complete length of conductor and no joint shall be within 300mm of any other joint in the same layer. The joint shall be made by brazing silver soldering or electric or gas welding.
- 10.04 No joints shall be made in the conductor after it has been stranded.

11.0 INSULATION:

The insulation shall be provided over the conductor with cross linked polyethylene, applied by extrusion and shall be of high quality, cross linked, shall be confirming of IS: 7098 (Part- I).

11.01 THICKNESS OF INSULATION:

The average thickness of XLPE insulation shall not be less than the nominal value subject to the applicable tolerance as specified in table 3 of IS: 7098.

- 11.03 The insulation shall be applied to closely fit on the conductor screen and it shall be possible to remove it without damaging the conductor.

12.0 LAYING UP OF CORES:

- 12.01 For multicore cables, the core shall be laid together with a suitable right hand lay, where necessary the interstices at the centre shall be filled with a non-hygroscopic material.
- 12.02 The cores shall be laid up with a suitable right hand lay and the interstices should be filled with PVC compound type ST-2 conforming to IS: 5831 or equivalent standard.
- 12.03 The minimum thickness of the inner sheath shall conform to Table 5 of IS: 7098 (Part-I), 1988 or equivalent standard.
- 12.04 The inner sheath shall be so applied that it fits closely on the laid up cores and it shall be possible to remove it without damage to the insulation.

13.0 OUTER SHEATH:

13.01 The PVC outer sheath with anti termite treatment shall be extruded over the multicore cables and single core cables.

13.02 The colour of the outer sheath shall be black.

13.03 The thickness of outer sheath shall be not less than the minimum value specified in column 5 of Table 8 of IS: 7098 (Part-I), 1988.

14.0 IDENTIFICATION:

14.01 The outer sheath shall have the following information embossed or indented on it, the Purchaser name, P.O No. & Date, manufacturer's name or trademark, the voltage grade, the year of manufacture . The identification shall repeat every 300/350 mm along the length of the cable.

15.0 CABLE DRUMS:

15.01 Cables shall be supplied in Non returnable wooden or steel drums of heavy construction and drum shall be properly seasoned, sound and free from defects, wood preservative shall be applied to the entire drum.

15.02 Standard length of each size of power cable to be supplied by the bidder shall be 500/1000 metres. The cable length per drum shall be 250/500 metres. The cable length per drum shall be subjected to a tolerance of +5% of the standard drum lengths. Acceptance of smaller lengths of cables are subject to approval of purchaser. However, smaller lengths of less than 100 mteres will not be accepted.

15.03 A layer of waterproof paper shall be applied to the surface of the drums and over the outer most cable layer.

15.04 A clear space of at least 40 mm shall be left between the cables and logging.

15.05 The cable drum shall carry OST marking with the following information stenciled on both sides of the drum. A tag containing the same information shall also be attached to the leading end of the cable.

- a) Reference to the Indian Standards.
- b) Manufacturer's name, Brand name or Trade name.
- c) Purchaser's name, contract No. and date.
- d) Type of cable and voltage grade.
- e) Number of cores.
- f) Nominal cross-sectional area of conductor.
- g) Cable code.
- h) Length of cable on the drum.
- i) Number of lengths on drum..
- j) Direction of rotation of drum (by means of an arrow)

- k) Net and gross weight
- l) Country of manufacture.
- m) Year of manufacture
- n) Purchase Order Reference.

15.06 Packing shall be sturdy and adequate to protect the cables, from any injury due to mishandling or other conditions encountered during transportation, handling and storage. Both cables ends shall be sealed with good quality heat shrinkable caps so as to eliminate ingress of water during transportation and erection.

16.0 INSPECTION:

16.01 QUALITY CONTROL: The Bidder shall furnish a complete and detailed quality plan for the manufacturing process of the cable. All raw materials shall conform to relevant applicable standards and tested for compliance to quality and requirement. During the manufacturing process, at all stages, inspections shall be made to check the physical and dimensional parameters, for verification to compliance to the standards. The Bidder shall arrange for inspection by the purchaser, during manufacture, if so desired by the purchaser to verify the quality control process of the Bidder.

17.0 TYPE TESTS:

17.01 Notwithstanding that type test have been conducted earlier, the successful bidder and each member conduct all type tests as per IS: 7098 (Part-I) 1988, with up to date amendments or equivalent international standard and supplies made only after approval of test reports from the purchaser.

17.02 All Type tests, Routine tests, and Acceptance tests shall be conducted in the presence of the purchaser or his representative.

17.03 The successful bidder shall give FIFTEEN days advance notice for inspections and witnessing of tests by the purchaser or his representative.

17.04 TPNODL reserves the right to test the materials at any recognised testing laboratory for any further tests to verify the compliance with the specifications and to reject the cables in case they are found not satisfying the qualifying requirements as per relevant standards.

17.05 The following type tests will be conducted on the cable as per IS: 7098 (Part-I).

- a) Test on conductor
- b) Test for thickness of XLPE insulation and inner and outer sheaths.
- c) Physical test on XLPE insulation.
- d) High voltage test.

e) Flammability test.

18.01 ACCEPTANCE TEST:

The sampling plan for acceptance test shall be as per IS: 7098 (Part-I) 1988, Appendix 'A'.

18.02 The following shall constitute the Acceptance Test.

- a) Tensile test for aluminium.
- b) Wrapping test for aluminium.
- c) Conductor resistance test.
- d) Test for thickness of insulation.
- e) Test for thickness of inner and outer sheath.
- f) Hot-set test for insulation.
- g) Tensile strength and elongation at break test for insulation and outer sheath.
- h) High voltage test.
- i) Insulation resistance (Volume resistivity) test.

18.03 ROUTINE TEST:

The following shall constitute Routine tests:

- a) Conductor resistance test.
- b) High voltage test.

19. GUARANTEE:

The bidder shall confirm for guarantee towards design, material, workmanship & quality of process/ manufacturing for integrated product delivered under the contract.

In the event any defect is found by TPNODL, upto a period of at least 60 months from the date of commissioning or 72 months from the date of last supplies made under the contract whichever is earlier, bidder shall be liable to undertake to replace / rectify such defect at its own costs, within mutually agreed time frame, and to the entire satisfaction of TPNODL, failing which TPNODL will be at liberty to get it replaced/ rectified at Bidder's risk and costs and recovery all such expenses plus the TPNODL's own charges (@20% of expenses incurred), from the Bidder or from 'Security cum Performance Deposit' as the case may be.

Free Replacement: 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 TPNODL.

20.0 SEALING OF CABLE ENDS ON DRUMS:

20.01 The cable ends shall be sealed properly so that ingress of moisture is completely prevented.

20.02 The individual core endings shall be sealed effectively with water resistant compound applied over the core and provided with a heat shrinkable cap of sufficient length with adequate cushion space so that the conductor does not puncture the cap in case of movement of the core during unwinding or laying. Before sealing, the semi-conducting layer on the cores may be removed for about 2mm at each end, to facilitate checking the insulation resistance from one end, without removing the sealing cap at the other end.

16.0.3 The multi cores should have an overall heat shrinkable cap with adequate end clearance and sufficient cushioning to prevent puncturing of the overall sealing cap due to stretching of the cores. The sealing cap shall have sufficient mechanical strength and shall prevent ingress of moisture into the cable. The ends of single core cables shall also be sealed on the same lines to prevent entry of moisture.

20.03 CABLE LENGTHS: The cables shall be supplied in continuous lengths of 250-500 Mtrs in case of multi core cables with a tolerance of 75% of drum length.

21.0 DRAWING & LITERATURE:

The following shall be furnished along with the tender.

- Cross sectional drawings of the cables, giving dimensional details for each size of cable.
- An illustrated literature on the cable, giving technical information on current ratings, cable constants, short circuit ratings, derating factors for different types of installation, packing date, weights and other relevant information.

Guaranteed Technical Particulars of 3.5 C 185 SO.MM LT XLPE Cable (Un-armoured)

To be Specified by the Bidder

Sr. No.	Description	Bidder's Offer
	Cable Size	3.5Cx185 mm ² LT XLPE Cable
1	System voltage.	
2	Make of cable.	

3	Type of cable	
4	IS or other specification to which the cable is manufactured	
5	Conductor material and its grade	
6	i) Number of wires in each conductor in nos.	
	ii) Nominal dia of wire dia each conductor in No. X mm	
7	No. cores and nominal cross sectional area of each conductor in No. X sq. mm	
8	Shape of conductors.	
9	Core identification	
10	Material used for insulation	
11	Total thickness of insulation used over each conductor in mm.	
12	Specific insulation resistance of dielectric ohm-Cm.	
13	Maximum thermal resistivity of dielectric in electric measure (i.e. difference in C between opposite faces of a cm. cube of the dielectric to transfer 1 Watt of heat).	
14	Type of extrusion /curing process	
15	Minimum thickness of Inner Sheath	
16	Method of application of Outer Sheath	
17	Minimum thickness of Outer Sheath in mm.	
18	Material used for Outer Sheath	
19	Calculated diameter over laying up cores (Calculated as per fictitious method to IS 10462 Part-I) in mm.	
20	Approximate overall diameter of cable in mm.	
21	Approximate total weight of aluminium conductor in 1000 mtrs. Length of finished cable in kgs	

22	Max. thermal resistivity of outer sheath in electrical measure (i.e. difference in C between opposite face of cm. Cube of the dielectric to cause transfer of 1 watt of heat)	
23	Total length of cable for each drum in metres.	
24	Total weight of each drum length of cable in Kg.	
25	Total weight of each drum length of cable with drum	
26	Size of each drum	
27	No. of years the design of the cable offered is in service	
28	Continuous safe current carrying capacity for following conditions for a single cable	
a)	Ground temperature	
b)	Thermal resistivity of soil 120 C cm/w	
c)	Depth of laying 1070 mm.	
29	Continuous current rating in air at 40°C	
30	Maximum permissible temperature rise of the conductor for continuous capacity	
31	Current density	
	a) Duct	
	b) Air	
	c) Ground	
32	Insulation resistance – Meg. Ohms. Per 1000 Meters finished cable at 20°C	
33	Conductor resistance- ohms per 1000 Metres of finished cable at 20°C	
34	Conductor reactance – ohms per 1000 Metres of finished cable at 20°C	
35	Specific inductive capacity Micro –	

36	Impulse level	
37	Positive sequence impedance of cable per 1000 metres in ohms.	
38	Negative sequence impedance of cable per 1000 metres in ohms	
39	Zero sequence impedance of cable per 1000 metres in ohms	
40	Maximum allowable asymmetrical fault current to earth for 1 sec	
41	Maximum allowable symmetrical short circuit current for a duration of one second.	

Name & Signature of the bidder with Seal

**Guaranteed Technical Particulars of 3.5 C 300 SQ.MM LT XLPE Cable
(Un-armoured)**

To be Specified by the
Bidder

Sr. No.	Description	Bidder's Offer
	Cable Size	3.5Cx300 mm² LT XLPE Cable
1	System voltage.	
2	Make of cable.	
3	Type of cable	
4	IS or other specification to which the cable is manufactured	
5	Conductor material and its grade	
6	i) Number of wires in each conductor in nos.	
	ii) Nominal dia of wire dia each conductor in No. X mm	
7	No. cores and nominal cross sectional area of each conductor in No. X sq. mm	
8	Shape of conductors.	
9	Core identification	
10	Material used for insulation	
11	Total thickness of insulation used over each conductor in mm.	
12	Specific insulation resistance of dielectric ohm-Cm.	
13	Maximum thermal resistivity of dielectric in electric measure (i.e. difference in C between opposite faces of a cm. cube of the dielectric to transfer 1 Watt of heat).	

14	Type of extrusion / curing process	
15	Minimum thickness of Inner Sheath	
16	Method of application of Outer Sheath	
17	Minimum thickness of Outer Sheath in mm.	
18	Material used for Outer Sheath	
19	Calculated diameter over laying up cores (Calculated as per fictitious method to IS 10462 Part-I) in mm.	
20	Approximate overall diameter of cable in mm.	
21	Approximate total weight of aluminium conductor in 1000 mtrs. Length of finished cable in kgs	
22	Max. thermal resistivity of outer sheath in electrical measure (i.e. difference in C between opposite face of cm. Cube of the dielectric to cause transfer of 1 watt of heat)	
23	Total length of cable for each drum in metres.	
24	Total weight of each drum length of cable in Kg.	
25	Total weight of each drum length of cable with drum	
26	Size of each drum	
27	No. of years the design of the cable offered is in service	
28	Continuous safe current carrying capacity for following conditions for a single cable	
a)	Ground temperature	
b)	Thermal resistivity of soil 120 C cm/w	
c)	Depth of laying 1070 mm.	
29	Continuous current rating in air at 40°C	
30	Maximum permissible temperature rise of the conductor for continuous capacity	

31	Current density	
	a) Duct	
	b) Air	
	c) Ground	
32	Insulation resistance – Meg. Ohms. Per 1000 Meters finished cable at 20°C	
33	Conductor resistance- ohms per 1000 Metres of finished cable at 20°C	
34	Conductor reactance – ohms per 1000 Metres of finished cable at 20°C	
35	Specific inductive capacity Micro –	
36	Impulse level	
37	Positive sequence impedance of cable per 1000 metres in ohms.	
38	Negative sequence impedance of cable per 1000 metres in ohms	
39	Zero sequence impedance of cable per 1000 metres in ohms	
40	Maximum allowable asymmetrical fault current to earth for 1 sec	
41	Maximum allowable symmetrical short circuit current for a duration of one second.	

Name & Signature of the bidder with Seal

TECHNICAL SPECIFICATIONS FOR 11KV 3 C 300 Sq.mm / 1C 185 Sq. mm XLPE INSULATED ARMOURED CABLES

1.0 SCOPE :

1.1 This specification covers design, manufacture, inspection, testing and supply of 11KV, 300 Sq. mm/ 185 Sq.mm Three Core/ Single Core , Aluminium Conductor Cross-linked polyethylene (XLPE) insulated, PVC sheathed, Armoured, screened Power Cables and delivery at destination Station anywhere in the jurisdiction of TPNODL.

2.0 RATED VOLTAGE

2.1 The rated voltage of the cable shall be 11000 Volts AC with the highest system voltage of 12000 Volts between phases of the effectively earthed three phase-distribution system.

3.0 APPLICABLE STANDARDS:

3.1 Unless otherwise stipulated in the specifications, the latest version of the following Standards shall be applicable.

- a. IS 8130 – Conductors for Insulated electrical cables and flexible cords
- b. IS 10810 (series) – Methods of tests for cables
- c. IS 10418 – Drums for electrical cables.
- d. IS 7098 (Part 2) – Cross – linked Polyethylene Insulation for Cables.
- e. IS 3975 – Specification for mild steel wires, strips and tapes for armoring of cables.
- f. IS 5831 – Specification for PVC insulation sheath for electric cables.

Dimensions of protective coverings of cables

Part 1 – Elastomeric and thermoplastic insulated cables.

3.2 The Cables manufactured to any other Internal Standards like BSS, IEC or equivalent standards not less stringent than Indian Standards are also acceptable. In such cases, the Bidders shall enclose a copy of the equivalent international standard, in English language, along with the bid.

4.0 CONSTRUCTION:

4.1 Conductor: - The conductor shall be composed of compacted circular aluminum wires complying with IS 8130.

4.2 Insulation: - The insulation shall be cross linked polyethylene conforming to the following requirements.

SI No	Properties	Requirements
1	Tensile Strength	12.5N/mm ² , Min
2	Elongation to break	200 percent, Min

	Aging in air oven	135+_30 C
	a) Treatment : Temperature	7 Days
3	Duration	
	a) Tensile Strength variation	+ 25 percent, Max
	b) Elongation variation	+ 25 percent, Max
4	Hot set	
	a)Treatment : Temperature	200 + 30 C
	Time under load	15 min
	Mechanical stress	20N/cm ²
	b) Elongation under load	175 percent, Max
	c) Permanent elongation (set) after cooling	15 percent, Max
5	Shrinkage	
	a)Treatment : Temperature	130+ 30 C
	Duration	1 hour
	b) Shrinkage	4 percent, Max
6	Water absorption (Gavin metric)	
	a)Treatment : Temperature	85+ 20 C
	Duration	14 days
	b) Water absorbed	1 mg / cm ² , Max
7	Volume Resistivity	
	at 270 C	1 x 10 ¹⁴ ohm-cm, Min
	at 700 C	1 x 10 ¹³ ohm-cm, Min

4.3 The screening shall consist of non-metallic semi conducting compound and copper tape, shielded cores laid up with fillers, inner sheath of extruded PVC, Galvanized steel strip Amour and PVC ST-2 overall sheath.

4.4 The cables should be suitable for use in solidly earthed system.

4.5 The 6.35/11KV underground cables shall be manufactured to the highest quality, best workmanship with scientific material management and quality control. The bidder shall furnish the quality plan, giving in detail the quality control procedure / management system.

4.6 The successful Bidder shall give sufficient advance notice to the purchaser of not less than fifteen days to arrange for stage inspection and inspection of quality assurance program during manufacture, at the works.

5.0 SYSTEM DETAILS

5.01 General Technical particulars

General Technical particulars		
Sl No	Particulars	Values
1	Nominal system voltage (rms) (U)	11KV
2	Highest system voltage (rms) (Um)	12KV

3	Phase to Earth voltage (rms) (U0)	6.35 KV
4	Number of Phase	3
5	Frequency	50Hz
6	Variation in Frequency	+ / - 3%
7	Type of Earthing	Solidly Earthed
8	Basic impulse insulation level (1.2/50 XS wave)	75KV
9	Total relay & circuit breaker Operating time	15-20 cycles
10	One Minutes power frequency withstand voltage	28 KV rms

- 5.02 **Conductor** :
- i) As per IS: 8130 ,
 - ii) Class-II
 - iii) Material – Plain Aluminium , Grade-H2/H4
 - iv) Shape – Standard Compacted Circular

	Nominal size of conductor mm ²	Min. number of strands	Max. DC resistance @ 20 deg C (Ohm/Km)	Conductor Short circuit current rating for 1 second
No. of strands & electrical parameters	150	15	0.206	14.2 kA
	185	30	0.164	28.3 kA
	300	30	0.1	28.3 kA
	400	53	0.0778	37.7 kA
	630	53	0.0469	59.4 kA
	1000	53	0.0291	94.3 kA

5.03 Weight of Conductor:

	Nominal size of conductor mm ²	Min. weight of conductor (kg/km/core)
Weight of conductor/Km (approx.)	150	390
	185	480
	300	780
	400	1080
	630	1650
	1000	2600

All other technical specification of 11 KV underground cables is attached separately as

*'Document Title Technical Specification – 11 kV Cable , Document No. ENG-HV-2010
Eff. Date: 27.03.2020 of TATA Power DDL' as sample*

*The same specification is applicable for supply of 3 core 300 mm² & 1core 185 mm²
armoured XLPE power cable for TPNODL.*

CONFIDENTIAL

GUARANTEED TECHNICAL PARTICULARS:

Guaranteed technical particulars of the cables to be furnished with the Bid are enclosed.

DRAWING & LITERATURE

The following shall be furnished along with the tender

- a) Cross sectional drawings of the cables, giving dimensional details for each size of cable.
- b) An illustrated literature on the cable, giving technical information, on current ratings, cable constants, short circuit ratings, de-rating factors, for different types of installation, packing date, weights and other relevant information.

**GURANTEED TECHNICAL PARTICULARS OF 11KV XLPE CABLE (ARMOURED)
(TO BE FURNISHED BY THE BIDDER)**

Sl. No.	Particulars	Bidder's Offer
1	CABLES	11KV 1Cx185mm ² XLPE Cable
a)	Manufacturer	
b)	Trade Name	
2	Type of Cable	
3	Applicable specification & Standards	
4	Voltage Class	
5	Whether suitable for extrusion technique is employed in the manufacture of conductor screen	
6	Whether triple extrusion technique is employed in the manufacture of conductor screen	
7	Permissible voltage and frequency variation for satisfactory operation	
8	Continuous Current Rating for standard conditions indicated in specifications:	
a)	Air (450 C Ambient)	
b)	In Ground (350 C)	
c)	In Duct	
d)	In Trench	
9	De-rating factors for various laying conditions	
10	Conductor	
a)	Material	
b)	Shape of conductor	
c)	Nominal area of cross section	
d)	Number of strands per core	
e)	Diameter of Wire (before compacting and stranding)	
f)	Diameter and size of conductor	

11	Conductor Screening	
a)	Type	
b)	Material	
c)	Nominal thickness	
d)	Continuous working temperature	
e)	Maximum allowable temperature at the termination of short circuit	
12	Insulation	
a)	Material	
b)	Thickness of Insulation	
c)	Thickness of Insulation between cores	
d)	Thickness of Insulation between cores and inner sheath	
e)	Tolerance of thickness in insulation	
f)	Diameter of core over insulation	
13	Specific Insulation Resistance at 900C	
14	Process of curing	
15	Whether XLPE Insulation filled or unfilled	
16	Insulation Screening:	
a)	Material	
b)	Thickness	
c)	Thickness of semi conducting part	
d)	Thickness of metallic part	
e)	Size of copper tape	
f)	Whether overlapping provided	
g)	Current carrying capacity for continuous rating	
h)	Current carrying capacity for short circuit rating for 1 minutes	
i)	Diameter of cable over screening	
j)	Whether insulation screen is removable without the application of heat	
17	Inner Sheath	
a)	Material	
b)	Extruded	
c)	Minimum thickness	
d)	Diameter of cable over inner sheath	
18	Armoring:	
a)	Material	
b)	Type of Armouring	
c)	Diameter of wire	
d)	Whether galvanized	
e)	Diameter of cable over Armouring	
f)	Current carrying capacity of Armor	
19	Outer Sheath:	

a)	Material	
b)	Minimum thickness of sheath	
c)	Tolerance over thickness of sheath	
d)	Overall diameter of cable	
20	Scheme for identification of cable	
21	Allowable/attainable maximum conductor temperature when carrying rated current continuously	
22	Cable constants:	
a)	DC Resistance per core 200 C	
b)	AC Resistance per core at operating temperature	
c)	Reactance	
d)	Capacitance	
e)	Insulation Resistance at 270C	
f)	Loss tangent	
g)	Dielectric constant – Maximum cable charging current at normal operating voltage	
23	Factory Tests (Enumerate in detail for each type of cable)	
24	Is the offered cable guaranteed to safely withstand continuous conductor temperature at 900C and also safely withstand temperature upto 1300C for a duration of one hundred hours per year.	
25	Are the offered Three core cable guaranteed to perform satisfactorily under installation conditions specified? If 'Yes' furnish relevant calculations in support including the following data:	
a)	Induced voltage in the Armour when a 500 mtr long cable is carrying current	
b)	Induced voltage and the circulating current in the copper tape	

Name & Signature of Bidder with seal

**GURANTEED TECHNICAL PARTICULARS OF 11KV XLPE CABLE (ARMOURED)
(TO BE FURNISHED BY THE BIDDER)**

Sl. No.	Particulars	Bidder's Offer
1	CABLES	11KV 3Cx300 mm ² XLPE Cable

a)	Manufacturer	
b)	Trade Name	
2	Type of Cable	
3	Applicable specification & Standards	
4	Voltage Class	
5	Whether suitable for extrusion technique is employed in the manufacture of conductor screen	
6	Whether triple extrusion technique is employed in the manufacture of conductor screen	
7	Permissible voltage and frequency variation for satisfactory operation	
8	Continuous Current Rating for standard conditions indicated in specifications:	
a)	Air (450 C Ambient)	
b)	In Ground (350 C)	
c)	In Duct	
d)	In Trench	
9	De-rating factors for various laying conditions	
10	Conductor	
a)	Material	
b)	Shape of conductor	
c)	Nominal area of cross section	
d)	Number of strands per core	
e)	Diameter of Wire (before compacting and stranding)	
f)	Diameter and size of conductor	
11	Conductor Screening	
a)	Type	
b)	Material	
c)	Nominal thickness	
d)	Continuous working temperature	
e)	Maximum allowable temperature at the termination of short circuit	
12	Insulation	
a)	Material	
b)	Thickness of Insulation	
c)	Thickness of Insulation between cores	
d)	Thickness of Insulation between cores and inner sheath	
e)	Tolerance of thickness in insulation	
f)	Diameter of core over insulation	
13	Specific Insulation Resistance at 900C	
14	Process of curing	
15	Whether XLPE Insulation filled or unfilled	
16	Insulation Screening:	

a)	Material	
b)	Thickness	
c)	Thickness of semi conducting part	
d)	Thickness of metallic part	
e)	Size of copper tape	
f)	Whether overlapping provided	
g)	Current carrying capacity for continuous rating	
h)	Current carrying capacity for short circuit rating for 1 minutes	
i)	Diameter of cable over screening	
j)	Whether insulation screen is removable without the application of heat	
17	Inner Sheath	
a)	Material	
b)	Extruded	
c)	Minimum thickness	
d)	Diameter of cable over inner sheath	
18	Armoring:	
a)	Material	
b)	Type of Armouring	
c)	Diameter of wire	
d)	Whether galvanized	
e)	Diameter of cable over Armouring	
f)	Current carrying capacity of Armor	
19	Outer Sheath:	
a)	Material	
b)	Minimum thickness of sheath	
c)	Tolerance over thickness of sheath	
d)	Overall diameter of cable	
20	Scheme for identification of cable	
21	Allowable/attainable maximum conductor temperature when carrying rated current continuously	
22	Cable constants:	
a)	DC Resistance per core 200 C	
b)	AC Resistance per core at operating temperature	
c)	Reactance	
d)	Capacitance	
e)	Insulation Resistance at 270C	
f)	Loss tangent	
g)	Dielectric constant – Maximum cable charging current at normal operating voltage	
23	Factory Tests (Enumerate in detail for each type of cable)	

24	Is the offered cable guaranteed to safely withstand continuous conductor temperature at 900C and also safely withstand temperature upto 1300C for a duration of one hundred hours per year.	
25	Are the offered Three core cable guaranteed to perform satisfactorily under installation conditions specified? If 'Yes' furnish relevant calculations in support including the following data:	
a)	Induced voltage in the Armour when a 500 mtr long cable is carrying current	
b)	Induced voltage and the circulating current in the copper tape	

Name & Signature of Bidder with seal

CONFIDENTIAL

TECHNICAL SPECIFICATION COVER SHEET

Document No: ENG-HV-2010

Document Title: Specification of 11 kV Underground Cable

00	ENG-HV-2010 For tendering	27.03.2020	1920ED5078	GK		RB		SA		HCS	-sd-
00	ENG-HV-72	01.09.2014	NA	PP	-sd-	SRC	-sd-	DRD	-sd-	HCS	-sd-
00	ENG-HV-88 For tender purpose	28.04.16	NA	KK	-sd-	KK	-sd-	DRD	-sd-	HCS	-sd-
03	ENG-HV-11 For tender purpose	13.03.18	1718ED1848	SC	-sd-	PS	-sd-	SRC	-sd-	DRD	-sd-
02	ENG-HV-11 For tender purpose	01.11.13	NA	PP	-sd-	DRD	-sd-	DRD	-sd-	HCS	-sd-
01	ENG-HV-11 For tender purpose	28.07.09	NA	NKY	-sd-	AK	-sd-	KG	-sd-	AS	-sd-
00	ENG-HV-11 For tender purpose	31.08.05	NA	AS	-sd-	BRS	-sd-	-sd-	-sd-	AS	-sd-
01	ENG-HV-01 For Tender	13.03.18	NA	SC	-sd-	PS	-sd-	SRC	-sd-	DRD	-sd-
00	ENG-HV-01 For Tender	30.08.12	NA	AP	-sd-	JC	-sd-	JKS	-sd-	HCS	-sd-
Rev No.	Remarks	Date	ERM No.	Initials	Sign	Initials	Sign	Initials	Sign	Initials	Sign
				Prepared By		Reviewed By		Approved By		Issued By	

Issuing Office

**HoG/HoD/ Head (Plant Engineering)
<Tata Power Delhi Distribution Limited>
< Behind MTNL office, Yogashram Marg, Institutional Area, Sector-3, Rohini – 110085>**

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 1 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

CONTENTS

- 1.0 SCOPE
- 2.0 APPLICABLE STANDARDS
- 3.0 CLIMATIC CONDITIONS OF THE INSTALLATION
- 4.0 GENERAL TECHNICAL REQUIREMENTS
- 5.0 GENERAL CONSTRUCTIONS
- 6.0 NAME PLATE AND MARKING
- 7.0 TESTS
- 8.0 TYPE TEST CERIFICATES
- 9.0 PRE-DISPATCH INSPECTION
- 10.0 INSPECTION AFTER RECEIPT AT STORE
- 11.0 GUARANTEE
- 12.0 PACKING
- 13.0 TENDER SAMPLE
- 14.0 TRAINING
- 15.0 QUALITY CONTROL
- 16.0 MINIMUM TESTING FACILITIES
- 17.0 MANUFACTURING ACTIVITIES
- 18.0 SPARES, ACCESSORIES AND TOOLS
- 19.0 DRAWING AND DOCUMENTS
- 20.0 GUARANTEED TECHNICAL PARTICULARS
- 21.0 SCHEDULE OF DEVIATIONS

+ Annexure: Inspection Test Plan

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 2 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

1.0	SCOPE	<p>This specification covers technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at stores/site, performance of 11 kV cable complete with all accessories for trouble free and efficient operations.</p> <p>Inclusive sizes:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">3 CORE CABLE</th> <th style="width: 50%; text-align: center;">1 CORE CABLE</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3C X 150 sq.mm.</td> <td rowspan="3" style="text-align: center; vertical-align: middle;">1C X 630 sq.mm.</td> </tr> <tr> <td style="text-align: center;">3C X 300 sq.mm.</td> </tr> <tr> <td style="text-align: center;">3C X 400 sq.mm.</td> </tr> <tr> <td style="text-align: center;">3C X 400 sq.mm. (co-extruded cable)</td> <td style="text-align: center; vertical-align: middle;">1C X 1000 sq.mm.</td> </tr> </tbody> </table>	3 CORE CABLE	1 CORE CABLE	3C X 150 sq.mm.	1C X 630 sq.mm.	3C X 300 sq.mm.	3C X 400 sq.mm.	3C X 400 sq.mm. (co-extruded cable)	1C X 1000 sq.mm.																																		
3 CORE CABLE	1 CORE CABLE																																											
3C X 150 sq.mm.	1C X 630 sq.mm.																																											
3C X 300 sq.mm.																																												
3C X 400 sq.mm.																																												
3C X 400 sq.mm. (co-extruded cable)	1C X 1000 sq.mm.																																											
2.0	APPLICABLE STANDARDS	<p>11 kV cable covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest revisions of relevant Indian Standards/ IEC/ International Standards and shall conform to the regulations of local statutory authorities.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">IS 7098 (Part-2)</td> <td>Specification for Cross-linked polyethylene insulated PVC sheathed Cables Part: 2 - For working voltages from 3.3 kV up to and including 33 kV</td> </tr> <tr> <td style="text-align: center;">IS 8130</td> <td>Specification for Conductor for insulated electric cables & flexible cords</td> </tr> <tr> <td style="text-align: center;">IS 3975</td> <td>Low carbon galvanized steel wires, formed wires and tapes for Armouring of cables</td> </tr> <tr> <td style="text-align: center;">IS 10418</td> <td>Specification for Drums for Electric cables</td> </tr> <tr> <td style="text-align: center;">IS 5831</td> <td>Specification for PVC insulation and sheath of electric cables</td> </tr> <tr> <td style="text-align: center;">IS: 3975</td> <td>Low carbon galvanized steel wires, formed wires and tapes for armoring of cables</td> </tr> <tr> <td style="text-align: center;">IEC-60228</td> <td>Conductor for insulated cables</td> </tr> <tr> <td style="text-align: center;">IEC-60502 (Part-2)</td> <td>Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1.2 kV) up to 30 kV (Um = 36 kV) - Part 2: 22 kV Cables for rated voltages from 6 kV (Um = 7.2 kV) up to 30 kV (Um= 36 kV).</td> </tr> <tr> <td style="text-align: center;">IEC-60811</td> <td>Test methods for insulations and sheaths of electric cables and cords.</td> </tr> <tr> <td style="text-align: center;">ASTM D 6097</td> <td>Standard test method for relative resistance to vented water tree growth in Solid Dielectric insulating materials.</td> </tr> <tr> <td style="text-align: center;">ICEA T 31-610</td> <td>Test method for conducting longitudinal water penetration resistance tests on blocked conductors</td> </tr> <tr> <td style="text-align: center;">IS 10810</td> <td>Methods of tests for cables</td> </tr> <tr> <td style="text-align: center;">IS 4905</td> <td>Methods for random sampling</td> </tr> <tr> <td style="text-align: center;">IS 4984</td> <td>High density polyethylene pipes for water supply</td> </tr> <tr> <td style="text-align: center;">IS 2530</td> <td>Methods of test for polyethylene moulding materials and polyethylene compounds</td> </tr> <tr> <td style="text-align: center;">IS 4826</td> <td>Specification for hot dipped galvanized coatings on round steel wires</td> </tr> <tr> <td style="text-align: center;">IEC 332</td> <td>Test on electric cables on the fire conditions</td> </tr> <tr> <td style="text-align: center;">IS 5:2007</td> <td>Colours for ready mixed paints and enamels</td> </tr> <tr> <td style="text-align: center;">ASTM 2863</td> <td>Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)</td> </tr> <tr> <td style="text-align: center;">IEC 60754</td> <td>Apparatus and procedure for the measurement of the amount of halogens evolved during the combustion of materials taken from electric or optical fiber cable constructions</td> </tr> <tr> <td style="text-align: center;">ASTM 2843</td> <td>Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics</td> </tr> </tbody> </table> <p><i>*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.</i></p>	IS 7098 (Part-2)	Specification for Cross-linked polyethylene insulated PVC sheathed Cables Part: 2 - For working voltages from 3.3 kV up to and including 33 kV	IS 8130	Specification for Conductor for insulated electric cables & flexible cords	IS 3975	Low carbon galvanized steel wires, formed wires and tapes for Armouring of cables	IS 10418	Specification for Drums for Electric cables	IS 5831	Specification for PVC insulation and sheath of electric cables	IS: 3975	Low carbon galvanized steel wires, formed wires and tapes for armoring of cables	IEC-60228	Conductor for insulated cables	IEC-60502 (Part-2)	Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1.2 kV) up to 30 kV (Um = 36 kV) - Part 2: 22 kV Cables for rated voltages from 6 kV (Um = 7.2 kV) up to 30 kV (Um= 36 kV).	IEC-60811	Test methods for insulations and sheaths of electric cables and cords.	ASTM D 6097	Standard test method for relative resistance to vented water tree growth in Solid Dielectric insulating materials.	ICEA T 31-610	Test method for conducting longitudinal water penetration resistance tests on blocked conductors	IS 10810	Methods of tests for cables	IS 4905	Methods for random sampling	IS 4984	High density polyethylene pipes for water supply	IS 2530	Methods of test for polyethylene moulding materials and polyethylene compounds	IS 4826	Specification for hot dipped galvanized coatings on round steel wires	IEC 332	Test on electric cables on the fire conditions	IS 5:2007	Colours for ready mixed paints and enamels	ASTM 2863	Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)	IEC 60754	Apparatus and procedure for the measurement of the amount of halogens evolved during the combustion of materials taken from electric or optical fiber cable constructions	ASTM 2843	Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
IS 7098 (Part-2)	Specification for Cross-linked polyethylene insulated PVC sheathed Cables Part: 2 - For working voltages from 3.3 kV up to and including 33 kV																																											
IS 8130	Specification for Conductor for insulated electric cables & flexible cords																																											
IS 3975	Low carbon galvanized steel wires, formed wires and tapes for Armouring of cables																																											
IS 10418	Specification for Drums for Electric cables																																											
IS 5831	Specification for PVC insulation and sheath of electric cables																																											
IS: 3975	Low carbon galvanized steel wires, formed wires and tapes for armoring of cables																																											
IEC-60228	Conductor for insulated cables																																											
IEC-60502 (Part-2)	Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1.2 kV) up to 30 kV (Um = 36 kV) - Part 2: 22 kV Cables for rated voltages from 6 kV (Um = 7.2 kV) up to 30 kV (Um= 36 kV).																																											
IEC-60811	Test methods for insulations and sheaths of electric cables and cords.																																											
ASTM D 6097	Standard test method for relative resistance to vented water tree growth in Solid Dielectric insulating materials.																																											
ICEA T 31-610	Test method for conducting longitudinal water penetration resistance tests on blocked conductors																																											
IS 10810	Methods of tests for cables																																											
IS 4905	Methods for random sampling																																											
IS 4984	High density polyethylene pipes for water supply																																											
IS 2530	Methods of test for polyethylene moulding materials and polyethylene compounds																																											
IS 4826	Specification for hot dipped galvanized coatings on round steel wires																																											
IEC 332	Test on electric cables on the fire conditions																																											
IS 5:2007	Colours for ready mixed paints and enamels																																											
ASTM 2863	Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)																																											
IEC 60754	Apparatus and procedure for the measurement of the amount of halogens evolved during the combustion of materials taken from electric or optical fiber cable constructions																																											
ASTM 2843	Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics																																											

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

		TATA POWER DELHI DISTRIBUTION LIMITED, DELHI	
TECHNICAL SPECIFICATION			
Document Title		Technical Specification – 11 kV Cable	
Document No.		ENG-HV-2010	Eff. Date: 27.03.2020
Revision No.		00	Page 3 of 23
Prepared by: Gagandeep Kaur		Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri
		Issued By: H C Sharma	

3.0	CLIMATIC CONDITIONS OF THE INSTALLATION	Max. Ambient Temperature		50 deg C		
		Max. temperature in shade		45 deg C		
		Min. temperature in shade		2.5 deg C		
		Relative humidity		10 to 100%		
		Average Annual Rainfall		790 mm		
		Rainy months		June to October		
		Max. Altitude above MSL		Not exceeding 300 meters		
		Max. wind pressure		126 kg/sq. m.		
		Seismic level (horizontal ground acceleration)		0.1 g		
		* Atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months.				
4.0	GENERAL TECHNICAL REQUIREMENTS	S.No.	Description	Requirement		
		1.	Voltage grade	11 kV (Earthed system)		
		2	Max System voltage	12 kV		
		3	Frequency	50 Hz		
		4	Variation in frequency	+/- 5%		
		5	Cable components		3 CORE CABLE	1 CORE CABLE
			Conductor		Watertight Stranded Aluminum (compacted circular)	
			Conductor screen		Semi conducting tape and screen	
			Insulation		XLPE	
			Insulation screen		Shall have three layers: a) Bonded Semiconducting, b) Semiconducting water swellable tape, c) Metallic copper tape	Shall have three layers: a) Bonded Semiconducting, b) Semiconducting water swellable tape, c) Metallic copper tape d) Polyester transparent tape over copper screen
Core identification strip			Beneath copper screen	NA		
Inner sheath			Pressure Extruded PVC ST- 2 with PP fillers	Extruded PVC ST-2		
Armour:			GI wire round binded with rubberized cotton binding tape	Aluminum wire binded by rubberized cotton tape		
Outer sheath		PVC ST-2 FRLSH type of colour 'Crimson Red shade' code: 540 as per IS 5:2007				
Outer sheath (For co-extruded cable)		Shall have two layers: a) Inner layer : HDPE ST-7, Crimson Red shade b) Outer sheath: HDPE ST-7, Black colour	NA			
5.0	GENERAL CONSTRUCTION	The cross linked polyethylene insulated (XLPE) Cable (Dry cured and Water cooled) shall be manufactured and tested strictly in accordance with the Indian Standard IS 7098 (Part – 2)/ relevant IEC/International standards and its latest amendments.				
		All material used in the manufacturing of cables shall be new and shall be selected as the best available for the intended use.				
The rating factors for variation in ground and air temperature, depth of laying, Thermal resistivity of soil and for different laying configuration of cables shall be provided by the bidder.						

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

 TATA POWER-DDL	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 4 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		(A) Conductor:			
S.No.	Parameter	Requirement			
1	Conductor	As per IS 8130			
2	Class	Class II			
3	Material	Plain Aluminium, grade H2/H4			
4	Shape	Stranded Compacted Circular			
5	No. of strands & electrical parameters	Nominal size of conductor mm ²	Min. number of strands	Max. DC resistance @ 20 deg C (Ohm/km)	Conductor Short circuit current rating for 1 second
		150	15	0.206	14.2 kA
		300	30	0.10	28.3 kA
		400	53	0.0778	37.7 kA
		630	53	0.0469	59.4 kA
1000	53	0.0291	94.3 kA		
6	Longitudinal water sealing of conductor	a) Non-conductive water swellable yarn/tape/ combination of both shall be provided in between interstices of the conductor. b) Also, this water swellable tape and yarn shall be compatible to withstand conductor continuous temperature of 90 deg C and short circuit temperature of 250 deg C without any decay. c) It shall not affect the electrical conductivity of the conductor.			
7	Cleanliness and uniformity	a) Before stranding, the cross-section of the Aluminium conductor shall be circular, and shall have uniform smooth surface, free from sharp edges and free from any defects. b) Stranded Conductor shall be free from oil traces & aluminum dust. Conductor (after stranding) shall be super cleaned. c) Traces of aluminum dust on conductor or conductor screen shall not be acceptable.			
8	Raw material supplier	Conductor raw material shall be procured from reputed suppliers viz., BALCO/ HINDALCO/ NALCO/ Vedanta only.			
9	Conductor jointing	Not acceptable in any strand or in any conductor after it is stranded.			
10	Diameter of conductor	To be specified by bidder			
11	Weight of conductor/km (approx.)	Nominal size of conductor mm ²	Min. weight of conductor (kg/km/core)		
		150	390		
		300	780		
		400	1080		
		630	1650		
1000	2600				
		(B) Conductor Screen			
S.No.	Parameter	Requirement			
1	Material	1st layer: Semi-conducting tape 2nd layer: Semi-conducting compound			
2	Configuration	1st layer: Semi-conducting tape shall be applied over conductor with nominal thickness of 0.2 mm.			

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 5 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		2nd layer: Semi-conducting conductor screen shall be applied through triple extrusion process.
3	Min. thickness	Minimum thickness of conductor screen shall be 0.5 mm at any point of measurement.
4	Resistivity	Resistivity of semiconducting conductor screen shall not exceed 1000 Ω-m
5	Uniformity on interfacial region	Interfacial region between conductor screen and insulation shall be uniform. Protrusion/ convolution/ other defects are not acceptable in the region.
6	Raw material supplier	Semiconducting compound shall be procured from reputed raw material suppliers viz.,Dow/Borealis/Hanwa only

(C) Insulation

S.No.	Parameter	Requirement
1	Material and extrusion process	XLPE insulation shall be applied through CCV/VCV line by triple extrusion process with 'Dry Curing' and 'Water Cooling'.
2	Raw material supplier	a) XLPE compound shall be super cleaned and procured from reputed raw material suppliers viz., Dow/Borealis/Hanwa only. b) Both XLPE and semi conductive compounds shall be used from same raw material supplier.
3	Thickness and Eccentricity	a) Minimum thickness of insulation shall be 3.14 mm at any point of measurement. b) Nominal thickness shall be 3.6 mm. c) Eccentricity of insulation shall not exceed 10%.
4	Thermal stability	The insulation properties shall be stable under thermal conditions arising out of continuous operation at conductor temperature of 90 deg. C rising momentarily to 250 deg. C under short circuit conditions.
5	Cleanliness and uniformity	Interfacial region between insulation and insulation screen shall be uniform. Protrusion/convolution/ other defects are not acceptable. Core shall be free from void and contamination.

(D) Insulation Screen & Core identification strip

S.No.	Parameter	Requirement
1	Material	a) 1st layer : Semi-conducting compound b) 2nd layer: Semi-conducting water swellable tape c) 3rd layer: Annealed copper tape
2	Configuration	a) 1st layer: Non-Metallic Part: Extruded Insulation semiconducting screen shall be bonded type. Resistivity shall not exceed 500 Ω-meter. Surface of insulation screen shall be smooth, free from cavity/ nicks/scratches/ other visible defects. Min. thickness shall be 0.3 mm at any point of measurement. b) 2nd layer: Water Swellable tape: Semi-conducting water swellable tapes shall be applied over non-metallic screen. Minimum thickness of water swellable shall be 0.3 mm and minimum overlapping shall be 15%.

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 6 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		<p>Core identification strip:</p> <table border="1"> <thead> <tr> <th></th> <th>3 CORE CABLE</th> <th>1 CORE CABLE</th> </tr> </thead> <tbody> <tr> <td>Each of the three core identification strips shall be applied longitudinally beneath copper screen. Width of the coloured strip shall be 7-10 mm.</td> <td></td> <td>NA</td> </tr> </tbody> </table> <p>c) 3rd layer: Metallic Part: Annealed copper tape, helically wound over the water swellable tape with minimum 15% overlap. Minimum thickness shall be 0.045 mm at any point of measurement.</p>		3 CORE CABLE	1 CORE CABLE	Each of the three core identification strips shall be applied longitudinally beneath copper screen. Width of the coloured strip shall be 7-10 mm.		NA									
	3 CORE CABLE	1 CORE CABLE															
Each of the three core identification strips shall be applied longitudinally beneath copper screen. Width of the coloured strip shall be 7-10 mm.		NA															
3	Raw material supplier	Semiconducting compound shall be procured from reputed raw material suppliers viz., Dow/Borealis/Hanwa only															
4	Diameter of cores	To be specified by bidder															
5	Weight of cores/km (approx.)	To be specified by bidder															
6	Weight of copper tape/km (approx.)	To be specified by bidder															
(E) Fillers																	
		<table border="1"> <thead> <tr> <th rowspan="2">S.No.</th> <th rowspan="2">Parameter</th> <th colspan="2">Requirement</th> </tr> <tr> <th>3 CORE CABLE</th> <th>1 CORE CABLE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Material</td> <td>Virgin Polypropylene fibers of natural colour</td> <td rowspan="2">NA</td> </tr> <tr> <td>2</td> <td>Configuration</td> <td>Virgin Polypropylene fibers shall be tightly filled in empty space as fillers.</td> </tr> </tbody> </table>		S.No.	Parameter	Requirement		3 CORE CABLE	1 CORE CABLE	1	Material	Virgin Polypropylene fibers of natural colour	NA	2	Configuration	Virgin Polypropylene fibers shall be tightly filled in empty space as fillers.	
S.No.	Parameter	Requirement															
		3 CORE CABLE	1 CORE CABLE														
1	Material	Virgin Polypropylene fibers of natural colour	NA														
2	Configuration	Virgin Polypropylene fibers shall be tightly filled in empty space as fillers.															
(F) Inner Sheath:																	
		<table border="1"> <thead> <tr> <th rowspan="2">S.No.</th> <th rowspan="2">Parameter</th> <th colspan="2">Requirement</th> </tr> <tr> <th>3 CORE CABLE</th> <th>1 CORE CABLE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Material</td> <td colspan="2">Black coloured Polyvinyl chloride (PVC) type ST-2 compound</td> </tr> <tr> <td>2</td> <td>Configuration</td> <td>The laid up cores shall be provided with <i>pressure extruded</i> Polyvinyl chloride (PVC) type ST-2 compound conforming to IS: 5831 with latest amendments. Pressurized extrusion is required to remove any gaps remaining in between the fillers and to make the cable as circular as possible. It shall be applied to fit closely on to the laid up cores and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens.</td> <td>Extruded PVC ST-2 type conforming to IS: 5831. It shall be applied to fit closely and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens.</td> </tr> </tbody> </table>		S.No.	Parameter	Requirement		3 CORE CABLE	1 CORE CABLE	1	Material	Black coloured Polyvinyl chloride (PVC) type ST-2 compound		2	Configuration	The laid up cores shall be provided with <i>pressure extruded</i> Polyvinyl chloride (PVC) type ST-2 compound conforming to IS: 5831 with latest amendments. Pressurized extrusion is required to remove any gaps remaining in between the fillers and to make the cable as circular as possible. It shall be applied to fit closely on to the laid up cores and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens.	Extruded PVC ST-2 type conforming to IS: 5831. It shall be applied to fit closely and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens.
S.No.	Parameter	Requirement															
		3 CORE CABLE	1 CORE CABLE														
1	Material	Black coloured Polyvinyl chloride (PVC) type ST-2 compound															
2	Configuration	The laid up cores shall be provided with <i>pressure extruded</i> Polyvinyl chloride (PVC) type ST-2 compound conforming to IS: 5831 with latest amendments. Pressurized extrusion is required to remove any gaps remaining in between the fillers and to make the cable as circular as possible. It shall be applied to fit closely on to the laid up cores and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens.	Extruded PVC ST-2 type conforming to IS: 5831. It shall be applied to fit closely and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens.														

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 7 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		3	Raw material supplier	PVC compound shall be procured from reputed raw material suppliers viz., Shakun, Kalpana, KLJ, DCM ShriRam. PVC compound from cable manufacturer shall be considered only after factory evaluation for the same.																	
		4	Min. thickness At any point of measurement	<table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2">3 CORE CABLE</th> <th colspan="2">1 CORE CABLE</th> </tr> </thead> <tbody> <tr> <td>3CX150 sq.mm.</td> <td>0.6 mm</td> <td>1CX630 sq.mm.</td> <td>0.5 mm</td> </tr> <tr> <td>3CX300 sq.mm.</td> <td>0.7 mm</td> <td>1CX1000 sq.mm.</td> <td>0.6 mm</td> </tr> <tr> <td>3CX400 sq.mm.</td> <td>0.7 mm</td> <td></td> <td></td> </tr> </tbody> </table>		3 CORE CABLE		1 CORE CABLE		3CX150 sq.mm.	0.6 mm	1CX630 sq.mm.	0.5 mm	3CX300 sq.mm.	0.7 mm	1CX1000 sq.mm.	0.6 mm	3CX400 sq.mm.	0.7 mm		
3 CORE CABLE		1 CORE CABLE																			
3CX150 sq.mm.	0.6 mm	1CX630 sq.mm.	0.5 mm																		
3CX300 sq.mm.	0.7 mm	1CX1000 sq.mm.	0.6 mm																		
3CX400 sq.mm.	0.7 mm																				
(G) Armour:																					
		S.No.	Parameter	Requirement																	
				3 CORE CABLE		1 CORE CABLE															
		1	Material	Low carbon annealed hot dipped galvanized round steel wires		H4 Grade Aluminium wires															
		2	Compliance to Standard	It shall comply with the requirements of IS 3975 along with latest amendments. Hot dipped galvanizing layer shall be uniform on low carbon annealed steel wires. Zinc coating shall be 290 g/m ² as per IS 4826:1979.		It shall comply with the requirements of IS 8130 along with latest amendments.															
		3	Nominal Dimensions	3 CORE CABLE		1 CORE CABLE															
				3CX150 sq.mm.	2.5 mm (GI wire)	1CX630 sq.mm.	2.0 mm (Aluminum wire)														
				3CX300 sq.mm.	3.15 mm (GI Wire)	1CX1000 sq.mm.	2.5 mm (Aluminum wire)														
		4	Approx. Armour Short circuit rating of armour for 1 sec (kA)	3 CORE CABLE		1 CORE CABLE															
				3CX150 sq.mm.	13	1CX630 sq.mm.	17														
				3CX300 sq.mm.	22	1CX1000 sq.mm.	25														
		5	Joining in the armour wires	Not acceptable in any armour wire																	
		6	Laying of armour	The armor wires shall be applied as closely as practicable. Shall not be less than 90% of total circumference.																	
		7	Binding	The rubberized cotton binding tape shall be applied to bind the armor wires such that it shall not affect the electrical properties of the armor wires and the overall cable.																	
		8	Weight of armor	To be furnished by Bidder																	

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 8 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

9	Raw material supplier	Armour shall be procured from reputed raw material suppliers viz., TATA Steel, Jindal Steel, SAIL only.
---	-----------------------	---

(H) Outer Sheath (for normal cable)

S.No.	Parameter	Requirement
1	Material	Polyvinyl chloride (PVC) ST-2 FRLSH type compound with ' lead naphthenate ' additive
2	Configuration	Polyvinyl chloride (PVC) ST-2 FRLSH type compound with ' lead naphthenate ' additive as 'termite & rodent repellent' applied by extrusion process.
3	Min. Thickness at any point of measurement	3 CORE CABLE
		3CX150 sq.mm. 2.36 mm
		3CX300 sq.mm. 2.84 mm
		3CX400 sq.mm. 3.00 mm
		1 CORE CABLE
		1CX630 sq.mm. 1.88 mm
		1CX1000 sq.mm. 2.2 mm
4	Colour	Crimson Red, colour code: 540 as per IS 5:2007.
5	Surface uniformity	Surface of outer sheath shall be free from cavity/ nicks/ other visible defects.
6	Raw material supplier	PVC compound shall be procured from reputed raw material suppliers viz., Shakun, Kalpana, KLJ, DCM ShriRam. PVC compound from cable manufacturer shall be considered only after factory evaluation for the same.
7	Weight of outer sheath/km	To be provided by bidder

(I) Outer Sheath (for co-extruded 3 core cable)

S.No.	Parameter	Requirement
1	Inner layer	HDPE ST-7, Crimson red of colour code 540, Minimum thickness at any point of measurement – 3 mm
2	Outermost layer	HDPE ST-7, Black colour, Nominal Thickness at any point of measurement – 2 mm. Carbon content shall be as per IS 7098
3	Surface uniformity	Surface of outer sheath shall be free from cavity/ nicks/ other visible defects.
4	Raw material supplier	HDPE shall be procured from reputed raw material suppliers viz., Shakun, Kalpana, KLJ, SCJ Plastics, and Borealis only.
5	Weight of outer sheath/km	To be provided by bidder
6	Weight of total HDPE/km	To be provided by bidder

(J) Sealing end cap:

S.No.	Parameter	Requirement
1	Material	Adhesive coated polyolefin heat shrinkable
2	Configuration	Adhesive coated polyolefin heat shrinkable end cap shall be provided at both ends of the cable.

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 9 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		3	Additional requirements	2 nos. additional cable end caps shall be provided with each drum and placed in the drum.
		(K) Other requirements		
		S.No.	Parameter	Requirement
		1	Overall diameter of cable	To be provided by bidder
		2	Weight of Overall cable	To be provided by bidder
6.0	NAME PLATE AND MARKING ON DRUM AND CABLE OUTER SHEATH	<p>Steel drums shall be provided. Drum shall be free from sharp edges and visual defect.</p> <p>Stencil plate on one flange side of the drum and laminated paper sheet on other side flange of drum.</p> <p>Cable length on one drum shall be 250 meters max. +/- 5%.</p> <p>i. Following details shall be provided on flanges of drum:</p> <ul style="list-style-type: none"> a) Manufacturer's name b) Type of Cable c) Size of Cable d) Voltage Grade e) Length of the cable on the drum f) Direction of the rotation of the drum g) Gross mass h) Country of manufacture i) Year and month of manufacture j) Purchase Order no. k) Drum No. <p>ii. Following details shall be embossed on the outer PVC Jacket (for normal cable) & HDPE layer (for co-extruded cable):</p> <p>Embossing shall be clearly visible.</p> <p>At interval of every 1 meter, following details to be embossed:</p> <ul style="list-style-type: none"> a) Sequential meter marking (shall be marked through printing) b) Property of TATA POWER-DDL c) Manufacturer name d) Month & Year of Manufacture e) Voltage grade f) Size of the cable g) Purchase Order no. h) Cable code 		

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 10 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

7.0	TESTS	<p>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 should also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the 11 kV cables in additions to others specified in IS/IEC standards.</p> <p><i>*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.</i></p> <p>(A) Type Tests</p>																																																																																																																									
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">S.No.</th> <th rowspan="2">Test</th> <th colspan="2">Specific value</th> <th colspan="2">Test method</th> </tr> <tr> <th>Clause No.</th> <th>Reference Standard</th> <th>Clause No.</th> <th>Reference Standard</th> </tr> </thead> <tbody> <tr> <td colspan="6" style="text-align: center;">Tests on Conductor</td> </tr> <tr> <td>1</td> <td>Conductor resistance test</td> <td>Table 2</td> <td>IS 8130</td> <td>10</td> <td>IS 10810 part 5</td> </tr> <tr> <td>2</td> <td>Conductor water penetration test</td> <td>IEC 60502/ ICEA T-31-610</td> <td>IEC 60502/ ICEA T-31-610</td> <td>Annexure F</td> <td>IEC 60502/ ICEA T-31-610</td> </tr> <tr> <td colspan="6" style="text-align: center;">Tests on Insulation</td> </tr> <tr> <td>3</td> <td>Tensile strength & Elongation at break (before ageing)</td> <td>Table 1 of Clause No.5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 7</td> </tr> <tr> <td>4</td> <td>Ageing in air oven</td> <td>Table 1 of Clause No.5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 11</td> </tr> <tr> <td>5</td> <td>Tensile strength & Elongation at break</td> <td>Table 1 of Clause No.5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 7</td> </tr> <tr> <td>6</td> <td>Tests for thickness of insulation</td> <td>Table 4</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 6</td> </tr> <tr> <td>7</td> <td>Eccentricity and Ovality of insulation</td> <td>12.4</td> <td>IS 7098 part 2</td> <td>Annexure A</td> <td>IS 7098 part 2</td> </tr> <tr> <td>8</td> <td>Hot set test</td> <td>Table 1 of Clause No.5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 30</td> </tr> <tr> <td>9</td> <td>Shrinkage test</td> <td>Table 1 of Clause No.5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 12</td> </tr> <tr> <td>10</td> <td>Gravimetric test (Water absorption)</td> <td>Table 1 of Clause No.5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 33</td> </tr> <tr> <td>11</td> <td>Volume resistivity/ Insulation Resistance</td> <td>Table 1 of Clause No.5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 43</td> </tr> <tr> <td colspan="6" style="text-align: center;">Tests on Inner Sheath</td> </tr> <tr> <td>12</td> <td>PVC thickness</td> <td>Table 5</td> <td>IS 7098 part 2</td> <td>8</td> <td>IS 10810 part 6</td> </tr> <tr> <td colspan="6" style="text-align: center;">Tests on Extruded semi-conducting screen</td> </tr> <tr> <td>13</td> <td>Volume resistivity test of conductor screen</td> <td>Table 2</td> <td>IS 7098 part 2</td> <td>Annexure E</td> <td>IS 7098 part 2</td> </tr> <tr> <td>14</td> <td>Volume resistivity test of core screen</td> <td>Table 2</td> <td>IS 7098 part 2</td> <td>Annexure E</td> <td>IS 7098 part 2</td> </tr> </tbody> </table>				S.No.	Test	Specific value		Test method		Clause No.	Reference Standard	Clause No.	Reference Standard	Tests on Conductor						1	Conductor resistance test	Table 2	IS 8130	10	IS 10810 part 5	2	Conductor water penetration test	IEC 60502/ ICEA T-31-610	IEC 60502/ ICEA T-31-610	Annexure F	IEC 60502/ ICEA T-31-610	Tests on Insulation						3	Tensile strength & Elongation at break (before ageing)	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 7	4	Ageing in air oven	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 11	5	Tensile strength & Elongation at break	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 7	6	Tests for thickness of insulation	Table 4	IS 7098 part 2	8	IS 10810 part 6	7	Eccentricity and Ovality of insulation	12.4	IS 7098 part 2	Annexure A	IS 7098 part 2	8	Hot set test	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 30	9	Shrinkage test	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 12	10	Gravimetric test (Water absorption)	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 33	11	Volume resistivity/ Insulation Resistance	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 43	Tests on Inner Sheath						12	PVC thickness	Table 5	IS 7098 part 2	8	IS 10810 part 6	Tests on Extruded semi-conducting screen						13	Volume resistivity test of conductor screen	Table 2	IS 7098 part 2	Annexure E	IS 7098 part 2	14	Volume resistivity test of core screen	Table 2	IS 7098 part 2	Annexure E	IS 7098 part 2
		S.No.	Test	Specific value				Test method																																																																																																																			
				Clause No.	Reference Standard	Clause No.	Reference Standard																																																																																																																				
		Tests on Conductor																																																																																																																									
		1	Conductor resistance test	Table 2	IS 8130	10	IS 10810 part 5																																																																																																																				
		2	Conductor water penetration test	IEC 60502/ ICEA T-31-610	IEC 60502/ ICEA T-31-610	Annexure F	IEC 60502/ ICEA T-31-610																																																																																																																				
		Tests on Insulation																																																																																																																									
		3	Tensile strength & Elongation at break (before ageing)	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 7																																																																																																																				
		4	Ageing in air oven	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 11																																																																																																																				
		5	Tensile strength & Elongation at break	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 7																																																																																																																				
		6	Tests for thickness of insulation	Table 4	IS 7098 part 2	8	IS 10810 part 6																																																																																																																				
		7	Eccentricity and Ovality of insulation	12.4	IS 7098 part 2	Annexure A	IS 7098 part 2																																																																																																																				
		8	Hot set test	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 30																																																																																																																				
9	Shrinkage test	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 12																																																																																																																						
10	Gravimetric test (Water absorption)	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 33																																																																																																																						
11	Volume resistivity/ Insulation Resistance	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 43																																																																																																																						
Tests on Inner Sheath																																																																																																																											
12	PVC thickness	Table 5	IS 7098 part 2	8	IS 10810 part 6																																																																																																																						
Tests on Extruded semi-conducting screen																																																																																																																											
13	Volume resistivity test of conductor screen	Table 2	IS 7098 part 2	Annexure E	IS 7098 part 2																																																																																																																						
14	Volume resistivity test of core screen	Table 2	IS 7098 part 2	Annexure E	IS 7098 part 2																																																																																																																						

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 11 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

Tests on Outer Sheath (PVC)					
15	Flammability test for outer sheath	As per IEC 332 part 1			
16	Thickness	Table 7	IS 7098 part 2		
17	Tensile strength and Elongation at break (before ageing)	Table 2	IS 5831	8	IS 10810 part 7
18	Tensile strength and Elongation at break (after ageing)	Table 2	IS 5831	8	IS 10810 part 7
19	Variation due to ageing	Table 2	IS 5831	8	IS 10810 part 7
20	Loss of mass test	Table 2	IS 5831	8	IS 10810 part 10
21	Shrinkage test	Table 2	IS 5831	8	IS 10810 part 12
22	Hot deformation test	Table 2	IS 5831	8	IS 10810 part 15
23	Heat shock test	Table 2	IS 5831	8	IS 10810 part 14
24	Thermal stability test	Table 2	IS 5831	Appendix B	IS 5831:1984
25	Oxygen index	As per ASTM 2863			
26	Temperature index	ASTM 2863			
27	Acid gas generation	IEC 60754			
28	Smoke density	ASTM 2843			
Tests on Outer Sheath – HDPE ST 7 (For co-extruded cable)					
29	Thickness	As per Specification			
30	Tensile strength & Elongation at break (before ageing)	Table 7	IS 7098 part 2	Annexure G	IS 7098 part 2
31	Tensile strength & Elongation at break (after ageing)	Table 7	IS 7098 part 2	12.4.4.3	IS 7098 part 2
32	Shrinkage test	Table 8	IS 7098 part 2	12.4.14	IS 7098 part 2
33	Carbon black content	12.4.12.2	IS 7098 part 2	12.4.12	IS 7098 part 2
Tests on Armour for 3 Core Cable					
34	Tensile test	8	IS 3975	6	IS 1608
35	Torsion test	8	IS 3975	7	IS 1717
36	Wrapping test	8	IS 3975	5	IS 1755
37	Resistance test	8	IS 3975	8	IS 10810 Part 42
38	Mass of zinc coating	9	IS 4826	6	IS 6745
39	Uniformity of zinc coating	9	IS 3975	4	IS 2633
40	Adhesion test	9	IS 3975	9.3	IS 3975
Tests on Armour for 1 Core Cable					
41	Tensile test	8	IS 8130	6	IS 1608
42	Torsion test	8	IS 8130	7	IS 1717

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

 TATA POWER-DDL	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 12 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

43	Wrapping test	8	IS 8130	5	IS 1755
44	Resistance test	8	IS 8130	8	IS 10810 Part 42
Tests on complete cable					
45	Partial discharge test	20.2	IS 7098 part 2	8	IS 10810 Part 46
46	Thermal ageing test	20.9	IS 7098 part 2	20.9	IS 7098 part 2
47	Bending test	20.3	IS 7098 part 2	20.3	IS 7098 part 2
48	Dielectric power factor test	20.4	IS 7098 part 2	20.4	IS 7098 part 2
49	High voltage test	21 kV for 5 minutes As per Clause no. 20.7.2	IS 7098 part 2	20.7	IS 7098 part 2
50	Heat cycle test	20.5	IS 7098 part 2	20.5	IS 7098 part 2
51	Impulse withstand test	20.6	IS 7098 part 2	20.6	IS 7098 part 2

(B) Routine Tests

Test	Clause No.	Reference Standard
Conductor resistance test	19.3	IS 7098 part 2
Partial discharge	19.3	IS 7098 part 2
High voltage test with power frequency	19.3	IS 7098 part 2
Resistance test for Aluminium armour	19.3	IS 7098 part 2

(C) Acceptance Tests:

All acceptance tests mentioned below shall be witnessed by TATA Power-DDL's representative during inspection stage.

S.No.	Test name	Specific value		Test method	
		Clause No.	Reference Standard	Clause No.	Reference Standard
(I) Test on Conductor					
1	Conductor resistance test	Clause No. 5(A.5)	ENG-HV-2010	10	IS 10810 part 5
2	Test for non-conductivity of water swellable tape/yarn of conductor	Clause No. 5(A.6)	ENG-HV-2010	Through multimeter	

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 13 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

	3	Visual inspection for conductor cleanliness	Clause No. 5(A.7)	ENG-HV-2010	Check for presence of any Aluminium dust		
	4	Conductor water penetration test	ICEA T-31-610				
	(II) Test on Conductor Screen						
	5	Thickness of semi-conducting tape over conductor	Clause No. 5(B.2)	ENG-HV-2010	Value to be noted by inspector		
	6	Test for conductivity of semi-conducting tape over conductor	Clause No. 5(B.2)	ENG-HV-2010	Through multimeter		
	7	Resistivity of extruded semi-conducting conductor screen	Clause No. 5(B.4)	ENG-HV-2010	Annexure E	IS 7098 part 2	
	8	Thickness of extruded semi-conducting conductor screen	Clause No. 5(B.3)	ENG-HV-2010	Value to be noted by inspector		
	(III) Test on Insulation						
	9	Tensile strength & Elongation at break (before ageing)	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 7	
	10	Insulation thickness	Clause No. 5(C.3)	ENG-HV-2010	8	IS 10810 part 6	
	11	Eccentricity and Ovality of insulation	Clause No. 5(C.3)	ENG-HV-2010	Annexure A	IS 7098 part 2	
	12	Hot set test	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 30	
	13	Volume resistivity	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 43	
	14	Void & contamination test on core (by silicon dip method)	Clause No. 5(C.5)	ENG-HV-2010	20.1	IS 7098 part 3	
	15	Surface smoothness of insulation	Clause No. 5(C.5)	ENG-HV-2010	To be checked by inspector		
	(IV) Test on Insulation Screen						
	16	Resistivity of insulation screen	Clause No. 5(D.2.a)	ENG-HV-2010	Annexure E	IS 7098 part 2	
17	Thickness of insulation screen	Clause No. 5(D.2)	ENG-HV-2010	Value to be noted by inspector			

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 14 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		18	Visual inspection for any convolution/ protrusion between conductor screen and XLPE insulation, XLPE insulation and insulation screen	Clause no. 5(C.5)	ENG-HV-2010	To be checked by inspector			
		19	Thickness & % Overlapping of semi-conducting water swellable tape	Clause no. 5(D.2.b)	ENG-HV-2010	Value to be noted by inspector			
		20	Thickness & % Overlapping of copper tape	Clause No. 5(D.2.c)	ENG-HV-2010	Value to be noted by inspector			
		(V) Test on Inner sheath							
		21	PVC thickness	Clause No. 5(F.4)	ENG-HV-2010	8	IS 10810 part 6		
		22	Colour of inner sheath	Clause No. 5(F.1)	ENG-HV-2010	To be checked by inspector			
		(VI) Test on Armour							
		For 3 core cable							
		23	Tensile test	8	IS 3975	IS 1608			
		24	Mass of zinc coating	Table 1	IS 4826	IS 6745			
		25	Uniformity of zinc coating	9	IS 3975	IS 2633			
		26	Adhesion test	9	IS 3975	IS 3975			
		27	Diameter and no. of wires	Clause No. 5(G.3)	ENG-HV-2010	Value to be noted by inspector			
		28	Coverage %	Clause No. 5(G.6)	ENG-HV-2010	Value to be noted by inspector			
		For 1 core cable							
		29	Tensile test	8	IS 8130	6	IS 1608		
		30	Wrapping test	8	IS 8130	5	IS 1755		
		31	Resistance test	8	IS 8130	8	IS 10810 Part 42		
		32	Diameter and no. of wires	Clause No. 5(G.3)	ENG-HV-2010	Value to be noted by inspector			
		33	Coverage %	Clause No. 5(G.6)	ENG-HV-2010	Value to be noted by inspector			
		(VII) Test on Outer Sheath							
		PVC Outer Sheath for normal cable							
		34	Thickness	Clause No. 5(H.3)	ENG-HV-2010	Value to be noted by inspector			

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

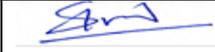
	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 15 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

35	Tensile strength and Elongation at break (before ageing)	Table 2	IS 5831	8	IS 10810 part 7
36	Colour of outer sheath	Clause No. 5(H.4)	ENG-HV-2010	To be checked by inspector	
37	Surface uniformity of outer sheath (on full drum)/ shall be free from any damage- void, nick, cavity.	Clause No. 5(H.5)	ENG-HV-2010	Through rewinding of drum (As per TATA POWER-DDL specification)	
38	Presence of lead naphenate in PVC outer sheath	Chemical test Clause no. 5(H.1)	ENG-HV-2010	To be checked by inspector	
39	Flammability test	As per IEC 332 part 1			
40	Oxygen index	As per ASTM 2863			
41	Temperature index	ASTM 2863			
42	Acid gas generation	IEC 60754			
43	Smoke density	ASTM 2843			
HDPE Outer Sheath for 3 core co-extruded cable					
(a) Inner layer					
44	Thickness	Clause No. 5(I.1)	ENG-HV-2010	Value to be noted by inspector	
45	Tensile strength and Elongation at break (before ageing)	Table 2	IS 7098 part 2	8	IS 10810 part 7
46	Colour	Clause No. 5(I.1)	ENG-HV-2010	To be checked by inspector	
(b) Outer layer					
47	Thickness	Clause No. 5(I.2)	ENG-HV-2010	Value to be noted by inspector	
48	Tensile strength and Elongation at break (before ageing)	Table 2	IS 7098 part 2	8	IS 10810 part 7
49	Carbon content	12.4.12.2	IS 7098 part 2	10	IS 2530
50	Colour	Clause No. 5(I.2)	ENG-HV-2010	To be checked by inspector	
51	Surface uniformity of outer sheath (on full drum)/ shall be free from any damage- void, nick, cavity	Clause No. 5(I.3)	ENG-HV-2010	Through rewinding of drum (As per TATA POWER-DDL specification)	
(VIII) Tests for complete cable					
52	Partial discharge test	5 pC	As per type test	8	IS 10810 part 46
53	High voltage test	21 kV for 5 minutes As per Clause no. 20.7.2	IS 7098 part 2	8	IS 10810 part 45

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 16 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		(IX) Additional tests				
		54	Raw material consumption	Document verification as proof to be submitted		
				Invoice to be shown from procurement to consumption		
		55	Colour coding identification over copper screen (for 3C cable)	Clause no. 5(D.2)	ENG-HV-2010	To be checked by inspector
		56	Sequential marking check	Clause no. 6.ii	ENG-HV-2010	To be checked by inspector
		57	Cable drum length verification	Clause no. 6	ENG-HV-2010	To be checked by inspector
		58	Packaging of cable on cable drum	By recyclable PVC sheet- As per Clause no.12	ENG-HV-2010	To be checked by inspector
		59	Diameter over outermost sheath of co-extruded cable	Clause No. 5(K.1)	ENG-HV-2010	Value to be noted by inspector
		60	Weight of outer sheath of co-extruded cable/ km	Clause No. 5(I.5)	ENG-HV-2010	Value to be noted by inspector
		61	Weight of total HDPE of co-extruded cable/ km	Clause No. 5(I.6)	ENG-HV-2010	Value to be noted by inspector
8.0	TYPE TEST CERTIFICATES	<p>Requirement: Bidder shall furnish the type test report of 11 kV cable for the tests as mentioned in Clause no. 7 of this specification and as per reference standards.</p> <p>Test Laboratories: Complete set of Type Tests shall be conducted at certified test laboratories, which are CPRI / ERDA only.</p> <p>Type test report shall be submitted for the type, size and rating of the cable mentioned in the bid/ OR for any size higher (than required) of similar type and similar voltage grade.</p> <p>Type test should have been conducted in certified test laboratories during the period not exceeding 5 years from the date of opening the bid.</p> <p>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 TATA POWER-DDL.</p> <p>In case the type test certificates are dated beyond 5 years and up to 10 years maintaining basic component design same then deviation should be submitted on vendor letter head. TATA POWER-DDL will have the rights to accept/reject the same.</p>				
9.0	PRE-DISPATCH INSPECTION	<p>Inspection shall be carried out by duly authorized representative of TATA POWER-DDL. Bidder shall grant free access to the places of manufacture to TATA Power-DDL's representatives at all times when the work is in progress.</p> <p>Inspection may be made at any stage of manufacturing at the discretion of TATA Power-DDL and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection.</p>				

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 17 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

		<p>Inspection by TATA Power-DDL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications.</p> <p>Dispatch of material: Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TATA Power-DDL.</p> <p>Following documents shall be sent along with the supplied material:</p> <ol style="list-style-type: none"> Test reports MDCC issued by TATA POWER-DDL Invoice in duplicate Packing list Delivery Challan
10.	INSPECTION AFTER RECEIPT AT STORES	The material received at TATA Power-DDL store shall 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 Contracts & Engineering department.
11.0	GUARANTEE	<p>Requirement: Bidder shall confirm for guarantee towards design, material, workmanship & quality of process / manufacturing for integrated product delivered under the contract. In the event any defect is found by TATA Power-DDL, up to a period of at least 60 months from the date of commissioning or 72 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 TATA POWER-DDL, failing which TATA POWER-DDL will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the TATA Power-DDL's own charges (@ 20% of expenses incurred), from the Bidder or from 'Security cum Performance Deposit' as the case may be.</p> <p>Free replacement: 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 TATA Power-DDL.</p>
12.0	PACKAGING	<ol style="list-style-type: none"> Standard length of Cable: The cable shall be supplied in continuous standard length of 250 (3 cores) & 500 (Single core) running meters with +/- 5% tolerance. Filling condition: Drum shall not be overfilled. Cable drum: The cable shall be wound on non-returnable steel drums without any extra cost to TATA POWER-DDL as per IS 10418 and its latest amendments. Sealing of cable ends: The ends of the cable shall be sealed by means of heat shrinkable polyolefin end caps. Additional 2 nos. end caps shall be provided with each drum. Requirements for Cable drums: Cable drums shall be so constructed as to have required mechanical strength so that the drum flanges and other components do not break during transport, in actual use or in storage. The flanges and the outside surface of the barrel shall be free from protruding materials/projections/ unevenness/ sharp edges that can damage the cable or hands of the operator during rotation of drums. A metal preservation shall be applied to the entire drum. Bottom end of cable should be clamped on drum by jute or nylon rope. All ferrous metal parts used shall be treated with a suitable rust free finish or coating to avoid rusting during transit or storage. The drums shall withstand normal handling and transport. Rail/ Road transportation: The bidder shall ensure that 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. Packaging shall be as per climate change perspective. Cable wound on cable drum shall be covered by recyclable PVC sheet for dust proof. TATA POWER-DDL encourages to use environment friendly packaging.

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 18 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

13.0	TENDER SAMPLE	NA
14.0	QUALITY CONTROL	<p>The bidder shall submit 'Quality Assurance Plan' followed by him in respect of:</p> <p>Bought out items Items manufactured by him Raw materials in process Final inspection Packaging & Marking.</p> <p>As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TATA POWER-DDL reserves the sole rights for the type test of random sample from the lot and in case of any discrepancy or deviation from the Type test certificates submitted along with the bid, the complete Lot shall be rejected. TATA Power-DDL's nominated representative shall have free access to the bidder's works to carry out inspections.</p>
15.0	MINIMUM TESTING FACILITIES	Bidder shall have adequate in house testing facilities for carrying out all routine and acceptance tests as per relevant International / Indian standards.
16.0	MANUFACTURING ACTIVITIES	<p>The successful bidder will have to submit (after placement of RC) technical compliance document and drawing of cable as per RC line items for getting approval before mass manufacturing.</p> <p>Manufacturing mass quantity to start only after getting CAT-A approved drawings or as per intimation from Tata POWER-DDL.</p>
17.0	SPARES, ACCESSORIES AND TOOLS	Not Applicable
18.0	DRAWINGS AND DOCUMENTS	<p>Following documents shall be submitted along with the bid for approval after award of RC/PO:</p> <ol style="list-style-type: none"> Completely filled-in clause wise compliance of the specification. General description of the equipment and all components including brochures Type test Certificates for each specified test Experience List. Cross sectional drawing of the cable. Rating factors for variation in ground and air temperature, depth of laying, thermal resistivity of soil and different laying configuration of cables. A detailed list of bought out items which got into the manufacture of cables should be furnished indicating the name of the firms from whom these items are procured. <p>All the Documents and Drawings shall be in English Language.</p>
19.0	GUARANTEED TECHNICAL PARTICULARS	Bidder to submit clause wise compliance.

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 19 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

(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.

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

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

Seal of the Company

Signature :

Designation

20.0

SCHEDULE OF DEVIATIONS

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 20 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

ANNEXURE – 1

INSPECTION TEST PLAN

S.No.	Test name	Specific value		Test method	
		Clause No.	Reference Standard	Clause No.	Reference Standard
(I) Test on Conductor					
1	Conductor resistance test	Clause No. 5(A.5)	ENG-HV-2010	10	IS 10810 part 5
2	Test for non-conductivity of water swellable tape/yarn of conductor	Clause No. 5(A.6)	ENG-HV-2010	Through multimeter	
3	Visual inspection for conductor cleanliness	Clause No. 5(A.7)	ENG-HV-2010	Check for presence of any Aluminium dust	
4	Conductor water penetration test	ICEA T-31-610			
(II) Test on Conductor Screen					
5	Thickness of semi-conducting tape over conductor	Clause No. 5(B.2)	ENG-HV-2010	Value to be noted by inspector	
6	Test for conductivity of semi-conducting tape over conductor	Clause No. 5(B.2)	ENG-HV-2010	Through multimeter	
7	Resistivity of extruded semi-conducting conductor screen	Clause No. 5(B.4)	ENG-HV-2010	Annexure E	IS 7098 part 2
8	Thickness of extruded semi-conducting conductor screen	Clause No. 5(B.3)	ENG-HV-2010	Value to be noted by inspector	
(III) Test on Insulation					
9	Tensile strength & Elongation at break (before ageing)	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 7
10	Insulation thickness	Clause No. 5(C.3)	ENG-HV-2010	8	IS 10810 part 6
11	Eccentricity and Ovality of insulation	Clause No. 5(C.3)	ENG-HV-2010	Annexure A	IS 7098 part 2
12	Hot set test	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 30
13	Volume resistivity	Table 1 of Clause No.5	IS 7098 part 2	8	IS 10810 part 43

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 21 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

14	Void & contamination test on core (by silicon dip method)	Clause No. 5(C.5)	ENG-HV-2010	20.1	IS 7098 part 3
15	Surface smoothness of insulation	Clause No. 5(C.5)	ENG-HV-2010	To be checked by inspector	
(IV) Test on Insulation Screen					
16	Resistivity of insulation screen	Clause No. 5(D.2.a)	ENG-HV-2010	Annexure E	IS 7098 part 2
17	Thickness of insulation screen	Clause No. 5(D.2)	ENG-HV-2010	Value to be noted by inspector	
18	Visual inspection for any convolution/ protrusion between conductor screen and XLPE insulation, XLPE insulation and insulation screen	Clause no. 5(C.5)	ENG-HV-2010	To be checked by inspector	
19	Thickness & % Overlapping of semi-conducting water swellable tape	Clause no. 5(D.2.b)	ENG-HV-2010	Value to be noted by inspector	
20	Thickness & % Overlapping of copper tape	Clause No. 5(D.2.c)	ENG-HV-2010	Value to be noted by inspector	
(V) Test on Inner sheath					
21	PVC thickness	Clause No. 5(F.4)	ENG-HV-2010	8	IS 10810 part 6
22	Colour of inner sheath	Clause No. 5(F.1)	ENG-HV-2010	To be checked by inspector	
(VI) Test on Armour					
For 3 core cable					
23	Tensile test	8	IS 3975	IS 1608	
24	Mass of zinc coating	Table 1	IS 4826	IS 6745	
25	Uniformity of zinc coating	9	IS 3975	IS 2633	
26	Adhesion test	9	IS 3975	IS 3975	
27	Diameter and no. of wires	Clause No. 5(G.3)	ENG-HV-2010	Value to be noted by inspector	
28	Coverage %	Clause No. 5(G.6)	ENG-HV-2010	Value to be noted by inspector	
For 1 core cable					
29	Tensile test	8	IS 8130	6	IS 1608
30	Wrapping test	8	IS 8130	5	IS 1755

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

		TATA POWER DELHI DISTRIBUTION LIMITED, DELHI	
TECHNICAL SPECIFICATION			
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 22 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

31	Resistance test	8	IS 8130	8	IS 10810 Part 42
32	Diameter and no. of wires	Clause No. 5(G.3)	ENG-HV-2010	Value to be noted by inspector	
33	Coverage %	Clause No. 5(G.6)	ENG-HV-2010	Value to be noted by inspector	
(VII) Test on Outer Sheath					
PVC Outer Sheath for normal cable					
34	Thickness	Clause No. 5(H.3)	ENG-HV-2010	Value to be noted by inspector	
35	Tensile strength and Elongation at break (before ageing)	Table 2	IS 5831	8	IS 10810 part 7
36	Colour of outer sheath	Clause No. 5(H.4)	ENG-HV-2010	To be checked by inspector	
37	Surface uniformity of outer sheath (on full drum)/ shall be free from any damage-void, nick, cavity.	Clause No. 5(H.5)	ENG-HV-2010	Through rewinding of drum (As per TATA POWER-DDL specification)	
38	Presence of lead naphthenate in PVC outer sheath	Chemical test Clause no. 5(H.1)	ENG-HV-2010	To be checked by inspector	
39	Flammability test	As per IEC 332 part 1			
40	Oxygen index	As per ASTM 2863			
41	Temperature index	ASTM 2863			
42	Acid gas generation	IEC 60754			
43	Smoke density	ASTM 2843			
HDPE Outer Sheath for 3 core co-extruded cable					
(a) Inner layer					
44	Thickness	Clause No. 5(I.1)	ENG-HV-2010	Value to be noted by inspector	
45	Tensile strength and Elongation at break (before ageing)	Table 2	IS 7098 part 2	8	IS 10810 part 7
46	Colour	Clause No. 5(I.1)	ENG-HV-2010	To be checked by inspector	
(b) Outer layer					
47	Thickness	Clause No. 5(I.2)	ENG-HV-2010	Value to be noted by inspector	
48	Tensile strength and Elongation at break (before ageing)	Table 2	IS 7098 part 2	8	IS 10810 part 7
49	Carbon content	12.4.12.2	IS 7098 part 2	10	IS 2530
50	Colour	Clause No. 5(I.2)	ENG-HV-2010	To be checked by inspector	
51	Surface uniformity of outer sheath (on full drum)/ shall be free from any damage-void, nick, cavity	Clause No. 5(I.3)	ENG-HV-2010	Through rewinding of drum (As per TATA POWER-DDL specification)	

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---

	TATA POWER DELHI DISTRIBUTION LIMITED, DELHI		
	TECHNICAL SPECIFICATION		
Document Title	Technical Specification – 11 kV Cable		
Document No.	ENG-HV-2010	Eff. Date: 27.03.2020	
Revision No.	00	Page 23 of 23	
Prepared by: Gagandeep Kaur	Reviewed By: Ravindra Bhanage	Approved By: Sanjeev Atri	Issued By: H C Sharma

(VIII) Tests for complete cable

52	Partial discharge test	5 pC	As per type test	8	IS 10810 part 46
53	High voltage test	21 kV for 5 minutes As per Clause no. 20.7.2	IS 7098 part 2	8	IS 10810 part 45

(IX) Additional tests

54	Raw material consumption	Document verification as proof to be submitted			
		Invoice to be shown from procurement to consumption			
55	Colour coding identification over copper screen (for 3C cable)	Clause no. 5(D.2)	ENG-HV-2010	To be checked by inspector	
56	Sequential marking check	Clause no. 6.ii	ENG-HV-2010	To be checked by inspector	
57	Cable drum length verification	Clause no. 6	ENG-HV-2010	To be checked by inspector	
58	Packaging of cable on cable drum	By recyclable PVC sheet- As per Clause no.12	ENG-HV-2010	To be checked by inspector	
59	Diameter over outermost sheath of co-extruded cable	Clause No. 5(K.1)	ENG-HV-2010	Value to be noted by inspector	
60	Weight of outer sheath of co-extruded cable/ km	Clause No. 5(I.5)	ENG-HV-2010	Value to be noted by inspector	
61	Weight of total HDPE of co-extruded cable/ km	Clause No. 5(I.6)	ENG-HV-2010	Value to be noted by inspector	

Initiator		HoG (Plant Engineering)	
-----------	---	-------------------------	---