CORRIGENDUM-4

Ref: TPCODL/P&S/56/2020-21/Corrigendum/004

Dated: 24th Aug 2020

Subject: Replies to Pre-bid queries, Modification to BoQ (Annexure-1) and Addition/Modification to Technical specification & Drawing of Tender number TPCODL/P&S/56/2020-21
Reference Document- Our Tender number TPCODL/P&S/56/2020-21 for Rate Contract for 11kV and 33 kV associated works (Construction / Augmentation) all over TPCODL area

With reference to above the bidder are intimated to note the following intimations:

I. TPCODL is sharing replies to Pre-Bid queries raised by all the bidders seeking clarification before the deadline date as mentioned in Event Calendar of Tender Document No. TPCODL/P&S/56/2020-21 and Corrigendum-2.

II. Bidder are requested to quote their price offers as per attached revised schedule of item (PART B-Annexure-1) of this Corrigendum instead of the Price schedule (Annexure-1) of above Tender

III. Bidders are requested to refer addition / modifications to Tender specification & Drawings attached to this Corrigendum as Part C- Annexure-2

Note:

- This document consists of three parts:
  i. PART A- ANNEXURE-3- Replies to Pre-Bid Queries for Rate Contract for 11kv and 33 kV Associated Works (Construction / Augmentation) all over TPCODL Area
  ii. PART B – ANNEXURE-1 – Revised Schedules of Item
  iii. PARC C – ANNEXURE-2- Addition / Modifications to Tender Specification and Drawings
- Bidder need to upload original signed Price bid along with copy of Price bid in Excel file in SAP Ariba
- All other terms and conditions of the above tender will remain same

By Order

Head-Procurement & Store, TPCODL

PART-A- ANNEXURE-3-REPLIES TO PRE-BID QUERIES FOR RATE CONTRACT FOR 11KV AND 33 KV ASSOCIATED WORKS (CONSTRUCTION / AUGMENTATION) ALL OVER TPCODL AREA (TENDER NUMBER- TPCODL/P&S/56/2020-21)

Sr. No.	Detailed Reference to Tata Power Technical Document. Please specify Document No / Clause No / Page No	Description as per Bid Document	Remarks - Query / Clarification	Tata Power Response
1	Page No. 21, BOQ Sl No. 25, ANNEXURE I, Schedule for Items	Supply and Installation of HDPE Pipe - 25mmdia and sealing of the same for wire/Cable protection. Scope also includes providing and laying all required consumable etc. for collar fixing and sealing of Pipe. --27906 -- M	Specification require	Kindly refer Part C (Annexure-2 Technical Specification) of this document (ENG-C-27_Technical Specification of HDPE pipe 25 mm dia_TPCODL)
2	Page No. 23, BOQ Sl No. 34, ANNEXURE I, Schedule for Items	Supply installation of TENSION SCREW GI SIZE 750X20MM for 11KV/33KV line -- 3480 -- EA	Drawing required	Line Item removed from Modified BoQ. Refer Part B (ANNEXURE I- Schedule of Item) of this document
3	Page No. 24, BOQ Sl No. 37, ANNEXURE I, Schedule for Items	SITC Installation of 33kV Disc Insulator with hardware fitting - 120KN as per TP Central Orissa Distribution Ltd. specification/drawing --2160 -- EA	Size of conductor required to ascertain the size of hardware fitting. GTP or drawing required	Line Item has been revised, Kindly refer Part B (ANNEXURE I- Schedule of Item) of this document
4	Page No. 24, BOQ Sl No. 38, ANNEXURE I, Schedule for Items	SITC Installation of 33kV Post Insulator with hardware fitting as per TP Central Orissa Distribution Ltd. specification/drawing --600- EA	Size of conductor required to ascertain the size of hardware fitting	Conductor size is 148 sqmm and 232 sqmm

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5	Page No. 26, BOQ Sl No. 48, ANNEXURE I, Schedule for Items	SITC Installation of 11kV Disc Insulator with hardware fitting - 70KN as per TP Central Orissa Distribution Ltd. specification/drawing -- 6500 -- EA	Size of conductor required to ascertain the size of hardware fitting	Conductor size is 125 sqmm
6	Page No. 26, BOQ Sl No. 49, ANNEXURE I, Schedule for Items	SITC Installation of 11kV Disc Insulator with hardware fitting - 90KN as per TP Central Orissa Distribution Ltd. specification/drawing -- 4800 -- EA	Size of conductor required to ascertain the size of hardware fitting	Conductor size is 125 sqmm
7	Page No. 26, BOQ Sl No. 50, ANNEXURE I, Schedule for Items	SITC Installation of 11kV Pin Insulator with hardware/PIN as per TP Central Orissa Distribution Ltd. specification/drawing	Size of conductor required to ascertain the size of hardware fitting	Conductor size is 125 sqmm
8	Page No. 26, BOQ Sl No. 51, ANNEXURE I, Schedule for Items	SITC Installation of 33kV Pin Insulator (PIN INSULATOR POLYMER 33 KV (10 KN))with hardware/PIN as per TP Central Orissa Distribution Ltd. specification/drawing -- 3360 -- EA	Size of conductor required to ascertain the size of hardware fitting	Conductor size is 148 sqmm and 232 sqmm
9	Annexure I Schedule for items		Meaning of EA, ST may be clarified mentioned in unit column	EA = each(Nos), ST = set
10	Annexure I Schedule for items	Sl. No. 1 and 2 Installation/Erection of (150 X 150mm RS joist (11 Mtr long)	Joist will be transported how far from site is not cleared .	Transportation from site/tent upto 6 kms. If Distance is more than 6 Km, we have considered separate line item (Sl. No. 31 of revised annexure I

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				attached to this document) for transportation
11	Annexure I Schedule for items	Sl. No 29 Supply and Fixing of GI Nut & Bolts	GI Nut, Bolts, sizes mentioned. But individual quantity of Nut bolt is not specified, only specified total 39162 kg. Individual qty please may indicate	Individual Quantity GI Nut & Bolts shall be based on approved drawing after site survey.
12	Annexure I Schedule for items	SL. No. 30 Supply and Fixing of Hexagonal Bolts with Nuts(GI) Nut & Bolts	Hexagonal Bolts with Nut (GI), sizes and specification not mentioned.	Line Item removed from Modified BoQ. Refer Part B (ANNEXURE I-Schedule of Item) of this document
13	Annexure I Schedule for items	Sl. No. 53-56,	Transformer oil filtration is required or not, please may clarify. If any Transformer oil is required, it will be whose scope. Contractor only provide routine site testing only like megger, tong tester, Multimeter, oil BDV test etc. OEM assistance and drawing may be required.	Transformer oil filtration is not required. OEM team will assist during charging. Only routine test will be done
14	Annexure I Schedule for items	SL. No. 57, BOQ installation of LT ACB, 400 Amp	during testing OEM assistance may be required and wiring drawing may require;	In case of any exigency OEM assistance will be provided
15	Annexure I Schedule for items	Sl. No. 69 -76	Jumpering & making of connection hooks, fitting of hardware and fixing of	Rate will be quoted as given below. i. If line item is for ""supply & erection"" or ""SITC"", then

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			Polypro, MVLC etc. , whose scope or TPCODL will supply free issue basis.	bidder will quote in both supply as well as in erection portion. ii. If line item is for supply only, then bidder quote only supply rate and in erection portion rate will be enter zero. iii. If line item is for service only (Installation, Laying, Stringing, Erection, Excavation, Dismantling, etc.), the bidder quote only in erection portion, in supply portion rate will be entered as zero. **Note:** Kindly read each line item carefully before quoting the rate.
16	Annexure I Schedule for items	SL. No. 77 , Laying of over head LT 1.1 kv XLPE cable	a) Cable jointing materials whose scope or TPCODL will supply free issue basis. b) It is mentioned testing is required. Please may clarify the testing procedure and instrument details	(a) Not in Bidder scope , (b) Testing as per IS .
17	Annexure I Schedule for items	SL. No. 80 ,	Construction of cable trench not clearly indication whose scope. Is it existed at site	Kindly refer reply to Sl. No. 15 Cable trench is not required for laying of LT, XLPE, GI wire Armoured,

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				AL Cable of size 4CX300 sqmm in 500KVA DT.
18	Annexure I Schedule for items	SL. No. 91 , Treated Pipe earthing with 40mm dia 3 Mtr long ClassB GI Pipe with earth chamber as per TP Central Orissa Distribution Ltd	Supply of Earth pipe whose scope or TPCODL will supply free issue basis	No Kindly refer reply to Sl. No. 15
19	Annexure I Schedule for items	SL. No. 96 , Fixing /installation of Cable Trench Cover.	a) Trench cover whose supply scope; b) Type of trench cover :- RCC Slab /MS Chequre plate; if, MS chequered plate any painting is required.	(a) Not in Bidder scope. Kindly refer reply to Sl. No. 15
20	Annexure I Schedule for items	Sl. No. 103, Painting of Pole In Black & Yellow Strips / Zebra as per TP Central Orissa Distribution Ltd.	Paint is whose scope of supply. Is the paining 2 coat epoxy Primer + 3 coat Al paint	Line Item removed from Modified BoQ. Refer Part B (ANNEXURE I-Schedule of Item) of this document
21	Annexure I Schedule for items	Sl. No. 104-122	Insurance/transit insurance of materials from store to site or vis-à-vis whose scope.	Shall be in Bidders scope
22	Annexure I Schedule for items	Sl. No. 113-141	a) During dismantling of materials, if anything damage or missing, any demurrage charges will be imposed to Contractor b) During interim staking of materials, who can provides the land or any kind of	a) Charges will be imposed on Contractor. B) For interim staking of materials no rent or charges will be borne by M/s. TPCODL.

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			rent of land , who will borne or arrange the same or TPCODL will arrange.	
23	Annexure I Schedule for items	General Query	BOQ contain supply and erection portion. May kindly clarify by TPDOCL	Rate will be quoted as given below. i. If line item is for ""supply & erection"" or ""SITC"", then bidder will quote in both supply as well as in erection portion. ii. If line item is for supply only, then bidder quote only supply rate and in erection portion rate will be enter zero. iii. If line item is for service only (Installation, Laying, Stringing, Erection, Excavation, Dismantling, etc.), the bidder quote only in erection portion, in supply portion rate will be entered as zero. **Note:** Kindly read each line item carefully before quoting the rate.
24	Annexure I Schedule for items	General Query	In some items installation items, consumables, hardware's etc. is contractor scope. Where we quote the supply item (however minor) in supply section or altogether in erection portion.	
25	**Clause 3.1 Bid Submission** **SIGNING OF BID DOCUMENTS:** **(Pg - 7 & 8 of 80)**	**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.**	**need clarifications**	The person signing the bid should have valid Authorization from the Principal to do so, failing which the bid maybe rejected.

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26	**SECOND PART: "TECHNICAL BID" (pg 7 of 80)**	**SECOND PART: "TECHNICAL BID" shall contain the following documents: a) Documentary evidence in support of qualifying criteria b) Technical literature/GTP/Type test report etc. (if applicable) c) Qualified manpower (if available) d) Testing facilities (if applicable) e) No Deviation Certificate as per the Annexure III – Schedule of Deviations f) Acceptance to Commercial Terms and Conditions viz. Delivery schedule/period, payment terms etc. as per the Annexure IV – Schedule of Commercial Specifications. g) Quality Assurance Plan/Inspection Test Plan for supply items (if applicable)**	**Submission of drawing , type test report & QAP & etc. are required or not**	Yes it is required
27	**General**	**General**	**We are in the process of collecting all the relevant papers from manufacturers and different sources. Because of this pandemic lockdown situation, we are here, at loss of time. Also due to various festivals and holidays, upcoming Government holidays like Independence day and specially complete weekly 2 days lockdown due to Covid19 in West Bengal, we as well as our sub-vendors**	As per Corrigendum-2 to this Tender, the Due date of the tender was extended from 19.08.2020 1500 Hours to 28.08.2020 1500 Hours. No further extension is considered at the moment

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			are facing lack of working time for preparation of techno-commercial offers and needs some detail engineering too. As we need to make exact estimation and as the offer you are giving, bring up more suitably competitive offer. As this is taking time to get the relevant documents, certificates, and commitments we request you to kindly allow us some more time for tender submission. **We shall be obliged to you if an extension of another two weeks is approved so that we shall be able to complete the bid in all respects**	
28	Page No. 16	Installation/Erection of (150X 150mm RS joist (11 Mtr long) (30.6 kV Per meter) (Each 336.6kg)) Pole including loading and unloading, transportation from site/tent upto 6 Kms., excavation, fixing of base plate, fixing of clamps, iron fittings, steel fabricated work (Angle installation), refilling, flooding with water, ramming/compacting of foundation as per TP Central Orissa Distribution Ltd.	Supply of RS Joist required (whether it is on Bidder scope or TPCODL Scope. Please clarify.)	Pole will be supplied by TPCODL. Pole Foundation Drawing attached is attached in Part C (Annexure-3-Technical Specification & Drawings) of this document.

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		specifications and drawing including removal & disposal of malba as per instruction of EIC. The scope of work excludes Brick betting, providing & laying of cement concrete, Pole Indexing and Painting of Pole (In Black & Yellow Strips/Zebra)		
29	Page No. 16 & 17	Installation/Erection of 150X 150mm RS joist (13 Mtr long) (34.6 kg Per meter) (Each 449.8 kg)) Pole including loading and unloading, transportation from site/tent upto 6 Kms., excavation, fixing of base plate,fixing of clamps ,iron fittings, steel fabricated work(Angle installation), refilling, flooding with water, ramming/compacting of foundation as per TP Central Orissa Distribution Ltd. specifications and drawing including removal & disposal of malba as per instruction of EIC. The scope of work excludes Brick betting, providing & laying of cement concrete, Pole Indexing and Painting of Pole (In Black & Yellow Strips/Zebra)	Supply of RS Joist required (whether it is on Bidder scope or TPCODL Scope. Please clarify.)	Kindly refer reply to Sl. No. 15 Pole will be supplied by TPCODL.
30	Page No. 21	Supply and Installation of HDPE Pipe - 25mmdia and sealing of the same for wire/Cable protection. Scope also includes	Class & Pressure of HDPE PIPE required.	Kindly refer Part C (Annexure-2 Technical Specification) of this

Sr. No.	Detailed Reference to Tata Power Technical Document. Please specify Document No / Clause No / Page No	Description as per Bid Document	Remarks - Query / Clarification	Tata Power Response
		providing and laying all required consumable etc. for collar fixing and sealing of Pipe.		document
31	Page No. 22	Supply and Installation of Polypro/COVER MVLC	Size of MVLC Cover is Required.	This item is revised. Kindly refer Part C (Annexure-2 Technical Specification) of this document
32	Page No. 24	SITC of PLATE BASE RCC SIZE 450X450X50MM for 150X 150mm RS joist (11 Mtr long)(30.6 kg Per meter)(Each 336.6kg)	Drawing Required.	Line Item removed from Modified BoQ. Refer Part B (ANNEXURE I-Schedule of Item) of this document
33	Page No. 24	SITC of PLATE BASE RCC SIZE 450X450X75MM for 150X 150mm RS joist (13 Mtr long)(34.6 kg Per meter)(Each 449.8 kg)	Drawing Required.	Line Item removed from Modified BoQ. Refer Part B (ANNEXURE I-Schedule of Item) of this document
34	Page No. 26 (S.No. 52 to 141)	Installation, Transportation, Dismantling	Only service charge we have to quote. Please clarify.	Rate will be quoted as given below. i. If line item is for ""supply & erection"" or ""SITC"", then bidder will quote in both supply as well as in erection portion. ii. If line item is for supply only, then bidder quote only supply

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				rate and in erection portion rate will be enter zero. iii. If line item is for service only (Installation, Laying, Stringing, Erection, Excavation, Dismantling, etc.), the bidder quote only in erection portion, in supply portion rate will be entered as zero. **Note:** Kindly read each line item carefully before quoting the rate
35	RATE CONTRACT FOR 11KV AND 33 KV ASSOCIATED WORKS (CONSTRUCTION / AUGMENTATION) ALL OVER TPCODL AREA / Document No - Not mentioned / Clause No - Not Mentioned	There is no where mentioned about the JOINT VENTURE IN THE BID.	We request to allow the **JOINT VENTURE**. Which will enable us to show our capability in a best qualitative way. The technical expertise and experience of both can be show cased in the desired way. The JV will help us in all aspect during and after COVID-19 pandemic.	Joint venture is not allowed
36	Clause 1.7(a) of Page-4 of Qualification criteria	The bidder should have an average annual turnover of Rs.10 crores in last three financial years (FY 17-18, FY 18-19 and FY 19-20). Copy of audited Balance Sheet and P&L Account to be submitted in this regard.	We request TPCODL to reduce/relax the requirement of annual average turnover criteria for bonafide technically qualified license holders to participate in the tender or else Joint venture may be allowed to technically qualified license	The turnover criteria cannot be reduced considering the size of the project

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			holders to fulfill the average annual turnover requirements of Rs.10 crores.	
37	Document No / Clause No / Page No 56/10/19	Installation of 4Cx300 sqmm O/D Termination	Type & specification of O/D Termination	Refer to revised annexure I
38	Document No / Clause No / Page No 56/18/20	Supply and Installation of Template for Transformer maintenance Record	type & specification of Template Transformer maintenance Record	Refer to revised annexure I It will be MS Stell of size(Length 1 foot, Length 1 Foot and Thickness 2mm) as per drawing attached
39	Document No / Clause No / Page No 56/19/20	Supply, Fabrication and Erection of Wooden Cleat set, MS strip and hard ware for fixing cable including painting one coat of red oxide & two coats of black paint for 990 kVA Transformer. Scope also includes supply of ISI marked paint. (Price per set)	type ,specification & function of Wooden Cleat set .	Kindly refer Part B (Annexure-1-Schedule of Item) and C (Annexure-2 Technical Specification) of this document
40	Document No / Clause No / Page No 56/23/21	Supply, Fabrication and Erection of Wooden Cleat set, MS strip and hard ware for fixing cable including painting one coat of red oxide & two coats of black paint for 630 kVA Transformer. Scope also includes supply of ISI marked paint. (Price per set)	type ,specification & function of Wooden Cleat set .	Kindly refer Part B (Annexure-1-Schedule of Item) and C (Annexure-2 Technical Specification) of this document

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41	Document No / Clause No / Page No 56/26/22	Supply, Fabrication and Erection of Wooden Cleatset, MS strip and hard ware for fixing cable including painting one coat of red oxide & two coats of black paint for Cable . Scope also includes supply of ISI marked paint. (Price per set).	type ,specification & function of Wooden Cleat set .	Kindly refer Part B (Annexure-1-Schedule of Item) and C (Annexure-2 Technical Specification) of this document
42	Document No / Clause No / Page No 56/39/24	SITC BUS BAR COPPER HDT SIZE 75X10MM	type & specification of BUS BAR COPPER HDT SIZE 75X10MM	Standard copper Flat as specified size with PVC insulated. Kindly refer Part B (Annexure-1-Schedule of Item) and C (Annexure-2 Technical Specification) of this document
43	Document No / Clause No / Page No 56/52/26	Installation of FPI with Communication Box with proper wiring on GPRS modem	Type & specification of FPI with Communication Box	FPI will be provided by M/s. TPCODL. Specification not required.

PART B: ANNEXURE-1-REVISED SCHEDULES OF ITEM

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
1	Installation/Erection of (150X 150mm RS joist (11 Mtr long) (30.6 kg Per meter) (Each 336.6kg)) Pole including loading and unloading, transportation from site/tent upto 6 Kms., excavation, fixing of base plate, fixing of clamps, iron fittings, steel fabricated work (Angle installation), refilling, flooding with water, ramming/compacting of foundation as per TP Central Orissa Distribution Co. Ltd. specifications and drawing including removal & disposal of malba as per instruction of EIC. The scope of work include providing & laying of cement concrete, and Painting of Pole (In Black & Yellow Strips/Zebra) .As per drawing.	EA	4600										
2	Installation/Erection of 150X 150mm RS joist (13 Mtr long)(34.6 kg Per meter)(Each 415.2kg)) Pole including loading and unloading, transportation from site/tent upto 6 Kms., excavation, fixing of base plate,fixing of clamps ,iron fittings,steel fabricated work(Angle installation), refilling,	EA	760										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	flooding with water, ramming/compacting of foundation as per TP Central Orissa Distribution Co. Ltd. specifications and drawing including removal & disposal of malba as per instruction of EIC.The scope of work include providing & laying of cement concrete, and Painting of Pole (In Black & Yellow Strips/Zebra) .As per drawing.												
3	Supply and Fixing of HT Complete Stay Set as per TP Central Orissa Distribution Co. Ltd. specifications and drawing. The scope of work includes excavation for all type of soils/RCC/Bituminous/ Rocky/Rajasthani tiles etc., breaking of asphalt, (only Fixing of Stay Wire (GI 7/10 SWG), Base Plate,Anchor road, Tension screw(GI SIZE 750X20MM), Egg insulator, etc back filling removal & disposing of malba as per instruction of EIC etc. Including stringing of GI Wire, fabrication works and providing and laying of cement concrete, supply , fabrication and erection of stay set clamp, nut-bot etc all consumable items.	ST	3480										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
4	Brick betting for Pole foundation including supply of consumables and strengthening as per TP Central Orissa Distribution Co. Ltd. specification/drawing (Price per pole/foundation)	EA	1000										
5	Supply and erection of Glanding for armored 1.1 kV XLPE AL Cable - 4CX300 sqmm, including making hole in base plate and dressing of cable along with Vermin proofing properly	EA	700										
6	Supply and Installation of Bird Cap for Lightning Arrestor	EA	5000										
7	Supply and Installation of V cross arm, Back clamp, F Bracket(Top Clamp) along with all required other accessories, nut-bolt etc. on HT Joist pole for 11kv Line as per Drawing	EA	4500										
8	Supply and Installation of V cross arm, Back clamp, F Bracket(Top Clamp) along with all required other accessories, nut-bolt etc. on HT Joist pole for 33kv Line as per Drawing	EA	2500										
9	Supply and laying of sand in substation cable trench (where it is not included in the scope)	M3	500										
10	Supply and Installation of 4cx300 sqmm O/D Termination kit.	EA	45										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
11	Supply and installation of Glanding armored 1.1 kV XLPE AL Cable - 4CX150 sqmm, including making hole in base plate and dressing of cable along with Vermin proofing properly .	EA	4500										
12	Supply and Fixing of Rubber Mat & First Aid Chart(MAT RUBBER 15KV SIZE 1X2MX2.5MM THICK)	EA	100										
13	Supply and Installation of mini wedge Connector for jumpering work for different size of conductor(For Connecting the conductor of different conductor size 55 to 100 Sq mm)	EA	7000										
14	Supply and Installation of wedge Connector for jumpering work for different size of conductor(For Connecting the conductor of different conductor size 125 Sq mm)	EA	1000										
15	Supply and Installation of wedge Connector for jumpering work for different size of conductor(For Connecting the conductor of different conductor size 148 to 232 Sq mm)	EA	2500										
16	Supply and Installation of P.G. CLAMP FOR 125 MM2 AAC CONDUCTOR	EA	900										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
17	Supply and Installation of P.G. CLAMP FOR 148 MM2 AAC CONDUCTOR	EA	600										
18	Supply and Installation of P.G. CLAMP FOR 232 MM2 AAC CONDUCTOR	EA	600										
19	Supply, Installation and fixing of 100 mm dia GI Pipe for Cable protection(PIPE G.I.100MM DIA HEAVY CLASS PLAIN END).Scope also include supply and erection of all required accesseries for fixing it with pole/structure such as GI cleat(75X12 mm)at every interval of 1.5 mtr ,Nut & Bolt ,sealing of the pipe .	M	5000										
20	Supply of AL Lugs 150 sq mm , Crimping with cable and Fixing/connecting with ACB/Transformer/MCCB etc.Scope also include supply and erection of PVC Tape as per voltage requirement.	EA	18000										
21	Supply of AL Lugs 300 sq mm , Crimping with cable and Fixing/connecting with ACB/Transformer/MCCB etc..Scope also include supply and erection of PVC Tape as per voltage requirement.	EA	3024										
22	Supply of AL Lugs 630 sq mm , Crimping with cable and	EA	10976										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	Fixing/connecting with ACB/Transformer/MCCB etc..Scope also include supply and erection of PVC Tape as per voltage requirement.												
23	Supply and Installation of Template for Transformer maintenance Record(Transformer Health Card).It will be MS Steel sheet of size(Length 1.5 foot, Breadth 1 Foot and Thickness 2mm) as per drawing attached	EA	10										
24	Supply, Fabrication and Erection of Wooden Cleat set, MS strip and hard ware for fixing cable including painting one coat of red oxide & two coats of black paint for 990 to 1000 kVA Transformer. Scope also includes supply of ISI marked paint. (Price per set). One set Cleat will be for holding the single core cable of 4 No. for supporting and spacing between the phases.	ST	100										
25	Supply and Installation of CONNECTOR PALM LT BRASS 1000A for 500-630KVA distribution transformer	EA	2560										
26	Supply and Installation of CONNECTOR PALM LT BRASS	EA	184										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	2000A for 990-1000KVA distribution transformer												
27	Supply of AL Lugs 95 sq mm , Crimping with cable/conductor and Fixing/connecting with ACB/Transformer/MCCB etc..Scope also include supply and erection of PVC Tape as per voltage requirement.	EA	3500										
28	Supply, Fabrication and Erection of Wooden Cleat set, MS strip and hard ware for fixing cable including painting one coat of red oxide & two coats of black paint for 500 to 630 kVA Transformer. Scope also includes supply of ISI marked paint. (Price per set)	ST	1500										
29	Supply, Fabrication and erection of MS Steel Structure including painting (one coat of red oxide & two coats of synthetic/aluminium paint) as per TP Central Orissa Distribution Co. Ltd. specification / drawing. Scope also includes supply of ISI marked paint. Size vary (Channel of Size-100*50 ,125*65 , 75*40 , and ANGLE of SIZE 50X50X6MM,& 75X75X6MM as per site survey and approved drawing)	KG	30000										
30	Supply, Installation and fixing of HDPE Pipe - 25mm dia for	M	27906										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	Wire/Cable protection. Scope also include supply and erection of all required accessories for fixing it with pole/structure such as GI cleat(12X3 mm)at every interval of 1.5 mtr ,Nut & Bolt ,sealing of the pipe ,collar fixing.												
31	Supply, Fabrication and Erection of Wooden Cleat set, MS strip and hard ware for fixing cable including painting one coat of red oxide & two coats of black paint for Cable. Scope also includes supply of ISI marked paint. (Price per set).	ST	4000										
32	Supply of AL Lugs 70 sq mm , Crimping with stay wire/earthing wire/conductor and Fixing/connecting to earth electrode etc. Scope also include supply and erection of PVC Tape as per voltage requirement.	EA	40000										
33	Supply of AL Lugs of 125 sq mm , Crimping and connecting with LA,G/O,DD Fuse for jumpering works of Distribution transformer .	EA	30000										
34	Supply of AL Lugs of 55 to 80 sq mm , Crimping and connecting with LA,G/O,DD Fuse for jumpering works of Distribution transformer .	EA	6000										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
35	Supply of AL Lugs of 148 to 232 sq mm for jumpering work of 33KV AB Switch , Crimping and connecting .	EA	1500										
36	Supply and Installation of MVLC medium voltage line cover (Polypro).	M	1000										
37	Supply and Fixing of GI Nut & Bolts of different size(12MMX50MM HEX,12MMX75MM HEX,16MMX100MM HEX,16MMX150MM HEX,16MMX200MM HEX,16MMX50MM HEX,16MMX75M HEX)etc based on site requirement.	KG	70000										
38	Supply and Installation of Pre - fabricated Hot dip Galvanized Steel Structure of different section (ISMC-100*50 GI Channel (9.76KG/M),ISMC-125*65 GI Channel (13.3KG/M),ISMC-75*40 GI Channel (7.24KG/M), ANGLE MS SIZE 50X50X6MM,ANGLE GI SIZE 75X75X6MM as per approved drawing and specification of TP Central Orissa Distribution Co. Ltd.. Scope also includes minor modification/fabrication required as per site condition/ for proper	KG	969160										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	fitting. Size shall be customized based on site requirement.												
39	Supply and Installation of 11kV D.O. Fuse 3 Phase(Price per Set) including Fuse Link on existing structure as per TP Central Orissa Distribution Co. Ltd. specification and drawing	ST	4000										
40	SITC Installation of 33kV Disc Insulator with GI hardware fitting - 120KN for 232 Sq mm AAAC Conductor with nuts and bolts as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	1000										
41	SITC Installation of 33kV Disc Insulator with GI hardware fitting - 120KN for 232 Sq mm ACSR Conductor with nuts and bolts as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	1000										
42	SITC Installation of 33kV Disc Insulator with GI hardware fitting - 120KN for 148 Sq mm AAAC Conductor with nuts and bolts as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	600										
43	SITC Installation of 33kV Disc Insulator with GI hardware fitting - 120KN for 148 Sq mm ACSR Conductor with nuts and bolts as	EA	800										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	per TP Central Orissa Distribution Co. Ltd. specification/drawing												
44	SITC Installation of 33kV Post Insulator with hardware fitting as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	600										
45	SITC BUS BAR COPPER HDT SIZE 75X10MM	M	686										
46	SITC Installation of 11 kV ,200Amp 3- Phase AB/G.O Switch on existing structure including alignment as per TP Central Orissa Distribution Co. Ltd. specification and drawing	ST	1586										
47	SITC Installation of 33 kV,200Amp 3- Phase AB/G.O Switch on existing structure including alignment as per TP Central Orissa Distribution Co. Ltd. specification and drawing	ST	110										
48	SITC Installation of 11kV LA Single Phase on existing structure as per TP Central Orissa Distribution Co. Ltd. specification and drawing(LA 9KV 5KA FOR 11KV POLYMERIC)	EA	4608										
49	SITC Installation of Barbed Wire (to avoid the climbing at pole) for 11Mtr/13 Meter pole as per TP Central Orissa Distribution	KG	4782										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	Co. Ltd. specification and drawing.												
50	SITC Installation of HT Danger Board with clamp(GI Flat 12X3 mm), nut & bolt as per TP Central Orissa Distribution Co. Ltd. specification	EA	8512										
51	SITC Installation of 11kV Disc Insulator with GI hardware fitting - 70KN for 125 sq mm AAAC conductor as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	2600										
52	SITC Installation of 11kV Disc Insulator with GI hardware fitting - 70KN for 125 sq mm ACSR conductor as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	3900										
53	SITC Installation of 11kV Disc Insulator with GI hardware fitting - 90KN for 125 sq mm AAAC as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	4800										
54	SITC Installation of 11kV Polymeric Pin Insulator for 125 Sq mm with Hardware/PIN as per TP Central Orissa Distribution Co. Ltd. specification/drawing	EA	15000										
55	SITC Installation of 33kV Pin Insulator for 148 sq mm & 232	EA	4000										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	Sq mm conductor (PIN INSULATOR POLYMER 33 KV (10 KN))with hardware/PIN as per TP Central Orissa Distribution Co. Ltd. specification/drawing												
56	Installation of FPI with Communication Box with proper wiring on GPRS modem .	EA	4500										
57	Installation, Testing and Commissioning of 11/0.4kV, 630kVA 3-Phase Distribution Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification including loading, unloading, shifting/transportation from site /tent. Scope of work excludes earthing, jumpering/connection at HT and LT side	EA	640										
58	Installation, Testing and Commissioning of 11/0.4kV, 160kVA/ 315KVA/ 400KVA/ 500KVA/ 3-Phase Distribution Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification including loading, unloading, shifting/transportation from site /tent. Scope of work excludes earthing,	EA	100										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	jumpering/connection at HT and LT side												
59	Installation, Testing and Commissioning of 11/0.4kV, 1000kVA 3-Phase Distribution Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification including loading, unloading, shifting/transportation from site /tent. Scope of work excludes earthing, jumpering/connection at HT and LT side	EA	46										
60	Installation, Testing and Commissioning of 11/0.4kV, 250kVA 3-Phase Distribution Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification including loading, unloading, shifting/transportation from site /tent. Scope of work excludes earthing, jumpering/connection at HT and LT side	EA	450										
61	Installation testing and commissioning of LT ACB 400 Amps with enclosure on existing structure	EA	1464										
62	Installation of Outdoor Type Distribution Box with MCCB for 11/0.4kV,63kVA Three Phase	EA	20										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification												
63	Installation of Outdoor Type Distribution Box with MCCB for 11/0.4kV,160kVA Three Phase Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification	EA	10										
64	Installation of Outdoor Type Distribution Box (BOX DIST.WITH 160A 35KA TP MCCB 6 O/G) with MCCB for Distribution Transformer etc.three Phase Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification	EA	650										
65	Installation of Outdoor Type Distribution Box(BOX DIST.WITH 500A 50KA TP MCCB 5 O/G) with MCCB for 11/0.4kV,250kVA Three Phase Transformer on existing structure as per TP Central Orissa Distribution Co. Ltd. specification	EA	900										
66	Installation of Fire Extinguisher by means of proper hooks clamps etc. as required including providing of grouting material	EA	100										

					SUPPLY				ERECTION			TOTAL	
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	(cement etc.) and painting of hooks/clamps. Scope exclude supply of hook/clamp												
67	Installation of Fire Bucket including supply of sand by means of proper hooks clamps etc. as required (price per bucket). Scope include supply of hooks/clamps/MS stand.	EA	100										
68	Installation, Testing and Commissioning of 11kV 3-way Ring Main Unit on existing structure/foundatiom as per TP Central Orissa Distribution Co. Ltd. specification including grouting, loading, unloading, shifting/transportation from site/tent. Scope of work excludes earthing, connection and construction of foundation	EA	60										
69	Installation, Testing and Commissioning of 11kV 4-way Ring Main Unit on existing structure / foundatiom as per TP Central Orissa Distribution Co. Ltd. specification including grouting, loading, unloading, shifting/transportation from site/tent. Scope of work excludes earthing, connection and construction of foundation	EA	16										
70	Construction of 3-way RMU Plinth with Brick, Mortar, 12 mm	EA	60										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	cement plaster and painting with enamle paint.As per drawing												
71	Construction of 4-way RMU Plinth with Brick, Mortar, 16 mm cement plaster and painting with enamle paint.As per drawing	EA	16										
72	Installation, Testing and commissioning of 11kV auto reclosure Unit on existing structure as per TPCODL specification including loading from TPCODL Store (Bhubneshwar/Cuttack/Nearby site) , unloading at Site, shifting/transportation from site/tent. Scope of work excludes earthing, jumpering/connection.	EA	40										
73	Installation, Testing and commissioning of 11kV Sectionaliser Unit on existing structure as per TPCODL specification including loading from TPCODL Store (Bhubaneshwar/Cuttack/Nearby site), unloading at Site, shifting/transportation from site/tent. Scope of work excludes earthing, jumpering/connection.	EA	120										
74	Sagging & Stringing of Dog Conductor(80sq.mm to 125 sq.mm AAAC)	M	91994										
75	Sagging & Stringing of Aluminum Conductor Steel	M	127991										

					SUPPLY				ERECTION			TOTAL	
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	Rainforced(ACSR) (Equivalent to 125 sq mm AAAC Conductor) .												
76	Sagging & Stringing of 148 mm2 All Aluminium Aloy Conductor(AAAC) .	M	25296										
77	Sagging & Stringing of Aluminium Conductor Steel Rainforced (ACSR) (Equivalent to 148 sq mm AAAC Conductor) .	M	32944										
78	Sagging & Stringing of 232 sqmm All Aluminium Aloy Conductor(AAAC) .	M	25496										
79	Sagging & Stringing of sq232mm Aluminium Conductor Steel Rainforced(ACSR).	M	30744										
80	Supply , Sagging & Stringing of Insulated Rabbit Conductor for Jumpering work of Distribution Transformer & making of connection hooks etc.	M	28128										
81	Supply and erection of GI wire 7/10 SWG for stay wire and earthing of equipments/structure as per TP Central Orissa Distribution Co. Ltd. specification/drawing.	M	448690										
82	Supply and erection(Sagging/Stringing/Drawing) of GI wire 4 SWG including making of connection hooks etc. as per TP Central Orissa	M	406000										

					SUPPLY				ERECTION			TOTAL	
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	Distribution Co. Ltd. specification/drawing												
83	Laying/stringing of Overhead LT 1.1 kV XLPE insulated PVC sheathed AL conductor GI wire Armoured Cable of size 4CX150 sqmm as per TP Central Orissa Distribution Co. Ltd. specification including testing of cable.	M	20100										
84	Supply and erection of earthing coil (8 SWG wire dia) along with 8 SWG Wire, Nut -bolt & other accessories and connecting with cross arm, Channel, angle and other accessories of pole having length up to 13 Mtr as per TP Central Orissa Distribution Co. Ltd. Design .	EA	7000										
85	Laying of LT, XLPE, GI wire Armoured, AL Cable of size 4CX300 sqmm in S/Sth. Trench/Trenchless duct/Tray/GI Pipe/Hume Pipe as per TP Central Orissa Distribution Co. Ltd. specification including testing of cable. Scope of work exclude laying of Hume Pipe, GI Pipe, PVC Pipe and Tray.	M	18000										
86	Laying (underground) of 1.1kV Armoured XLPE AL Cable of size 4CX300 sqmm in existing trench with supply & laying of 9 bricks horizontaly with sand &	M	18000										

					SUPPLY				ERECTION			TOTAL	
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	back filling, ramming and levelling of earth as per TP Central Orissa Distribution Co. Ltd. specification and drawing including testing of cable. Scope also include removal and disposal of loose malba above road/ground level as per instruction of EIC..BA will provide support during joint making by OEM of joint kit,no seperate payment will be paid to BA for this support by BA.												
87	Laying (underground) of 11kV Armoured XLPE AL Cable of size 3CX400/ 3X300 sqmm (Single Run) in open cut/ existing trench with supply & laying of 9bricks with sand & back filling, ramming and levelling of earth as per TP Central Orissa Distribution Co. Ltd. specification and drawing including testing of cable. Scope also include removal and disposal of loose malba above road/ground level as per instruction of EIC.BA will provide support during joint making by OEM of joint kit,no seperate payment will be paid to BA for this support by BA.	M	4000										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
88	Laying of 11kV Armoured XLPE AL Cable 3CX400/ 3X300 sqmm in S/Sth. Trench/Tray as per TP Central Orissa Distribution Co. Ltd. specification including testing of cable. Scope of work exclude fixing of Tray.BA will provide support during joint making by OEM of joint kit,no separate payment will be paid to BA for this support by BA.	M	2000										
89	Stringing/Laying of 1.1kV XLPE insulated PVC sheathed AL conductor Cable of size 1CX300 sqmm as per TP Central Orissa Distribution Co. Ltd. specification including testing of cable. BA will provide support during joint making by OEM of joint kit, no separate payment will be paid to BA for this support by BA.	M	3000										
90	Stringing/Laying of 1.1kV XLPE insulated PVC sheathed AL conductor Cable of size 1CX630 sqmm as per TP Central Orissa Distribution Co. Ltd. specification including testing of cable	M	46100										
91	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centering, shuttering, finishing and reinforcement- All work upto plinth level b) 1:2:4	M3	2006.4										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	(1cement : 2 coarse sand :4 graded stone aggregate 20 mm nominal size.												
92	Stringing/Laying of 1.1kV XLPE insulated PVC sheathed AL conductor Cable of size 1CX95 sqmm as per TPDDL specification including testing of cable..BA will provide support during joint making by OEM of joint kit,no seperate payment will be paid to BA for this support by BA.	M	100										
93	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : 1:3:6 (1 Cement : 3 coarse sand (Zone - III) : 6 graded stone aggregate 20 mm nominal size).	M3	1500										
94	Treated Pipe earthing with 40mm dia 3 Mtr long Class-B GI Pipe with earth chamber as per TP Central Orissa Distribution Co. Ltd. specification and drawing (Each pit resistance will be measured and recorded and shall be less than 1ohm). Scope include supply of all required material like Earth Electrode, Salt, Charcoal, Nuts-Bolt etc.	EA	10910										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
95	Excavation of cable trench upto 975 mm depth & 450 mm width in Ordinary Soil as per TP Central Orissa Distribution Co. Ltd. drawing and specification for laying of 11/1.1kV one Cable. Scope of work excludes laying of HUME/PVC pipe/GI Pipe. For each additional cable 50% will be payable against above activity	M3	10000										
96	Excavation of cable trench upto 1075 mm depth & 450 mm width in Ordinary Soil as per TP Central Orissa Distribution Co. Ltd. drawing and specification for laying of 11kV one Cable. Scope of work excludes laying of HUME/PVC pipe/GI Pipe. For each additional cable 50% will be payable against above activity	M3	2400										
97	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqmm on plan) including disposal of excavated earth as per direction of EIC for all kinds of soil.	M3	100										
98	Earth work in excavation by mechanical means (Hydraulic	M3	100										

					SUPPLY				ERECTION			TOTAL	
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	excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan) including dressing of sides and ramming of bottoms, including getting out the excavated soil and disposal of surplus excavated soil as directed by EIC for all kinds of soil												
99	Fixing /installation of Cable Trench Cover.	M	4000										
100	Indoor/Outdoor Termination Jointing of 11 kV Armoured XLPE, AL Cable 3CX400 sqmm including consumable	ST	120										
101	Indoor/Outdoor Termination Jointing of HT (33KV) UGC including all related work and Approved Jointer	ST	240										
102	Jointing of I/D or O/D of LT UGC including all related work and Approved Jointer	EA	100										
103	Making & Fixing of Guard Lace(Bracing) of G.I. Wire 4 SWG for HV Line (price per lacing)	EA	72552										
104	Mounting of Cable (LT & HT) at Pole, after passing through suitable size of GI Pipe proper clamping and fixing wooden bush along with clamping of End Box. Scope of work excluding	EA	3500										

					SUPPLY				ERECTION			TOTAL	
S.No	**Item Description**	**Unit**	**Quantity (A)**	**HSN /SAC Code**	**Unit Ex-Work Price (Rs./Unit)**	**Freight & Insurance Charges (Rs/Unit)**	**GST (Rs/ Unit)**	**Unit Supply Rate (Rs.) (B)**	**Unit Erection Charge (Rs./Unit)**	**GST (Rs/ Unit)**	**Unit Erection Price including GST (C)**	**All Inclusive Unit rate (D=B+C)**	**Total All Inclusive Value (Rs.) (A*D)**
	supply and erection of Wooden Cleat set(Including Nomenclature , phase marking and numbering)												
105	Outdoor Termination of 11 kV Armoured XLPE, AL Cable 3CX400 sqmm including consumable	ST	120										
106	Sign writing on Transformer, double pole structure & fencing as per details mentioned in the scope of work and specification	EA	5918										
107	Sign writing - substation name as per details mentioned in the scope of work and specification	EA	1216										
108	Sign writing on leg of 11 KV RMU as per details mentioned in the scope of work and specification (price per RMU)	EA	76										
109	Transportation of various items from TPCODL store/site to other site or vice versa in TPCODL operational area - **Tempo 709** with labours as required (price per trip). Scope of work also include loading and unloading of materials except heavy items like HT Panel, Transformer, Cable Drum, LT Board where loading, unloading is to be done with crane and will be paid separately **(Price per Truck/tempo)**	EA	3000										

					SUPPLY				ERECTION			TOTAL	
S.No	**Item Description**	**Unit**	**Quantity (A)**	**HSN /SAC Code**	**Unit Ex-Work Price (Rs./Unit)**	**Freight & Insurance Charges (Rs/Unit)**	**GST (Rs/ Unit)**	**Unit Supply Rate (Rs.) (B)**	**Unit Erection Charge (Rs./Unit)**	**GST (Rs/ Unit)**	**Unit Erection Price including GST (C)**	**All Inclusive Unit rate (D=B+C)**	**Total All Inclusive Value (Rs.) (A*D)**
110	Transportation of various items from TPCODL store/site to other site or vice versa in TPCODL operational area - **Tempo 407** with labours as required (price per trip). Scope of work also include loading and unloading of materials except heavy items like HT Panel, Transformer, Cable Drum, LT Board where loading, unloading is to be done with crane and will be paid separately **(Price per Truck/tempo)**	EA	2500										
111	Transportation of various items from TPCODL. store/site to other site or vice versa in TPCODL. operational area - **Three wheeler/Vikram** with labours as required (price per trip). Scope of work also include loading and unloading of materials except heavy items like HT Panel, Transformer, Cable Drum, LT Board where loading, unloading is to be done with crane and will be paid separately **(Price per Truck/tempo)**	EA	3000										
112	Loading, transportation and Unloading of HT panel, Transformer, LT board, Cable drum/Conductor Drum with	EA	3000										

					SUPPLY				ERECTION			TOTAL	
S.No	**Item Description**	**Unit**	**Quantity (A)**	**HSN /SAC Code**	**Unit Ex-Work Price (Rs./Unit)**	**Freight & Insurance Charges (Rs/Unit)**	**GST (Rs/ Unit)**	**Unit Supply Rate (Rs.) (B)**	**Unit Erection Charge (Rs./Unit)**	**GST (Rs/ Unit)**	**Unit Erection Price including GST (C)**	**All Inclusive Unit rate (D=B+C)**	**Total All Inclusive Value (Rs.) (A*D)**
	crane or tripode Per truck/tempo **(Price per Truck/tempo)**												
113	Loading, transportation and Unloading of JOIST Pole of 11 Mtr long from TP Central Orissa Distribution Co. Ltd. store/site to other site or vice versa (above 6 km) - **price per Pole.**	No.	4782										
114	Loading, transportation and Unloading of JOIST Pole of 13 Mtr long from TP Central Orissa Distribution Co. Ltd. store/site to other site or vice versa (above 6 km) - **price per Pole**.	No.	1500										
115	Dismantling / Removal of all hardware fittings & Insulator etc. from Double Pole Structure including loading, transportation, unloading and staking of dismantled material at a proper place in safe position and returning the material to TPCODL Store is in BA scope.	EA	5000										
116	Dismantling of 11 Mtr. PCC/Joist Pole (Serviceable Pole) after digging the pit and taking out the pole, transportation and stacking the pole at a proper place in safe position within 3km /BA site store and refilling the pit with loose earth and ramming including removal and disposal of malba at proper location as	EA	20000										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	per instruction of EIC. Returning of Pole to the TPCODL store is in the scope of BA.												
117	Dismantling of 11kV Pin Insulator with Pin including loading, transportation, unloading and staking at a proper place in safe position/BA site store. Returning the items to the TPCODL Store is in the scope of BA	EA	20701										
118	Dismantling of 11kV Disc Insulator with Hardware including loading, transportation, unloading and staking at a proper place in safe position/BA site store. Returning the items to the TPCODL Store is in the scope of BA	EA	20000										
119	Dismantling of Danger Board including removal of all Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	10000										
120	Dismantling of the G.I.Wire 7/8 SWG as per standard practice of TP Central Orissa Distribution Co. Ltd. including recoiling loading, transportation, unloading and staking at a	Kg	10000										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	proper place in safe position/BA site store												
121	Dismantling of the G.I.Wire 7/10 SWG as per standard practice of TP Central Orissa Distribution Co. Ltd. including recoiling loading, transportation, unloading and staking at a proper place in safe position/BA site store	Kg	10000										
122	Dismantling of the G.I.Wire 4 SWG as per standard practice of TP Central Orissa Distribution Co. Ltd. including recoiling loading, transportation, unloading and staking at a proper place in safe position/BA site store	Kg	10000										
123	Dismantling/Removal of all hardware fittings & Insulator etc. from HT Single Pole including loading, transportation, unloading and staking of dismantled material at a proper place in safe position/BA site store (price per Pole)	EA	10000										
124	Dismantling of Lightening Arrester(LA) including removal of all Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	3600										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
125	Dismantling of LT Distribution Box suitable for 3-Phase Distribution Transformer including their safe removal. Scope of work also includes removal of all the Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store. Returning to TPCODL store is in BA scope.	EA	2500										
126	Dismantling of three phase DD Fuse/ fuse set arrangement fitted on structure (price per set) including removal of all Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	3408										
127	Dismantling of ACB-400A including removal of all Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	1464										
128	Dismantling of ACSR DOG conductor from overhead line, recoiling, loading, transportation, unloading and staking at a proper place in safe position/BA site store	M	4000										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
129	Dismantling of ACSR Rabbit conductor from overhead line, recoiling, loading, transportation, unloading and staking at a proper place in safe position/BA site store	M	4000										
130	Dismantling of ACSR Racoon conductor from overhead line, recoiling, loading, transportation, unloading and staking at a proper place in safe position/BA site store	M	4000										
131	Dismantling of HT AL Bus bar mounted on 11kV insulator with re-openable insulation cover including removal of all Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	1000										
132	Dismantling/Removal of all hardware fittings & Insulator etc. from Triple Pole Structure including loading, transportation, unloading and staking of dismantled material at a proper place in safe position/BA site store (price per TP Structure)	EA	1000										
133	Dismantling of Fencing structure and loading, transportation, unloading and staking at a	M2	1000										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	proper place in safe position/BA site store												
134	Dismantling of existing 11/0.4kV, 630kVA Three Phase Distribution Transformer including removal of HT/LT leads, earth connections and unloading by crane if required. Scope of work also includes loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	640										
135	Dismantling/Removal of all hardware fittings & Insulator etc. from Four Pole Structure including loading, transportation, unloading and staking of dismantled material at a proper place in safe position/BA site store	EA	500										
136	Dismantling of existing Street Light fixture and loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	500										
137	Dismantling of 11 Mtr. PCC/Joist Pole (Broken Pole) after digging the pit and taking out the pole, refilling the pit with loose earth and ramming. Scope also include crushing of broken Pole and removal & disposal of malba	EA	100										

					SUPPLY				ERECTION			TOTAL	
S.No	Item Description	Unit	Quantity (A)	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	Freight & Insurance Charges (Rs/Unit)	GST (Rs/ Unit)	Unit Supply Rate (Rs.) (B)	Unit Erection Charge (Rs./Unit)	GST (Rs/ Unit)	Unit Erection Price including GST (C)	All Inclusive Unit rate (D=B+C)	Total All Inclusive Value (Rs.) (A*D)
	at proper location as per instruction of EIC												
138	Dismantling of existing 11/0.4kV, 250kVA Three Phase Distribution Transformer including removal of HT/LT leads, earth connections and unloading by crane if required. Scope of work also includes loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	450										
139	Dismantling of existing 11/0.4kV, 990/1000kVA Three Phase Distribution Transformer including removal of HT/LT leads, earth connections and unloading by crane if required. Scope of work also includes loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	46										
140	Dismantling of 10/8 Way Moulded Bus Bar Box including removal of all Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store	EA	1										
141	Dismantling of 11 kV GO/AB Switch including removal of all	EA	1136										

					SUPPLY				ERECTION			TOTAL	
S.No	**Item Description**	**Unit**	**Quantity (A)**	**HSN /SAC Code**	**Unit Ex-Work Price (Rs./Unit)**	**Freight & Insurance Charges (Rs/Unit)**	**GST (Rs/ Unit)**	**Unit Supply Rate (Rs.) (B)**	**Unit Erection Charge (Rs./Unit)**	**GST (Rs/ Unit)**	**Unit Erection Price including GST (C)**	**All Inclusive Unit rate (D=B+C)**	**Total All Inclusive Value (Rs.) (A*D)**
	Electric/Earth connections, loading, transportation, unloading and staking at a proper place in safe position/BA site store												
142	Dismantling of Steel Structure and Nuts and Bolt including loading, transportation, unloading and staking of dismantled material at a proper place in safe position/BA site store	KG	113600										
TOTAL (All Inclusive Value)													

PART-C - ANNEXURE-2- MODIFICATIONS TO TENDER SPECIFICATION

S.No.	Description
1	HDPE pipe 25 mm dia_TPCODL
2	33kV Polymer Ball and socket disc insulator 120 KN
3	11kV Polymer Ball and socket disc insulator
4	11kV Polymer Pin Insulator_TPCODL
5	33 KV Pin Insulators_TPCODL
6	CONCREATING OF RS JOIST 150X150 FOR NORMAL POINT
7	Cable Cleat (two-bolt type)
8	Specification of Medium Voltage line cover

CONTENTS

1.0	**SCOPE**	Scope of this Specification includes technical requirement, design, material grade requirement, testing, inspection, supply, packaging and transportation of 'High Density Polyethylene (HDPE) Pipe-ISI marked' of nominal outside diameter of 32 mm.

Initiator		HOG (ENGINEERING)	

2.0 APPLICABLE STANDARDS

'HDPE pipe' covered in 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 Statutory authorities:

IS 4984:2016	Specification for Polyethylene Pipes for Water Supply (fifth revision)
IS 7328:1992	High Density Polyethylene Materials for Moulding and Extrusion – Specification(first revision)
IS 2530	Methods of test for polyethylene moulding materials and polyethylene compounds

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION

The service conditions shall be as follows:

1. Maximum altitude above sea level 1,000m
2. Maximum ambient air temperature 50°C
3. Maximum daily average ambient air temperature 35°C
4. Minimum ambient air temperature 0°C
5. Maximum relative humidity 95%
6. Average number of thunderstorm days per annum (isokeraunic level) 70
7. Average number of rainy days per annum 120
8. Average annual rainfall 150cm
9. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g
10. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g

(g being acceleration due to gravity)

11 .Wind velocity: 300 km/hr, 200 km/hr and 160 km/hr.

Environmentally, some of the regions, where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas.

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

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

4.0 GENERAL TECHNICAL REQUIREMENTS

S.No.	Characteristics	Units	Requirements
1	Nominal size or Outside diameter	mm	32
2	Wall thickness	mm	Min.2.4 to Max. 2.7
3	Standard dimension ratio(SDR)	13.6	
4	Min. required strength of PE resin @ 20 deg C for 50 years life	MPa	6.3
5	Melt Flow Rate of polymer (sample pre-heated for 10 mins at 190°C, and weight application of 5kgf)	gm of polymer/10 min	0.20 to 1.1 (both inclusive)
6	Raw material grade	PE-63	
7	Nominal pressure rating	PN 6	
8	Range of Base Density of HDPE @ 27 deg C	kg/mtr^3	930 to 960
9	% of Antioxidant	<0.3% by mass of finished resin	
10	Colour of pipe	Black with blue identification stripes	

Initiator		HOG (ENGINEERING)	

		11	Surface finish	Internal and External surface of the pipe shall be smooth and free from grooving and other defects	
		12	Carbon Black content	%	2.5 ± 0.5
		13	Overall migration	Mg/dm^2	Max. 10
		14	Reversion	%	<= 3%
5.0	**GENERAL CONSTRUCTION**	PE resin used for the manufacture of HDPE pipe shall conform to the following requirements: a) Pipe shall be manufactured from virgin PE resin. Reprocessed or recycled materials shall not be used. b) Should not constitute toxic hazard, should not support microbial growth and should not give rise to unpleasant taste or odour. c) The resin shall be compounded with carbon black. Carbon black particle size should be less than 0.025 µ. d) The anti-oxidant used shall be physiologically harmless and shall be selected from the list given in IS 10141:1982. e) **Visual appearance:** The internal and external surface of the pipe shall be smooth, clean and free from grooving and other defects. f) Pipe should be capable to withstand internal pressure creep rupture test without showing signs of localized swelling, leakage or weeping and shall not burst.		
6.0	**MARKING**	Marking on the HDPE pipe shall carry the following minimum information: a) Manufacturer name b) Pipe Designation(Material grade, SDR, Nominal outside diameter, Pressure rating) c) ISI mark d) Date and year of manufacture e) Property of TPCL, Bhubaneswar. Shall be embossed at every 1 meter though out the length of the pipe.			
7.0	**TESTS**	All Routine, Acceptance & Type Tests shall be carried out in accordance with the relevant IS as mentioned above. All Routine /Acceptance Tests shall be witnessed by TPCL representative.			
7.1	**TYPE TESTS**	Certificate showing proof of relevant Type tests(not exceeding last 5 years from the date of bid opening) shall be furnished by bidder for: a) Tensile strength b) Overall migration c) Internal pressure creep rupture test @ 27 deg C for 100 hrs d) Internal pressure creep rupture test @ 80 deg C for 165 hrs e) Internal pressure creep rupture test @ 80 deg C for 1000 hrs f) Slow crack growth rate test			
7.2	**ROUTINE/ ACCEPTANCE TEST**	The following tests shall be conducted in presence of TPCL representative on the samples taken from the offered lot material: a) Visual appearance and dimensions b) Melt flow rate c) Density d) Reversion test e) Elongation at break f) Carbon black content g) Carbon black dispersion h) Oxidation induction i) Internal pressure creep rupture test @ 80 deg C for 48 hrs			
8.0	**TYPE TEST CERTIFICATION**	Bidder shall furnish the type test report certified from NABL/ERDA accredited lab as per the relevant standards. Type testing date should not exceed last 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or			

		any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCL.
9.0	**PRE DISPATCH INSPECTION**	Material shall be subject to inspection by duly authorized representative of TPCL. - Inspection may be made at any stage of manufacture at the discretion of TPCL and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. - Bidder shall grant free access to the manufacturing location to TPCL's representative at all times when the work is in progress. - Inspection by the TPCL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. - Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCL. Following documents shall be sent along with material: a) Test reports b) MDCC issued by TPCL c) TPCL invoice in duplicate d) Packing list e) Drawings & catalogue f) Guarantee / Warrantee card g) Delivery Challan h) Other Documents (as applicable) i) Certificate from manufacturer of resin(raw material with mention of material grade)
10.0	**INSPECTION AFTER RECEIPT AT STORES**	The material received at TPCL, Bhubaneswar, Odisha 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 and Engineering department.
11.0	**GUARANTEE**	Bidder shall stand guarantee towards design, material, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect found by TPCL up to a period of 12 months from the date of commissioning or 18 months from the date of last supplies made under the contract whichever is earlier, 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 TPCL, failing which TPCL will be at liberty to get it replaced/rectified at bidder's cost and recover all such expenses plus TPCL' s own charges (@ 20% of expenses incurred), from the bidder or from the 'Security cum Performance Deposit' as the case may be. Bidder shall further be responsible for 'free replacement' for another period of 3 years from the end of guarantee period for any 'latent defects' if noticed and reported by TPCL.
12.0	**PACKING**	Bidder shall ensure that the HDPE pipe shall be packed in rolls of 500 meters of length and shall be prepared for rail/road transport in a manner so as to protect from damage in transit.
13.0	**TENDER SAMPLE**	Not required
14.0	**QUALITY CONTROL**	The bidder shall have track record of not less than 10 years in HDPE Pipe manufacturing and servicing in Indian market. The bidder shall submit with the offer Quality Assurance Plan indicating the various stages of inspection, the tests and checks which will be carried out on the material during manufacture. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TPCL's representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant Indian standards.
16.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality Assurance Plan submitted with the offer. The bar chart will have to be submitted within 15 days from the release of the order. Pipe manufacturer shall obtain a certificate from the raw material supplier as a confirmation to the requirements of non-presence of toxic substance.
17.0	**SPARES, ACCESSORIES AND TOOLS**	Not applicable.
18.0	**DRAWINGS AND DOCUMENTS**	Following documents shall be submitted along with the bid: a) Completely filled in GTP b) Bill of Material c) Type test Certificates Following Drawings/Documents shall be submitted after the award of the contract:

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

19.0 GUARANTEED TECHNICAL PARTICULARS

S.No.	Characteristics	Units	Requirements	Compliance from bidder
1	Nominal size or Outside diameter	mm	32	
2	Wall thickness	mm	Min.2.4 to Max. 2.7	
3	Standard dimension ratio(SDR)	13.6		
4	Min. required strength of PE resin @ 20 deg C for 50 years life	MPa	6.3	
5	Melt Flow Rate of polymer (sample pre-heated for 10 mins at 190°C, and weight application of 5kgf)	gm of polymer/ 10 min	0.20 to 1.1 (both inclusive)	
6	Raw material grade	PE-63		
7	Nominal pressure rating	PN 6		
8	Range of Base Density of HDPE @ 27 deg C	kg/mtr^3	930 to 960	
9	% of Antioxidant	<0.3% by mass of finished resin		
10	Colour of pipe	Black with blue identification stripes		

Initiator		HOG (ENGINEERING)	

		11	Surface finish	Internal and External surface of the pipe shall be smooth and free from grooving and other defects		
		12	Carbon Black content	%	2.5 ± 0.5	
		13	Overall migration	Mg/dm^2	Max. 10	
		14	Reversion	%	<= 3%	

20.0 **SCHEDULE OF DEVIATIONS**

(TO BE ENCLOSED WITH TECHNICAL BID)

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

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

Initiator		HOG (ENGINEERING)	

CONTENTS

1	**SCOPE:**	This specification covers the technical requirements of design, manufacture, performance, testing at manufacturer's works, packing & forwarding, supply and unloading at store/ site, performance of Ball and Socket Disc polymer insulator complete with all the accessories for trouble free and efficient performance.

2	**APPLICABLE STANDARDS**:	Insulator shall comply with the requirements stated in the latest editions of the following standards- a) IEC: 61109: Definition, test methods and acceptance criteria for composite insulators for A.C. overhead lines above 1000V. b) IS: 2071/ IEC: 60060-1: Methods of High Voltage Testing c) IS: 2486/ IEC: 60120/IEC: 60372: Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements locking devices d) IEC: 60575: Thermal Mechanical Performance test and mechanical performance test on string insulator units. e) IS: 13134/ IEC: 60815: Guide for the selection of insulators in respect of polluted condition. f) IEC: 60433: Characteristics of string insulator units of the long rod type g) IS: 14329-1995: Malleable Iron Castings h) IS: 60437: Methods of RI Test of HV insulators i) STRI guide 1.92/1: Hydrophobicity Classification Guide. j) CISPR:18-2 part: Radio interference characteristics of overhead power lines and high-voltage equipment k) IS: 8263/ IEC: 260437: Methods of RI Test of HV Insulators l) ANSI C29 13-2000: Standard for insulators – Composite-Distribution Dead-end type m) IS: 4759/ISO: 1459/ ISO: 1461: Hot dip zinc coatings on structural steel & other allied products. n) IS: 2629/ISO: 1461(E): Recommended Practice for Hot, Dip Galvanization for iron and steel. o) IS: 6745/ISO: 1460: Determination of Weight of Zinc Coating on Zinc coated iron and steel articles. p) IS: 3203/IS0: 2178: Methods of testing of local thickness of electroplated coatings. q) IS: 2633: Testing of Uniformity of Coating of zinc coated articles. r) ASTM D 578-05: Standard specification for glass fiber strands. s) ASTM E 1131-03: Standard test method for compositional analysis by Thermo-gravimetric t) IS: 4699: Specification for refined secondary zinc

3	**CLIMATIC CONDITIONS OF THE INSTALLATION**	a) Max. Ambient Temperature : 50 deg.C b) Max. Daily average ambient temp : 40 deg.C c) Min. Ambient Temperature : 0 deg.C d) Maximum Relative Humidity : 100% e) Minimum Relative Humidity : 10% f) Average No. of thunderstorm per annum : 50 g) Average Annual Rainfall : 750 mm h) Average No. of rainy days per annum 60 i) Rainy months : June to Oct. j) Altitude not exceeding : 300 meters. k) Wind Pressure : 126kg/sq. m up an elevation of 10m. Atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

4.0 GENERAL TECHNICAL REQUIREMENTS

Sl No.	Description	Unit	Requirements
1	Type of Insulator		Polymeric 33 kV Ball and Socket Disc Insulator
2	Standard according to which the insulators manufactured and tested		IEC 61109
3	Material of housing and weather sheds		High voltage grade Silicone Rubber
(a)	Material of Core (FRP rod)	kV	ECR BORON FREE
(b)	Material of end fittings	Hz	Ball fitting - Forged Steel and Socket fitting - SGI Cast /forged steel
(c)	Sealing compound for end fittings		Silicone Sealant
4	Color of housing	KN	Grey
5	Electrical characteristics		
(a)	Nominal System Voltage	kV	33
(b)	Highest System Voltage	kV	36
(d)	Rated Frequency	Hz	50
(f)	Wet power frequency withstand voltage	kV (rms)	75
(g)	Dry lightning impulse withstand voltage	kV	170
(h)	Visible Discharge Test Voltage	kV	27
(i)	Minimum creepage	mm	900

	distance		
(j)	Inclined plane tracking and erosion resistance of housing	kV	4.5kV for 360 minutes
(k)	FRP rod leakage current at 175 V/mm	mA	<0.05mA
(l)	Minimum Failing load	kN	120

5	**GENERAL CONSTRUCTIONS**	Polymeric Insulators shall be designed to meet the high quality, safety and reliability and are capable of withstanding a wide range of environmental conditions. Polymeric Insulators shall consist of THREE parts, at least two of which are insulating parts:- (a) Core- the internal insulating part (b)Housing- the external insulating part (c)Metal end fittings.
5.1	**CORE**	Core shall be a glass-fiber reinforced epoxy resin rod of high strength (FRP rod). Glass fibers and resin shall be optimized in the FRP rod. Glass fibers shall be Boron free electrically corrosion resistant (ECR) glass fiber (minimum 80%) and shall exhibit both high electrical integrity and high resistance to acid corrosion. FRP Rod Diameters Should be minimum 20mm for 120KN ball and socket disc insulator. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP rod shall be manufactured through Pultrusion process. The FRP rod shall be void free.
5.2	**POLYMER HOUSING**	The FRP rod shall be covered by a seamless sheath of high voltage grade Silicone rubber housing. It shall be one- piece housing using only Injection Molding process to cover the core. Primer should be used to bond the housing with FRP rod. The housing shall be designed to provide the necessary creepage distance and protection against environmental influences. Housing shall conform to the requirements of IEC 61109/93-93 with latest amendments. It shall be extruded or directly moulded on core and shall have chemical bonding with the FRP rod. The strength of the bond shall be greater than the tearing strength of the polymer. Sheath material in the bulk as well as in the sealing / bonding area shall be free from voids. All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.
5.3	**WEATHERSHEDS**	The composite polymer weathersheds made of high voltage grade Silicone rubber polymer shall be molded as part of the sheath and shall be free from imperfections. It should protect the FRP rod against environmental influences, external pollution and humidity. The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer. The Weathersheds should have silicon content of minimum 30% by weight. The interface, if any, between sheds and sheath (housing) shall be free from voids. Housing and weather shed material shall have tensile strength of 3 MPa with 400% elongation minimum and tear strength of 16N/mm. Method of fixing of sheds to housing should be only injection moulding. Also Single mould of injection moulding will be preferred.

5.4	**HARDWARE FITTINGS**	a) Ball pin and socket couplings: Ball pin and socket shall be of forged steel with 16B designation hardware fitting and dimensions are as specified in IS 2486 (Part-2): 1989. Insulator metal caps shall be made of malleable cast iron conforming to IS 14329: 1995. b) Locking device of the coupling: The security clips to be used as a locking device for ball and socket coupling shall be 'R' shaped hump type or 'W' type as per IS 2486. The locking device shall be resilient, corrosion resistant, and of suitable mechanical strength. Material to be used for 'W' locking clip is phosphor bronze and for 'R' type locking clip is stainless steel. The hardness and temper of material are important for their satisfactory operation. The locking devices shall retain their ability after being operated from the locking to the coupling position at least twenty times at normal temperature. They should be effective at the lowest temperature likely to be encountered in service. Socket for use with W-clips have the lower edge of the rectangular slot at the level of bottom of the socket. The slot is so shaped that it will accept the W-clip and retain it in two distinct positions when operated for coupling and locking. The shape of the W-clip is such that complete withdrawal when moving from the locking to the coupling position prevented c) All ferrous parts shall be hot dip galvanized in accordance with the latest edition of IS 2629-1985. The Zinc to be used for galvanizing shall conform to grade Zn 99.99 as per IS 209-1992. The Zinc coating shall be uniform, smoothly adherent, reasonably bright, continuous and free from impurities such as flux, ash, rust stains, bulky white deposits and blisters. Before ball fittings are galvanized, all die flashing on the shank and on the bearing surface of the ball shall be carefully removed without reducing the design dimensional requirements
6.0	**MARKING**:	Each insulator box shall be legibly and indelibly marked with "PO no. with moth and year of manufacturing, "Property of TPCODL Bhubneshwar ", "CODE NUMBER", along with following: a. Manufacturer's name b. Type designation or serial no. c. Minimum failing load in kN d. No. of relevant standard e. Month and year of manufacture f. Country of manufacture Each insulator shall be embossed with Manufacturer name/Logo.
7.0	**TESTS**	All routine, acceptance and type tests shall be witnessed by the purchaser/his authorized representative. Following tests for 33kV Ball and Socket Disc polymer insulator should be done as per relevant standards:

7.1	**TYPE TESTS OF COMPLETE POLYMER INSULATORS**	• Dry lightning impulse withstand voltage test. • Wet power frequency test. • Mechanical failing load test. • Radio interference test. • Mechanical performance test U.V Resistance as per ASTM G 53: 1000 Hrs - UV Light for 8 Hours and condensation for 4 hours in a continuous cycle. Elongation to be limited to 20% (% Elongation to break before and after the test). • Salt Fog test: On insulators for 1000 hours as per IEC. • Galvanization test. • Visual examination. • Verification of dimensions. • Bending test. • Verification of the locking system or the tightness of the interface between end fitting and insulator housing. • Assembled core load time test. • Determination of the average failing load of the core of the assembled insulator.
7.2	**TYPE TESTS ON SILICONE RUBBER**	• Tensile Strength & Elongation • Tear Strength • Inclined Plane Tracking & Erosion • Volume resistivity • Dielectric Strength • Dielectric Constant • Density • Hardness • Arc Resistance • Silicone content • Flammability • Resistance to weathering & UV. • Limiting oxygen index test. • Specific gravity.
7.3	**TYPE TESTS ON FRP RODS**	• Verification of dimensions. • Specific Gravity • Glass Content • Water Diffusion Test • Hardness • Dye Penetration Test. • Flexural strength. • Water absorption. • Brittle fracture resistance test. • Visible discharge test. • Dry lightning impulse withstand voltage test. • Wet power frequency withstand voltage test. • Power Arc test. • Accelerated weathering test. • Tracking & erosion test.

7.4	**TYPE TESTS ON END FITTINGS**	• Thickness of Zinc Coating • Uniformity of Zinc Coating • Micro-structural of metal fitting.
7.5	**DESIGN TESTS**	For composite insulators it is essential to carry out design test as per clause 4.1 of IEC 61109 / 92-93 with latest amendments. The design tests are intended to verify the suitability of the design, materials and method of manufacture (technology). When a composite insulator is submitted to the design tests, the result shall be considered valid for the whole class of insulators, which are represented by the one tested and having the following characteristics: • The materials for the core, and sheds and same manufacturing method; • The material of the fittings, the same design, the same method of attachment; • Polymer insulator should have greater layer thickness of the shed material over the core (including a sheath where used); • Polymer insulator should have smaller ratio of the highest system voltage to insulation length; • Polymer insulator should have smaller ratio of all mechanical loads to the smallest core diameter between fittings • Polymer insulator should have greater diameter of the core. The tested composite insulators shall be identified by a drawing giving all the dimensions with the manufacturing tolerances. Manufacturer should submit test reports for Design Tests as per IEC – 61109 (clause – 5) along with the bid. Additionally following tests shall be carried out or reports for the tests shall be submitted after award of contract: UV test: the test shall be carried out in line with clause 7.2 of ANSI C29.13. In addition, chemical composition test for silicon content would also be added in the testing list.
7.6	**ROUTINE TESTS**	• Visual Examination (Free from void, cavity, foreign particle and scratch/nick spot). • Mechanical Routine Test • Electrical Routine Test
7.7	**ACCEPTANCE TESTS**	• End Sealing test (FRP rod and Silicone rubber housing). • Visual examination (Free from void, cavity, foreign particle and scratch/nick spot). • Verification of dimensions. • Galvanizing Tests. • Bending load test. • Mechanical performance test. • Mechanical Failing Load test. • Dry power frequency withstand voltage test • Wet power frequency withstand voltage test.
8.0	**TYPE TEST CERTIFICATES**:	The Bidder shall furnish the type test certificates of the 33 KV Ball and Socket Disc polymer Insulators for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/International Laboratory as per the relevant standards. Type tests should have been conducted in certified Test laboratories during the

		period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCODL.
9.0	**PRE DISPATCH INSPECTION**:	The material shall be subject to inspection by a duly authorized representative of the TPCODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPCODL's representatives at all times when the work is in progress. Inspection by the TPCODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL. Following documents shall be sent along with material a) Test reports b) MDCC issued by TPCODL c) TPCODL Invoice in duplicate d) Packing list e) Drawings & catalogue f) Guarantee / Warrantee card g) Delivery Challan h) Other Documents (as applicable).
10.0	**INSPECTION AFTER RECEIPT AT STORES**:	The material received at TPCODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering & contracts department.
11.0	**GUARANTEE:**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is later, (the time scale of 12/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.
12.0	**PACKING:**	Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.
13.0	**TENDER SAMPLE:**	1 insulator sample to be provided during submission of technical bid.

14.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.
15.0	**MINIMUM TESTING FACILITIES:**	The tenderer must clearly indicate what testing facilities are available in the works of the manufacturer and whether facilities are adequate to carry out all Routine & acceptance Tests. These facilities should be available to TPCODL Engineers if deputed or carry out or witness the tests in the manufacturer works. If any test cannot be carried out at the manufacturer's work, the reasons should be clearly stated in the tender. The insulators shall be tested in accordance with the procedure detailed in IEC 61109 / 92-93 with latest amendments.
16.0	**MANUFACTURING ACTIVITIES:**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.
17.0	**SPARES, ACCESSORIES AND TOOLS:**	Not Applicable.
18.0	**DRAWINGS AND DOCUMENTS:**	Following documents shall be prepared based on TPCODL specifications and statutory requirements with complete BOM and shall be submitted with the bid: a) Completely filled in Technical Particulars b) General description of the equipment and all components including brochures c) Generalized drawing for Insulation Piercing Connector d) Bill of Material e) Type test Certificates f) Experience List. After the after of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser. Following Drawings/Documents shall be submitted after the award of the contract:

S. No	Description	For Approval	For Review Information	Final Submission

			1	Technical Parameters	√	√
			2	General Arrangement drawings	√	√
			3	Terminal and connection drawings	√	√
			4	Manual catalogue		√
			5	Installation/Commissioning Manuals		√
			6	Instructions for use		√
			7	Transport/shipping dimension drawing		√
			8	QA & QC Plan	√	√
			9	Routine, Acceptance and Type test Certificates	√	√

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

19.0	**GUARANTEED TECHNICAL PARTICULARS:**	Sl No.	Description	Requirements	As furnished by Bidder
		1	Type of insulator	Polymeric Ball and Socket Disc	Bidder has to submit
		2	Standard according to which the insulators manufactured and tested	IEC 61952 & IEC 61109	
		3	Material of Housing and Weather sheds	High voltage grade	
		4	Material of Core (FRP Rod)	ECR BORON free	
		5	Material of end fittings	Ball fitting Forged Steel and Socket fitting SGI Cast /forged steel	

		6	Sealing compound for end fittings	Silicone Sealant			
		7	Colour of housing	Grey			
		8	Electrical characteristics				
		9	Nominal system voltage	33kV			
		10	Highest system voltage	36kV			
		11	Rated frequency	50Hz			
		13	Wet power frequency with stand voltage	75kV (rms)			
		14	Impulse with stand voltage	170kV (rms)			
		15	Visible Discharge test Voltage	27 kV			
		16	Minimum creepage distance	900 mm			
		17	FRP rod leakage current	<0.05 mA			
		18	Minimum Failing loads	120 kN			
		19	FRP rod dia. Min	20 mm			
		20	No. of Weathersheds	As per bidder			
		21	Length of FRP rod	As per bidder			
		22	Insulator weight	As per bidder			
		23	Dia. of weather sheds	As per bidder			
		24	Thickness of housing	As per bidder			
		25	Type of Sheds	Aerodynamics			
		26	Method of fixing of sheds to housing (Single mould)	Injection Moulding			

20.0	**SCHEDULE OF DEVIATIONS** **(TO BE ENCLOSED WITH TECHNICAL BID)**	**(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:

Designation
Signature

CONTENTS

1	**SCOPE:**	This specification covers the technical requirements of design, manufacture, performance, testing at manufacturer's works, packing & forwarding, supply and unloading at store/ site, performance of Ball and Socket Disc polymer insulator complete with all the accessories for trouble free and efficient performance.
2	**APPLICABLE STANDARDS**:	Insulator shall comply with the requirements stated in the latest editions of the following standards- a) IEC: 61109: Definition, test methods and acceptance criteria for composite insulators for A.C. overhead lines above 1000V. b) IS: 2071/ IEC: 60060-1: Methods of High Voltage Testing c) IS: 2486/ IEC: 60120/IEC: 60372: Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements locking devices d) IEC: 60575: Thermal Mechanical Performance test and mechanical performance test on string insulator units. e) IS: 13134/ IEC: 60815: Guide for the selection of insulators in respect of polluted condition. f) IEC: 60433: Characteristics of string insulator units of the long rod type g) IS: 14329-1995: Malleable Iron Castings h) IS: 60437: Methods of RI Test of HV insulators i) STRI guide 1.92/1: Hydrophobicity Classification Guide. j) CISPR:18-2 part: Radio interference characteristics of overhead power lines and high-voltage equipment k) IS: 8263/ IEC: 260437: Methods of RI Test of HV Insulators l) ANSI C29 13-2000: Standard for insulators – Composite-Distribution Dead-end type m) IS: 4759/ISO: 1459/ ISO: 1461: Hot dip zinc coatings on structural steel & other allied products. n) IS: 2629/ISO: 1461(E): Recommended Practice for Hot, Dip Galvanization for iron and steel. o) IS: 6745/ISO: 1460: Determination of Weight of Zinc Coating on Zinc coated iron and steel articles. p) IS: 3203/IS0: 2178: Methods of testing of local thickness of electroplated coatings. q) IS: 2633: Testing of Uniformity of Coating of zinc coated articles. r) ASTM D 578-05: Standard specification for glass fiber strands. s) ASTM E 1131-03: Standard test method for compositional analysis by Thermo-gravimetric t) IS: 4699: Specification for refined secondary zinc

3	**CLIMATIC CONDITIONS OF THE INSTALLATION**	a) Max. Ambient Temperature : 50 deg.C b) Max. Daily average ambient temp : 40 deg.C c) Min. Ambient Temperature : 0 deg.C d) Maximum Relative Humidity : 100% e) Minimum Relative Humidity : 10% f) Average No. of thunderstorm per annum : 50 g) Average Annual Rainfall : 750 mm h) Average No. of rainy days per annum 60 i) Rainy months : June to Oct. j) Altitude not exceeding : 300 meters. k) Wind Pressure : 126kg/sq. m up an elevation of 10m. Atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

4.0 GENERAL TECHNICAL REQUIREMENTS

Sl No.	Description	Unit	Requirements
1	Type of Insulator		Polymeric 11 kV Ball and Socket Disc Insulator
2	Standard according to which the insulators manufactured and tested		IEC 61109
3	Material of housing and weather sheds		High voltage grade Silicone Rubber
(a)	Material of Core (FRP rod)	kV	ECR BORON FREE
(b)	Material of end fittings	Hz	SGI Cast/Forged Steel
(c)	Sealing compound for end fittings		Silicone Sealant
4	Color of housing	KN	Grey
5	Electrical characteristics		
(a)	Nominal System Voltage	kV	11
(b)	Highest System Voltage	kV	12
(d)	Rated Frequency	Hz	50
(f)	Wet power frequency withstand voltage	kV (rms)	35
(g)	Dry lightning impulse withstand voltage	kV	75
(h)	Visible Discharge Test Voltage	kV	9
(i)	Minimum creepage distance	mm	320
(j)	Inclined plane tracking	kV	4.5kV for 360 minutes

	and erosion resistance of housing		
(k)	FRP rod leakage current at 175 V/mm	mA	<0.05mA
(l)	Minimum Failing load	kN	70

5	**GENERAL CONSTRUCTIONS**	Polymeric Insulators shall be designed to meet the high quality, safety and reliability and are capable of withstanding a wide range of environmental conditions. Polymeric Insulators shall consist of THREE parts, at least two of which are insulating parts:- (a) Core- the internal insulating part (b)Housing- the external insulating part (c)Metal end fittings.
5.1	**CORE**	Core shall be a glass-fiber reinforced epoxy resin rod of high strength (FRP rod). Glass fibers and resin shall be optimized in the FRP rod. Glass fibers shall be Boron free electrically corrosion resistant (ECR) glass fiber (minimum 80%) and shall exhibit both high electrical integrity and high resistance to acid corrosion. FRP Rod Diameters Should be minimum 16mm for 70KN ball and socket insulator. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP rod shall be manufactured through Pultrusion process. The FRP rod shall be void free.
5.2	**POLYMER HOUSING**	The FRP rod shall be covered by a seamless sheath of high voltage grade Silicone rubber housing. It shall be one- piece housing using only Injection Molding process to cover the core. Primer should be used to bond the housing with FRP rod. The housing shall be designed to provide the necessary creepage distance and protection against environmental influences. Housing shall conform to the requirements of IEC 61109/93-93 with latest amendments. It shall be extruded or directly moulded on core and shall have chemical bonding with the FRP rod. The strength of the bond shall be greater than the tearing strength of the polymer. Sheath material in the bulk as well as in the sealing / bonding area shall be free from voids. All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.
5.3	**WEATHERSHEDS**	The composite polymer weathersheds made of high voltage grade Silicone rubber polymer shall be molded as part of the sheath and shall be free from imperfections. It should protect the FRP rod against environmental influences, external pollution and humidity. The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer. The Weathersheds should have silicon content of minimum 30% by weight. The interface, if any, between sheds and sheath (housing) shall be free from voids. Housing and weather shed material shall have tensile strength of 3 MPa with 400% elongation minimum and tear strength of 16N/mm.

5.4	**HARDWARE FITTINGS**	a) Ball pin and socket couplings: Ball pin and socket shall be of forged steel and dimensions are as specified in IS 2486 (Part-2): 1989. Insulator metal caps shall be made of malleable cast iron conforming to IS 14329: 1995. b) Locking device of the coupling: The security clips to be used as a locking device for ball and socket coupling shall be 'R' shaped hump type or 'W' type as per IS 2486. The locking device shall be resilient, corrosion resistant, and of suitable mechanical strength. Material to be used for 'W' locking clip is phosphor bronze and for 'R' type locking clip is stainless steel. The hardness and temper of material are important for their satisfactory operation. The locking devices shall retain their ability after being operated from the locking to the coupling position at least twenty times at normal temperature. They should be effective at the lowest temperature likely to be encountered in service. Socket for use with W-clips have the lower edge of the rectangular slot at the level of bottom of the socket. The slot is so shaped that it will accept the W-clip and retain it in two distinct positions when operated for coupling and locking. The shape of the W-clip is such that complete withdrawal when moving from the locking to the coupling position prevented c) All ferrous parts shall be hot dip galvanized in accordance with the latest edition of IS 2629-1985. The Zinc to be used for galvanizing shall conform to grade Zn 99.99 as per IS 209-1992. The Zinc coating shall be uniform, smoothly adherent, reasonably bright, continuous and free from impurities such as flux, ash, rust stains, bulky white deposits and blisters. Before ball fittings are galvanized, all die flashing on the shank and on the bearing surface of the ball shall be carefully removed without reducing the design dimensional requirements
6.0	**MARKING**:	Each insulator box shall be legibly and indelibly marked with "PO no. with moth and year of manufacturing, "Property of TPCODL Bhubneshwar", "CODE NUMBER", along with following: a. Manufacturer's name b. Type designation or serial no. c. Minimum failing load in kN d. No. of relevant standard e. Month and year of manufacture f. Country of manufacture Each insulator shall be embossed with Manufacturer name/Logo.
7.0	**TESTS**	All routine, acceptance and type tests shall be witnessed by the purchaser/his authorized representative. Following tests for 11kV Ball and Socket Disc polymer insulator should be done as per relevant standards:

7.1	**TYPE TESTS OF COMPLETE POLYMER INSULATORS**	• Dry lightning impulse withstand voltage test. • Wet power frequency test. • Mechanical failing load test. • Radio interference test. • Mechanical performance test U.V Resistance as per ASTM G 53: 1000 Hrs - UV Light for 8 Hours and condensation for 4 hours in a continuous cycle. Elongation to be limited to 20% (% Elongation to break before and after the test). • Salt Fog test: On insulators for 1000 hours as per IEC. • Galvanization test. • Visual examination. • Verification of dimensions. • Bending test. • Verification of the locking system or the tightness of the interface between end fitting and insulator housing. • Assembled core load time test. • Determination of the average failing load of the core of the assembled insulator.
7.2	**TYPE TESTS ON SILICONE RUBBER**	• Tensile Strength & Elongation • Tear Strength • Inclined Plane Tracking & Erosion • Volume resistivity • Dielectric Strength • Dielectric Constant • Density • Hardness • Arc Resistance • Silicone content • Flammability • Resistance to weathering & UV. • Limiting oxygen index test. • Specific gravity.
7.3	**TYPE TESTS ON FRP RODS**	• Verification of dimensions. • Specific Gravity • Glass Content • Water Diffusion Test • Hardness • Dye Penetration Test. • Flexural strength. • Water absorption. • Brittle fracture resistance test. • Visible discharge test. • Dry lightning impulse withstand voltage test. • Wet power frequency withstand voltage test. • Power Arc test. • Accelerated weathering test. • Tracking & erosion test.

7.4	**TYPE TESTS ON END FITTINGS**	• Thickness of Zinc Coating • Uniformity of Zinc Coating • Micro-structural of metal fitting.
7.5	**DESIGN TESTS**	For composite insulators it is essential to carry out design test as per clause 4.1 of IEC 61109 / 92-93 with latest amendments. The design tests are intended to verify the suitability of the design, materials and method of manufacture (technology). When a composite insulator is submitted to the design tests, the result shall be considered valid for the whole class of insulators, which are represented by the one tested and having the following characteristics: • The materials for the core, and sheds and same manufacturing method; • The material of the fittings, the same design, the same method of attachment; • Polymer insulator should have greater layer thickness of the shed material over the core (including a sheath where used); • Polymer insulator should have smaller ratio of the highest system voltage to insulation length; • Polymer insulator should have smaller ratio of all mechanical loads to the smallest core diameter between fittings • Polymer insulator should have greater diameter of the core. The tested composite insulators shall be identified by a drawing giving all the dimensions with the manufacturing tolerances. Manufacturer should submit test reports for Design Tests as per IEC – 61109 (clause – 5) along with the bid. Additionally following tests shall be carried out or reports for the tests shall be submitted after award of contract: UV test: the test shall be carried out in line with clause 7.2 of ANSI C29.13. In addition, chemical composition test for silicon content would also be added in the testing list.
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8.0	**TYPE TEST CERTIFICATES**:	The Bidder shall furnish the type test certificates of the 11 KV Ball and Socket Disc polymer Insulators for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/International Laboratory as per the relevant standards. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not

		acceptable, same shall be carried out without any cost implication to TPCODL.
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12.0	**PACKING:**	Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.
13.0	**TENDER SAMPLE:**	1 insulator sample to be provided during submission of technical bid.
14.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be

		carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.
15.0	**MINIMUM TESTING FACILITIES:**	The tenderer must clearly indicate what testing facilities are available in the works of the manufacturer and whether facilities are adequate to carry out all Routine & acceptance Tests. These facilities should be available to TPCODL Engineers if deputed or carry out or witness the tests in the manufacturer works. If any test cannot be carried out at the manufacturer's work, the reasons should be clearly stated in the tender. The insulators shall be tested in accordance with the procedure detailed in IEC 61109 / 92-93 with latest amendments.
16.0	**MANUFACTURING ACTIVITIES:**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.
17.0	**SPARES, ACCESSORIES AND TOOLS:**	Not Applicable.
18.0	**DRAWINGS AND DOCUMENTS:**	Following documents shall be prepared based on TPCODL specifications and statutory requirements with complete BOM and shall be submitted with the bid: a) Completely filled in Technical Particulars b) General description of the equipment and all components including brochures c) Generalized drawing for Insulation Piercing Connector d) Bill of Material e) Type test Certificates f) Experience List. After the after of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser. Following Drawings/Documents shall be submitted after the award of the contract:

S. No	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√

			3	Terminal and connection drawings	√	√	√
			4	Manual catalogue		√	
			5	Installation/Commissioning Manuals		√	
			6	Instructions for use		√	
			7	Transport/shipping dimension drawing		√	
			8	QA & QC Plan	√	√	√
			9	Routine, Acceptance and Type test Certificates	√	√	√

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

19.0 **GUARANTEED TECHNICAL PARTICULARS:**

Sl No.	Description	Requirements	As furnished by Bidder
1	Type of insulator	Polymeric Ball and Socket Disc	Bidder has to submit
2	Standard according to which the insulators manufactured and tested	IEC 61952 & IEC 61109	
3	Material of Housing and Weather sheds	High voltage grade	
4	Material of Core (FRP Rod)	ECR BORON	
5	Material of end fittings	SGI Cast/ Forged	
6	Sealing compound for end fittings	Silicone Sealant	
7	Colour of housing	Grey	
8	Electrical characteristics		
9	Nominal system voltage	11kV	

		10	Highest system voltage	12kV		
		11	Rated frequency	50Hz		
		13	Wet power frequency with stand voltage	35kV (rms)		
		14	Impulse with stand voltage	75kV (rms)		
		15	Power frequency puncture with stand voltage	1.3 times the actual dry flashover voltage of the unit		
		16	Visible Discharge test Voltage	9 kV		
		17	Minimum creepage distance	320mm		
		18	Minimum Failing loads	70 kN		
		19	FRP rod dia.	16 mm		

20.0 **SCHEDULE OF DEVIATIONS**

(TO BE ENCLOSED WITH TECHNICAL BID)

(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:

Designation
Signature

CONTENTS

1	**SCOPE:**	This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at store/ site of 11 KV Pin polymer insulator 10 KN used in 11 KV Overhead Transmission lines.
2	**APPLICABLE STANDARDS**:	Insulator shall comply with the requirements stated in the latest editions of the following standards- a) IEC: 61109: Definition, test methods and acceptance criteria for composite insulators for A.C. overhead lines above 1000V. b) IEC: 61952: Insulators for overhead lines – Composite line post insulators for alternative current. c) IS: 2071/ IEC: 60060-1: Methods of High Voltage Testing. d) IS: 2486/ IEC: 60120: Specification for Insulator fittings for Overhead power Lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements Locking Devices. e) IEC: 60575: Thermal Mechanical Performance test and mechanical performance test on string insulator units. f) IS: 13134/ IEC: 60815: Guide for the selection of insulators in respect of polluted condition. g) STRI guide 1.92/1: Hydrophobicity Classification Guide. h) IEC: 60437: Methods of RI Test of HV insulators. i) IS: 4759: Hot dip zinc coatings on structural steel & other allied products. j) IS: 2629: Recommended Practice for Hot, Dip Galvanization for iron and steel. k) IS: 6745: Determination of Weight of Zinc Coating on Zinc coated iron and steel articles. l) IS: 2633: Testing of Uniformity of Coating of zinc coated articles. m) ASTM D 578-05: Standard specification for glass fiber strands.
3	**CLIMATIC CONDITIONS OF THE INSTALLATION**	The service conditions shall be as follows: 1. Maximum altitude above sea level 1,000m 2. Maximum ambient air temperature 50°C 3. Maximum daily average ambient air temperature 35°C 4. Minimum ambient air temperature 0°C 5. Maximum relative humidity 95% 6. Average number of thunderstorm days per annum (isokeraunic level) 70 7. Average number of rainy days per annum 120 8. Average annual rainfall 150cm 9. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g 10. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity) 11 .Wind velocity: 300 km/hr, 200 km/hr and 160 km/hr.

		Environmentally, some of the regions, where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas. Therefore, Outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive and humid coastal atmosphere The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.

4.0 GENERAL TECHNICAL REQUIREMENTS			
Sl No.	Description	Unit	Requirements
1	Type of Insulator		Polymeric Pin Insulator
2	Standard according to which the insulators manufactured and tested		IEC 61952 and IEC 61109
3	Material of housing and weather sheds		High voltage grade
(a)	Material of Core (FRP rod)	kV	ECR BORRON FREE
(b)	Material of end fittings	Hz	SGI Cast/Forged Steel
(c)	Sealing compound for end fittings		Silicone Sealent
4	Colour of housing	KN	Grey
5	Electrical characteristics		
(a)	Type		B
(b)	Rated Voltage	kV	12
(c)	Service Voltage	kV	11
(d)	Rated Frequency	Hz	50
(e)	Visible discharge test voltage	kV	9
(f)	Wet power frequency withstand voltage	kV (rms)	35
(g)	Impulse withstand voltage	kV (peak)	75
(h)	Power frequency puncture withstand voltage	kV (rms)	105
(i)	Creepage distance in heavily polluted atmosphere	Mm	320
(j)	Minimum failing loads	kN	10

5	**GENERAL CONSTRUCTIONS**	Polymeric Insulators shall be designed to meet the high quality, safety and reliability and are capable of withstanding a wide range of environmental

		conditions. Polymeric Insulators shall consist of THREE parts, at least two of which are insulating parts:- (a) Core- the internal insulating part (b)Housing- the external insulating part (c)Metal end fittings.
5.1	**CORE**	Core shall be a glass-fiber reinforced epoxy resin rod of high strength (FRP rod). Glass fibers and resin shall be optimized in the FRP rod. Glass fibers shall be Boron free electrically corrosion resistant (ECR) glass fiber and shall exhibit both high electrical integrity and high resistance to acid corrosion. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP rod shall be manufactured through Pultrusion process. The FRP rod shall be void free.
5.2	**POLYMER HOUSING**	The FRP rod shall be covered by a seamless sheath of high voltage grade Silicone rubber housing. It shall be one- piece housing using only Injection Molding process to cover the core. Primer should be used to bond the housing with FRP rod. The housing shall be designed to provide the necessary creepage distance and protection against environmental influences. Housing shall conform to the requirements of IEC 60815 with latest amendments. All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.
5.3	**WEATHERSHEDS**	The composite polymer weathersheds made of high voltage grade Silicone rubber polymer shall be molded as part of the sheath and shall be free from imperfections. It should protect the FRP rod against environmental influences, external pollution and humidity. The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer. The interface, if any, between sheds and sheath (housing) shall be free from voids. Housing and weather shed material shall have tensile strength of 3 MPa with 400% elongation minimum and tear strength of 16N/mm.
5.4	**METAL END FITTINGS**	End fitting transmit the mechanical load to the core. They shall be made of spheroidal graphite cast iron, malleable cast iron or forged steel or aluminum alloy. Metal end fitting shall be suitable for pin type hardware support of respective specified mechanical load and shall be hot dip galvanized in accordance with IS 2629. They shall be connected to the rod by means of a controlled compression technique. The OD of end fittings should be machined to make the surface uniform round to ensure effective sealing when housing is molded over it. The material used in fittings shall be corrosion resistant. As the main duty of the end fittings is the transfer of mechanical loads to the core the fittings should be properly attached to the core by a coaxial or hexagonal compression process & should not damage the individual fibers or crack the core. The dimensions of end fittings of insulators shall be in accordance with the standard dimensions stated in IEC: 60120/ IS: 2486 - Part-II /1989. Outer portion of Pin should be Zinc sleeved with minimum 99.95% purity of Electrolytic high grade zinc. Bottom end metal fitting (Shank) of Pin insulator should be forged steel as per IS 2002/92. Bottom end fitting should be single unit without any joints. Nuts as per IS 1363 (P-III) and spring washer shall be as per IS 3063 with Latest amendments if any, Nuts and spring washer shall be hot dip galvanized. The design of the insulator shall be such that stresses due to expansion and contraction in

		any part of the insulators shall not lead to deterioration. The Pin insulator shall not engage directly with hard metal.
6.0	**MARKING**:	Each insulator shall be legibly and indelibly marked with "PO no. with date, "Property of TPCL, Bhubaneswar", "CODE NUMBER", along with following: a. Manufacturer's name b. Type designation or serial no. c. Minimum failing load in kN d. No. of relevant standard e. Month and year of manufacture f. Country of manufacture
7.0	**TESTS**:	All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. Following tests for 11kV Pin Polymer insulator should be done as per relevant standards: **Tests on Silicone Rubber:** • Tensile Strength & Elongation • Tear Strength • Inclined Plane Tracking & Erosion • Volume resistivity • Dielectric Strength • Dielectric Constant • Density • Hardness • Arc Resistance • Silicone content • Flammability • Resistance to weathering & UV. • Limiting oxygen index test. • Specific gravity. **Tests on FRP Rods:** • Verification of dimensions. • Specific Gravity • Glass Content • Water Diffusion Test • Hardness • Dye Penetration Test. • Flexural strength. • Water absorption. • Brittle fracture resistance test. • Visible discharge test. • Dry lightning impulse withstand voltage test. • Wet power frequency withstand voltage test. • Power Arc test. • Accelerated weathering test. • Tracking & erosion test. **Tests on End Fittings**: • Thickness of Zinc Coating • Uniformity of Zinc Coating • Micro-structural of metal fitting. **Test of Complete polymer insulators:**

		• Dry lightning impulse withstand voltage test. • Wet power frequency test. • Mechanical failing load test. • Radio interference test. • Mechanical performance test U.V Resistance as per ASTM G 53: 1000 Hrs - UV Light for 8 Hours and condensation for 4 hours in a continuous cycle. Elongation to be limited to 20% (% Elongation to break before and after the test). • Salt Fog test: On insulators for 1000 hours as per IEC. • Galvanisation test. • Visual examination. • Verification of dimensions. • Bending test. • Verification of the locking system or the tightness of the interface between end fitting and insulator housing. • Assembled core load time test. • Determination of the average failing load of the core of the assembled insulator. **Design Tests:** For composite insulators it is essential to carry out design test as per clause 4.1 of IEC 61109 / 92-93 with latest amendments. The design tests are intended to verify the suitability of the design, materials and method of manufacture (technology). When a composite insulator is submitted to the design tests, the result shall be considered valid for the whole class of insulators, which are represented by the one tested and having the following characteristics: • The materials for the core, and sheds and same manufacturing method; • The material of the fittings, the same design, the same method of attachment; • Polymer insulator should have greater layer thickness of the shed material over the core (including a sheath where used); • Polymer insulator should have smaller ratio of the highest system voltage to insulation length; • Polymer insulator should have smaller ratio of all mechanical loads to the smallest core diameter between fittings • Polymer insulator should have greater diameter of the core. The tested composite insulators shall be identified by a drawing giving all the dimensions with the manufacturing tolerances. Manufacturer should submit test reports for Design Tests as per IEC – 61109 (clause – 5) along with the bid. Additionally following tests shall be carried out or reports for the tests shall be submitted after award of contract: UV test: the test shall be carried out in line with clause 7.2 of ANSI C29.13. In addition, chemical composition test for silicon content would also be added in the testing list. **Acceptance Tests** For Composite Insulators • Verification of dimensions • Visual examination

		• Verification of the locking system or the tightness of the interface between end fitting and insulator housing • Galvanizing test • Verification of the specified mechanical load • Bending load test • Dry power frequency withstand voltage test • Analysis of material properties of housing material • Analysis of material properties of core material **Routine Tests** • Visual Examination • Mechanical load test as per IEC 61109 & IEC 62231
8.0	**TYPE TEST CERTIFICATES**:	The Bidder shall furnish the type test certificates of the 11 KV Pin polymer Insulators for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/International Laboratory as per the relevant standards. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCL.
9.0	**PRE DISPATCH INSPECTION**:	The material shall be subject to inspection by a duly authorized representative of the TPCL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPCL's representatives at all times when the work is in progress. Inspection by the TPCL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCL. Following documents shall be sent along with material a) Test reports b) MDCC issued by TPCL c) TPCL Invoice in duplicate d) Packing list e) Drawings & catalogue f) Guarantee / Warrantee card g) Delivery Challan h) Other Documents (as applicable).
10.0	**INSPECTION AFTER RECEIPT AT STORES**:	The material received at TPCL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering & contracts department.
11.0	**GUARANTEE:**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is later, (the time scale of 12/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify

		such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.
12.0	**PACKING:**	Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.
13.0	**TENDER SAMPLE:**	As and when required
14.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.
15.0	**MINIMUM TESTING FACILITIES:**	The tenderer must clearly indicate what testing facilities are available in the works of the manufacturer and whether facilities are adequate to carry out all Routine & acceptance Tests. These facilities should be available to TPCL Engineers if deputed or carry out or witness the tests in the manufacturer works. If any test cannot be carried out at the manufacturer's work, the reasons should be clearly stated in the tender. The insulators shall be tested in accordance with the procedure detailed in IEC 61109 / 92-93 with latest amendments.
16.0	**MANUFACTURING ACTIVITIES:**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.
17.0	**SPARES, ACCESSORIES AND TOOLS:**	Not Applicable.
18.0	**DRAWINGS AND DOCUMENTS:**	
Following documents shall be prepared based on TPCL specifications and statutory requirements with complete BOM and shall be submitted with the bid: a) Completely filled in Technical Particulars b) General description of the equipment and all components including brochures c) Generalized drawing for Pin Insulator d) Bill of Material		

e) Type test Certificates
f) Experience List.

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

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

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

All the Documents and Drawings shall be in English Language.

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

19.0 **GUARANTEED TECHNICAL PARTICULARS:**

Sl No.	Description	Requirements	As furnished by Bidder
1	Type of insulator	Polymeric Pin	Bidder has to submit
2	Standard according to which the insulators manufactured and tested	IEC 61952 & IEC 61109	
3	Material of Housing and Weather sheds	High voltage grade	
4	Material of Core (FRP Rod)	ECR BORRON	
5	Material of end fittings	SGI Cast/ Forged	
6	Sealing compound for end fittings	Silicone Sealent	
	Colour of housing	Grey	
	Electrical characteristics		
	Nominal System voltage	33kV	
	Rated voltage	12V	

	Service voltage	11kV	
	Rated frequency	50Hz	
	Visible discharge test voltage	9kV	
	Wet power frequency with stand voltage	35kV (rms)	
	Impulse with stand voltage	75kV (rms)	
	Power frequency puncture with stand voltage	105kV (rms)	
	Creepage distance in heavily polluted	320mm	
	Minimum Failing loads	10kN	

20.0 **SCHEDULE OF DEVIATIONS**

(TO BE ENCLOSED WITH TECHNICAL BID)

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

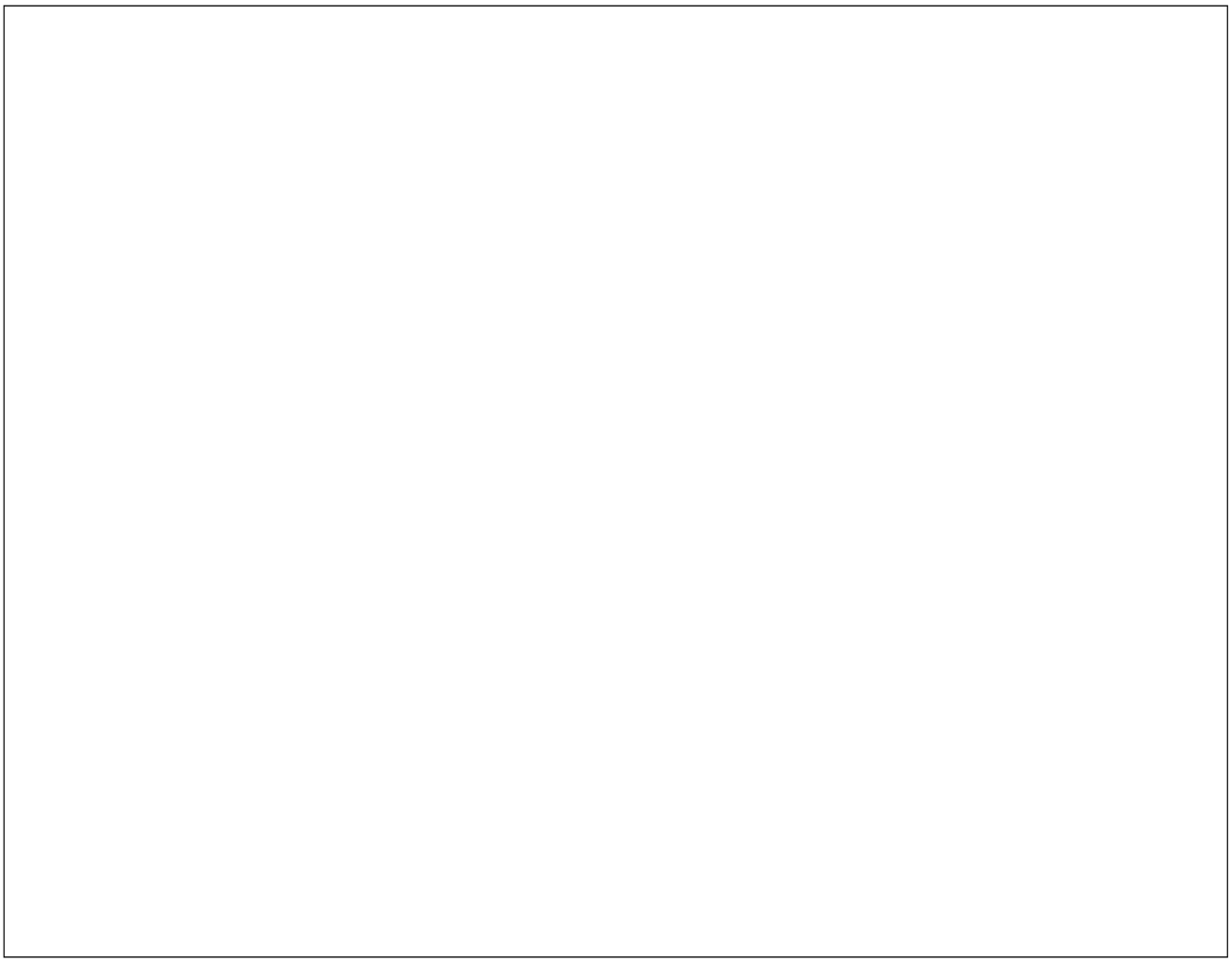
S. No	Clause No.	Details of deviation with justifications

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

Seal of the Company:

Signature

Designation



CONTENTS

1. SCOPE:

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at store/ site of 33 KV Pin polymer insulator 10 KN used in 33 KV Overhead Transmission lines.

2. **APPLICABLE STANDARDS**:

Insulator shall comply with the requirements stated in the latest editions of the following standards-

- IEC: 61109: Definition, test methods and acceptance criteria for composite insulators for A.C. overhead lines above 1000V.
- IEC: 61952: Insulators for overhead lines – Composite line post insulators for alternative current.
- IS: 2071/ IEC: 60060-1: Methods of High Voltage Testing.
- IS: 2486/ IEC: 60120: Specification for Insulator fittings for Overhead power Lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements Locking Devices.
- IEC: 60575: Thermal Mechanical Performance test and mechanical performance test on string insulator units.
- IS: 13134/ IEC: 60815: Guide for the selection of insulators in respect of polluted condition.
- STRI guide 1.92/1: Hydrophobicity Classification Guide.
- IEC: 60437: Methods of RI Test of HV insulators.
- IS: 4759: Hot dip zinc coatings on structural steel & other allied products.
- IS: 2629: Recommended Practice for Hot, Dip Galvanization for iron and steel.
- IS: 6745: Determination of Weight of Zinc Coating on Zinc coated iron and steel articles.
- IS: 2633: Testing of Uniformity of Coating of zinc coated articles.
- ASTM D 578-05: Standard specification for glass fiber strands.

3. **CLIMATIC CONDITIONS**:

The service conditions shall be as follows:

1. Maximum altitude above sea level 1,000m
2. Maximum ambient air temperature 50°C
3. Maximum daily average ambient air temperature 35°C
4. Minimum ambient air temperature 0°C
5. Maximum relative humidity 95%
6. Average number of thunderstorm days per annum (isokeraunic level) 70
7. Average number of rainy days per annum 120
8. Average annual rainfall 150cm
9. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g
10. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

11. Wind velocity: 300 km/hr, 200 km/hr and 160 km/hr.

Environmentally, some of the regions, where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas.

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

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

4. GENERAL TECHNICAL REQUIREMENTS:

Sr.No.	Description	Unit	Requirements
1.	Type of Insulator		Polymeric Pin Insulator
2.	Standard according to which the Insulators manufacturedand tested.		IEC 61952 & IEC 61109
3.	Material of Housing and Weather Sheds		high voltage grade Silicone rubber
(a)	Material of core(FRP rod)		ECR BORRON FREE
(b)	Material of end fittings		SGI Cast/Forged steel
(c)	Sealing compound for end fittings		Silicone Sealent
4.	Colour of housing		Grey
5.	Electrical characteristics		
(a)	Nominal system voltage	KV	33 KV
(b)	Highest system voltage	KV	36 KV
(c)	Wet Power frequency withstand voltage	KV	75 KV
(d)	Dry lighting impulse withstand voltage	KV	170 KV
(e)	Visible Discharge Test Voltage	KV(rms)	27
(f)	Creepage distance (Min.)	mm	900 MM
(g)	Inclined plane Tracking and Erosion Resistance of Housing		4.5 kV for 360 minutes
(h)	FRP rod leakage Current at 175 V/mm		< 0.05 mA
6. (a)	Mechanical characteristics : SCL (kN)	KN	10 KN

5. GENERAL CONSTRUCTION

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

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

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

5.1 CORE

It shall be a glass-fiber reinforced epoxy resin rod of high strength (FRP rod). Glass fibers and resin shall be optimized in the FRP rod. Glass fibers shall be Boron free electrically corrosion resistant (ECR) glass fiber and shall exhibit both high electrical integrity and high resistance to acid corrosion. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP rod shall be manufactured through Pultrusion process. The FRP rod shall be void free. All rods must pass electric leakage current test of 170V/mm. The leakage current shall not exceed 0.05mA.

5.2 POLYMER HOUSING:

The FRP rod shall be covered by a seamless sheath of high voltage grade Silicone rubber housing of thickness 3mm minimum. It shall be one- piece housing using only Injection Molding process to cover the core. Primer should be used to bond the housing with FRP rod. The housing shall be designed to provide the necessary creepage distance and protection against environmental influences. Housing shall conform to the requirements of IEC 60815 with latest amendments.

The high voltage grade Silicone rubber polymer material should be as per requirement specified in clause 8.2.2

5.3 WEATHERSHEDS

The composite polymer weathersheds made of high voltage grade Silicone rubber polymer shall be molded as part of the sheath and shall be free from imperfections. It should protect the FRP rod against environmental influences, external pollution and humidity. The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer. The interface, if any, between sheds and sheath (housing) shall be free from voids. Housing and weather shed material shall have tensile strength of 3 MPa with 400% elongation minimum and tear strength of 16N/mm.

The high voltage grade Silicone rubber polymer material should be as per requirement specified in clause 8.2.2

5.4 METAL END FITTINGS:

End fitting transmit the mechanical load to the core. They shall be made of spheroidal graphite cast iron, malleable cast iron or forged steel or aluminum alloy. Metal end fitting shall be suitable for pin type hardware support of respective specified mechanical load and shall be hot dip galvanized in accordance with IS 2629. They shall be connected to the rod by means of a controlled compression technique. The OD of end fittings should be machined to make the surface uniform round to ensure effective sealing when housing is molded over it. The material used in fittings shall be corrosion resistant. As the main duty of the end fittings is the transfer of mechanical loads to the core the fittings should be properly attached to the core by a coaxial or hexagonal compression process & should not damage the individual fibers or crack

the core. The dimensions of end fittings of insulators shall be in accordance with the standard dimensions stated in IEC: 60120/ IS: 2486 - Part-II /1989. Outer portion of Pin should be Zinc sleeved with minimum 99.95% purity of Electrolytic high grade zinc. Bottom end metal fitting (Shank) of Pin insulator should be forged steel as per IS 2002/92. Bottom end fitting should be single unit without any joints.
Nuts as per IS 1363 (P-III) and spring washer shall be as per IS 3063 with Latest amendments if any, Nuts and spring washer shall be hot dip galvanized.

The design of the insulator shall be such that stresses due to expansion and contraction in any part of the insulators shall not lead to deterioration. The Pin insulator shall not engage directly with hard metal.

6. MARKING:

Each insulator shall be legibly and indelibly marked as-

(a) Name & Trade mark of the manufacturer
(b) Month and year of manufacture
(c) Minimum failing load in KN
(d) "TPCODL" Name should be mentioned on each insulator.

7. TESTS:

Type Tests

- Dry lightning impulse withstand voltage test.
- Wet power frequency test.
- Mechanical load-time test.
- Radio interference test.
- Recovery of Hydrophobicity test.
- Brittle fracture resistance test.
- Cantilever Load withstand test for Pin Insulators.

Tests on the high voltage grade Silicone rubber material used in manufacture of the insulator housing and weathersheds:

The bidder shall furnish following type test reports conducted on High voltage Silicone rubber material used for Polymer housing confirming following properties along with their bid.

Sl. No	Property	Requirement	Standard
1	Tensile Strength (MPa)	4 Mpa min	ASTM D 412-06a
2	Elongation (%)	300%	ASTM D 412-06a
3	Tear Strength	15 N/mm min	ASTMD 624
4	Inclined plane Tracking & Erosion resistance test	(4.5KV 360 min)	ASTM D2303
5	Volume Resistivity (Ohm –cm)	$1*10^{13}$ Ohm-cm min	ASTM D257
6	Dielectric constant	4	ASTM D150
7	Dielectric Strength (kv/mm)	26 kV /mm min	ASTM D149
8	Density	1.5 min	ASTM D792
9	Hardness (shore A)	62 nominal	ASTM D 2240
10	Arc Resistance	> 220 Seconds	ASTM D 495-99
11	Silicone Content	> 40%	BS: 2782-Pt10

12	Flammability	V0	UL 94

Acceptance Tests

- Verification of dimensions.
- Verification of the specified Cantilever load test.
- Galvanizing test.

Routine Test-

- Visual Inspection.
- Tensile Load Test (As per clause 13.2 of IEC-61952)
- Identification of marking.

8. TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates of the 33 KV Pin polymer Insulators for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA as per the relevant standards. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCODL.

9. PRE-DISPATCH INSPECTION:

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

Following documents shall be sent along with material

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

10. INSPECTION AFTER RECEIPT AT STORE:

TPCODL Inspectors will inspect the material received at TPCODL Store and shall have right to reject if found different from the reports of the pre-dispatch inspection.

11. GUARANTEE:

Supplier shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the

Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges(@ 20% of expenses incurred), from the supplier or from the" Security cum Performance Deposit" as the case may be. Supplier 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.

12. PACKING AND TRANSPORT:

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

13. TENDER SAMPLE:

As and when required.

14. QUALITY CONTROL:

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

15. TESTING FACILITIES:

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

16. DRAWINGS AND DOCUMENTS:

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

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

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

S No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement Drawing	√		√
3	Mounting and fixing arrangement		√	√
4	Instruction for use		√	√
5	QA & QC Plan & Type test certificates	√	√	√

17. GUARANTEED TECHNICAL PARTICULARS:

Bidder shall submit guaranteed technical particulars in the attached format.

Sr.No.	Description	Unit	Requirements	As furnished by bidder
1.	Type of Insulator		Polymeric Pin	Bidder has to furnish
2.	Standard according to which the Insulators manufacturedand tested.		IEC 61952 & IEC 61109	
3.	Material of Housing and Weather Sheds		high voltage grade Silicone rubber	
(a)	Material of core(FRP rod)		ECR BORRON	
(b)	Material of end fittings		SGI Cast/Forged	
(c)	Sealing compound for end fittings		Silicone Sealent	
4.	Colour of housing		Grey	
5.	Electrical characteristics			
(a)	Nominal system voltage	KV	33 KV	
(b)	Highest system voltage	KV	36 KV	
(c)	Wet Power frequency withstand voltage	KV	75 KV	
(d)	Dry lighting impulse withstand voltage	KV	170 KV	
(e	Visible Discharge Test Voltage	KV(rm	27	
(f)	Creepage distance (Min.)	mm	900 MM	
(g)	Inclined plane Tracking and Erosion Resistance of Housing		4.5 kV for 360 minutes	
(h)	FRP rod leakage Current at 175 V/mm		< 0.05 mA	
6. (a)	Mechanical characteristics : SCL (kN)	KN	10 KN	
7.	Dimensions of insulator			
(i)	Weight	Kg.	As per bidder	
(ii)	Dia of FRP rod	mm	33.5	
(iii)	Length of FRP rod	Mm	As per bidder	
(iv)	Dia of weather sheds	mm	As per bidder	
(v)	Thickness of housing	mm	As per bidder	
(vi)	Dry arc distance Dimensioned drawings of insulator (including weight with tolerances in weight) to be enclosed.	mm	As per bidder	

8.	Method of fixing of sheds to housing (specify). Single mould or Modular construction (injection moulding)		Injection moulding	
9.	No of weathersheds		As per bidder	
10.	Type of sheds			
i)	Aerodynamic		Aerodynamic	

Note- For 33 KV GI Pin for 33KV Pin insulator, TPCODL specification- "PEC-GEN-127-01" shall be referred.

18. **SCHEDULES OF DEVIATIONS**:

The Bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless specifically mentioned in this schedule, the bidder shall be deemed to confirm the purchaser's specifications. (Format is attached)

(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:

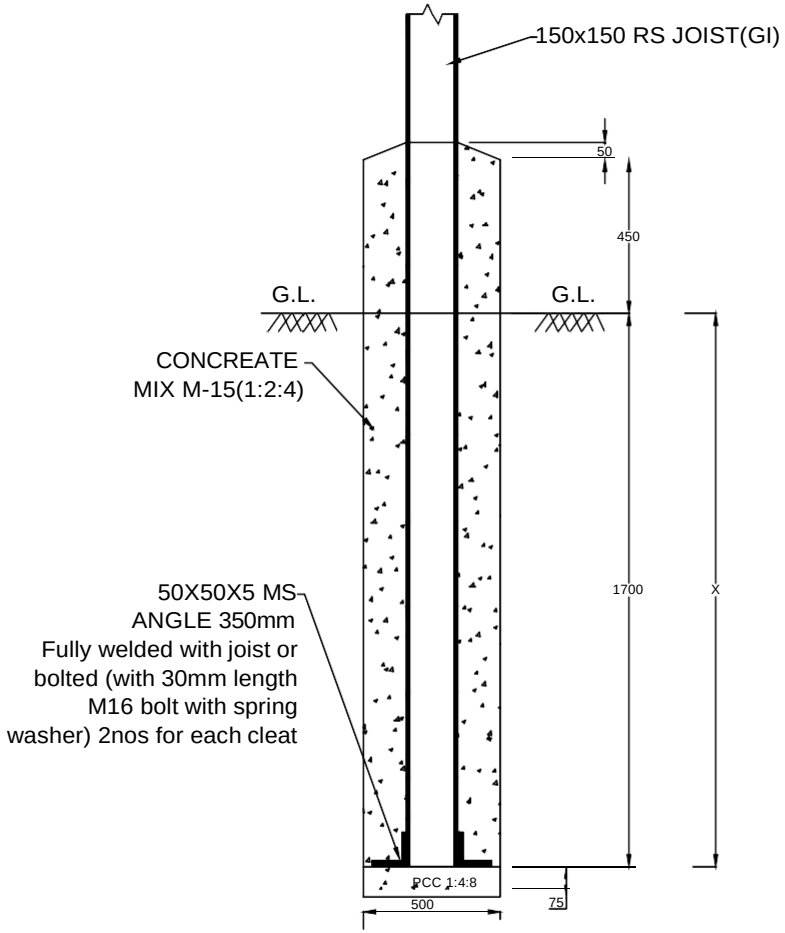
S.No.	Clause No.	Details of deviation with justifications

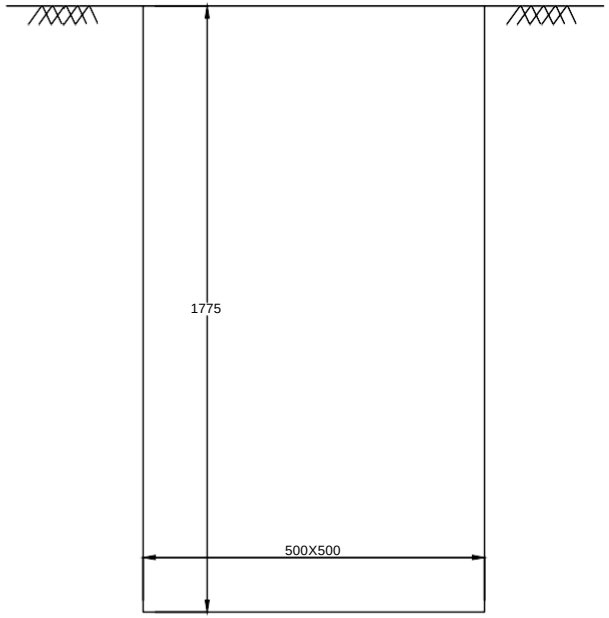
We confirm that there are no deviations apart from those detailed above.

Seal of the Company. Designation:

Signature:

DRAWING FOR CONCREATING OF RS JOIST 150X150X FOR NORMAL POLES





POLE PIT TO BE EXCAVATED

NOTE:

1.PCC(1:4:8)=1X1X0.075=0.075 CUM

2.PCC(1:2:4)=a) 0.4X0.4X2.2=0.352 CUM

3. MS ANGLE, Fully welded with joist or bolted (with 30mm length M16 bolt with spring washer) 2nos for each cleat = 0.35X(3.8kg/mtr)=1.33kg

4. A) 'X" WILL VARY DEPENDING UPON THE LENGTH OF THE POLE.
   B) ALL OTHER DIMENSIONS WILL REMAIN AS IT IS.
   C) RODS HAS TO BE PROVIDED IN ANGLE LOCATION MORE THEN 10 degree.

	TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED		
	STANDARD TECHNICAL PARTICULARS		
Document Title	Standard Technical Particular – Cable Cleat (two-bolt type)		

CONTENTS

	TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED
	STANDARD TECHNICAL PARTICULARS
Document Title	Standard Technical Particular – Cable Cleat (two-bolt type)

1.0	Scope	Scope of Specification covers: Technical Requirements wrt design, manufacture, packing and forwarding, supply and delivery of Cable Cleats (two-bolt type) at TATA Power-CODL stores office.	
2.0	Applicable Standards	The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian/International standard(s) and shall conform to the regulations of local statutory authorities.	
		IS 6746	Specification of unsaturated polyester resin system
		IS 617	Cast Aluminium and Aluminium Alloy
		IEC 61914 : 2009	Cable cleats for electrical installations
3.0	Climatic conditions of installation	a) Max. Ambient Temperature : 50 deg C b) Max. Daily average ambient temp. : 40 deg C d) Maximum Humidity : 100% e) Minimum Humidity : 10% f) Average No. of thunderstorm per annum : 50 g) Average Annual Rainfall : 750 mm h) Average No. of rainy days per annum : 60 i) Rainy months : June to Oct. j) Altitude above MSL not exceeding : 300meter k) Wind Pressure : 126kg/sq. m. up to an elevation of 10m Atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.	
4.0	General Technical Requirements	**S.No.**	**DESCRIPTION** / **REQUIREMENT**
		1	Application: For supporting of cables (Both outdoor and indoor)
		2	Cable diameter: Sizes in the range covered in Table - I
		3	Dimensions: As per drawing mentioned in Annexure-I & Table-II of this specification
		4	Material: **(A) Nylon 6 (Polyamide) with fiber glass 15%** with features of UV, weather, fire, oil and chemical resistance **(B) SMC (Sheet Moulded Compound)** with features of high impact, corrosion, fire and UV resistance, chemical resistance (C) **Aluminium cable cleat** – manufactured from Aluminium Alloy of high strength
		5	Properties: Unbreakable, Oil, Acid, Fire, UV retardant, High dielectric strength, High mechanical strength
		6	Colour: Black
		7	Inner side shape of cleat: Oval/ Circular
		Cable cleat shall be provided with galvanized nut, bolt, plain and spring washer. A galvanized washer to be provided at the front side of cable cleat with two bolts. Complete finished surface shall be smooth, free of voids, cracks etc. General tolerance in dimension allowable shall be +/-2%.	
5.0	General Construction	Refer to Annexure - I	

Initiator		HoG(Plant Engineering)	

	TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED
	STANDARD TECHNICAL PARTICULARS
Document Title	Standard Technical Particular – Cable Cleat (two-bolt type)

6.0	Name plate and Marking	Sticker shall be fixed on Cable cleat required with following details: 1) Property of TATA Power CODL 2) Name of Manufacturer 3) Month & Year of manufacturing (MM/YYYY) 4) Range of cable diameter
7.0	Tests	All Routine, Acceptance & Type tests shall be carried out in accordance with the Relevant IS/IEC. Acceptance tests shall be witnessed by TATA Power-CODL authorized representative from either in-house lab or from 3rd party NABL lab. All the components shall also be type tested as per the relevant standards mentioned below. Following tests shall be conducted from CPRI/ERDA/3rd party NABL accredited lab within the time period not exceeding last 5 years of bid opening:
8.0	Type test certificates	The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/3rd party NABL as per the relevant standards not exceeding 5 years from the date of opening of bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TATA Power-CODL. TATA Power-CODL has rights for Surveillance test of random selected samples from third party lab for quality checks of item. TATA Power-CODL shall be intimated in case revision is done by manufacturer in product design/ dimension/ material during execution of contract. Subsequently Type test certificate shall be produced.
9.0	Pre-dispatch inspection	Equipment shall be subject to inspection by a duly authorized representative of TATA Power-CODL. Inspection may be made at any stage of manufacturing at the option of TATA Power-CODL and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TATA Power-CODL's representatives at all times when the work is in progress. Inspection by TATA Power-CODL's authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TATA Power-CODL. Following documents shall be sent along with material: a) Test reports b) MDCC issued by TATA Power-CODL c) Invoice in duplicate d) Packing list e) Drawings & catalogue f) Guarantee / Warrantee card g) Delivery Challan

Test	Clause No.	IS/IEC
Impact resistance	6.2 & 9.2	IEC 61914
Lateral load retention	6.4, 7.3, 9.3	
Corrosion resistance	6.5.2, 11.2	
UV resistance	6.5.1, 11.1	
Flame propagation	10.1	

Initiator		HoG(Plant Engineering)	

	TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED		
	STANDARD TECHNICAL PARTICULARS		
Document Title	Standard Technical Particular – Cable Cleat (two-bolt type)		

		h) Other Documents (as applicable)
10.0	Inspection after receipt at Stores	The material received at Tata Power-CODL 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 Plant Engineering Group.
11.0	Guarantee	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by TATA Power-CODL up to a period of at least 12 months from the date of commissioning or 18 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 own costs, within mutually agreed time frame, and to the entire satisfaction of TATA Power-CODL, failing which TATA Power-CODL shall be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the "Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for free replacement for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by TATA Power-CODL. There would be free replacement for any manufacturing defects during the guarantee period.
12.0	Packaging	Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. The material used for packing shall be environmentally friendly.
13.0	Tender Sample	Bidder shall be submit the sample of material during tender evaluation process with the offer (in case of first supply to TATA Power-CODL).
14.0	Training	NA
15.0	Drawings & Documents	To be submitted in the Technical bid.
16.0	Guaranteed Technical Particular	Bidder to comply all above clauses as per specification.
17.0	Schedule of Deviations	**(TO BE ENCLOSED WITH THE BID)** All deviations from this specification shall be set out by the bidder, clause by clause in the below mentioned tabular format. Unless specifically mentioned in this schedule, the tender shall be deemed to confirm Tata Power-CODL's Specification.

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 :

Initiator		HoG(Plant Engineering)	

	TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED		
	STANDARD TECHNICAL PARTICULARS		
Document Title	Standard Technical Particular – Cable Cleat (two-bolt type)		

		Designation :

Annexure - I

Cable Cleat dimensions

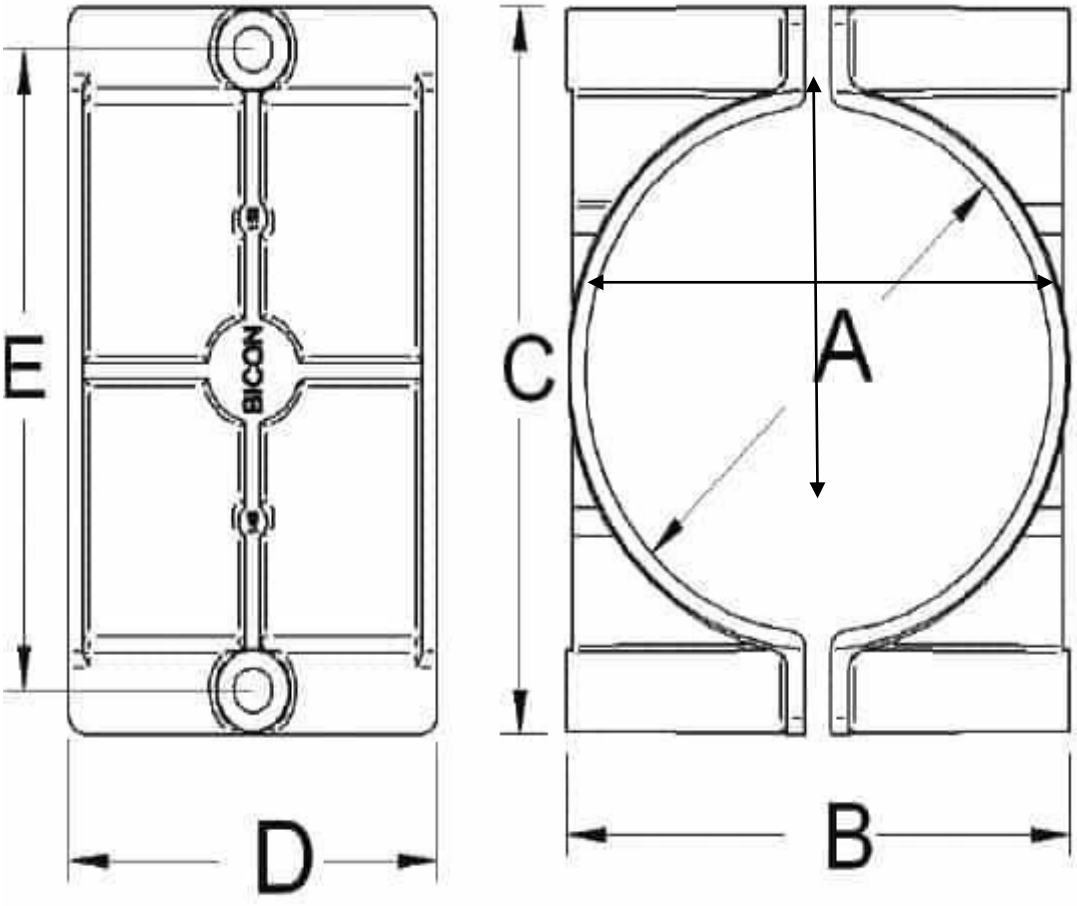


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Table – I

66 kV cable	1C X 1000 sq.mm.	95 mm
	1C X 630 sq.mm.	83 mm
	3C X 300 sq.mm.	127 mm
33 kV Cable	3C X 300 sq.mm.	108 mm
	3C X 400 sq.mm.	115 mm
11 kV Cable	1C X 630 sq.mm.	51 mm
	1C X 1000 sq.mm.	64 mm
	3C X 400 sq.mm.	95 mm
LT Cable	1C X 630 sq.mm.	39 mm
	4C X 300 sq.mm.	67 mm

Table – II

A Cable diameter (mm)	B (mm) Max.	C (mm)	D (mm)	E (mm)	Stud Size
39-51 mm	70	95	40	72	M08
64-67 mm	92	113	75	92	M10
77-88 mm	96	136	45	115	M10
95-115 mm	150	203	82	162	M16
120-127 mm	184	226	82	190	M16

1.0	Scope	This specification covers the technical requirements of design, engineering, manufacturing, testing, packing, forwarding, supply and unloading at site/stores of MVLC – medium voltage line cover for 11 kV and 33 kV overhead bare conductor.

2.0 Applicable Standards

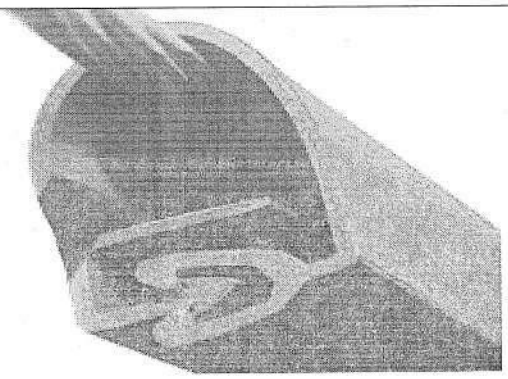
The offered products covered by this specification shall conform to the test requirements stated in latest edition of relevant IS/IEC and other applicable standards and shall also conform to the regulations of local statutory authorities.

S. No.	Standards	Title
1	ENA TS -09-13	High voltage heat shrinkable components for use up to and including 36 kV
2	IEC 60216	Guide for the determination of thermal endurance properties of electrical insulating materials
3	ASTM D149	Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
4	IEC 60093 and ASTM D-257	Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials
5	ASTM D2132	Standard Test Method for Dust-and-Fog Tracking and Erosion Resistance of Electrical Insulating Materials
6	ASTM D2303	Standard Test Methods for Liquid-Contaminant, Inclined-Plane Tracking and Erosion of Insulating Materials
7	ASTM D638	Standard Test Method for Tensile Properties of Plastics
8	ASTM D746	Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
9	IEC 61439	Electrical Insulating Material Properties
10	UL 94 HB	Flammability Standard
11	ASTM D792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

3.0 Climate conditions of the installation

a) Max. Ambient Temperature	:	50 deg.C
b) Max. Daily average ambient temp.	:	40 deg.C
c) Min Ambient Temp	:	0 deg. C
d) Ground Temperature	:	25 deg.C
e) Maximum Humidity	:	95%
f) Minimum Humidity	:	10%
g) Average No. of thunderstorm days per annum	:	50
h) Average Annual Rainfall	:	750 mm
i) Average No. of rainy days per annum	:	60
j) Thermal Resistivity of soil	:	150deg.Ccm/W
k) Wind Pressure	:	126 kg/sq. m up to an elevation of 10 meter.

The atmosphere is generally laden with mild acid and dust in suspension during the months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.



Following sizes recommended as per the size of conductor:

Size	Suitable voltage	Max. conductor diameter
20	11 kV	14.15 mm
38	33 kV	22.26 mm