

Ref: TPCODL/P&S/1000000105/2021-22

(Open tender Regarding RC for supply of 1.1 kV LT XLPE Power Cable of various sizes)

Sub: **Corrigendum – I**

Following amendments as below:

1. Submission of Bid document Date:

Existing Bid submission Dt:	Extended Dates of Bid submission
30.09.2021 , 03.00 Hr.	05.10.2021 , 03.00 Hr.


2. Line item -10 of Annexure-I (schedule of line item)

Existing line item	May be read as
10. 1.1KV AL LT XLPE 1CX400SQ MM ARMoured CABLE.	10. 1.1KV AL LT XLPE 1CX400SQ MM UNARMoured CABLE

3. Revised Technical Specification (Annexure-II) are as follows

All other terms and conditions of the above open tender remain unaltered.

By Order,
Chief (Procurement & Stores)

 TPCODL TP CENTRAL ODISHA DISTRIBUTION LIMITED	TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED, ODISHA		
	TECHNICAL SPECIFICATION		
Doc. Title	Technical Specification - 1.1 kV LT XLPE Power Cable of various sizes		
Doc. No	ENG-LV-013	Eff. Date:22/03/21	
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Prepared by: Priyanka Dash	Reviewed By: Niranjan Khuntia	Approved By: Khajan C. Bhardwaj	Issued By: Pourush Garg

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1.0	SCOPE	<p>This specification covers the technical requirements of design, manufacture, testing at manufacturer's work, packing, forwarding, supply and unloading at site/store of 1.1 kV LT XLPE Power Cable for trouble free and efficient operation.</p> <p>Applicable for 1.1 kV LT XLPE insulated Power Cable of following sizes:</p> <p>a) 4C X 300 sq.mm. (Aluminium conductor cable) b) 4C X 240 sq.mm. (Aluminium conductor cable) c) 4C X 185 sq.mm. (Aluminium conductor cable) d) 4C X 150 sq.mm. (Aluminium conductor cable) e) 4C X 120 sq.mm. (Aluminium conductor cable) f) 4C X 95 sq.mm. (Aluminium conductor cable) g) 4C X 50 sq.mm. (Aluminium conductor cable) h) 4C X 35 sq.mm. (Aluminium conductor cable) i) 4C X 25 sq.mm. (Aluminium conductor cable) j) 4C X 16 sq.mm. (Aluminium conductor cable) k) 2C X 50 sq. mm. (Aluminium conductor cable) l) 2C X 25 sq. mm. (Aluminium conductor cable) m) 2C X 16 sq. mm. (Aluminium conductor cable) n) 2C X 10 sq. mm. (Aluminium conductor cable) o) 1C X 630 sq. mm. (Aluminium conductor cable) p) 1C X 300 sq. mm. (Aluminium conductor cable) q) 1C X 185 sq. mm. (Aluminium conductor cable) r) 1C X 95 sq. mm. (Aluminium conductor cable) s) 1C X 25 sq. mm. (Aluminium conductor cable) t) 1C X 4 sq. mm. (Aluminium conductor cable) u) 1C X 2.5 sq. mm. (Aluminium conductor cable) v) 1C X 50 sq. mm. (Copper conductor cable) w) 2C X 50 sq. mm. (Copper conductor cable)</p>																											
2.0	APPLICABLE STANDARDS	<p>The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International standards / IEC and shall conform to the regulations of the local authorities.</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Standards</th> <th>Title</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">IS-7098 (Part-I):1988</td> <td>Specifications for Cross Linked Polyethylene PVC Sheathed Cables: Part 1-For Working Voltages up to and including 1100 Volts</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">IS-8130:1984</td> <td>Conductor for insulated electric cables & flexible cords.</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">IS-398(Part-IV):1994</td> <td>Aluminum Conductors for overhead transmission purposes, Part 4: Aluminum alloy stranded conductors (aluminum magnesium silicon type)</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">IS-5831:1984</td> <td>PVC insulation and sheath of electric cables.</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">IEC-60228/3-2004</td> <td>Conductor of insulated cables</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">IEC-60502/1-2004</td> <td>Extruded solid dielectric insulated power cables for rated voltage from 1 kV up to 30 kV</td> </tr> <tr> <td style="text-align: center;">7</td> <td style="text-align: center;">IS-3975:1999</td> <td>Mild steel wires, round wires and tapes for armouring of cables</td> </tr> <tr> <td style="text-align: center;">8</td> <td style="text-align: center;">IS 10418: 1982</td> <td>Specification for Drums of Electric cables</td> </tr> </tbody> </table>	S. No.	Standards	Title	1	IS-7098 (Part-I):1988	Specifications for Cross Linked Polyethylene PVC Sheathed Cables: Part 1-For Working Voltages up to and including 1100 Volts	2	IS-8130:1984	Conductor for insulated electric cables & flexible cords.	3	IS-398(Part-IV):1994	Aluminum Conductors for overhead transmission purposes, Part 4: Aluminum alloy stranded conductors (aluminum magnesium silicon type)	4	IS-5831:1984	PVC insulation and sheath of electric cables.	5	IEC-60228/3-2004	Conductor of insulated cables	6	IEC-60502/1-2004	Extruded solid dielectric insulated power cables for rated voltage from 1 kV up to 30 kV	7	IS-3975:1999	Mild steel wires, round wires and tapes for armouring of cables	8	IS 10418: 1982	Specification for Drums of Electric cables
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3.0	CLIMATIC CONDITIONS OF THE INSTALLATION	For TPCODL:																																																				
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11	Insulation	High grade XLPE insulation by extrusion process as per IS: 7098 (Part-I) - 1988	
12	Inner sheath	Extruded PVC Compound Type ST2 as per IS:5831-1984	
13	Armour	Galvanized steel round wire as per IS:3975-1999	
14	Outer sheath	Extruded FRLSH PVC Compound Type ST2 as per IS:5831-1984	
15	Standard length of cable on a drum with tolerance	M	As mentioned in Clause No.12 of this specification

1.1 kV Single Core XLPE insulated unarmoured cable conforming to IS 7098:1988											
S No.	Parameter	Unit	Requirement								
			2.5	4	25	50	95	185	300	400	630
Size of Cable		sq.mm									
1	Conductor										
a.	Type		Al	Al	Al	Cu	Al	Al	Al	Al	Al
b.	Grade		H2	H2	H4	H4	H4	H4	H4	H4	H4
c.	No. of Cores	Nos.	1	1	1	1	1	1	1	1	1
d.	Maximum D.C. resistance of conductor at 20 deg C	Ohm/Km	-	7.41	1.20	0.387	0.320	0.164	0.100	0.0778	0.0469
e.	A.C. resistance at operating temperature of 90 deg C	Ohm/Km	-	9.50	1.54	0.496	0.410	0.212	0.130	0.1023	0.064
f.	Short circuit capacity for 1 second	kA	0.24	0.38	2.36	7.15	9	17.5	28.3	37.6	59.43
g.	Continuous current rating at 40 deg C	A	20	31	98	222	230	360	501	542	814
h.	Minimum no. of wires in the conductor	Nos.	3	3	6	6	15	30	30	53	53
i.	Shape of conductor		Non-compact	Stranded Compact Circular or Compact shaped							
2	Insulation										
a.	Nominal thickness	mm	0.70	0.70	0.90	1.0	1.10	1.60	1.80	2	2.40
b.	Minimum thickness (at any point of measurement)	mm	0.55	0.55	0.75	0.95	0.90	1.35	1.55	1.7	2.10
3	Inner sheath		Not Applicable								
4	Armour		Not Applicable								
5	Outer Sheath										
a.	Nominal thickness	mm	1.80	1.80	1.80	1.80	1.80	2.00	2.00	2.20	2.20
b.	Minimum thickness (at any point of measurement)	mm	1.24	1.24	1.24	1.24	1.24	1.40	1.40	1.56	1.56

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1.1 kV Two Core XLPE insulated armoured cable conforming to IS 7098:1988							
S No.	Parameter	Unit	Requirement				
Size of Cable		sq.mm.	6	10	16	25	50
1	Conductor						
a.	Type		Al	Al	Al	Al	Al
b.	Grade		H2	H2	H4	H4	H4
c.	No. of Cores	Nos.	2	2	2	2	2
d.	Maximum D.C. resistance of conductor at 20 deg C	Ohm/Km	4.61	3.08	1.91	1.2	0.641
e.	A.C. resistance at operating temperature of 90 deg C	Ohm/Km	5.9	3.95	2.45	1.539	0.822
f.	Short circuit capacity for 1 second	kA	0.564	0.94	1.5	2.35	4.7
g.	Continuous current rating at 40 deg C	A	40	67	88	117	176
h.	Minimum no. of wires in the conductor	Nos.	3	7	6	6	6
i.	Shape of conductor		Stranded non compacted circular	Non-compact circular	Stranded Compact Circular or Compact shaped		
2	Insulation						
a.	Nominal thickness	mm	0.7	0.7	0.7	0.9	1
b.	Minimum thickness(at any thickness(at any point of measurement))	mm	As per IS 7098 part 1	0.55	0.55	0.75	0.8
3	Inner sheath						
a.	Type	Extruded PVC FRLSH (Flame)retardant cables with reduced halogen evolution and smoke)					
b.	Minimum thickness(at any point of measurement)	mm	0.3	0.3	0.3	0.3	0.3
4	Armour						
a.	Type	GS round Wire			GS round Wire		
b.	Nominal	mm	1.4	1.4	1.4	1.6	1.6

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c.	Tolerance	mm	plus/minus 0.040	plus/minus 0.045	plus/minus 0.045	plus/minus 0.045	plus/minus 0.045
d.	No. of wires	Nos.	Total number should be such that these are closely laid over inner sheath with a gap of less than the diameter of single wire of armour.				
e.	Type of zinc coating		Medium	Medium	Medium	Medium	Medium
f.	Mass of zinc coating	g/sq.m.	95	95	95	95	95
g.	No. of dips		As per IS	As per IS	As per IS	As per IS	As per IS
5	Outer Sheath		Extruded FRLSH PVC Compound Type ST2 as per IS:5831-1984				
a.	Minimum thickness(at any point of measurement)	mm	1.24	1.4	1.4	1.56	1.56

1.1 kV Four Core XLPE insulated armoured cable conforming to IS 7098:1988							
S No.	Parameter	Unit	Requirement				
B	Size of cable	sq.mm	4C*120	4C*150	4C*185	4C*240	
1.	Conductor						
a.	Type		Aluminum				
b.	Grade		H4				
c.	No. of cores	Nos.	4	4	4	4	
d.	Maximum dc resistance of conductor at 20°C	ohm/km	0.253	0.206	0.164	0.125	
e.	Short circuit capacity for one second	kA	11.34	14.17	17.48	22.68	
f.	Continuous current rating at 40degC	A	264	305	350	418	
g.	Minimum number of wires in the conductor	Nos.	15	15	30	30	
h.	Shape of conductor		Stranded sector shaped				
2.	Insulation						
a.	Nominal thickness	mm	1.2	1.4	1.6	1.7	
b.	Minimum thickness (at any point of measurement)	mm	1.15	1.20	1.54	1.65	
4.	Inner sheath						
a.	Type		Extruded PVC FRLSH (Flame retardant cables with reduced h evolution and smoke)				
b.	Minimum thickness (at any point of measurement)	mm	0.5	0.5	0.5	0.6	
3.	Armour						
a.	Type of armour		GS Round Wire				

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			b.	Nominal Diameter	mm	2.0	2.5	2.50	2.50			
			c.	Tolerance	mm		±0.065					
			d.	Type of Zinc coating		Medium	Medium	Medium	Medium			
			e.	Mass of Zinc coating	g/m ²		110					
			f.	Number of dips		1 dip for 1 minute and 1 dip for ½ min	1 dip for 1 minute and 1 dip for ½ min	1 dip for 1 minute and 1 dip for ½ min	1 dip for 1 minute and 1 dip for ½ min	1 M 1 M		
			5.	Outer Sheath								
			a.	Minimum thickness (at any point of measurement)	mm	1.88	2.04	2.20	2.36			
			S No.	Parameter	Unit	Requirement						
			B	Size of cable	sq.mm	4C*10	4C*16	4C*25	4C*35	4C*50	4C*95	4C*70
			1	Conductor		Aluminum						
			a.	Type								
			b.	Grade		H4	H4					
			c.	No. of cores	Nos.	4	4	4	4	4	4	4
			d.	Maximum dc resistance of conductor at 20°C	ohm/km	3.08	1.91	1.2	0.868	0.641	0.32	0.443
			e.	Short circuit capacity for one second	kA	0.94	1.5	2.35	3.31	4.7	8.93	4.7
			f.	Continuous current rating at 40degC	A	53	74	96	118	142	222	142
			g.	Minimum number of wires in the conductor	Nos.	7	6	6	6	6	15	
			h.	Shape of conductor		Stranded sector shaped						
			2	Insulation								
			a.	Nominal thickness	mm	0.7	0.7	0.9	0.9	1	1.1	1.1
			b.	Minimum thickness(at any point of measurement)	mm	As per IS 7098 part 1	0.6	0.75	0.75	0.8	0.9	0.89
			3	Inner sheath								
			a.	Type		For TPCODL-Extruded PVC FRLSH (Flame retardant cables with reduced halogen evolution and smoke) For TPCODL-Extruded PVC						
			b.	Minimum thickness (at any point of measurement)	mm	0.3	0.3	0.3	0.3	0.3	0.4	0.4
			4	Armour								
			a.	Type of armour		GS round Wire						
			b.	Nominal Diameter	mm	1.4	1.6	1.6	1.6	1.6	2	2
			c.	Tolerance	mm	±0.040	±0.045	±0.045	±0.045	±0.045	±0.050	±0.045
			d.	Type of Zinc coating		Medium	Medium	Medium	Medium	Medium	Medium	Medium

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	e.	Mass of Zinc coating	g/m ²	95	95	95	95	95	105	95
	f.	Number of dips		1 dip for 1 minute	1 dip for 1 minute	1 dip for 1 minute	1 dip for 1 Minute	1 dip for 1 min	1 dip for 1 min	1 dip for 1 min
	5	Outer Sheath								
	a.	Minimum thickness (at any point of measurement)	mm	1.24	1.4	1.4	1.4	1.56	1.72	1.56

5.0	GENERAL CONSTRUCTION	<p>1.1 kV Power Cable shall be manufactured and tested strictly in accordance with the Indian Standard IS 7098 (Part – I):1988 and its latest amendments.</p> <p>All material used in the manufacturing of cables shall be new and shall be selected as the best available for the intended use.</p>									
		Conductor									
		Material	a) Class 2, high electrical conductivity plain Aluminum, Stranded, Grade H2/H4. Or, b) Plain Copper, Stranded Note: For cable size ≤ 10 sq.mm, H2 grade conductor is required For cable size > 10 sq.mm, H4 grade conductor is required								
		Shape	Before stranding, the conductor shall be circular in cross-section, uniform in Quality, solid, smooth and free from scale, sharp edges and other defects. Shape as per no. of cores: a) for 4C cables - sector shaped b) for 2C - compacted circular/shaped c) for 1C - compacted circular as per IS 8130:1984								
		Permissible joints	Conductors shall conform to relevant standard for permissible number of joints in any one of the single wires forming every complete length of conductor, for location of joints in same layer of conductors and for method of making such Joints. No joint shall be made in any conductor after it is stranded.								
		Insulation									
		Material	The insulating material shall be Cross Linked Polyethylene (XLPE) cured by dry curing process and applied by extrusion process as per IS-7098 (Part I):1988 and its latest amendments. The insulation properties shall be stable under thermal conditions arising out of continuous operation at conductor temperature of 90 degree Centigrade rising momentarily to 250 degree Centigrade under short circuit conditions. The insulating material shall have excellent electrical properties with regard to resistivity dielectric constant and loss factor and shall have high tensile strength and resistance to abrasion. This shall not deteriorate at elevated temperatures or when immersed in water. The insulation shall be preferably fire resistant and resistant to chemicals like acids, alkalis, oils and ozone. The quality of insulation shall be good and shall not deteriorate when exposed to climatic conditions and shall be uniform, free from voids, scratches and longitudinal grooves. Surface should be smooth.								
		Thickness	The average thickness of the insulation shall be as per IS 7098 (Part-I):1988 with latest amendments or as specified in GTP, whichever is greater with tolerance as per IS 7098 (Part-I):1988. The smallest value of thickness of insulation shall not fall below the nominal value (ti) as specified in IS 7098 (Part 1):1988 by more than 0.1 mm+/- 0.1 (ti).								
		Insulation fitting	It shall fit tightly to the conductor and shall be applied concentrically about the Conductor in thickness consistent with the voltage classification. The insulation shall be so applied that it shall be possible to remove it without								

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			Damaging the conductor.
Core identification			
	4C Cable	<p>Coloured strips or coloured insulation shall be applied on core for identification of cores in 4C cable. Red, Yellow and Blue strips shall be used to identify different phase conductors and black strip shall be used to identify neutral conductor.</p> <p>Bright Red line shall represent - R ph Bright Yellow line shall represent - Y ph Bright Blue line shall represent - B ph</p> <p>For 150 sq. mm. and above, the colored line shall be (3 mm width X 0.5 mm depth from insulation surface) extruded/embedded on the insulation surface.</p> <p>Below 150 sq. mm, the colored line shall be (2 mm width X 0.3 mm depth from insulation surface) extruded/embedded on the insulation surface.</p> <p>For neutral, as core is already black, extruded line is not required.</p>	
	2C Cable	For two core cables, cores shall be identified by insulation colored Red and Black.	
	1C Cable	For single core cable, natural XLPE Colour with blue PVC outer sheath.	
Laying up of Cores			
	Laying up	In twin, three and multi-core cables, the cores shall be laid up together with a suitable lay, the outermost layer shall have be right-hand lay and successive layer shall be laid with opposite lay. Where necessary, the interstices shall be filled with non-hygroscopic material to make the laid-up cores circular. The layup plan of multi cores shall be as per IS 7098 (Part-I):1988.	
Fillers			
	4C Cable	Fillers are not required.	
	For 1C & 2C Cable	Fillers or bedding used shall be non-wicking and non-moisture absorbing Thermoplastic material. Fillers shall be so chosen as to be compatible with the temperature ratings of the cables and shall have no deleterious effect on any other component of the cable.	
Inner Sheath			
	Material	The inner sheath material shall be of polyvinyl chloride (PVC) FRLSH (Flame retardant cables with reduced halogen evolution and smoke) compound conforming to the requirements of type ST 2 compound of IS: 5831:1984 with latest amendments. *Note: 1C cables shall not have any inner sheath.	
	Laying up	The laid up cores shall be provided with an inner sheath applied by pressurized Extrusion process. It shall be ensured that it is as circular as possible. The inner sheath shall be so applied that it fits closely on the laid up cores and it shall be possible to remove it without damage to the underlying insulation of the cores. When one or more layers of proofed plastic tape are applied over the laid up cores as a binder, the thickness of such tapes shall not be construed as part of the extruded inner sheath.	
	Thickness	The thickness of the inner sheath shall be as per IS-7098 (Part-I):1988.	
Armouring			
	Material	The armouring shall be of galvanized round steel wires complying the requirements of IS: 3975:1999 along with latest amendments. The resistance measured for galvanized wires/strips when corrected to 20°C, shall comply with appropriate values mentioned in IS: 7098 (Part - I):1988. The round steel wires taken from the cable shall meet the following: a) Tensile strength not less than 250 N/mm ² and not more than 580 N/mm ² b) Elongation at the break of round steel wires shall not be less than 6%	

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		<p>c) Round steel wire shall meet the requirement of torsion test. The gauge length between vices and minimum no. of turns without break shall be as per IS 3975:1999.</p> <p>d) The zinc coating shall not show any cracks and shall not flake off on rubbing by the bare finger when the round steel wire is subjected to winding test.</p> <p>e) The uniformity of round steel wire shall comply to requirement of IS 3975:1999.</p> <p>f) The mass of zinc coating of round steel wire shall not be less than 95 % that of mentioned in IS 3975:1999.</p> <p>The resistivity of round steel wire shall meet the requirement of IS 3975:1999. *Note: 1C cables shall not be provided with armouring.</p>
	Laying up	The armouring shall be applied over the inner sheath in multi core cables. The armour wires shall be applied as closely as practicable (less than the diameter of single wire in between the interstices). The direction of lay of the armour shall be left hand.
	Thickness	The dimensions of armour round wires shall be as per IS-7098(Part-I):1988.
	Joints	The joints in armour wire shall be made by brazing or welding and the surface Irregularities shall be removed. A joint in any wire shall be at least 300mm from the nearest joint in any other armour wire in the completed cable.
	Outer Sheath	
	Material	The outer sheath shall be of polyvinyl chloride (PVC) FRLSH (Flame retardant cables with reduced halogen evolution and smoke) compound conforming to the requirements of Type ST-2 of IS – 5831:1984 with latest amendments. Surface should be smooth. The sheath shall be ultraviolet protected for operation in direct sunlight. It shall be free from voids/bubbles/ bulges & mechanical scratches and damages. Surface should be smooth.
	Laying up	The outer sheath shall be applied by extrusion process, It shall be tightly applied: a) Over the insulation in case of unarmoured single core cables. b) Over the armouring in case of armoured cables.
	Thickness	The thickness of the outer sheath shall be as per IS: 7098 (Part - I):1988.
	Colour	The outer sheath shall be blue in color
6.0	NAME PLATE AND MARKING	<p>Following information shall be either stenciled on both sides of the drum or contained in a label attached to it:</p> <ol style="list-style-type: none"> Reference to the Standards Purchase Order number Manufacturer's name Type of Cable (INCLUDING FRLSH) Voltage Grade Drum serial number Number of cores Nominal Cross sectional Area of the conductor/Cable size Cable code Length of the cable on the drum Number of lengths on the drum (if more than one) Direction of the rotation of the drum Gross mass Country of manufacture Year and month of manufacture <p>Following details shall be printed on both sides of outer sheath at regular interval of every meter and 180° apart:</p> <ol style="list-style-type: none"> TPCODL Name of manufacturer Year of manufacture Voltage Grade No. of cores

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		<p>f) Size of the cable</p> <p>g) Type of cable (FRLSH type)</p> <p>h) Sequential length marking at every meter distance throughout the cable length with letter font size 12 mm should be embossed on the cable in bold letters.</p>
7.0	TESTS	<p>All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by TPCODL's authorized representative. All the components should also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the 1.1 kV cables in additions to others specified in IS/IEC standards.</p> <p>A. Type tests:</p> <p>1. Tests on Conductor</p> <p>a) Tensile test</p> <p>b) Wrapping test</p> <p>c) Resistance test</p> <p>2. Test for armouring wires as per IS 3975:1999</p> <p>a) Dimensional check</p> <p>b) Tensile strength</p> <p>c) Elongation at break</p> <p>d) Torsion test(for round wires)</p> <p>e) Winding test(for round wires)</p> <p>f) Uniformity of zinc coating</p> <p>g) Mass of zinc coating</p> <p>h) Resistivity</p> <p>3. Test for thickness for insulation and sheath</p> <p>4. Physical tests for insulation</p> <p>a) Tensile strength and elongation at break</p> <p>b) Ageing in air oven</p> <p>c) Hot set test</p> <p>d) Shrinkage test</p> <p>e) Water absorption/gravimetric</p> <p>5. Physical tests for outer sheath</p> <p>a) Tensile strength and elongation at break</p> <p>b) Ageing in air oven</p> <p>c) Loss of mass in air oven</p> <p>d) Shrinkage test</p> <p>e) Hot deformation</p> <p>f) Heat shock</p> <p>g) Thermal stability</p> <p>6. Insulation resistance (Volume resistivity) test</p> <p>7. High voltage test</p> <p>8. Flammability test</p> <p>B. Routine tests:</p> <p>1. Conductor Resistance test</p> <p>2. High Voltage test</p> <p>C. Acceptance tests:</p> <p>1. Annealing test</p> <p>2. Tensile test (for non-compacted conductor)</p>

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		<ol style="list-style-type: none"> 3. Wrapping test (for non-compacted conductor) 4. Conductor Resistance Test 5. Test for thickness of insulation and sheath 6. Hot set test for insulation and outer sheath 7. Tensile strength and elongation at break test for insulation and sheath 8. High Voltage test 9. Insulation resistance (Volume resistivity) test 10. Flammability test on outer sheath 11. Cold impact test on outer sheath 12. Uniformity of zinc coating on armour wires 13. Dimensional test on armour wires 14. Oxygen index test
8.0	TYPE TEST CERTIFICATES	<p>The bidder shall furnish the type test certificates of the 1.1 kV Power cable for the tests as mentioned Above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA Labs as per the relevant standards. Type test shall have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL. In case type test is being carried beyond 5years up to 10years, bidder shall have to submit on their company letter head confirming for no change in basic design of the item. TPCODLhas rights to accept/reject the same.</p> <p>Additional certification should be provided as: The cable produced is expected to meet long duration performance criteria based on quality and consistency of manufacturing.</p>
9.0	PRE-DISPATCH INSPECTION	<p>The material shall be subject to inspection by a duly authorized representative of TPCODL. Inspection may be made at any stage of manufacture at the discretion of TPCODL 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 representative(s) at all times when the work is in progress. Inspection by TPCODL its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. TPCODL's authorized representatives shall have the right to inspect the design, materials and workmanship and to report thereon, at any stage of manufacture, if found necessary. All facilities shall be extended to TPCODLrepresentatives for witnessing the tests. Due advance notice shall be given to enable to depute TPCODL's representatives for stage inspection.</p> <p>Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL.</p> <p>Following documents shall be sent along with material</p> <ol style="list-style-type: none"> a) Test reports b) MDCC issued by TPCODL c) 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	<p>The material received at TPCODL's 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 department of TPCODL.</p>
11.0	GUARANTEE	<p>Bidder shall stand guarantee towards design, material, workmanship & quality of process / manufacturing of item 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 TPCODL 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 their own cost, within mutually agreed time frame, and to the entire satisfaction of TPCODL, failing which the later will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus TPCODL'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</p>

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		replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by TPCODL.												
12.0	PACKING	<p>The cable shall be wound on strong weatherproof and non-returnable wooden drums packed in coil lengths as specified below and in line with the requirement of IS 10418:1982 and its latest amendments. The ends of the cable shall be sealed by means of non-hygroscopic sealing material. Cable drums shall be so constructed as to have required mechanical strength so that the drum flanges and other components do not break during transportation or in storage. The flanges and the outside surface of the barrel shall be free from protruding parts or projections or unevenness which might be damaging to the cable or hands of operator during rotation of drums. A protective covering of polymeric sheet shall be applied inside the drum before winding the cable on the drum. 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.</p> <p>Drum lengths for 4C cables should be as follows: 1.1kV 4C 300 sq mm XLPE cable – 500 m 1.1kV 4C 240 sq mm XLPE cable – 500 m 1.1kV 4C 185 sq mm XLPE cable – 500 m 1.1kV 4C 120 sq mm XLPE cable – 500 m 1.1kV 4C 95 sq mm XLPE cable – 500 m 1.1kV 4C 50 sq mm XLPE cable – 500 m 1.1kV 4C 35 sq mm XLPE cable – 1000 m 1.1kV 4C 25 sq mm XLPE cable – 1000 m 1.1kV 4C 16 sq mm XLPE cable – 1000 m For 2C and 1C cables – 1000 m</p>												
13.0	TENDER SAMPLE	Bidder shall submit the sample of material (0.3 meter of length of cable) as specified by TPCODL.												
14.	QUALITY CONTROL	<p>The bidder shall submit with the offer, Quality Assurance Plan indicating: a) Various stages of inspection plan b) Tests and checks for each inspection stage which is scheduled to be carried out on the material of construction/ components during manufacturing 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 period of delivery schedule shall be furnished by the bidder. TPCODL reserves the sole right for getting type test of a random sample from the lot and in case of any discrepancy or deviation from the type test certificates submitted along with the bid; the complete lot shall be rejected. TPCODL's nominated representative shall have free access to the bidder's works to carry out inspections.</p>												
15.	MINIMUM TESTING FACILITIES	Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.												
16.	MANUFACTURING ACTIVITIES	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality Assurance Plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.												
17.0	SPARES, ACCESSORIES AND TOOLS	Not applicable												
18.0	DRAWINGS AND DOCUMENTS	<p>Following mentioned drawings and documents shall be prepared based on TPCODL specification and statutory requirements and shall be submitted with the bid: a) Completely filled-in Technical Particulars b) Type test Certificates c) Quality Assurance Plan d) General description of the equipment and all components including brochures e) Experience List f) Cross sectional diagram of the cable g) Bill of material Note: From a) to c) to be submitted as per TPCODL's required format. Else to be submitted as per specification. Following drawings/documents to be submitted by the bidder after the award of the contract:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">S No.</th> <th style="width: 40%;">Description</th> <th style="width: 15%;">For Approval</th> <th style="width: 15%;">For Review / Information</th> <th style="width: 20%;">Final Submission</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Technical Parameters</td> <td style="text-align: center;">√</td> <td></td> <td style="text-align: center;">√</td> </tr> </tbody> </table>			S No.	Description	For Approval	For Review / Information	Final Submission	1	Technical Parameters	√		√
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			2	Manual/Catalogues/drawings of all components		√	
			3	Installation Instructions		√	√
			4	Cross sectional diagram of the cable	√		√
			5	Instruction 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.
After the award of the contract four (4) copies of cross-sectional drawing of cable, GTP and test certificates shall be forwarded for approval from TPCODL.

19.0	GUARANTEED TECHNICAL PARTICULARS	S. No.	Description	Units	Requirement
		1	Voltage grade	kV	
		2	System Voltage	V	
		3	Variation in supply voltage	%	
		4	Variation in supply frequency	Hz	
		5	Number of phases		
		6	System grounding		
		7	Fault level		
		8	Type of Cable		
		9	Core		
		10	Conductor		
		11	Insulation		
		12	Inner sheath		
		13	Armour		
		14	Outer sheath		
15	Standard length of cable on a drum with tolerance	m			

To be furnished by the bidder

1.1 kV Single Core XLPE insulated armoured cable conforming to IS 7098:1988

S No.	Parameter	Unit	Requirement							
	Size of Cable	sq.mm.	2.5	4	25	50(Cu)	95	185	300	630
1	Conductor		To be furnished by the bidder							
a.	Type									
b.	Grade									
c.	No. of Cores									
d.	Maximum D.C. resistance of conductor at 20 deg C									

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		e.	A.C. resistance at operating temperature of 90 deg C		To be furnished by the bidder
		f.	Short circuit capacity for 1 second		
		g.	Continuous current rating at 40 deg C		
		h.	Minimum no. of wires in the conductor		
		i.	Shape of conductor		
		2	Insulation		
		a.	Nominal thickness		
		b.	Minimum thickness(at any point of measurement)		
		3	Inner sheath		
		4	Armour		
		5	Outer Sheath		
		a.	Nominal thickness		
		b.	Minimum thickness(at any point of measurement)		

1.1 kV Two Core XLPE insulated armoured cable conforming to IS 7098:1988							
S No.	Parameter	Unit	Requirement				
Size of Cable		sq.mm.	10	16	25	50	50
1	Conductor						
a.	Type		Al	Al	Al	Al	Cu
b.	Grade		To be furnished by bidder				
c.	No. of Cores	Nos.					
d.	Maximum D.C. resistance of conductor at 20 deg C	Ohm/Km					
e.	A.C. resistance at operating temperature of 90 deg C	Ohm/Km					
f.	Short circuit capacity for 1 second	kA					
g.	Continuous current rating at 40 deg C	A					

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		h.	Minimum no. of wires in the conductor	Nos.		
		i.	Shape of conductor			
		2	Insulation			
		a.	Nominal thickness	mm		
		b.	Minimum thickness(at any point of measurement)	mm		
		3	Inner sheath			
		a.	Type			
		b.	Minimum thickness(at any point of measurement)	mm		
		4	Armour			
		a.	Type			
		b.	Nominal diameter	mm		
		c.	Tolerance	mm		
		d.	No. of wires	Nos.		
		e.	Type of zinc coating			
		f.	Mass of zinc coating	g/sq.m.		
		g.	No. of dips			
		5	Outer Sheath			
		a.	Minimum thickness(at any point of measurement)	mm		

1.1 kV Four Core XLPE insulated armoured cable conforming to IS 7098:1988			
S No.	Parameter	Unit	Requirement
B	Size of cable		
1.	Conductor		
a.	Type		
b.	Grade		
c.	No. of cores		
d.	Maximum dc resistance of conductor at 20°C		
e.	Short circuit capacity for one second		
f.	Continuous current rating at 40degC		
g.	Minimum number of wires in the conductor		
h.	Shape of conductor		
2.	Insulation		
a.	Nominal thickness		
b.	Minimum thickness		

To be furnished by bidder

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			(at any point of measurement)	
		4.	Inner sheath	
		a.	Type	
		b.	Minimum thickness (at any point of measurement)	
		3.	Armour	
		a.	Type of armour	
		b.	Nominal Diameter	
		c.	Tolerance	
		d.	Type of Zinc coating	
		e.	Mass of Zinc coating	
		f.	Number of dips	
		5.	Outer Sheath	
		a.	Minimum thickness (at any point of measurement)	
		S No.	Parameter	Unit
		B	Size of cable	
		1.	Conductor	
		a.	Type	
		b.	Grade	
		c.	No. of cores	
		d.	Maximum dc resistance of conductor at 20°C	
		e.	Short circuit capacity for one second	
		f.	Continuous current rating at 40degC	
		g.	Minimum number of wires in the conductor	
		h.	Shape of conductor	
		2.	Insulation	
		a.	Nominal thickness	
		b.	Minimum thickness (at any point of measurement)	
		4.	Inner sheath	
		a.	Type	
		b.	Minimum thickness (at any point of measurement)	
		3.	Armour	
		a.	Type of armour	
		b.	Nominal Diameter	
		c.	Tolerance	
		d.	Type of Zinc coating	
		e.	Mass of Zinc coating	
		f.	Number of dips	
				To be furnished by bidder

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		5.	Outer Sheath							
		a.	Minimum thickness (at any point of measurement)							
		<u>(TO BE ENCLOSED WITH TECHNICAL BID)</u>								
		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.								
		<table border="1"> <thead> <tr> <th>S.No.</th> <th>Clause No.</th> <th>Details of deviation with justifications</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			S.No.	Clause No.	Details of deviation with justifications			
S.No.	Clause No.	Details of deviation with justifications								
(20.	SCHEDULE OF DEVIATIONS	<p>We confirm that there are no deviations apart from those detailed above.</p> <p style="text-align: center;">Seal of the Company Signature :</p> <p style="text-align: center;">Designation</p>								