



TATA POWER

TECHNICAL SPECIFICATION COVER SHEET

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1. SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at site/store and performance of 1.1kV FRLSH Armoured Control Cables & Lower size LT PVC Power cable for trouble free and efficient operation.

Cable size mentioned below:

- 1Cx2.5sqmm - YY
- 2Cx2.5sqmm - YWY
- 2Cx6sqmm - YWY
- 4Cx2.5sqmm- YWY
- 4Cx4sqmm – YWY
- 4Cx10sqmm – YWY
- 4Cx10sqmm - AYWY
- 4Cx16sqmm - AYWY
- 6Cx2.5sqmm - YWY
- 6Cx4sqmm - YWY
- 7Cx2.5sqmm - YWY
- 10Cx2.5sqmm - YWY
- 12Cx2.5sqmm - YWY
- 14Cx2.5sqmm - YWY
- 19Cx2.5sqmm - YWY
- 1Cx50sqmm - YY
- 2Cx50sqmm – YWY
- 1CX16sqmm – YY

Additional size of 1.1 kV lower size PVC Power cable – 10Cx4 sq.mm Aluminium stranded circular, HR PVC, wire Armoured, FRLSH PVC (AYWY) shall be as per IS 1554 Part-1.

2. APPLICABLE STANDARDS:

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

Ref IS/IEC	Description
IS-1554 (Part-I)	PVC insulated (heavy duty) electric cables
IS-8130:1984	Conductor for insulated electric cables & flexible cords
IS-5831:1984	PVC insulation and sheath of electric cables
IEC-60228/3-2004	Conductor of insulated cables
IEC 60332-1:1993	Flame retardant, characteristics of electrical cables.
IS-3975:1979	Mild steel wires strips and tapes for armoring cables.
IS:3961-(Part-2)	Recommended current ratings for cables
IS 10418: 1982	Drums for Electric Cables
10810	Methods of test for cables

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ASTM 2863:	Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
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3. CLIMATIC CONDITIONS OF THE INSTALLATION:

SL.NO.	CONDITIONS	VALUES
1	Max. altitude above sea level	1200m
2	Max. Ambient Temperature	50 °C
3	Max. Daily average ambient temp	35 °C
4	Min Ambient Temp	0 °C
5	Maximum temperature attainable by an object exposed to sun	60 °C
6	Maximum Humidity	95%
7	Minimum Humidity	10%
8	Average No. of thunderstorm days per annum	70
9	Average Annual Rainfall	150 cm
10	Average No. of rainy days per annum	120
11	Thermal Resistivity of soil	150 Deg. Ccm/W
12	Wind Pressure	126 kg/sq. m up to an elevation of 10 meter.
14	Earthquakes of intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
15	Earthquakes of intensity in vertical direction	equivalent to seismic acceleration of 0.15g
16	Wind velocity	300 km/hr.

Environmentally, some of the regions, where the work will take place include 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 atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces as mentioned above.

4. GENERAL TECHNICAL REQUIREMENTS:

Table 1

Sr. No	Particulars	UNITS	DESIRED VALUE
1	Reference Standard		IS:1554, Part-1/1988 in General
2	Voltage grade		1.1 KV
3	Type of cable		Stranded copper conductor, HR PVC insulation, extruded PVC ST2 inner sheath, galvanized armoured wire, extruded FRLSH ST2 PVC outer sheathed.
A	Size of cable		1CX2.5
			2CX2.5
			4CX2.5
			6CX2.5

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			7CX2.5	
			10CX2.5	
			12CX2.5	
			14CX2.5	
			19CX2.5	
1	Conductor			
a.	Conductor Material		Plain Annealed Copper	
b.	No. of cores	Nos.	1CX2.5	1
			2CX2.5	2
			4CX2.5	4
			6CX2.5	6
			7CX2.5	7
			10CX2.5	10
			12CX2.5	12
			14CX2.5	14
			19CX2.5	19
c.	Size of conductor	sq.mm.	2.5	
d.	Shape of conductor		Multi Stranded circular	
e.	No. & diameter of each wire in conductor		Minimum size shall be corresponding to meet the requirement of conductor resistance as per relevant clause of IS:8130-1984	
2	Insulation			
a.	Material		HR PVC insulation conforming to type C as per IS: 5831:1984 applied by extrusion process.	
b.	Nominal thickness	mm	1CX2.5	1.2
			2CX2.5	0.9
			4CX2.5	0.9
			6CX2.5	0.9
			7CX2.5	0.9
			10CX2.5	0.9
			12CX2.5	0.9
			14CX2.5	0.9
			19CX2.5	0.9
c.	Core identification		1CX2.5	NA
			2CX2.5	Red & Black
			4CX2.5	Red, yellow, blue & black
			6CX2.5	All cores white with core numbers printed in black ink as per clause 10.3 of IS:1554(Part- I)/1988
			7CX2.5	
			10CX2.5	
			12CX2.5	
			14CX2.5	
			19CX2.5	
3	Inner sheath			
a.	Material		1CX2.5	NA
			2CX2.5	PVC conforming to type ST-2 as per IS:5831-1984
			4CX2.5	

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			6CX2.5	
			7CX2.5	
			10CX2.5	
			12CX2.5	
			14CX2.5	
			19CX2.5	
b.	Color		1CX2.5	NA
			2CX2.5	
			4CX2.5	
			6CX2.5	Black
			7CX2.5	
			10CX2.5	
			12CX2.5	
			14CX2.5	
			19CX2.5	
c.	Minimum thickness (at any point of measurement)	mm	1CX2.5	NA
			2CX2.5	
			4CX2.5	
			6CX2.5	0.3
			7CX2.5	
			10CX2.5	
			12CX2.5	
			14CX2.5	
			19CX2.5	
4	Armour			
a.	Material		NA	Galvanized Steel round wire confirming to IS: 3975-1999
b.	Nominal Diameter	mm	NA	1CX2.5 1.4 2CX2.5 1.4 4CX2.5 1.4 6CX2.5 1.4 7CX2.5 1.4 10CX2.5 1.6 12CX2.5 1.6 14CX2.5 1.6 19CX2.5 1.6 Note – Diameter of the armor wire shall be as per IS 1554 Part 1, table no 5, Calculation sheet needs to submit during the approval.
c.	Type		NA	Wire
5	Outer Sheath			
a.	Material			FRLSH PVC Type ST-2, extruded type as per IS:5831-1984 (With FRLSH Properties)
b.	Color			Blue
c.	Minimum thickness (at any point of	mm	1CX2.5	1.8
			2CX2.5	1.24

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	measurement)		4CX2.5 6CX2.5 7CX2.5 10CX2.5 12CX2.5 14CX2.5 19CX2.5 Note – Thickness of outer sheath shall be as per IS 1554 Part 1, table no 7, Calculation sheet needs to submit during the approval.	1.24 1.24 1.24 1.4 1.4 1.4 1.4
6	Diameter			
a.	Approx. overall diameter	mm	1CX2.5 2CX2.5 4CX2.5 6CX2.5 7CX2.5 10CX2.5 12CX2.5 14CX2.5 19CX2.5	7.5 15 17 18 20 22 25 27 28
b.	Tolerance of diameter	mm	±3	
7	Short circuit capacity for one second	kA	0.26	
8	Approx. Weight of cable	Kg/km	1CX2.5 2CX2.5 4CX2.5 6CX2.5 7CX2.5 10CX2.5 12CX2.5 14CX2.5 19CX2.5	90 450 550 750 750 750 1100 1200 1600
9	Tolerance in cable weight		+/-10%	
10	Standard length of cable drum with tolerance	m	500	
11	Tolerance in cable drum length		+/- 5 %	
12	Allowable conductor temp at continuous current	°C	85	
13	Allowable conductor temp during short circuit	°C	160	
14	Max. DC resistance at 20°C – Main	Ohm/k m	7.41	

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15	Max. AC resistance at max. Operating temp.	Ohm/k m	9.336
16	Guaranteed value of min oxygen index at 27°C	%	29
17	Guaranteed value of min. temp. index	°C	250
18	Smoke Density Rating		Max. average 60 SDR

Table 2

Sr. No	Particulars	UNITS	DESIRED VALUE	
1	Reference Standard		IS:1554, Part-1/1988 in General	
2	Voltage grade		1.1 KV	
3	Type of cable		Stranded copper conductor/EC H2 Grade Aluminum , HR PVC insulation, extruded PVC ST2 inner sheath, galvanized Unarmoured/ armoured wire, extruded FRLSH ST2 PVC outer sheathed.	
A	Size of cable		2CX6	
			4CX4	
			6CX4	
			10CX4	
			4CX10	
			4CX16	
			1CX16	
			2CX50	
			1CX50	
1	Conductor			
a.	Conductor Material		2CX6	Plain Annealed Copper
			4CX4	Plain Annealed Copper
			6CX4	Plain Annealed Copper
			10CX4	EC H2 Grade Aluminum
			4CX10	EC H2 Grade Aluminum
			4CX16	EC H2 Grade Aluminum
			1CX16	Plain Annealed Copper
			2CX50	Plain Annealed Copper
			1CX50	Plain Annealed Copper
b.	No. of cores	Nos.	2CX6	2
			4CX4	4
			6CX4	6
			10CX4	10
			4CX10	4
			4CX16	4
			1CX16	1
			2CX50	2
			1CX50	1
c.	Size of conductor	sq.mm.	2CX6	6

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			4CX4	4
			6CX4	4
			10CX4	4
			4CX10	10
			4CX16	16
			1CX16	16
			2CX50	50
			1CX50	50
d.	Shape of conductor		2CX6	Stranded circular
			4CX4	Stranded circular
			6CX4	Stranded circular
			10CX4	Stranded circular
			4CX10	Stranded circular
			4CX16	Stranded circular
			1CX16	Stranded compacted shaped
			2CX50	Stranded compacted shaped
			1CX50	Stranded compacted shaped
e.	No. & diameter of each wire in conductor		2CX6	Minimum size shall be corresponding to meet the requirement of conductor resistance as per relevant clause of IS:8130-1984
			4CX4	
			6CX4	
			10CX4	7/0.82(min)
			4CX10	Minimum size shall be corresponding to meet the requirement of conductor resistance as per relevant clause of IS:8130-1984
			4CX16	
			1CX16	
			2CX50	7/3.05
			1CX50	7/3.05
2	Insulation			
a.	Material		HR PVC insulation conforming to type C as per IS: 5831:1984 applied by extrusion process.	
b.	Nominal thickness	mm	2CX6	1.0
			4CX4	1.0
			6CX4	1.0
			10CX4	1.0
			4CX10	1.0
			4CX16	1.0
			1CX16	1.0
			2CX50	1.4
			1CX50	1.4
c.	Core identification		2CX6	Red & Black
			4CX4	Red, yellow, Blue & Black
			6CX4	Red, yellow, Blue, Black, Grey & Green

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			10CX4	As per requirements of IS 1554-1 requirement
			4CX10	Red, yellow, Blue & Black
			4CX16	Red, yellow, Blue & Black
			1CX16	Green
			2CX50	Red & black
			1CX50	Blue
3	Inner sheath			
a.	Material		2CX6	PVC conforming to type ST-2 as per IS:5831-1984
			4CX4	
			6CX4	
			10CX4	
			4CX10	
			4CX16	
			1CX16	NA
			2CX50	PVC conforming to type ST-2 as per IS:5831-1984
			1CX50	NA
b.	Color		2CX6	Black
			4CX4	Black
			6CX4	Black
			10CX4	Black
			4CX10	Black
			4CX16	Black
			1CX16	NA
			2CX50	Black
			1CX50	NA
c.	Minimum thickness (at any point of measurement)	mm	2CX6	0.3
			4CX4	0.3
			6CX4	0.3
			10CX4	0.3
			4CX10	0.3
			4CX16	0.3
			1CX16	NA
			2CX50	0.3
			1CX50	NA
4	Armour			
a.	Material		2CX6	Galvanized Steel round wire confirming to IS:3975-1999
			4CX4	
			6CX4	
			10CX4	
			4CX10	
			4CX16	
			1CX16	NA
			2CX50	Galvanized Steel round wire confirming to IS:3975-1999

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			1CX50	NA
			2CX6	1.6
			4CX4	1.6
			6CX4	1.6
			10CX4	1.6
			4CX10	1.6
			4CX16	1.6
			1CX16	NA
			2CX50	1.6
			1CX50	NA
b.	Nominal Diameter	mm	2CX6	Round
			4CX4	Round
			6CX4	Round
			10CX4	Round
			4CX10	Round
			4CX16	Round
			1CX16	NA
			2CX50	Round
			1CX50	NA
5	Outer Sheath			
a.	Material		FRLSH PVC Type ST-2, extruded type as per IS:5831-1984 (With FRLSH Properties)	
b.	Color		Blue	
			2CX6	1.24
			4CX4	1.24
			6CX4	1.4
			10CX4	
			4CX10	1.4
			4CX16	1.4
			1CX16	1.8
			2CX50	1.56
			1CX50	1.8
6	Diameter			
			2CX6	19
			4CX4	18
			6CX4	22
			10CX4	
			4CX10	22
			4CX16	23
			1CX16	10
			2CX50	27
			1CX50	16
b.	Tolerance of diameter	mm	±3	
			2CX6	0.69
			4CX4	0.46
			6CX4	0.46
7	Short circuit capacity for one second	kA		

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			10CX4	As per IS 1554 Part 1
			4CX10	0.76
			4CX16	1.216
			1CX16	1.84
			2CX50	5.75
			1CX50	5.75
8	Approx. Weight of cable		2CX6	650
			4CX4	750
			6CX4	1000
			10CX4	To be specified by the bidder
			4CX10	1000
			4CX16	1000
			1CX16	250
			2CX50	1700
			1CX50	600
9	Tolerance in cable weight		+/-10%	
10	Standard length of cable drum with tolerance	m	500	
11	Tolerance in cable drum length		+/- 5 %	
12	Allowable conductor temp at continuous current	°C	85	
13	Allowable conductor temp during short circuit	°C	160	
14	Max. DC resistance at 20°C – Main	Ohm/k m	2CX6	3.08
			4CX4	4.61
			6CX4	4.61
			10CX4	As per IS 1554 Part 1
			4CX10	3.08
			4CX16	1.91
			1CX16	1.15
			2CX50	0.387
			1CX50	0.387
15	Max. AC resistance at max. Operating temp.	Ohm/k m	2CX6	3.7
			4CX4	5.53
			6CX4	5.53
			10CX4	As per IS 1554 Part 1
			4CX10	3.7
			4CX16	2.29
			1CX16	1.38
			2CX50	0.485
			1CX50	0.485
16	Guaranteed value of min oxygen index at 27°C	%	29	

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17	Guaranteed value of min. temp. index	°C	250	
18	Smoke Density Rating		Max. average 60 SDR	
19	Continuous current rating in Air at 40 degC	Amps	2CX6	To be specified by the bidder.
			4CX4	
			6CX4	
			10CX4	
			4CX10	
			4CX16	
			1CX16	
			2CX50	
			1CX50	

5. GENERAL CONSTRUCTION:

- The PVC Insulated Cable shall be manufactured and tested strictly in accordance with the Indian Standard IS 1554 (Part – I):1988 and its latest amendments.
- For all cables excluding 4CX10 sq.mm. and 4CX16 sq.mm. Cable shall be plain annealed stranded copper conductor, HR PVC insulation, extruded PVC ST2 inner sheath, galvanized steel armoured wire(Multicore only), extruded FRLSH ST2 PVC outer sheathed cable conforming to IS:1554(Part-I) with latest amendments.
- 4CX10 sq.mm. and 4CX16 sq.mm. Cable shall be stranded aluminium EC H2 grade conductor, HR PVC insulation, extruded PVC ST2 inner sheath, galvanized steel armoured wire, extruded FRLSH ST2 PVC outer sheathed cable conforming to IS:1554(Part-I) with latest amendment. Overall outer sheath in blue color.
- Individual core of multi-core cable shall be colour-coded and/or numbered for proper identification in accordance with relevant IS/manufacturer's standard.
- Cables shall be supplied in the wooden drums in specified length. Wooden drums shall be strong, weatherproof coated and shall be non-returnable. The ends of the cable shall be sealed by means of non-hygroscopic sealing material.

6. MARKING:

Drum – The cable shall be wound on Non-returnable MS/steel drums as per IS/ Steel Drum of recycled steel shall be of good quality. It shall be free from any damages & sharp edges of nails/ hardware inside the drums. A protective covering of polymeric sheet shall be applied inside the drum before winding the cable on the drum.

The drum shall carry the following information stenciled on both sides of the drum:

- Manufacturer's name
- Type of Cable
- Voltage Grade
- Number of cores
- Nominal Cross sectional Area
- Length of the cable on the drum
- Number of lengths on the drum (If more than one)

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- h) Direction of the rotation of the drum
- i) Gross mass
- j) ISI Certification mark

The following details shall be embossed on the outer sheath of the cable at regular intervals every meter.

- a) Manufacturer's name
- b) Voltage grade
- c) Number of cores, size, type
- d) FRLSH
- e) Property of The TPDDL/TPADL/TPSODL/TPCODL/TPWODL/TPNODL/TPC
- f) IS Reference
- g) ISI Mark
- h) PO Number
- i) Material code
- j) Year of manufacturing
- k) Sequential length marking shall be provided on the outer sheath of the cable by printing.

7. TESTS:

The bidder shall be required to submit complete set of the following test reports along with the offer: -

Type test:

S.No.	Test	Specific value		Test method	
		Clause No.	Reference Standard	Clause No.	Reference Standard
Tests on Conductor					
1	Tensile Test (for aluminium)	6.2.1	IS : 8130-1984	IS : 10810 -1	
2	Annealing test (for copper)	6.1.2	IS : 8130-1984	IS : 10810 -2	
3	Wrapping Test (for aluminium)	6.2.2	IS : 8130-1984	IS : 10810 -3	
4	Conductor resistance test	Table 2	IS 8130	10	IS 10810 part 5
Test on Inner sheath					
5	Thickness	4	Specification	IS 10810 part 6	
Tests on insulation and outer sheath					
6	Thickness of insulation	4	Specification	IS 10810part 6	
7	Thickness of outer sheath	4	Specification	IS 10810 part 6	
8	Tensile strength and Elongation at break (before ageing)	Table 1/2	IS 5831	8	IS 10810 part 7
9	Tensile strength and Elongation at break (after ageing)	Table 1/2	IS 5831	8	IS 10810 part 7
10	Variation due to ageing	Table 1/2	IS 5831	8	IS 10810 part 7
11	Loss of mass test	Table 1/2	IS 5831	8	IS 10810 part 10
12	Shrinkage test	Table 1/2	IS 5831	8	IS 10810 part 12

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13	Hot deformation test	Table 1/2	IS 5831	8	IS 10810 part 15
14	Heat shock test	Table 1/2	IS 5831	8	IS 10810 part 14
15	Thermal stability test	Table 1/2	IS 5831	Appendix B	IS 5831:1984
16	Flammability test for outer sheath	As per IEC 332 part 1			
17	Oxygen index	As per ASTM 2863			
18	Temperature index	ASTM 2863			
19	Smoke density	ASTM 2843			
Tests on Armour for Multi-Core Cable					
20	Tensile test	8	IS 3975	6	IS 1608
21	Torsion test	8	IS 3975	7	IS 1717
22	Wrapping test	8	IS 3975	5	IS 1755
23	Resistance test	8	IS 3975	8	IS 10810 Part 42
24	Mass of zinc coating	Table 1	IS 4826	6	IS 6745
25	Uniformity of zinc coating	9	IS 3975	4	IS 2633
26	Adhesion test	9	IS 3975	9.3	IS 3975
Tests on complete cable					
27	Insulation Resistance test	15.1	IS 5831	IS 10810 Part 43	
28	High voltage test (water immersion test) – AC & DC	16.3	IS 1554	IS 10810 Part 45	
29	High voltage test at room temperature	16.2	IS 1554	IS 10810 - 45	
30	Flammability test	16.4	IS 1554	IS 10810 - 53	

Routine test:

Test	Clause No.	Reference Standard
Conductor resistance test	19.3	IS 7098 part 2
High voltage test at room temperature	16.2	IS 1554

Acceptance tests:

S.No.	Test name	Specific value		Test method	
		Clause No.	Reference Standard	Clause No.	Reference Standard
(I) Test on Conductor					
1	Tensile Test (for aluminium)	6.2.1	IS : 8130-1984	IS : 10810 -1	
2	Annealing test (for copper)	6.1.2	IS : 8130-1984	IS : 10810 -2	
3	Wrapping Test (for aluminium)	6.2.2	IS : 8130-1984	IS : 10810 -3	
4	Conductor Resistance Test	Table 2	IS 8130	10	IS 10810 part 5
(II) Test on Insulation and sheath					
5	Thickness insulation and sheath (outer and inner)	4	Specification	IS 10810 part 6	
6	Tensile strength and Elongation at break insulation and outer sheath	Table 2	IS 5831	8	IS 10810 part 7

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7	Volume resistivity test for insulation	-	-	IS : 10810	
8	Flammability test for outer sheath	As per IEC 332 part 1			
9	Oxygen index	As per ASTM 2863			
10	Temperature index	ASTM 2863			
11	Smoke density	ASTM 2843			
(III)Tests on Armour for Multi-Core Cable					
12	Dimension check	4		IS 10810 part 6	
13	Mass of zinc coating	Table 1	IS 4826	6	IS 6745
14	Uniformity of zinc coating	9	IS 3975	4	IS 2633
(IV) Tests for complete cable					
15	Insulation Resistance test	15.1	IS 5831	IS 10810 Part 43	
16	High voltage test at room temperature	16.2	IS 1554	IS 10810 - 45	
17	Flammability test	16.4	IS 1554	IS 10810 - 53	

8. TYPE TEST CERTIFICATES:

Requirement: Bidder shall furnish the type test report of 1.1 KV Control and lower sizes PVC power cables for the tests as mentioned in Clause no. 7 of this specification and as per reference standards. Complete set of Type Tests shall be conducted at certified test laboratories, which are CPRI/ERDA/Any other reputed & equivalent lab. Type test report shall be submitted for the type, size and rating of the cable mentioned in the bid/ OR for any size higher (than required) of similar type and similar voltage grade. Type test should have been conducted in certified test laboratories during the period not exceeding 10 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/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPCODL/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC. 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/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC's representatives at all times when the work is in progress. Inspection by the TPCODL/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC 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/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC.

Following documents shall be sent along with material.

- Test reports
- MDCC issued by TPCODL/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC
- TPCODL/TPNODL/TPSODL/TPWODL Invoice in duplicate
- Packing list

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- Drawings & catalogue
- Guarantee / Warrantee card
- Delivery Challan
- Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPCODL/TPNODL/TPSODL/TPWODL, Odisha 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.

11. GUARANTEE:

Bidder 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 60 months from the date of commissioning or 72 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.

12. PACKING:

- a) **Standard length of Cable** – The cable shall be supplied in continuous standard length of 500 M.
- b) **Filling condition** – Drum shall not be overfilled.
- c) **Cable drum** – The cable shall be wound on Non-returnable Hybrid MS/Steel drums as per IS/ Steel Drum of recycled steel shall be of good quality without any extra cost to The TPCODL/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC as per IS 10418 and its latest amendments.
- d) **Sealing of cable ends** – The ends of the cable shall be sealed by means of heat shrinkable polyolefin end caps. Additional 2 nos. end caps shall be provided with each drum.
- e) **Requirements for Cable drums** – Cable drums shall be so constructed as to have required mechanical strength so that the drum flanges and other components do not break during transport, in actual use or in storage. The flanges and the outside surface of the barrel shall be free from protruding materials/projections/ unevenness/ sharp edges that can damage the cable or hands of the operator during rotation of drums.
A metal preservation shall be applied to the entire drum.
- f) Bottom end of cable should be clamped on drum by jute or nylon rope.
- g) All ferrous metal parts used shall be treated with a suitable rust free finish or coating to avoid rusting during transit or storage. The drums shall withstand normal handling and transport.
- h) **Rail/ Road transportation** – The bidder shall ensure that the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.
- i) Packaging shall be as per climate change perspective. Cable wound on cable drum shall be covered by recyclable PVC sheet for dust proof.

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13. TENDER SAMPLE:

NA

14. TRAINING:

NA

15. QUALITY CONTROL:

The bidder shall submit 'Quality Assurance Plan' followed by him in respect of bought out items, items manufactured by him, Raw materials in process, Final inspection Packaging & Marking. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The TPCODL/TPNODL/TPSODL/TPWODL/TPDDL/TPADL/TPC reserves the sole rights for the type test of random sample from the lot and in case of any discrepancy or deviation from the Type test certificates submitted along with the bid, the complete Lot shall be rejected. The Tata Power-Company Limited's nominated representative shall have free access to the bidder's works to carry out inspections.

16. TESTING FACILITIES:

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

17. MANUFACTURING FACILITIES:

The successful bidder shall 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.

18. SPARES, ACCESSORIES AND TOOLS

Not applicable.

19. DRAWINGS AND DOCUMENTS:

Following documents to be submitted along with the bid for evaluation:

- a) Completely filled-in clause wise compliance of this specification.
- b) Signed and stamped copy of drawing
- c) Complete Type test reports
- d) Completely filled signed and stamped copy of tender document.

Following documents shall be submitted after award of RC/PO before manufacturing:

- a) Completely filled-in clause wise compliance of the specification.
- b) Signed and stamped copy of Drawing
- c) Compliance of all undertaking submitted during technical evaluation, if any

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All the Documents and Drawings shall be in English Language.

20. SCHEDULE- “A” GUARANTEED TECHNICAL PARTICULARS:

Bidder to submit clause wise compliance.

21. SCHEDULE “B” DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

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

SL. No	Clause No.	Details of deviation with justifications

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

Seal of the Company:

Signature
Designation

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ANNEXTURE 1

Inspection plan

S.No.	Test name	Specific value		Test method	
		Clause No.	Reference Standard	Clause No.	Reference Standard
(I) Test on Conductor					
1	Tensile Test (for aluminium)	6.2.1	IS : 8130-1984	IS : 10810 -1	
2	Annealing test (for copper)	6.1.2	IS : 8130-1984	IS : 10810 -2	
3	Wrapping Test (for aluminium)	6.2.2	IS : 8130-1984	IS : 10810 -3	
4	Conductor Resistance Test	Table 2	IS 8130	10	IS 10810 part 5
(II) Test on Insulation and sheath					
5	Thickness insulation and sheath (outer and inner)	4	Specification	IS 10810 part 6	
6	Tensile strength and Elongation at break insulation and outer sheath	Table 2	IS 5831	8	IS 10810 part 7
7	Volume resistivity test for insulation	-	-	IS : 10810	
8	Flammability test for outer sheath	As per IEC 332 part 1			
9	Oxygen index	As per ASTM 2863			
10	Temperature index	ASTM 2863			
11	Smoke density	ASTM 2843			
(III)Tests on Armour for Multi-Core Cable					
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13	Mass of zinc coating	Table 1	IS 4826	6	IS 6745
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(IV) Tests for complete cable					
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16	High voltage test at room temperature	16.2	IS 1554	IS 10810 - 45	
17	Flammability test	16.4	IS 1554	IS 10810 - 53	
(V) Additional test					
18	Color coding identification	4	Specification	To be checked by inspector.	
19	Sequential marking check	6	Specification	To be checked by inspector.	
20	Cable drum length verification	12. A	Specification	To be checked by inspector.	
21	Packaging of cable on cable drum	12	Specification	To be checked by inspector.	
22	Diameter over outer most sheath of co-extruded cable	4	Specification	To be checked by inspector.	
23	Weight of cable per Km	4	Specification	To be checked by inspector.	