



TATA POWER

TECHNICAL SPECIFICATION COVER SHEET

Document No. : TPU-D-ENG-GEN-40064

Document Title : ACSR Conductor

Release date : 05-07-2025

Prepared by	Reviewed by	Reviewed by	Reviewed by	Reviewed by	Reviewed by	Reviewed by	Approved by	Released by
UDIT SANKAR DAS	TAPAN KUMAR BEHERA	ASHUTOSH KUMAR JAISWAL	ANSHULA THAKUR	Jeevan Sangram	Shailendra Kumar Jaiswal	Yash Mane	TAPAN KUMAR BEHERA	SANDIP PAL

Property of TATA POWER DISCOMs – Not to be reproduced without permission of TATA POWER

<p>Central Engineering Services</p>		<p>TECHNICAL SPECIFICATION</p> <p>ACSR Conductor</p> <p>Page - 1 /15</p>
--	--	---

CONTENTS

1. SCOPE
2. APPLICABLE STANDARDS
3. CLIMATIC CONDITIONS OF THE INSTALLATION
4. GENERAL TECHNICAL REQUIREMENTS
5. GENERAL CONSTRUCTIONS
6. MARKING
7. TESTS
8. TYPE TEST CERTIFICATES
9. PRE-DISPATCH INSPECTION
10. INSPECTION AFTER RECEIPT AT STORES
11. GUARANTEE
12. PACKING
13. TENDER SAMPLE
14. TRAINING
15. QUALITY CONTROL
16. TESTING FACILITIES
17. MANUFACTURING FACILITIES
18. SPARES, ACCESSORIES AND TOOLS
19. DRAWINGS AND DOCUMENTS
20. SCHEDULE “A” GUARANTEED TECHNICAL PARTICULARS
21. SCHEDULE “B” DEVIATIONS

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 2 /15
------------------------------	--	--

1. SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, unloading at site/store and performance of **ACSR conductors** for trouble free and efficient operation.

2. APPLICABLE STANDARDS:

ACSR Conductors covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest revisions of relevant Indian Standards/ IEC/ International Standards and shall conform to the regulations of local statutory authorities.

SL. No	IS	Description
1	IS 209	Zinc Ingot (Amendment I).
2	IS 398 (Part II)	Aluminum conductors for overhead transmission purposes for Aluminum Conductors, galvanized steel reinforced.
3	IS 1778	Reels and drums for bare conductors (Amendment I)
4	IS 2633	Methods for testing uniformity of coating of zinc coated articles
5	IS 4026	Aluminium ingots, billets and wire bars (EC grade)
6	IS 4826	Hot dipped galvanized coatings on round steel wires
7	IS 5484	EC grade Aluminium produced by continuous casting and rolling
8	IS 6745	Method of determination of mass of zinc coating on zinc coated iron and steel articles
9	IS 7623	Lithium base grease for industrial purposes

3. CLIMATIC CONDITIONS:

SL.NO.	CONDITONS	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	Max 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

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 3 /15
------------------------------	--	--

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 corresponding to an acceleration of 0.1 g.

4. GENERAL TECHNICAL REQUIREMENTS:

S/no	Parameter	Unit	Requirement			
1	Current Carrying Capacity	A	Conductor size		Current Carrying Capacity	
			ZEBRA		780	
			GOAT		648	
			PANTHER		510	
			WOLF		418	
			DOG		320	
			RACOON		260	
			RABBIT		205	
			SQUIRREL		112	
Technical details of overall ACSR conductor as per IS 398 part 2, table no 3						
2	No of strands & (min) diameter of Al wire	Nos/mm	Conductor size		No of Al strands	Dia of Al wire (min)
			ZEBRA		54	3.18
			GOAT		30	3.71
			PANTHER		30	3.00
			WOLF		30	2.59
			DOG		6	4.72
			RACOON		6	4.09
			RABBIT		6	3.35
			SQUIRREL		6	2.11
3	No of strands & diameter of Steel wire	Nos/mm	Conductor size		Number of Steel Strands	Dia of steel strands
			ZEBRA		7	3.18
			GOAT		7	3.71
			PANTHER		7	3.00
			WOLF		7	2.59
			DOG		7	1.57
			RACOON		1	4.09
			RABBIT		1	3.35
			SQUIRREL		1	2.11
4	Sectional Area of Aluminium	Mm ²	Conductor size		Sectional Area of Aluminium	
			ZEBRA		428.9	
			GOAT		324.3	
			PANTHER		212.1	
			WOLF		158.1	
			DOG		105.0	
			RACOON		78.83	
			RABBIT		52.88	
			SQUIRREL		20.98	
5	Total sectional Area of	Mm ²	Conductor size			

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 4 /15
------------------------------	--	--

	conductor		ZEBRA	484.5
			GOAT	400.0
			PANTHER	261.5
			WOLF	194.86
			DOG	118.5
			RACoon	91.97
			RABBIT	61.70
			SQUIRREL	24.48
6	Approx. Diameter of Conductor	Mm	Conductor size	Conductor dia
			ZEBRA	28.62
			GOAT	25.97
			Panther	21.00
			WOLF	18.13
			DOG	14.15
			RACoon	12.27
			RABBIT	10.05
SQUIRREL	6.33			
7	Approx. mass	kg/km	Conductor size	Conductor dia
			ZEBRA	1621
			GOAT	1489
			Panther	974
			WOLF	726
			DOG	394
			RACoon	319
			RABBIT	214
SQUIRREL	85			
8	Max Calculated DC Resistance of Conductor @ 20°C	Ohm/Km	Conductor size	Max Calculated DC Resistance of Conductor @ 20°C
			ZEBRA	0.06868
			GOAT	0.0891
			PANTHER	0.1390
			WOLF	0.1871
			DOG	0.2792
			RACoon	0.3712
			RABBIT	0.5524
SQUIRREL	1.394			
9	Approx calculated breaking load of the conductor	KN	Conductor size	Breaking load
			ZEBRA	130.32
			GOAT	136.0
			PANTHER	89.67
			WOLF	67.34
			DOG	32.41
			RACoon	26.91
			RABBIT	18.25
SQUIRREL	7.61			
Details of aluminium wire used in the ACSR conductor as per IS 398 Part 2, table 1				
10	Minimum Purity of	%	99.5	

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 5 /15
------------------------------	--	--

	Aluminium					
11	Maximum & minimum Diameter of Aluminium Strand	Mm	Conductor size	Number of Aluminium Strands	Nominal as Min	Max
			ZEBRA	54	3.18	3.21
			GOAT	30	3.71	3.75
			PANTHER	30	3.0	3.03
			WOLF	30	2.59	2.62
			DOG	6	4.72	4.77
			RACoon	6	4.09	4.13
			RABBIT	6	3.35	3.38
			SQUIRREL	6	2.11	2.13
12	Cross sectional area of aluminium wire at nominal diameter	Mm ²	Conductor size	Nominal dia of aluminium strands	Cross sectional area of nominal dia wire each	
			ZEBRA	3.18	7.942	
			GOAT	3.71	10.811	
			PANTHER	3.00	7.069	
			WOLF	2.59	5.269	
			DOG	4.72	17.50	
			RACoon	4.09	13.14	
			RABBIT	3.35	8.814	
			SQUIRREL	2.11	3.497	
13	Mass of Al strand wire	Kg/km	Conductor size	Min dia of aluminium strands	Mass	
			ZEBRA	3.18	21.96	
			GOAT	3.71	29	
			PANTHER	3.00	19.11	
			WOLF	2.59	14.56	
			DOG	4.72	48	
			RACoon	4.09	36	
			RABBIT	3.35	24.16	
			SQUIRREL	2.11	9.66	
14	Minimum Breaking Load of Aluminium Strand after Stranding	kN	Conductor size	Nominal dia of aluminium strands	Minimum Breaking Load of Aluminium Strand after Stranding	
			ZEBRA	3.18	1.23	
			GOAT	3.71	1.71	
			PANTHER	3.00	1.11	
			WOLF	2.59	0.85	
			DOG	4.72	2.64	
			RACoon	4.09	1.98	
			RABBIT	3.35	1.36	
			SQUIRREL	2.11	0.60	
15	Maximum resistance of Al strand at 20 Deg.C	Ohm/km	Conductor size	Nominal dia of aluminium strands	Maximum resistance of Al strand at 20	

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 6 /15
------------------------------	--	--

					Deg.C		
			ZEBRA	3.18	3.626		
			GOAT	3.71	2.614		
			PANTHER	3.00	4.079		
			WOLF	2.59	5.490		
			DOG	4.72	1.650		
			RACoon	4.09	2.194		
			RABBIT	3.35	3.265		
			SQUIRREL	2.11	8.237		
Details of steel wire used in the ACSR conductor as per IS 398 Part 2, table 2							
16	Number of Steel Strands & Nominal, Maximum & Minimum Diameter of steel strand	mm	Conductor size	Number of Steel Strands	Min	Max	Nominal
			ZEBRA	7	3.12	3.24	3.18
			GOAT	7	3.63	3.79	3.71
			PANTHER	7	2.94	3.06	3.00
			WOLF	7	2.54	2.64	2.59
			DOG	7	1.54	1.60	1.57
			RACoon	1	4.01	4.17	4.09
			RABBIT	1	3.28	3.42	3.35
			SQUIRREL	1	2.07	2.15	2.11
17	Minimum Breaking Load of steel Strand after Stranding	kN	Conductor size	Nominal dia of steel wire	Minimum Breaking Load of steel Strand after Stranding		
			ZEBRA	3.18	9.91		
			GOAT	3.71	13.50		
			PANTHER	3.00	8.83		
			WOLF	2.59	6.57		
			DOG	1.57	2.57		
			RACoon	4.09	16.4		
			RABBIT	3.35	11.00		
			SQUIRREL	2.11	4.37		
18	Cross sectional area of nominal diameter steel wire	Mm ²	Conductor size	Nominal dia of steel wire	Cross sectional wire of nominal diameter each wire		
			ZEBRA	3.18	7.942		
			GOAT	3.71	10.81		
			PANTHER	3.00	7.069		
			WOLF	2.59	5.269		
			DOG	1.57	1.936		
			RACoon	4.09	13.14		
			RABBIT	3.35	8.814		
			SQUIRREL	2.11	3.497		
19	Mass of steel wire	Kg/km	Conductor size	Nominal dia of steel wire	Mass (each wire)		
			ZEBRA	3.18	61.95		
			GOAT	3.71	84.36		

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 7 /15
------------------------------	--	--

			PANTHER		3.00	55.13	
			WOLF		2.59	41.09	
			DOG		1.57	15.10	
			RACOON		4.09	102.48	
			RABBIT		3.35	68.75	
			SQUIRREL		2.11	27.27	
Other Requirement							
20	Minimum purity of Zinc	%	99.95				
21	Minimum weight of zinc coating after stranding Note – As per IS 4826 table 1 – Heavy coated hard wire	gm/m2	Conductor size		Nominal dia of steel strands	Max dia of steel wire	Weight
			ZEBRA		3.18	3.24	250
			GOAT		3.71	3.79	260
			PANTHER		3.00	3.06	240
			WOLF		2.59	2.64	230
			DOG		1.57	1.60	190
			RACOON		4.09	4.17	275
			RABBIT		3.35	3.42	250
			SQUIRREL		2.11	2.15	210
22	Minimum no. dips after stranding for zinc uniformity test Note – As per IS 4826 table 1 – Heavy coated hard wire	Nos.	Conductor size	Nominal dia of steel strands	Max dia of steel wire	No of dips	
			ZEBRA	3.18	3.24	3 dips of 1 minute each	
			GOAT	3.71	3.79	3 dips of 1 minute each	
			PANTHER	3.00	3.06	3 dips of 1 minute each	
			WOLF	2.59	2.64	3 dips of 1 minute each	
			DOG	1.57	1.60	2 dips of 1 minute each	
			RACOON	4.09	4.17	3 dips of 1 minute & 1 dip of ½ minute each	
			RABBIT	3.35	3.42	3 dips of 1 minute each	
			SQUIRREL	2.11	2.15	2 dips of 1 minute each	
23	Minimum number of twists in torsion test Strand dia (after stranding)	Nos.	16				
24	Lay ratio	Max – Min.	Conductor size	Steel Core	Aluminium core outermost layer	Aluminium core beneath outermost layer	Aluminium core innermost layer with 3 layers
			ZEBRA	28 – 13	14 – 10	16 – 10	17 – 10
			GOAT	28 – 13	14 – 10	16 – 10	-
			PANTHER	28 – 13	14 – 10	16 – 10	-
			WOLF	28 – 13	14 – 10	16 – 10	-
			DOG	28 – 13	14 – 10	-	-
			RACOON	-	14 – 10	-	-
			RABBIT	-	14 – 10	-	-
SQUIRREL	-	14 – 10	-	-			
25	Standard length of	M	2000				

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 8 /15
------------------------------	--	--

	stranded conductor		
26	Direction of lay for outermost Layer		Right hand
27	Density of Aluminium wire	g/cm ³	2.703
28	Density of galvanized steel wire	g/cm ³	7.8

5. GENERAL CONSTRUCTION:

The conductors shall be constructed as per IS 398 (Part II)/ BS 215 part 2. The steel strands shall be uniformly grease coated as anti-corrosive agent in Zebra, Goat and wolf conductors. Neutral Lithium based Grease shall complied to IS 7623

A. Material –

1. The materials shall be as per clause 4.0 & 6.0 of IS 398 (Part II). The Aluminium conductor strands shall be drawn from **99.5% pure electrolytic EC grade Aluminum rods**.
2. Aluminum raw material shall be procured from **NALCO, BALCO, HINDALCO and VEDANTA** only.
3. The galvanized steel wire shall be drawn from high carbon steel rods produced by either acid or base open-hearth process, electric furnace or basic oxygen process. The zinc used for galvanizing shall be **electrolyte high grade zinc not less than 99.95 % purity**. The coating on galvanized steel wire shall be applied by hot process.
4. Steel raw material shall be from **Tata Steel, Jindal steel, SAIL** only.
5. Grease shall be from **BPCL, HPCL, Balmer Lawrie** only.
6. The steel strands shall be uniformly grease coated as anti-corrosive agent in **Zebra, Goat, Panther and wolf conductors**.
7. Neutral Lithium based Grease shall complied to IS 7623

B. Surface condition –

1. Surface conditions of the conductor shall be generally as per clause 7.0 of IS 398 (Part II). The wires used for standard conductor shall be smooth and free from imperfections, such as spills and split the conductor shall be free from points, sharp edges, abrasions and other departures from smoothness on uniformity of surface contour that would increase radio interference and corona losses. When subjected to tension up to 50% of the ultimate strength of the conductor, the surface shall not depart from the cylindrical form on any part of the compartment, parts or strands, more relative to each other in such a way as to get out of place and disturb the longitudinal smoothness of the conductor.
2. The zinc coating on steel wire shall be uniform, adherent, smooth and free from such imperfections as flurry, ash and dross inclusions, bare patches, black spots, pimples, lumpiness, runs, rust stains, bulky white deposits, and blisters

C. Standard sizes – Size of the wire shall be as specified in the Guaranteed Technical Requirement of this specification.

D. Joints in wire – The wires shall be drawn in continuous length, without joints, except those made in wire rod or before drawing operation.

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 9 /15
------------------------------	--	--

E. Strandings – The wires used in the construction of galvanized steel-reinforced Aluminum conductor shall, before stranding, satisfy all the relevant requirements of the IS 398- Part II. Steel wires shall be formed during stranding so that they remain intact when the conductor is cut for jointing operation. The lay ratio shall comply as per the Clause No.4 of this specification.

6. MARKING:

The conductor shall be wound on non-returnable wooden reels or drums conforming to IS 1778:1981. Drum shall be marked with the following:

1. Reference to the Standards.
2. Manufacturer's name
3. Size and the type of conductor
4. Net weight of the conductor (in kg)
5. Gross weight of the conductor (in kg)
6. Length of the conductor (in meter).
7. No. of short length on the drum (if any).
8. Marking of PO no.
9. Direction of rotation of the drum.
10. Gross mass.
11. Country of manufacture.
12. Year of manufacture.
13. "PROPERTY OF TPNODL/TPCODL/TPSODL/TPWODL/TPADL/TATA POWER- DDL/TPC mumbai" shall be written in bold letters.

7. TESTS:

All Routine, Acceptance & Type tests shall be carried out in accordance with the Relevant IS/IEC/ ENA TS 09-13. All the components shall also be type tested as per the relevant standards mentioned below. Following tests shall be necessarily conducted on the conductors in additions to others specified in the IS standards:

*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid

A. ACCEPTANCE TESTS:

SNO	Test	Clause No.	Reference Standard
1	Resistance Test on Aluminum & steel wire	13.6	IS 398 part- 2
2	Measurement of diameter of individual Aluminum wire	13.2	IS 398 part- 2
3	Wrapping test on aluminum wire	13.5.1	IS 398 part- 2
4	Breaking load on aluminum wire	13.3.1	IS 398 part- 2
5	Measurement of lay ratio of Aluminum Layers	13.8	IS 398 part- 2
6	Measurement of diameter of individual Steel wire	13.2	IS 398 part- 2
7	Wrapping test on steel wire	13.5.2	IS 398 part- 2
8	Breaking load on Steel wire	13.3.1	IS 398 part- 2
9	Torsion Test on steel Wire	13.4.1	IS 398 part- 2
10	Elongation Test Steel Wire	13.4.2	IS 398 part- 2
11	Uniformity of Zinc coating	4	IS 4826
12	Mass of Zinc coating	4	IS 4826

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 10 /15
------------------------------	--	---

13	Measurement of lay ratio of steel wire (Not applicable for rabbit & Squirrel conductor)	13.8	IS 398 part- 2
14	Raw material invoice document verification		As per specification
15	Visual & surface smoothness test for Aluminum wire		As per specification
16	Visual & surface smoothness test for steel wire		As per specification
17	Grease coating on steel wires		As per specification
18	Packaging & Marking		As per specification
19	Conductor Surface smoothness and length verification		As per specification

B. ROUTINE TESTS

The routine tests shall be done same as acceptance tests and shall be carried out before and after stranding.

C. TYPE TESTS:

S/No	Test	Clause No.	Reference Standard
1	Resistance Test on Aluminum wire	13.6	IS 398 part – 2
2	Measurement of diameter of individual Aluminum & steel wire	13.2	IS 398 part – 2
3	Wrapping test on aluminum wire	13.5.1	IS 398 part – 2
4	Breaking load on aluminum wire	13.3	IS 398 part – 2
5	Measurement of lay ratio of Aluminum Layers	13.8	IS 398 part – 2
6	Measurement of diameter of individual Steel	13.2	IS 398 part – 2
7	Wrapping test on steel wire	13.5.2	IS 398 part – 2
8	Breaking load on Steel wire	13.3	IS 398 part – 2
9	Torsion Test on steel Wire	13.4.1	IS 398 part – 2
10	Elongation Test Steel Wire	13.4.2	IS 398 part – 2
11	Uniformity of Zinc coating	4.2	IS 4826
12	Mass of Zinc coating	4.1	IS 398 part – 2
13	Measurement of lay ratio of Steel (Not applicable for rabbit & Squirrel conductor)	13.8	IS 398 part – 2
14	Stress strain test on conductor (For Aluminium Area 100mm ² & Above)	13.11	IS 398 part – 2
15	Ultimate Breaking Load Test (For Aluminium Area 100mm ² & Above)	13.10	IS 398 part – 2
16	Surface condition Test (For Aluminium Area 100mm ² & Above)	13.9	IS 398 part – 2

8. TYPE TEST CERTIFICATES:

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

9. PRE-DISPATCH INSPECTION:

<p>Central Engineering Services</p>		<p>TECHNICAL SPECIFICATION</p> <p>ACSR Conductor</p> <p>Page - 11 /15</p>
--	--	--

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

Following documents shall be sent along with material.

- Test reports
- MDCC issued by TPCODL/TPWODL/TPNODL/TPSODL/TPC mumbai/ TPDDL/ TPADL
- TPCODL/TPWODL/TPNODL/TPSODL/TPC mumbai/ TPDDL/ TPADL Invoice in duplicate
- Packing list
- Drawings & catalogue
- Guarantee / Warrantee card
- Delivery Challan
- Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORE:

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

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is earlier, (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.

12. PACKING AND TRANSPORT:

- The conductor shall be wound on non-returnable wooden reels or drums conforming to IS 1778:1981 Conductor 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 conductor or hands of the operator during rotation of drums. Material preservation shall be applied to the entire drum.

<p>Central Engineering Services</p>		<p>TECHNICAL SPECIFICATION</p> <p>ACSR Conductor</p> <p>Page - 12 /15</p>
--	--	--

B. The conductor shall be supplied in the standard length of 2.00km. Not less than 95% of the conductor shall be supplied in standard lengths and the remaining 5% required to be supplied in one drum only and length of pieces shall not be less than 500 meters. The number of pieces if in the drum shall be indicated on the conductor drum.

C. No. of standard length @ 2000 mtrs \pm 5% per Drum shall be as follows –

ZEBRA	GOAT	PANTHER	WOLF	DOG	RACCOON	RABBIT	SQUIRREL
1	1	1	1	1	2	3	5

D. Conductor wound on wooden drum shall be covered by recyclable polyethylene sheets.

13. TENDER SAMPLE:

NA

14. TRAINING:

NA

15. 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.

Rejection and Retest – During inspection if any one of the test pieces first selected fail to pass the tests, three further samples from the same batch shall be selected as per IS, one of which shall be from the length from which the original test sample was taken, unless that length has been withdrawn by the supplier. If all of the three test pieces from these additional samples satisfy the requirements of the tests, the batch represented by these samples shall be deemed to comply with the standard. In case, the test pieces from any of the three additional samples fail, the batch represented shall be deemed not to comply with the standard.

16. TESTING FACILITIES:

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

17. MANUFACTURING FACILITIES:

The successful bidder will have to submit (after placement of RC) technical compliance document as per RC line items for getting approval before mass manufacturing. Bidder shall start manufacturing of mass quantity only after getting Cat – A approved specification / GTP/ drawings as per intimation from TPCODL/ TPWODL/ TPNODL/ TPSODL/ TPDDL/ TPADL /Tata power mumbai.

18. SPARES, ACCESSORIES AND TOOLS

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 13 /15
------------------------------	--	---

NA

19. DRAWINGS AND DOCUMENTS:

Following drawings and documents shall be prepared based on TPCODL/ TPWODL/ TPNODL/ TPSODL/ TPDDL/ TPADL /Tata power Mumbai. Specifications and statutory requirements and shall be submitted with the bid:

- Completely filled in Technical Particulars.
- Type test Certificates

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

Sl/No	Description	For approval	For Review Information	Final submission
1	Technical Parameters	√		√
2	Technical details and test certificates of conductor.		√	√
3	Cross sectional Drawing of the conductor		√	√
4	QA & QC Plan	√	√	√

All the Documents and Drawings shall be in English Language

20. SCHEDULE- “A” GUARANTEED TECHNICAL PARTICULARS:

All clauses and points in the Specification to be complied.

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

Central Engineering Services		TECHNICAL SPECIFICATION ACSR Conductor Page - 14 /15
------------------------------	---	---

Annexure 1

Inspection Test Plan

SNO	Test	Clause No.	Reference Standard
1	Resistance Test on Aluminum & steel wire	13.6	IS 398 part- 2
2	Measurement of diameter of individual Aluminum wire	13.2	IS 398 part- 2
3	Wrapping test on aluminum wire	13.5.1	IS 398 part- 2
4	Breaking load on aluminum wire	13.3.1	IS 398 part- 2
5	Measurement of lay ratio of Aluminum Layers	13.8	IS 398 part- 2
6	Measurement of diameter of individual Steel wire	13.2	IS 398 part- 2
7	Wrapping test on steel wire	13.5.2	IS 398 part- 2
8	Breaking load on Steel wire	13.3.1	IS 398 part- 2
9	Torsion Test on steel Wire	13.4.1	IS 398 part- 2
10	Elongation Test Steel Wire	13.4.2	IS 398 part- 2
11	Uniformity of Zinc coating	4	IS 4826
12	Mass of Zinc coating	4	IS 4826
13	Measurement of lay ratio of steel wire (Not applicable for rabbit & Squirrel conductor)	13.8	IS 398 part- 2
14	Raw material invoice document verification		As per specification
15	Visual & surface smoothness test for Aluminum wire		As per specification
16	Visual & surface smoothness test for steel wire		As per specification
17	Grease coating on steel wires		As per specification
18	Packaging & Marking		As per specification
19	Conductor Surface smoothness and length verification		As per specification