



SUPPLY CHAIN MANAGEMENT THIRUVANANTHAPURAM

SPECIFICATION ACSR Wolf, Moose & Dog Conductors

APPLICABLE TO KSEBL	Rev#0	DOC. NO.: SCM-SPEC/XT/ ACSR Wolf, Moose & Dog Conductor EFF. DATE: 31/05/2021
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Number of Pages: 31

Technical Specification and Evaluation Committee for Transmission Material



SUPPLY CHAIN MANAGEMENT
Thiruvananthapuram

TECHNICAL SPECIFICATION
ACSR WOLF, MOOSE & DOG CONDUCTORS

Doc. #: **SCM-SPEC/XT/ACSR Wolf,
Moose & Dog**

Rev.#: 0

Effective Date **31/05/2021**

(i) Document Approval & Control Status

	Compiled by	Verified by	Approved by
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Position	Assistant Executive Engineer (Supply Chain Management)	Executive Engineer (Supply Chain Management)	Chief Engineer (Supply Chain Management)
Date	08/05/2021	14/05/2021	31/05/2021
Signature	Sd/-	Sd/-	Sd/-

(ii) Amendments and History

Sec. #	Rev. #	Date	History of Change



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1. Purpose:

Purpose of this document is to document updates & history, upkeep and publish the specifications related to **ACSR Wolf, Moose & Dog Conductors** in a professional manner

2. Scope:

The Scope of this document is to inform and alert all relevant stakeholders including KSEBL, Public, KSERC etc regarding the current specifications and historical changes adopted in specifications of **ACSR Wolf, Moose & Dog Conductors** used in field by KSEBL

3. Responsibility:

The Executive Engineer (T), Office of Chief Engineer, Supply Chain Management shall compile and take necessary steps to publish the specification in KSEBL website and shall inform relevant stakeholders regarding updates and revisions

4. Procedure For Revision:

Modifications if any, in the technical specification will be incorporated as **Revisions**. Any changes in values, minor corrections in pages, incorporation of small details etc. will be considered as Minor Modification. **The Revisions due to minor modifications will be assigned as Rev. No.0.1, 0.2 etc.**

A complete updation of the technical specification will be considered as Major modification. **The Revisions due to major modifications will be assigned as Rev. No.1.0, 2.0 etc.**

All the details of regarding the revisions (both minor and major) will be incorporated in **“(ii)-Amendments and history”** above.

The concerned officers, in consultation with the Technical Committee will review and suggest changes required and the revision suggestion will be approved by **Chief Engineer (SCM)**. Those who notice any discrepancy or have any suggestion regarding revision, may bring the matter to the attention of Chief Engineer (SCM) in writing or through e-mail id: **cescm@kseb.in**



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TECHNICAL SPECIFICATION OF POWER CONDUCTORS

1) **Scope**

This specification provides for the design, manufacture, testing before despatch, supply and delivery including unloading of ACSR Wolf, Moose & Dog Conductor at site.

2) **Standards:-**

- 2.1. The conductor shall comply in all respects with the Indian Standards specification (ISS)398.1996/British Standard 215/IEC Publication No.209 with latest amendments or any other authoritative standard. The specification and working shall be marked in the flat sides of the drum.

3) **Materials:-**

- 3.1. The materials offered shall be of best quality and workmanship. The steel cored Aluminium conductor strands will consist of hard-drawn Aluminium wire manufactured from 99.6% pure electrolytic Aluminium rods of E.C.Grade. The steel wire shall be made from materials produced either by the acid or base open hearth process or by electric process. No steel wire drawn from Bessmar process steel shall be used. The steel wire shall not contain Sulphur or Phosphorus exceeding 0.05% and the total of Sulphur and phosphorous shall not exceed 0.085% as stipulated in the IS:398 (Part-2).
- 3.2. The steel wire shall be evenly and uniformly treated with zinc complying with Indian Standard 209-1956 specification for zinc (Revised) or BS or any other authoritative standard. The uniformity of zinc coating and the weight of coating shall be in accordance with technical specifications and shall be tested and determined according to Indian Standard 429/1954 or BS.443 or any other authoritative standard.

4) **Sizes:-**

The size of steel cored Aluminium conductors shall be as given in technical specifications & Guaranteed Technical Particulars attached. The resistance and weights shall be in accordance with the values given in the same.

5) **Tolerances:-**

No negative tolerance shall be permitted on the nominal diameter of Aluminium and steel wires used in the manufacture of ACSR. However positive tolerance in this respect shall be as provided in IS.398(Part-II) .

6) **Mechanical Properties:-**

The value of the final modulus of elasticity for steel cored Aluminium conductor is the average of values obtained from actual stress strain tests. The co-efficient of linear expansion

for steel cored Aluminium Conductors has been calculated on the basis of co-efficient of linear expansion of 23×10^{-6} per degree centigrade for Aluminium and 11.5×10^{-6} per degree centigrade for steel and represent only the average values.

7) Surface Conditions:-

The wires shall be smooth and free from inequalities, spills and splits. The surface conductor shall be free from points, sharp edges, abrasions or other departures from smoothness or uniformity of surface contour that would increase radio interference and corona losses. When subjected to tension upto 50% of the ultimate strength of the conductor, the surface shall not depart from its cylindrical form, not any part of the component parts or strands, move relative to each other in such a way as to get out of place and disturb the longitudinal smoothness of the conductor.

8) Joints in Wires and Conductors:-

For steel cored Aluminium conductors, joints shall be permitted in the steel core strands as also in Aluminium strands provided no two joints in the complete stranded conductor occur closer together than 15 metres. Joints in Aluminium wires shall be made by autogenous welding. Joints in steel wires shall be made by brazing and shall be protected against corrosion.

9) Stranding:-

- 9.1. The wires used in construction of a stranded conductor shall before stranding, satisfy all requirements of IS.398/BS.215/iec-209. For steel cored Aluminium conductor the lay ratio of the different layers shall be within the limits given in the technical specifications attached.
- 9.2. For all construction, each alternate layer shall be stranded in opposite directions. The wires in each layer shall be evenly and closely stranded round the underlying layer of wires. The final layer of wires shall have a right hand lay.
- 9.3. The steel core and inner Aluminium layer shall be protected by a suitable compound before application of the Aluminium strands. The type of coating used shall be lithium soap grease corresponding to Grade II of IS.7623/1974.

10) Packing and Marking:-

- 10.1. The conductor shall be wound in non-returnable reels and drums conforming to Indian Standard 1778-1980. Specification for Reels and Drums for Bare Wire and marked with the following.
 - a) Trade Name, if any.



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- b) Name of Manufacturer.
- c) Size of Conductor, and
- d) Length of Conductor in meter.
- e) Net weight of the conductor in kg
- f) And all other marking specified with standard.
- g) Year of manufacture
- h) Purchase order no.

10.2. The reels shall be of such construction as to ensure delivery of conductor in the field free from displacement and damage and should be able to withstand all stresses due to handling and the stringing operations so that conductor surface is not dented, scratched or damaged any way during manufacture, transport and erection. The conductor shall be properly lagged on the drums and the method of logging to be employed may be clearly stated in the tender. It should be noticed to suit the reel and held in place by steel strapping. Lagging shall not be nailed or bolted in place.

10.3. The conductor drum should be suitable for wheel mounting before reeling, the cardboard or other suitable material shall be secured to the drum and inside flanges of the drum. After reeling the conductor the exposed surface should be wrapped with suitable soft materials to prevent the conductor from contamination from dirt and grit. Any space between the drum lagging and conductor shall be suitably filled with soft water proof filler material compactly packed.

10.4. **Protective Measures:-**

- a) Conductor:- Tamper proof sealing should be provided at the conductor and with specific identification of the manufacturer.
- b) Drum:- The wooden parts of the Drum should be treated with wood preservative.
- c) All metal parts should be coated with metal primer.
- d) The materials used for wrapping shall be non hygroscopic and mechanically strong. Barrel surface and inner surface of the flanges of the drums shall be painted with bitumen based

paint .A layer of the water proof paper (bituminized paper) shall be provided over the barrel and inner surface of the flanges. Another layer of waterproof material shall be provided over the last layer of the conductor and under the loggings.

11) Lengths:-

The conductor shall be supplied in the standard lengths of not less than 2km/drum for ACSR Wolf & ACSR Dog and 1km/drum for ACSR Moose Conductors as per manufacturer's standard practice. Not less than 90% of the total quantity of the conductor shall be supplied in standard lengths. Thus the quantity of the conductor of lengths shorter than standard one shall not exceed 10% the total quantity to be supplied. Further no single conductor lengths in respect of such 10% (Maximum) supply in random lengths shall be shorter than 50% of the standard length.

12) Tests and Test Certificate:-

i) **Type Tests:-** All the following type test certificates of the tendered item from NABL accredited labs / CPRI / Govt. of India approved labs issued within 10 years to be submitted

i)	Measurement of Diameter
a)	Aluminium Wire
b)	Steel Wire
ii)	Breaking Load Test
a)	Aluminium Wire (before/ after)
b)	Steel Wire (before/ after)
iii)	Ductility Test
a)	% Elongation (Steel Wire) (before/after)
b)	Torsional Test (before/ after)
iv)	Wrapping Test
a)	Aluminium Wire
b)	Steel Wire
v)	Resistance Test
a)	Aluminium Wire

b)	Conductor
vi)	Measurement Lay Ratio
a)	First Layer (Steel)
b)	Outermost Layer (Aluminium)
c)	Beneath Outermost Layer (Aluminum)
vii)	Stress Strain Test
a)	On Composite Conductor
b)	On Steel Core
viii)	Surface Condition Test
ix)	Ultimate Breaking Load of Stranded Conductor
x)	Galvanizing Test of Steel Wire
a)	Weight of Zinc Coating
b)	Uniformity of Zinc Coating

ii) Acceptance Test:-

- i) Measurement of Diameter of individual Aluminium and Steel Wires
- ii) Measurement Lay Ratio
- iii) Breaking Load of individual wires
- iv) Ductility Test
- v) Wrapping Test
- vi) Resistance Test
- vii) Galvanizing Test

iii) Routine Test:- The routine test shall be done same as acceptance tests and shall be carried out before and after stranding.

12.1. Individual wire and finished steel cored Aluminium conductor shall be subjected before dispatch from the works to the tests as specified in the Indian Standard Specification 398-1996 and its amendments or any other authoritative standard.



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- 12.2. Samples of individual wires for test shall be taken before stranding from not less than 10% of the spools in the case of Aluminium wire and ten percent of the wire coils in the case of steel wires. If samples are taken after stranding they shall be obtained by cutting 1.2 metres from the outer end of the finish conductor, from not more than 10% of the finished reels.
- 12.3. The mechanical tests shall be carried out on single wire only.
- 12.4. The tensile test shall apply to wires of all diameters forming part of steel cored Aluminium conductors. If it is not possible to test the component wires before stranding, the test may be made on wires taken from stranded conductors. In such cases the tensile strength of any of the wires shall not be less than 95 percent of the minimum values given in technical specifications attached.
- 12.5. Tensile testing machine shall be used, the accuracy of which can easily be checked and the machine adjusted if necessary. The test samples, before being placed in the machine, shall be straightened, if necessary, in such a way as to cause the minimum alteration in its physical properties. When an automatic tensile testing machine is issued the load shall be applied gradually and rate of separation of the jaws of the testing machine shall not be greater than 10cm/min. When a hand operated lever testing machine is used, 90 percent of the breaking load shall be applied quickly and the load shall then be increased steadily until the specimen breaks. The time taken to apply the last ten percent of the load shall be approximately 15 seconds and the total time from the application of the load to the break shall be approximately 20 seconds.
- 12.6. The strength of steel cored Aluminium conductor in terms of the sum of the strength of the individual components wires may be taken to be as follows.
- 98 percent of the sum of the strength of the Aluminium wires plus 89 percent of the sum of the strengths of the steel wires when taken from the stranded conductor and tested or
 - 98 percent of the sum of the strength of the Aluminium wires plus 85 percent of the sum of the strengths of the steel wires, based on the strengths of the component wires before stranding, that is, in the coil

The value of approximate ultimate strength of conductor shall be as per IS:398 Part-2/1996.



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13) Wrapping Test:-

- 13.1. Samples of Aluminium wires shall be wrapped round a wire of its own diameter to form a close helix of eight turns. Six turns shall then be unwrapped and again closely wrapped in the same directions as before. The wire shall not break.
- 13.2. Samples of steel wires shall withstand being closely wrapped six times round a mandrel of diameter equal to four times the wire diameter, to form a close helix of eight turns. Six turns shall then be unwrapped and again closely wrapped in the same directions as before. The wire shall not break.
- 13.3. unwrapped and again closely wrapped six times round the mandrel in the same direction as the first wrapping without showing signs of fracture of the steel.

14) Galvanizing Test:-

- 14.1. The uniformity of zinc coating and the weight of coating shall be in accordance with IS:4826/1979 and shall be determined according to Indian Standard Specification 2633-1072 and 6745-1972 respectively/ BS.443 or any other authoritative standard.
- 14.2. This test shall be made whenever practicable on wires before stranding and before the specimen has been bent, straightened or tested in any other way.

15) Torsion Test:-

The sample of steel wire shall be gripped in two vices exactly 15cm apart. One of the vices shall be made to revolve at a speed not exceeding one revolution per second and the other shall be capable of moving longitudinally to allow for contraction or expansion during testing. The test shall be continued until fracture occurs and the fracture shall show a smooth surface at right angles to the axis of the wire. After fracture, the specimen shall be free from helical splits. The samples shall withstand a number of twists equivalent not less than 20 on a length equal to 100 diameters.

16) Resistance Test:-

The measurement of resistance shall be made on solid Aluminium conductors, and shall be carried out to an accuracy of at least one part in a thousand. The length of the sample wire selected for this test shall be sufficient to give the accuracy required and shall be suitable for the method of testing, employed. Certificates as to the accuracy of the apparatus shall be provided and either party shall have the right to satisfy himself that the apparatus and methods of testing are correct.



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17) **Retest and Rejection:-**

Each coil or spool selected for testing shall be tested for compliance with the requirements of Indian Standard Specification 398/1976 and its amendments or any other equipments of Indian Standard Specification 398/1976 and its amendments or any equivalent authoritative standard should any selected coil or spool not fulfill any of the test requirements, that particular coil or spool shall be withdrawn. In respect of each failure two test pieces shall be selected from different coils in the lot and subjected to the test under which the failure occurred. If either of the two retest pieces fails to pass that test the lot concerned shall be rejected. If samples are taken for test after stranding and if any selected reel fails in the reset the manufacturer may test each and every reel and submit them for further inspection. All rejected materials shall be suitably marked segregated.

18) **Guaranteed Technical Particulars:-**

The bidder shall fill in the guaranteed technical particulars in the proforma in Annexure IV and submit the same with his bid. The bid submitting without GTP will be rejected without intimation to the supplier.

Sd/-

Chief Engineer (SCM)

Technical Specification for ACSR Wolf, Moose & Dog Conductors

IS:398 (Part-II)

		WOLF	MOOSE	DOG
1)	Description	95mm ² Copper equivalent steel cored aluminium conductor	250mm ² Copper equivalent steel cored aluminium conductor	65mm ² Copper equivalent steel cored aluminium conductor
2)	Stranding and wire diameter			
	a) Aluminium	30/2.59 mm	54/4.13 mm	6/4.72 mm
	b) Steel	7/2.59 mm	7/3.53 mm	7/1.57 mm
	Sectional area of Aluminium	158.10 mm ²	528.5 mm ²	105.0 mm ²
3)	Total Sectional area of the Conductor	194.9 mm ²	597 mm ²	118.5
4)	Approximate Mass	726 kg/km	1998 kg/ km	394 kg/km
5)	Approximate overall diameter	18.13 mm	31.77mm	14.15 mm
6)	Calculated resistance at 20 ^o C	0.187 ohm/km	0.05552 ohm/ km	0.2792 ohm/km
7)	Approximate calculated Breaking Load	67.34 KN	159.6 kN	32.41 kN

Sd/-

Chief Engineer (SCM)



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GUARANTEED TECHNICAL PARTICULARS OF ACSR WOLF CONDUCTORS

Sl.No.	Description	KSEBL's Requirement	Offer by supplier
1)	Code word	Wolf	
2)	Makers name & address		
	a) Aluminium rods.	From reputed firms satisfying relevant BIS Specification. Specify the name of the manufacture	
	b) Steel wire rods	From reputed firms satisfying relevant BIS Specification. Specify the name of the manufacture	
	c) Complete conductor		
3)	Stranding and wire diameter		
	a) Aluminium.	30/2.59mm	
	b) Steel.	7/2.59 mm	
4)	Standard nominal copper area in sq. mm	95	
5)	Calculated equivalent aluminum area in sq.mm	154.3	
6)	Actual aluminum area in sq.mm	158.1	
7)	Standard area of cross section in sq. mm		
	a) Aluminium strand	5.269	
	b) Steel strand	5.269	

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	c) Conductor	194.9	
8)	Diameter of complete conductor in mm	18.13	
9)	Minimum Ultimate tensile stress of strand in Kg/sq.mm		
	a) Aluminum strand	17.3/ 16.45	
	b) Steel strand.	134/ 127.2	
10)	Guaranteed ultimate tensile strength of conductor in kg.	6864	
11)	Minimum breaking load in KN for		
	a) Aluminum strand		
	Before stranding	0.89	
	After stranding	0.85	
	b) Steel strand		
	Before stranding	6.92	
	After stranding	6.57	
12)	Purity of aluminum rods	99.60%	
13)	Zinc coating of steel strand		
	a) Uniformity of coating and duration of dips No.1 Min.x No	One minute -2 dips, ½ minutes – 1 dip	
	b) (Preece test) with strand No.2 Min. x ... No	One minute -2 dips, ½ minutes – 1 dip	

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	c) Minimum weight of coating (gm / sq.mm)	230	
14)	Maximum working tension	50% of Ultimate Tensile Strength (3432 kgs)	
15)	Weight in Kg. per Km		
	a) Aluminium	436	
	b) Steel	289	
	c) Conductor	726	
16)	Resistance in ohms per Km at 20°C	0.1871	
17)	a) Continuous maximum current rating of conductor in still air at 32 degree C ambient temperature (Amps.)	As per IS	
	b) Temperature rise for the above current °C	As per IS	
18)	Modulus of elasticity of conductor.	80 GN/Sq.m	
19)	Co. efficient linear expansion per degree centigrade of		
	a) Aluminium strand	23×10^{-6} / degree C	
	b) Steel strand	11.5×10^{-6} / degree C	



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	c) Conductor.	17.8x10 ⁻⁶ / degree C	
20)	Percentage of carbon in steel wire rods.	0.50 to 0.85	
21)	Standard length of each piece in Km.	2	
22)	Initial and final sags & tensions and stringing charts whether furnished		
23)	Tolerance, if any, on standard length.	+/-100 mtr	
24)	No. of standard lengths in one reel.	One	
25)	Dimension of reel in cms	1475	
26)	Weight of conductor in one reel	1500kg approx.	
27)	Weight of reel in Kg.	250kg approx.	
28)	Gross Weight of reel including the weight of the conductor	1750kg approx.	
29)	Standard according to which the conductor will be manufactured and tested.	IS:398 (Part-2):1996	
30)	Number of strands in each layer.		
	a) Aluminium	Outermost – 18 strands Middle – 12 strands	
	b) Steel	Innermost – 6 strands Center– 1 strands	
31)	Lay ratio for each layer.		
	a) Aluminium (Min. Max)	Outermost – Min.-10, Max.-14 Middle – Min.-10, Max. -16	
	b) Steel (Min. Max)	Min. -13, Max. - 28	
32)	Diameter of strands in mm		



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	Aluminium		
	a) Nominal	2.59	
	b) Maximum	2.62	
	c) Minimum	2.56	
	Steel		
	a) Nominal	2.59	
	b) Maximum	2.64	
	c) Minimum	2.54	
33)	Calculated maximum D.C resistance at 20°C for Aluminium wires.	5.490 ohm/ km approx.	
34)	Approximate calculated breaking load of Conductor KN.	67.34	
35)	Number of twists which the steel wire can withstand in the torsion test.	Before stranding – 16 After stranding - 18	
36)	Minimum stress in the steel wire corresponding to 10% elongation in Kg/Sq.mm.		
37)	Drum.		
	Constructional details:		
a)	Type of wood used.	Seasoned Soft wood	
b)	Number and thickness of piles forming the flange	2 plies, 33mm	
c)	No. and diameter of barrel bolts.	6 Nos., 19mm	
d)	Thickness of barrel battens in mm	50 mm	
e)	Thickness of external logging in mm.	50 mm	



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f)	Spindle hole diameter in mm.	90 mm	
g)	Details of protective wrapping.	Barrel surface and inner surfaces of the flanges of the drums will be painted with bitumen based paint. A layer of water proof paper (bituminized paper) will be provided over the barrel and inner surfaces of the flanges. Another layer of waterproof material will be provided over the last layer of the conductor and under the laggings.	
h)	Weight of the empty drum with protective wrapping and external laggings.	Min. 400kg	
i)	Standard to which the conductor drums conforms.	Conforming to IS:398 (Part-2)	
j)	Licence No. and date for using ISI Certification (or mark if any).		
38)	Other Particulars, if any.		



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Sl.No.	Description	KSEBL's Requirement	Offer by supplier
1)	Code word	ACSR Moose	
2)	Makers name & address		
	a) Aluminium rods.	From reputed firms satisfying relevant BIS Specification. Specify the name of the manufacture	
	b) Steel wire rods	From reputed firms satisfying relevant BIS Specification. Specify the name of the manufacture	
	c) Complete conductor		
3)	Stranding and wire diameter		
	a) Aluminium.	54/3.53mm	
	b) Steel.	7/3.53 mm	
4)	Standard nominal copper area in sq. mm	325	
5)	Calculated equivalent aluminum area in sq.mm	515.7	
6)	Actual aluminum area in sq.mm	528.5	
7)	Standard area of cross section in sq. mm		
	a) Aluminium strand	9.787	
	b) Steel strand	9.787	
	c) Conductor	597	

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8)	Diameter of complete conductor in mm	31.77	
9)	Minimum Ultimate tensile stress of strand in Kg/sq.mm		
	a) Aluminum strand	16.36	
	b) Steel strand.	134.03	
10)	Guaranteed ultimate tensile strength of conductor in kg.	16285.71	
11)	Minimum breaking load in KN for		
	a) Aluminum strand		
	Before stranding	1.57	
	After stranding	1.49	
	b) Steel strand		
	Before stranding	12.86	
	After stranding	12.22	
12)	Purity of aluminum rods	99.60%	
13)	Zinc coating of steel strand		
	a) Uniformity of coating and duration of dips No.1 Min.x No	One minute - 3 dips,	
	b) Minimum weight of coating (gm / sq.mm)	260	
14)	Maximum working tension	50% of Ultimate Tensile Strength (8143 kgs)	
15)	Weight in Kg. per Km		
	a) Aluminium	26.45	

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	b) Steel	76.34	
	ci) Conductor	1998	
16)	Resistance in ohms per Km at 20°C	0.0560	
17)	a) Continuous maximum current rating of conductor in still air at 32 degree C ambient temperature (Amps.)	As per IS	
	b) Temperature rise for the above current °C	As per IS	
18)	Modulus of elasticity of conductor.	69 GN/Sq.m	
19)	Co. efficient linear expansion per degree centigrade of		
	a) Aluminium strand	23×10^{-6} / degree C	
	b) Steel strand	11.5×10^{-6} / degree C	
	c) Conductor.	19.3×10^{-6} / degree C	
20)	Percentage of carbon in steel wire rods.	0.50 to 0.85	
21)	Standard length of each piece in Km.	1	



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22)	Initial and final sags & tensions and stringing charts whether furnished		
23)	Tolerance, if any, on standard length.	+/-100 mtr	
24)	No. of standard lengths in one reel.	One	
25)	Dimension of reel in cms	1725	
26)	Weight of conductor in one reel	2100kg approx.	
27)	Weight of reel in Kg.	550kg approx.	
28)	Gross Weight of reel including the weight of the conductor	2800kg approx.	
29)	Standard according to which the conductor will be manufactured and tested.	IS:398 (Part-2):1996	
30)	Number of strands in each layer.		
	a) Aluminium	Outermost – 24 strands Middle – 18 strands Innermost – 12 strand	
	b) Steel	Steel– 7 strands	
31)	Lay ratio for each layer.		
	a) Aluminium (Min. Max)	Outermost – Min.-10, Max.-14 Middle – Min.-10, Max. - 16 Innermost – Min.-10, Max. -17	
	b) Steel (Min. Max)	Steel - Min. -13, Max. - 28	

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32)	Diameter of strands in mm		
	Aluminium		
	a) Nominal	3.53	
	b) Maximum	3.57	
	Steel		
	a) Nominal	3.53	
	b) Maximum	3.6	
33)	Calculated maximum D.C resistance at 20°C for Aluminium wires.	2.954 ohm/ km	
34)	Approximate calculated breaking load of Conductor KN.	159.6	
35)	Number of twists which the steel wire can withstand in the torsion test.	Before stranding – 16 After stranding - 18	
36)	Minimum stress in the steel wire corresponding to 10% elongation in Kg/Sq.mm.	As per IS	
37)	Drum.	As per IS:1778/1980	
	Constructional details:		
a)	Type of wood used.	Seasoned Soft wood	
b)	Number and thickness of piles forming the flange	2 plies, 33mm	
c)	No. and diameter of barrel bolts.	6 Nos., 19mm	
d)	Thickness of barrel battens in mm	50 mm	
e)	Thickness of external logging in mm.	50 mm	
f)	Spindle hole diameter in mm.	90 mm	



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g)	Details of protective wrapping.	<p>Barrel surface and inner surfaces of the flanges of the drums will be painted with bitumen based paint.</p> <p>A layer of water proof paper (bituminized paper) will be provided over the barrel and inner surfaces of the flanges. Another layer of waterproof material will be provided over the last layer of the conductor and under the laggings.</p>	
h)	Weight of the empty drum with protective wrapping and external laggings.	680 kgs	
i)	Standard to which the conductor drums conforms.	Conforming to IS:398 (Part-2)	
j)	Licence No. and date for using ISI Certification (or mark if any).		
38)	Other Particulars, if any.		



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GUARANTEED TECHNICAL PARTICULARS OF ACSR DOG CONDUCTORS

Sl.No.	Description	KSEBL's Requirement	Offer by supplier
1)	Code word	ACSR Dog	
2)	Makers name & address		
	a) Aluminium rods.	From reputed firms satisfying relevant BIS Specification. Specify the name of the manufacture	
	b) Steel wire rods	From reputed firms satisfying relevant BIS Specification. Specify the name of the manufacture	
	c) Complete conducto		
3)	Stranding and wire diameter		
	a) Aluminium.	6/4.72 mm	
	b) Steel.	7/1.57 mm	
4)	Standard nominal copper area in sq. mm	65	
5)	Calculated equivalent aluminum area in sq.mm	103.6 Sq.mm	
6)	Actual aluminum area in sq.mm	105 sq.mm	
7)	Standard area of cross section in sq. mm		
	a) Aluminium strand	17.50	
	b) Steel strand	1.936	



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	c) Conductor	118.5	
8)	Diameter of complete conductor in mm	14.15	
9)	Minimum Ultimate tensile stress of strand in Kg/sq.mm		
	a) Aluminum strand	16.17 kg/ sq.mm (Before Stranding)	
	b) Steel strand.	142.17 kg/ sq.mm (Before Stranding)	
10)	Guaranteed ultimate tensile strength of conductor in kg.	3299	
11)	Minimum breaking load in KN for		
	a) Aluminum strand		
	Before stranding	2.78	
	After stranding	2.64	
	b) Steel strand		
	Before stranding	2.70	
	After stranding	2.57	
12)	Purity of aluminum rods	99.60%	
13)	Zinc coating of steel strand		
	a) Uniformity of coating and duration of dips No.1 Min.x No	1 minute - 2 dips (Before stranding)	
	b) Minimum weight of coating (gm / sq.mm)	1 dip of 30 second (After Stranding)	
	c) Minimum weight of coating (gm / sq.mm)	190	



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14)	Maximum working tension	50% of Ultimate Tensile Strength	
15)	Weight in Kg. per Km		
	a) Aluminium	288 kg/km	
	b) Steel	106 kg/km	
	c) Conductor	394 kg/km	
16)	Resistance in ohms per Km at 20°C	0.2792	
17)	a) Continuous maximum current rating of conductor in still air at 32 degree C ambient temperature (Amps.)	239	
	b) Temperature rise for the above current °C	65	
18)	Modulus of elasticity of conductor.	75 GN/sq.m	
19)	Co. efficient linear expansion per degree centigrade of		
	a) Aluminium strand	23×10^{-6}	
	b) Steel strand	11.5×10^{-6}	
	c) Conductor.	19.8×10^{-6}	
20)	Percentage of carbon in steel wire rods.	0.50 to 0.85%	
21)	Standard length of each piece in Km.	2	
22)	Initial and final sags & tensions and stringing charts whether furnished		
23)	Tolerance, if any, on standard length.	+/-100m	



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24)	No. of standard lengths in one reel.	1	
25)	Dimension of reel in cms		
26)	Weight of conductor in one reel	850 kg approx.	
27)	Weight of reel in Kg.	200 kg approx.	
28)	Gross Weight of reel including the weight of the conductor	1200kg approx.	
29)	Standard according to which the conductor will be manufactured and tested.	IS:398 (Part-2):1996 with latest amendments	
30)	Number of strands in each layer.		
	a) Aluminium	6 Strands	
	b) Steel	7 Strands	
31)	Lay ratio for each layer.		
	a) Aluminium (Min. Max)	Min.-10, Max.-14	
	b) Steel (Min. Max)	Min. -13, Max. - 28	
32)	Diameter of strands in mm		
	Aluminium		
	a) Nominal	4.72	
	b) Maximum	4.77	
	Steel		
	a) Nominal	1.57	
	b) Maximum	1.60	



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	c) Maximum	1.54	
33)	Calculated maximum D.C resistance at 20°C for Aluminium wires.	1.650 ohms/km	
34)	Approximate calculated breaking load of Conductor KN.	32.41	
35)	Number of twists which the steel wire can withstand in the torsion test.	Before Stranding -16 After stranding - 18	
36)	Minimum stress in the steel wire corresponding to 10% elongation in Kg/Sq.mm.		
37)	Drum.		
	Constructional details:		
a)	Type of wood used.	Seasoned Soft wood	
b)	Number and thickness of piles forming the flange	2 plies of 33mm each	
c)	No. and diameter of barrel bolts.	4 Nos. of 12mm each	
d)	Thickness of barrel battens in mm	38 mm	
e)	Thickness of external logging in mm.	38 mm	
f)	Spindle hole diameter in mm.	90 mm	
g)	Details of protective wrapping.	IS:1778-1989	
h)	Weight of the empty drum with protective wrapping and external loggings.	250 kgs (approx.)	
i)	Standard to which the conductor drums conforms.	IS:1778-1989	



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j)	Licence No. and date for using ISI Certification (or mark if any)	As per IS	
38)	Other Particulars, if any.		