



SUPPLY CHAIN MANAGEMENT THIRUVANANTHAPURAM

SPECIFICATION

7/3.15MM DIA. G.I.EARTHWIRE

APPLICABLE TO KSEBL	Rev#0	DOC. NO.: SCM-SPEC/XT/7/3.15mm Earthwire
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Technical Specification and Evaluation Committee for Transmission Material



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(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	09/04/2021	23/04/2021	03/05/2021
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 **7/3.15mm dia G.I.Earthwire** 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 **7/3.15mm dia G.I.Earthwire** 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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ANNEXURE I - TECHNICAL SPECIFICATION OF GROUND WIRE

1) Scope:-

- 1.1. This specification provides for the manufacture, testing before despatch, supply and delivery of ground wire of different type for the purpose of earthing and protection of power transmission lines, as per the particulars attached. The ground wire shall consist of stranded galvanised steel wires.

2) Standards:-

- 2.1. The ground wire shall comply in all respects with the Indian Standard 2141/1968 & IS:2141/1979, British standard (BS):183/1983, IS:12776:2002 and its latest amendments or any other authoritative standard.

3) Materials:-

- 3.1. The materials offered shall be of best quality and workmanship as per relevant standards. The steel wires (strands) shall be manufactured from steel produced by any suitable process. The wires shall be cold drawn from steel made by open hearth basic oxygen or electric furnace process and of such quality that when drawn to the size of wire specified and coated with zinc. The steel wire shall not contain sulphur and phosphorus exceeding 0.050% each.
- 3.2. The steel wires shall be evenly and uniformly coated with zinc of grade zn 98 of IS 209-1966 (specification for Zinc (Revised) or any other authoritative standard. The finished strand and the individual wire shall be of uniform quality and have the properties and the characteristics as per IS.

- 4) Size and construction:-** Size and physical properties of the Ground wire shall be as per Annexure-1A attached. The wires shall be so stranded together that when an evenly distributed pull is applied at the end of the completed strand, each wire will take an equal share of the pull. The outer wire of strand shall have a right hand lay. Length of lay of wire strands shall be 12 to 18 times the strand diameter.

5) Length and jointing:-

- 5.1. The length of strand which shall be supplied without joints in the individual wires comprising it, depends on the length of the wire which shall be carried by the bobbin in a normal stranding machine. The normal lengths of strand shall be supplied without joints in the individual wires, excluding welds made in the rod before drawing shall be 1500m.
- 5.2. In cases where joints are permitted, they shall be made by welding or brazing. Joints in the same wire shall be separated by a length not less than 1500m. Joints in different wires in a strand shall not be less than 20m apart.

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5.3. Each coil shall be warranted to contain no weld joint or splice other than in the rod before it is drawn and those permitted in clauses given above. The wire shall be circular and shall be free from scale, irregularities, imperfections, flaws, splits and other defects. The zinc coating shall conform to IS: 4826-1979.

5.4. Ground wire shall be subjected before despatch, from the works to the tests as specified in the IS 2141-1968 and 1979 IS. 183-1938, IS:12776:2002 or any other authoritative standard and its latest revisions.

All the coils of the galvanized strand of the same grade, diameter and construction, manufactured under similar conditions shall be grouped to constitute one lot.

5.5. Samples from each lot shall be tested for ascertaining the conformity to the requirements of these specifications. The coils selected shall be tested for length of the lay and joints. The lot shall be declared conforming to the requirements of these characteristics if all the coils are found satisfactory. If the lot is found satisfactory, one test specimen from each wire of the strand shall be drawn from every selected coil and subjected to tensile tests, ductility test and coating test.

5.6. Freedom from Defects:- The wire shall be circular and free from scale, irregularities imperfections flaws, splits and other defects which may affect the quality of wire.

6) **Chemical Analysis:-** One sample shall be drawn from the lot for chemical analysis.

7) **Test on Wires before Manufacture:-**

7.1) **Ductility test:-** The wire shall be subjected to wrapping test in accordance with IS:1755/1961 with latest amendments or any other authoritative standard. When wrapped 8 close turns round its own diameter and on being subsequently unwrapped for seven turns the wire shall not break or split.

7.2) **Tolerance on Wire Diameter:-** The diameter of the test piece shall be determined with suitable micrometer by taking two measurements at dia. metrically opposite points three places along a length of not less than 250mm. and the average of these six measurements shall be taken as the diameter of the galvanized wire. Tolerance shall +0.06 mm and -0.03mm.

8) **Test on Completed Strand:-**

8.1) **Tensile and Elongation test:-** Then wire when tested in accordance with IS: 1521 of 1960 or any other authoritative standard shall have the minimum tensile strength specified in Annexure IV. The tensile strength of the finished strand shall not be less than 95% of the aggregate of the single wire. Elongation shall be as per IS:12776:2002.



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The end of the strand shall be suitably prepared by either filling in the interstices with five wires or other suitable means, to minimize failure at the testing machine grips. The force shall be applied at a steady rate not exceeding 100N/mm² per second.

9) **Coating Tests:-** The uniformity of zinc coating shall be tested as per IS.2633 of 1964 or any other authoritative standard. The wire shall conform to Heavy Coating as laid down in IS.4826-1979 and its latest amendments.

9.1. Three copies of manufacturer's test certificates shall be submitted by the contractor to the purchaser for approval immediately after such tests have been conducted on G.S strands and the wire. The purchaser reserves the right to inspect the material at manufacturer's works before despatch or during manufacture.

10) **BIS Certification Mark shall be as per IS:2141/2000.**

11) **Packing and Marking:-**

11.1. The ground wire shall be supplied in non-returnable reels or drums of non-perishable or treated wood conforming to IS.1778-1961 (specification for reels and drums for Barewire), BS. 1559 or any other authoritative standard. **The item shall be suitably protected to avoid damage in transit and corrosion.** Each reel shall be provided with a label fixed firmly bearing the following information.

- a) Manufacturer's Name or Trade Mark.
- b) Drum No.
- c) Size of Galvanized Steel Earth Strand
- d) Gross Weight of drum with galvanized steel earth strand.
- e) Arrow mark for unwinding.
- f) Length of Wire.
- g) Mass.

Lot No. along with order no. of purchaser. The stranded wire shall be supplied in coils of 1500m length or multiples.



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Technical particulars of Ground wire

1)	Voltage Level	220 kV, 110 kV & 66 kV
2)	Material	Galvanized Steel
3)	Stranding/ Wire dia meter	7/3.15 mm
4)	Total Sectional area	54.55 sq.mm
5)	Overall diameter	9.45 mm
6)	Approximately weight	428 kg/km
7)	Calculated DC resistance at 20oC	3.375 Ohm/km
8)	Minimum UTS	56.02 KN
9)	Modulus of elasticity (Kg/mm ²)	19361
10)	Coefficient of linear expansion	11.5 x10 ⁻⁶ /deg C
11)	Maximum allowable Temperature	53°C



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GUARANTEED TECHNICAL PARTICULARS OF THE GROUND WIRE

Sl.No.		7/3.15mm (dia.)
1.	Makers name, address and country	
2.	Percentage of carbon content of the steel wire	
3.	Particulars of steel strand	
	a) Number of strands	
	b) Diameter	
	c) Standard sectional area/ strand	
	d) Minimum ultimate tensile strength	
	e) Minimum breaking load	
4.	a) Uniformity of coating number and duration of dips	
	b) Minimum weight of coating (As per IS:12776:2002)	
5.	Standard overall diameter of ground wire	
6.	Area of cross section of ground wire	
7.	Resistance in chms. Per km at 200 C	



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	(Max.)	
8.	Standard length of ground wire	
9.	Tolerance, if any, on standard length	
10.	Modulus of elasticity of ground wire	
11.	Weight of ground wire/km	
12.	Standard length of ground wire in the each drum	
13.	Standard weight of ground wire in the drum	
14.	Weight of drum	
15.	Gross weight of the drum	
16.	Dimension of the drum in cms.	
17.	Standard according to which the ground wire will be manufactured	