

SPECIFICATION No ETI/OHE/36 (Rev.1))

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

SPECIFICATION FOR GALVANISED STEEL WIRE FOR 25 KV TRACTION OVERHEAD EQUIPMENT

Issued by

**Research Designs & Standards Organisation
Manak Nagar, Lucknow-226011**

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Signature			
Designation	JE/TI (OHE)	DTI-2	EDTI

131418/2020/O/o PED/TI/RDSO

- 1.0 Scope:
This specification covers stranded galvanised steel wire of concentric lay construction for use of 25 V ac traction overhead equipment.
- 2.0 Service Conditions:
- 2.1 The galvanised steel wire is intended for use in normally polluted, moist tropical climate in India, where the maximum ambient temperature may reach 45⁰ C in shade & 65⁰ C in Sun, the daily average maximum ambient reaching 35⁰C with a relative humidity reaching up to 100%.
- 2.2 The galvanised steel wire is required to be used as an anti-creep wire, in particular, on 25 kV ac electric traction overhead equipment and for stay and earthing purpose, in general, for power supply installations.
- 3.0 Governing Specification:
- 3.1 The galvanised steel wire shall generally conform to the provisions of IS: 2141-2000(R-2010) here in after altered, amended or supplemented in the subsequent paras of this specification.
- 3.2 All the specified tests shall be conducted in the manner indicated in the above governing specification (IS: 2141-2000(R 2010)) unless otherwise stated.
- 3.3 **References:**
- IS: 2141-2000(R 2010) Specification for "Hot dip galvanized stay strand".
IS: 209-1992(R 2003) Specification for "Zinc ingot".
- ~~IS: 1521-1972 Method for tensile testing of steel wire Indian Standards Institution.~~
- IS: 1755-1983 (R 2006): Method for wrapping test for metallic wire.
IS: 2633-1986 (R 2016): methods for testing uniformity of coating of zinc coated articles.
- IS: 1778-1980 (2004) Reels and drums for bare conductors.
IS 4826: 1979(R2016): Specification for hot-dipped galvanized coatings on round steel wires.
- 4.0 Technical Particulars:
- 4.1 Materials:
- (i) "The wire **should be cold drawn** from steel made by open hearth basis oxygen or electric furnace process and of such quality that when drawn to the size of wire specified and coated with zinc, the finished strand and the individual wires shall be of uniform quality and have the properties and characteristics as specified in this specification. The wire shall not contain sulphur and phosphorus exceeding 0.060 percent each."
- (ii) The wire shall be coated with zinc of Grade Zn 98 of IS: 209-1992(R 2003)
- 4.2 Construction:
- (i) "The wire shall have a minimum tensile strength of 700 N/mm² corresponding to Grade 4 of IS: 2141-2000 (R-2010).
(ii) The wire shall be of 19 wire construction.
(iii) Dia. Of single wire – 2.50mm
(iv) "The tolerance on the galvanised wire diameter shall be + 0.060/-0.030 mm
(v) "The lay length of wire strand shall be 12 to 18 times the strand diameter.

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- (vi) The successive layers shall have opposite direction of lay, the outer layer being right handed.
- (vii) The wire shall be so stranded that when an evenly distributed pull is applied at the ends of the completed strand, each wire will take an equal share of the pull.

4.3 Strength:

- (i) Elongation of completed strand on measured gauge length of 600mm shall be **6 % min.**
- (ii) Substitute the existing contents with the following minimum breaking load.
- (a) Single wire before stranding :3.44 kN
- (b) Stranded wire :57.5 kN

5.0 Test Samples:

Unless otherwise agreed between the purchaser and the **supplier manufacturer**, the following procedure for selection of test samples shall be followed:

5.1 Samples of individual wires for tests specified in para 6.0 shall normally be taken by the manufacturer before stranding from the outer ends of not less than 10% of the wire drums **Or min one wire drum.**

5.2 Samples shall **also** be obtained by cutting 1.2 metres from the outer end of the finished conductor **from** not more than ten percent of the finished drums.

6.0 Tests:

6.1 The wire shall be inspected and tested at manufacturer works. The **supplier manufacturer** shall arrange without making claim of charge, all the necessary machinery, apparatus, conveyance, labour and assistance required to get the specified tests conducted in presence of the **purchaser's RDSO/CORE/Inspecting Authority.**

6.1.1 Visual examination:

The wire shall be visually examined. It shall be circular and free from scale, irregularities, imperfections, flaws, splits and other defects. The zinc coating shall be smooth, even and bright. The wire strand shall be examined for the direction of laying and uniformity of laying.

6.1.2 Measurement of Dimensions:

The diameter of wire shall be determined with a micrometer by taking two measurements at three places along **a length of not less than 250mm**, and the average of these six measurements shall be taken as being the diameter of the galvanised wire which shall be 2.5 mm + **0.060/-0.030 mm.**

6.1.3 Chemical Analysis:

This will be carried out to ascertain the percentage of sulphur contents in the steel used in the manufacture of wire. The method of analysis will be agreed to between the purchaser and the **supplier manufacturer.**

6.1.4 Tensile and Elongation Test:

The wire when tested in accordance with IS:1608-**2005** shall have a minimum tensile strength of 700 N/mm² and a minimum breaking load of 3.44 kN before stranding. The completed strand when tested in accordance with clause **9.1** of IS: 2141-**2000 (R 2010)** shall have a minimum breaking load of 62.04 kN and elongation of **6 percent (min).**

6.1.5 Ductility Test:

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The wire shall be subjected to the wrapping test in accordance with IS: 1755-1983 (R-2006). When wrapped eight times round its own diameter and on being subsequently straightened the wire shall not break or split.

6.1.6 Coating Test:

"Galvanising test - The zinc coating shall conform to 'Heavy coating' as laid down in IS: 4826-1979 (R 2016) and shall conform to the requirements of clause 4 and 5 of IS: 4826-1979 (R 2016)".

7.0 Retests:

Should any one of the pieces first selected fail to pass any of the specified tests, two further test pieces shall be selected for testing in respect of failure. Should the test pieces from both these additional samples pass, the material represented by the test samples shall be deemed to comply with the requirements of that test. Should the test piece from either of these additional samples fails, the material represented by the test samples shall be rejected.

8.0 Normal Lengths, Packing, Labelling and Marking:

8.1 The conductor shall be delivered to the purchaser properly wound on wooden drums. Normally a drum shall carry only one continuous length of conductor, without joints, of about 1500 meters or as agreed to between the manufacturer and the purchaser.

The conductor must be carefully wound on drums, the turns being continuous and close without overriding except on the first and last turns of each layer.

8.2 The drums shall be of strong construction and shall generally conform to IS: 1778-1980 (2004). The flanges of the drum shall be large enough to prevent any possible contact between conductor and ground during handling or transport. No external or internal lagging is necessary but wooden battens shall be nailed to the flanges covering the whole length of the drum and the fill circumference of flanges.

8.3 The spindle plates of drums shall have a square hole 105mmx 105mm to permit the passage of a square axle of size 100mmx100mm.

8.4 The labelling of the drums shall include the following information:

- a. Size of the Conductor
- b. Length of the Conductor
- c. Weight of the Conductor
- d. Drum Number
- e. Manufacturer's brand or mark
- f. Trade name, if any
- g. Any other particulars specified by the purchaser

9.0 The "Make in India" policy-2017 of Government of India shall be applicable.

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