

Research Designs and Standards Organisation
(Traction Installation Directorate)

Reasoned document of RDSO's Specification No. TI/SPC/OHE/JMP/0941 for Annealed Stranded Copper Conductor for Jumper Wire for Electric Traction

1. RDSO's Specification No. TI/SPC/OHE/JMP/0941 for Annealed Stranded Copper Conductor for Jumper Wire was uploaded on RDSO website for one month dated 29.06.2020 for seeking comments,
2. Comments/Suggestion received from viewers are as below.

Clause No.	Particular	Comments Recieved	RDSO's Remark
1	<p>This specification covers the requirements and method of tests for bare stranded annealed copper conductors of concentric and/or rope lay (having concentric stranded members) for nominal system voltage of 25 kV ac at 50 Hz.</p> <p>The annealed copper conductor is used as jumper wires, not under tension to provide electric continuity and to carry current from one conductor to other or equipment of 25 kV AC OHE.</p> <p>This specification supersedes the earlier specification no. ETI/OHE/3(1/83). Specification no. ETI/OHE/3(2/94) of this specification is updated to TI/SPC/OHE/JMP/0941 in-line with TI document no. TI-WI-7.5.1-1 ver 1.0.</p>	----	In compliance of Spl DG letter no. SplDG(VD)/Misc dated 25.06.2020 regarding inclusion of Make in India clause added in the technical specification.
3(ix)	<p>Altitude: 1000 m above mean sea level.</p> <p>Altitude: 2000m in J& K area.</p>	-----	Altitude updated to 2500 m above mean sea level.
4.2	<p>Diameter :</p> <p>The diameter of wires as well as the conductor shall be measured at right angles at the same cross section at three places. The average diameter of the wire shall be within the limits prescribed in Clause 5.5 and the average diameter of the stranded conductor shall be not less than the appropriate overall diameters prescribed in Clause 6.1</p>	<p><u>M/s APAR Industries</u></p> <p>In clause 6.1 only nominal diameter of conductor is given and as per clause no. 4.2 it becomes minimum diameter.</p> <p>Tolerance on overall conductor diameter can be given as ± 1 percent.</p>	<p>May be accepted.</p> <p>Standard diameter is specified as minimum limit with which conductor shall comply. Upper limit of +1 % & -0% on nominal overall diameter is specified in clause 4.2</p>

128549/2020/O/o PED/TI/RDSO

5.1	The conductor shall consist of drawn and annealed round bare copper wire for electrical purpose. The wire shall be made out of Grade 'A' copper. Grade 'A' copper must conform to the chemical composition of Cu-Cath-1 of IS 191:2007 or latest.	<u>M/s Hindalco Industries Limited</u> Copper wires for Jumper Wire shall be drawn out of Continuous cast & Rolled Copper Rods (CCR) AND Copper used to make CCR should be Electrolytic grade Copper cathodes conforming to the requirement of LME Grade 'A' copper as listed in the London Metal Exchange.	May be accepted. However instead of continuous cast & rolled copper rods, continuous cast copper rods are mentioned in specification.
5.5 , 5.8, 6.1 ,6.5, 8.1.7.2, 8.2.2	----	----	Conductor 304 mm ² (61/7/0.95 mm) included in the specification.
6.1	The nominal area of cross section, numbers and diameters of wires, type of construction, overall diameter, weight of the conductors and resistance/km shall be as under.	<u>M/s Steller Cables</u> Pl mention tolerance on diameter and weight	May be accepted.
8.1.4(iv)	Measurement of weight of wires and conductors (Clause 9.4)	----	Measurement of weight of wires discarded, as weight of wires is not mentioned in specification.
8.2.1	All the test mentioned in clause 8.1.4 shall constitute the acceptance test.	<u>M/s Steller Cables</u> All the test mentioned in clause 8.1.4 shall constitute the acceptance test. Except chemical analysis. <u>Note :</u> If chemical analysis is included in Acceptance Test than it should be done by spectrometer to save testing time. Normally Jumper wires are supplied to private contractor for electrification in small quantities.	Not accepted as chemical analysis test is added in-line with specifications of other conductors. For relaxation, sampling reduced to 1 sample per 10 drum/coil.
8.2.2	<u>Selection of samples of conductors for acceptance tests :</u> Sample of wires and conductors for acceptance tests shall be cut from each drum. After visual examination, the diameter, lay length, weight and electrical resistance shall be measured first. Three wires from 50 mm ² (one from each layer and core) and nine wires (3 wires from each layer and 3 wires from core) for 105 mm ² ,160 mm ² and 253 mm ² jumpers shall be taken at random and	<u>M/s APAR Industries</u> Sampling for Chemical Analysis test can be reduced to 1 sample per 10 drum coil.	i. Comment of M/s APAR may be accepted ii. .Conductor 304 mm ² (61/7/0.95 mm) included in the specification. iii. Measurement of weight of wires discarded, as weight of wires is not mentioned in specification.

128549/2020/O/o PED/TI/RDSO

	subjected to the tests for visual examination, measurement of diameter, measurement of weight and elongation test. After these tests, one wire from each drum shall be subjected to chemical analysis test.		
9.2	<p><u>MEASUREMENT OF DIAMETER OF WIRES AND STRANDED CONDUCTOR</u></p> <p>The diameter shall be measured by means of a ratchet micrometer or a dial micrometer between two flat circular studs of minimum diameter of 5mm. The measurement shall be taken at 3 places of the sample. The average diameter of the wires and conductor shall be within the limits prescribed in Clause 5.5 and 6.1 respectively.</p>	<p><u>M/s APAR Industries</u></p> <p>For diameter measurement of the overall conductor, vernier calliper/Measuring Tape can be included</p>	May be accepted.
9.4	The weight of wires and stranded conductor per km shall be measured by weighing three samples each of 50 cm(approx) length by a balance having accuracy of ± 1 gm for conductor and ± 0.1 gm accuracy for wires.		Method for Measurement of weight of wires discarded, as weight of wires is not mentioned in specification.
9.7	<p>The trace elements shall be determined by Spectrometric method. The copper shall be determined in accordance with IS: 440-1964.</p> <p>The chemical composition shall conform to composition of Cu-Cath-1 of IS 191:2007</p>	---	Chemical composition Table mentioned in specification in-line with IS 12444.
---	---	<p><u>M/s Hindalco Industries Limited</u></p> <p>The clause on Proof of Purchase should be added as follows:</p> <p><input type="checkbox"/> Supplier shall be required to submit following documents at the time of Routine Inspection which shall be part of Inspection Certificate.</p> <p><input type="checkbox"/> Procurement of CCR (Continuous Cast Copper Rod) from indigenous manufacturer is preferable.</p> <p><input type="checkbox"/> Procurement of CCR rod from any distributor/trader/channel partner of manufacturer is not permitted to ensure quality of material.</p>	May be accepted

128549/2020/O/o PED/TI/RDSO

		Reason: The above clauses are not there in the draft as is in the case of other copper products like Contact wire etc. to ensure the quality of the material and to source indigenously preferably from the copper rod Manufacturers.	
--	--	---	--