**93533/2020/O/o PED/TI/RDSO**

Research Designs and Standards Organisation
(Traction Installation Directorate)

Reasoned document of RDSO's Specification No. TI/SPC/OHE/ CCFD /0160(02/2020) for Current Carrying Flexible Dropper ('A' Dropper) for 25kV AC Electric Traction.

1. RDSO's Specification No. TI/SPC/OHE/ CCFD /0160(02/2020) for Current Carrying Flexible Dropper ('A' Dropper) was uploaded on RDSO website for one month dated 01.06.2020 for seeking comments,
2. No Comments received so far from viewers/Vendors/Zonal Railways.
3. Suggestion received only from Southern Railway is as below.

| Clause No. | Particular | Southern Railway | RDSO's Remark |
|---|---|---|---|
| -- | -- | Fixing arrangements with fitting for these droppers may be included in the specification | May be accepted |

4. Following modification are incorporated in Final draft Specification No. TI/SPC/OHE/ CCFD /0160(02/2020)

| Clause No. | Particular in Draft Specification | Particular in Final Draft Specification | RDSO Remarks |
|---|---|---|---|
| 1 | In existing system of OHE, the dropper Wires of 5/7 mm diameter are used to hold the Contact Wire from Catenary Wire and are not the current carriers. During the passage of pantographs of 'High Speed' Trains, the dropper (either side of Bracket Assembly) gets compressed and quickly goes back to the original position, acting like whip.<br>For increasing the speed potential of existing OHE, Railway Board vide letter no. 2001/Elect(G)/170/1 dated 19.10.2016 has issued guideline that 'A' droppers shall be 'Current carrying Flexible Dropper'.<br>Keeping the requirement of stability of Contact Wire & carrying of current during passing of Pantographs of high speed Trains, this Specification has been prepared.<br>This Specification covers the requirement of Current Carrying Flexible Dropper("A" Dropper) for Overhead lines (OHE) of 25 kV AC Electric Traction System. Herein after, throughout the Specification, it will be referred as Flexible Dropper Wire. Nomenclature for 0.5 mm wire is "Wire", 7*0.5mm conductor is "Concentric Stranded Member" and 19*7*0.5 conductor is "Flexible Dropper Wire". Presently, in India, current carrying flexible dropper is being used in Metros and DFFCIL.<br>This Specification of Current Carrying Flexible Dropper | In existing system of OHE, the dropper Wires of 5/7 mm diameter are used to hold the Contact Wire from Catenary Wire and are not the current carriers. During the passage of pantographs of 'High Speed' Trains, the dropper (either side of Bracket Assembly) gets compressed and quickly goes back to the original position, acting like whip.<br>For increasing the speed potential of existing OHE, Railway Board vide letter no. 2001/Elect(G)/170/1 dated 19.10.2016 has issued guideline that 'A' droppers shall be 'Current carrying Flexible Dropper'.<br>Keeping the requirement of stability of Contact Wire & carrying of current during passing of Pantographs of high speed Trains, this Specification has been prepared.<br>This Specification covers the requirement of Current Carrying Flexible Dropper("A" Dropper) for Overhead lines (OHE) of 25 kV AC Electric Traction System. Herein after, throughout the Specification, it will be referred as Flexible Dropper Wire. Nomenclature for 0.5 mm wire is "Wire", 7*0.5mm conductor is "Concentric Stranded Member" and 19*7*0.5 conductor is "Flexible Dropper Wire". Presently, in India, current carrying flexible dropper is being used in Metros and DFFCIL.<br>This Specification of Current Carrying Flexible Dropper has been drafted for development purpose and keeping the requirement of Indian Railways in view. The properties have been taken from | In compliance of Spl DG letter no. SplDG(VD)/Misc dated 25.06.2020 regarding inclusion of Make in India clause in the technical specification |

| | | | |
|---|---|---|---|
| | has been drafted for development purpose and keeping the requirement of Indian Railways in view. The properties have been taken from the International & National Standards for development of it; final Specification shall be frozen on the basis of results of validation of prototype. | the International & National Standards for development of it; final Specification shall be frozen on the basis of results of validation of prototype.<br>The "Make in India" Policy of Government of India shall be applicable. | |
| 4.1 | Flexible Dropper wire having enhanced vibration property shall be made rope lay construction. The flexible dropper shall be made of bronze BzII (CuMg). The diameter of Flexible Dropper Wire shall be 7.5 mm. Copper used for fabrication of Bz II Flexible Dropper Wire should be Electrolytic grade Copper cathodes conforming to LME Grade `A' copper as listed in the London Metal Exchange The chemical composition of the Flexible Dropper wire shall be as given in table 2. | Flexible Dropper wire having enhanced vibration property shall be made rope lay construction. The flexible dropper shall be made of bronze BzII (CuMg). The diameter of Flexible Dropper Wire shall be 7.5 mm. Copper used for fabrication of Bz II Flexible Dropper Wire should be grade 'A' Copper cathodes conforming to chemical composition of Cu-Cath 1 of IS 191-2007 or latest. The chemical composition of the Flexible Dropper wire shall be as given in table 2. | ------ |
| 9.1 | Three wires before stranding and nine wires (3 wires from each layer and 3 from core) from flexible dropper wire shall be taken at random for each type test except Chemical composition test. Three wires before stranding and three wires from flexible dropper wire shall be taken for Chemical composition test | Three wires before stranding and nine wires (3 wires from each layer and 3 from core) from flexible dropper wire shall be taken at random for each type test except Chemical composition test. Three wires before stranding and three wires from flexible dropper wire shall be taken for Chemical composition test by Spectrometer. One sample of wire shall be subjected to Electrolysis Test (IS: 440-1964 or latest) for determination of copper content. | To reduce the number of samples subjected to Electrolysis Test as Electrolysis Test takes 16-18 hours per sample. |
| 9.2 | Same as Type Tests, in addition, weighment of 3 or $1/5^{th}$ of offered Flexible Dropper Wire coils for acceptance tests, whichever is higher, for gross weight. Samples of flexible dropper wire for acceptance tests shall be cut from each coil. The tests specified in Clause no. 9.1.2 shall be conducted on flexible dropper wire. Then nine wires(3 wire from each layer and 3 wires from core) from flexible dropper wires shall be taken at random and subjected to the test specified in Clause 9.1.1 except chemical composition test. One wire from each coil shall be taken for Chemical composition test The Inspector shall verify the results of manufacturer's tests. | Same as Type Tests, in addition, weighment of 3 or $1/5^{th}$ of offered Flexible Dropper Wire coils for acceptance tests, whichever is higher, for gross weight. Samples of flexible dropper wire for acceptance tests shall be cut from each coil. The tests specified in Clause no. 9.1.2 shall be conducted on flexible dropper wire. Then nine wires(3 wire from each layer and 3 wires from core) from flexible dropper wires shall be taken at random and subjected to the test specified in Clause 9.1.1 except chemical composition test. One wire from each coil shall be taken for Chemical composition test by Spectrometer. Chemical composition shall be as per Table 2. After chemical composition analysis by Spectrometer, one sample(one wire) per 10 coils, shall be subjected to Electrolysis Test (IS: 440-1964 or latest) for determination of copper content. The Inspector shall verify the results of manufacturer's tests. | To reduce the number of samples subjected to Electrolysis Test as Electrolysis Test takes 16-18 hours per sample. |
| 9.3 | MANUFACTURER TESTS<br>i) Visual Examination.<br>ii) Measurement of Dimensions.<br>iii) Measurement of Weight.<br>iv) Chemical Composition.<br>v) Tensile Strength.<br>vi) Elongation.<br>vii) Electrical Resistance. | MANUFACTURER TESTS<br>Sampling shall be as per Acceptance Test.<br>i) Visual Examination.<br>ii) Measurement of Dimensions.<br>iii) Measurement of Weight.<br>iv) Chemical Composition.<br>v) Tensile Strength.<br>vi) Elongation.<br>vii) Electrical Resistance. | To mention sampling criteria |