

Page 1 of 8	RDSO/M&C/RP-191/2020(Revision 2.0)	Effective from December 2020
-------------	------------------------------------	------------------------------

SPECIFICATION No .RDSO/M&C/RP-191/2020 (Revision 2.0)

Government of India
Ministry of Railways

Indian Railway Standard Specification for
Cable Cleats
(Revision 2.0)

M&C Directorate
Research Designs & Standards Organization
Lucknow - 226011

0. FOREWARD

- 0.1 This specification is issued under fixed Sl. No. RDSO/M&C/RP-191/2020 (Revision 2.0) the final number indicates the year of adoption as standard or in case of revision, the year of last revision.
- 0.2 This specification was first adopted in year 1993 and has been revised mainly for incorporating quality control practices. A code of practice for quality control and inspection of rubber and plastic components (Appendix 'A') is incorporated to ensure satisfactory process and quality control at the works of the manufacturers. The provision of this code shall be applicable for all the rubber & plastic components being used in the railways.
- 0.3 This specification is intended to cover the technical provisions relating to materials, constructions and tests, and does not include all the necessary provisions of the contracts.
- 0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with the IS:2: 1960 : (Reaffirmed 2016). The number of significant places retained in the rounded off value should that of the specified value in this standard.

1.0 SCOPE

- 1.1 This standard specifies requirements and methods of tests for cable cleats used for supporting cables in Diesel-Electric locomotives.
- 1.1 Cable cleats are designed to fix, retain and support cables. In addition, where short-circuit faults are anticipated, correct cleating will result in the containment of the cables during a fault and enable the circuit to be restored once the fault has been repaired. When adjacent cables carrying three phase current suffer a short circuit fault, the induced magnetic fields result in the cables experiencing significant opposing forces, a safe installation requires well designed and thoroughly tested cable cleats.

2. REQUIREMENTS

2.0 Material

2.1.1 The base polymer shall be acrylonitrile-butadiene copolymer suitable for electrical application.

2.2 Construction and finish

2.2.1 The cable cleat shall be manufactured as per the relevant drawings and shall be smooth, free from pin holes and other visual flaws.

2.3 Technical Requirements

2.3.1 Physical properties of rubber compounds

The rubber compound used shall conform to the following requirements:-

	Property	Value
a.	Hardness (Shore 'A')	70±5
b.	Tensile strength (N/m ²),min.	12
c.	Elongation at break (%), min.	300
d.	Compression set (%) at 100 ± 1° C for 24 + 0 hrs., max.	30
- 2		
e.	Swelling by volume (%), max in liquid 'B' at 27 ± 2° C for 24+0/-2 hrs., max.	35

2.3.2 Accelerated ageing test :

After ageing at $100 \pm 1^\circ\text{C}$ in an air oven for 72 ± 2 hrs., the hardness, tensile strength and elongation at break (%) shall not vary from the values obtained with the unaged specimens by more than the following:-

Property	Value
a. Hardness (Shore 'A')	+7/-0
b. Tensile Strength (%)	+10/-25
c. Elongation at break (%)	+10/-30

2.3.3 Electrical Strength:

- (i) Voltage Test – The test specimen shall withstand 12 KV for one minute when tested according to the method prescribed in IS: 2584: 1963 (Reaffirmed 2016). The test specimen shall not puncture, become appreciably warm at any spot or show any other weakness. The leakage current shall not exceed 160 mA/m^2 (calculated on the area of the smaller electrode) for any position of the electrodes.
- (ii) Break Down Strength – The test specimen shall not fail at less than 20 KV when tested in air between electrodes, the voltage being applied to failure at the rate specified and tested according to IS: 2584: 1963 (Reaffirmed 2016).

Surface resistivity ohms (min) at 27°C 1×10^9

Volume resistivity ohms (min) at 27°C 1×10^9

Note: Methods of tests shall be as per IS:3400 (the methods of test for vulcanized rubber). The tests shall be carried out on the finished product wherever practicable or from prepared test slabs of approximately same degree of vulcanization and using the same rubber compound.

For the purpose of confirming/co-relating the degree of curing/vulcanization and composition of the rubber test slabs with that of the finished product, inspecting/purchasing authorities may at their discretion shall perform the following tests both on the test slabs and the products, and shall comply with the requirements as given under: -

1. For comparing the degree of curing/vulcanization -

Hardness (Shore A) : The result shall be within ± 2 degrees

2. For comparing the composition :

(i) Identification of Polymer : Observations shall be identical

(ii) Specific Gravity : The result shall be within ± 0.02

(iii) Percent Ash Content : The result shall be within ± 1.0 for ash content up to 20% and ± 1.5 for ash content above 20%.

(iv) Swelling by volume % in Reference Fuel 'B' at $27 \pm 2^\circ\text{C}$ for 24 +0/-2 hrs : The results shall be within ± 5.0

3. SAMPLING AND CRITERIA FOR CONFORMITY

2.1.1 A minimum of six test samples or 1% of the lot offered for inspection whichever is more shall be drawn for the tests indicated in the specification. Should any of the test samples fail to meet the requirements an additional two sets of samples from the same lot shall be drawn for re-testing. Should any of the retest samples fail to meet the requirements, the entire lot shall be rejected.

2.1.2 In the event of the rejection of the entire lot, after the retest of samples, the entire lot offered for inspection shall be made unusable, in the presence of the Inspecting Officer/Purchaser.

4. MARKING

4.1 Each cable cleat shall be embossed in raised letters on a recess as follows:-

Drawing number
Manufacturer's name/initial/trade mark
Quarter/year of manufacture

5. PACKING

5.1 The cable cleat shall be dusted with French chalk to IS :380 :1978 (Reaffirmed 2020) and securely packed in wooden boxes to avoid any distortion and to prevent any damage during transit and storage. The boxes shall be suitably sealed by the Inspecting authority and shall carry markings similar to clause 4.

6. STORAGE

6.1 The cable cleat shall be stored in a cool dry place, in their original packing.

7. "Firm should comply Make in India policy and Public Procurement (Preference to Make in India) order -2017 under this specification" and subsequent amendment done time to time.

APPENDIX 'A'

CODE OF PRACTICE FOR QUALITY CONTROL AND INSPECTION OF RUBBER
AND PLASTIC COMPONENTS

A.1 THE SYSTEM

A.2 RECORDS, TESTS & SAMPLING:

A.2.1 The manufacturer shall furnish the Purchasing/Inspecting authorities the detail of tests and inspection records and other relevant records as required under the quality control systems in force. These records and reports shall be maintained by the Competent Technical Authority of the manufacturers and shall be open to examine by the Purchasing/Inspecting authorities at all reasonable time. The Purchasing/Inspecting authorities at their discretion may draw samples of materials used in manufacture and products at any stage of production for conforming tests either at the works of the manufacturers or in an approved laboratory. In case the samples do not conform to the requirements of the specification double the number of samples from the same lot/batch shall be drawn for re-tests. Should any one of the re-test a sample does not conform to the requirements, the entire lot/batch shall be rejected.

A.2.2 The manufacturer shall supply and submit all gauges for the approval of the Inspecting Officer.

A.2.3 All tests required by the Inspecting Officer shall be carried out in his presence and he shall be supplied with a copy of the results signed by the manufacturer or his representative.

A.2.4 The manufacturer shall furnish the material for all tests required and shall also provide the necessary labour and appliances for carrying out such tests. Failing facilities at his own works, the tests shall be carried out at a testing works approved by the Purchaser at the expense of the manufacturer.

A.2.5 The gaskets shall be supplied to the purchaser when requested, free of cost for testing.

A.2.6 The gaskets found to be defective in any way after delivery may be returned to the manufacturer at his own expense notwithstanding the fact that they may have passed the tests prescribed by the specification and have been accepted by the Inspecting Officer.

A.2.7 The notice shall be given to the Inspecting Officer when the components are ready for inspection.

A.2.8 The gasket shall not be dispatched from the manufacturer's works before an acceptance certificate has been obtained from the Inspecting Officer.

A.3 APPROVED MANUFACTURERS:

A.3.1 The manufacturer should have complete manufacturing and quality control facilities as per the specification at their works.

A.3.2 For reasonable quality assurance, it is desirable that the components are procured from manufacturers approved by Research Designs & Standards Organization (RDSO), Lucknow or by any other agency as assigned by the Purchasing Authority, based on evaluation of the components as per the specification, manufacturing and quality control facilities and quality assurance programme. However, such approval does not guarantee the supply of consistent quality of material/components and therefore every lot offered shall be subjected to inspection and testing as per the specification.

A.3.3 The approved manufacturers shall be subjected to periodical re-appraisal (periodicity for each component shall be assigned by the approving authority). In case of withdrawal of any manufacturing and quality control facilities provided at the time of approval of the component produced at the time of re-appraisal are not conforming to the specification, the manufacturers are liable to be withdrawn from the approved list. The approving authority reserves the right to withdraw the manufacturers from the approved list without assigning any reason.

A.3.4 The consignee may also periodically arrange testing if so desired, at RDSO or in an approved laboratory for confirmatory tests within six months from the date of receipt of the supplies, in their original packing. In case of samples do not conform to the specification, the consignee may at their discretion suspend the manufacturer for further supply and the fact brought to the notice of approving/inspecting authorities for appropriate action.
