

**SPECIFICATION No. RDSO/M&C/RP-118/2020 (Revision 1.0)**

Government of India  
**Ministry of Railways**

*Indian Railway Standard Specification for*  
**Rubber Diaphragm used in Pressure switch for QPH**  
**application in Electric Locos (Revision 1.0)**

**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-118/2020 (Revision 1.0) ,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 1981 and has been revised mainly for incorporating quality control practices and the methodology for authentication of the test slab with that of the product where test specimens of desired dimensions cannot be prepared from the finished products.. 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.
- 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 on 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 be the same as that of the specified value in this standard.
- 0.5 The specification contained a code of practice for quality control and inspection of rubber and plastic component (Appendix 'A') to ensure satisfactory process and quality control at the works of the manufacture. The provision of this code shall be applicable for all the rubber & plastic components being used in the railways.

## 0. SCOPE

This specification covers the material requirements, method of sampling and test for rubber diaphragms used in pressure switch for QHP application for electric locos in contact with transformer oil at temperature of up to about 80° C. The diaphragm is subjected to repeated flexing under a load of about 50 kg.

## 2. REQUIREMENTS

- 2.1 **Material** – The rubber used for the manufacture of the diaphragm shall be polychloroprene suitably compounded so as to conform to the requirements as laid down in this specification.

**2.2 Workmanship** -The surface of the rubber diaphragm shall be smooth and free from air bubbles and other moulding defects.

**2.3 Dimensions and tolerances** – The dimensions and tolerances of the rubber diaphragm shall be as per the relevant drawings.

## **2.4 Tests**

Note: All test procedures shall be as per IS:3400 (the methods of test for vulcanized rubber). The test shall be carried out on the finished product wherever practicable or on a 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  $\pm 2$  degrees

### 2. For comparing the composition :

(i) Identification of Polymer : Observations shall be identical

(ii) Specific Gravity : The result shall be within  $\pm 0.02$

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

### 2.4.1 Physical properties

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

- |    |   |      |
|----|---|------|
| a. | Hardness (Shore 'A')  | 65±5 |
| b. | Tensile strength (kg/cm <sup>2</sup> ),min.                 | 150  |
| c. | Elongation at break ( % ), min.                             | 250  |
| d. | Compression set ( % ) max, at 100 ± 1 °C for 24 + 0/-2 hrs. | 25   |

### 2.4.2 Accelerated air ageing test

After ageing for 72 + 0/-2 hrs. , at 100 ± 1 °C in an air oven, the hardness, tensile strength, and elongation at break ( % ) shall not vary from the values obtained before ageing by more than the following:

- |    |                           |               |
|----|---------------------------|---------------|
| a. | Hardness (Shore 'A')      | ± 5 degree    |
| b. | Tensile strength          | ± 15%         |
| c. | Elongation at break ( % ) | + 10%<br>-20% |

### 2.4.3 Accelerated oil ageing test

After immersion for 72 + 0/-2 hrs , at 100 ± 1 °C in transformer oil the hardness, tensile strength, and elongation at break ( % ) shall not vary from the values obtained before ageing by more than the following:

- |    |                           |          |
|----|---------------------------|----------|
| a. | Hardness (Shore 'A')      | -7degree |
| b. | Tensile strength          | -30%     |
| c. | Elongation at break ( % ) | -30%     |

### **SAMPLING AND CRITERIA FOR CONFORMITY**

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 relevant component specification for rubber fittings. 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.

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**

Rubber diaphragm used in Pressure switch for QPH application in Electric Locomotives shall be marked in indelible ink with the letters IRS, manufacturer's name initials on trade mark and the quarter/ year of manufacture.

#### **5. PACKING**

- 5.1 Rubber diaphragm shall be securely packed in wooden boxes to avoid 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**

The rubber diaphragm 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 &amp; 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.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.

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