

**Specefication No. RDSO/M&C/RP-168/2020 (Revision 2.0)**

**Government of India  
Ministry of Railways**

*Indian Railway Standard Specification for*  
**Moulded Fluorocarbon Elastomeric Seals and Gaskets (Revision-2)**

**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-168/2020 (Revision 2.0), the final number indicates the year of adoption as standard or in case of revision, the year of last revision. This specification was first adopted in year 1991.
- 0.2 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.
- 0.3 This specification draws reference to some of the relevant IS specification. Latest versions of these specifications shall be taken as references.
- 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 be the same as that of the specified value in this standard.
- 0.5 In framing the specification, due consideration has been given to the development in the field of elastomeric materials and process technologies, serviceability requirements of the Indian Railways and the practices followed in advanced countries in this field. While framing the specification guidance has been taken of the specification No. D 58695 issued by Diesel Locomotive Works, Varanasi.
- 0.6 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 manufactures. The provisions of this code shall be applicable for all the rubber & plastic components being used on the railways. Similarly provision on 'Sampling and criteria for conformity' and 'Inspection and testing facilities' shall be applicable for all rubber components.

## 1.0 SCOPE

- 1.1.1 This specification covers the material requirements, method of sampling and tests for fluorocarbon elastomeric seals and gaskets used in contact with oil, grease or/and moisture at temperature -20°C to 250°C.
- 1.1.2 For use as cylinder liner gasket the hardness Shore 'A' as specified in clause 2.4.1 shall be maintained within 75 to 80 Shore 'A'.
- 1.1.3 The test specified in clause 2.4.3.4 shall be applicable where the component is subjected to steam pressure or comes in contact with boiling water.

- 1.1.4 The swelling test as specified in clause 2.4.3.3 shall be conducted during the product approval or at a certain time interval at the discretion of the Inspecting/Purchasing authorities and shall not necessarily constitute an acceptance test.

## 2.0 REQUIREMENTS

- 2.1 **Material** – Rubber used for the manufacture of seals and gaskets shall be of suitable grades of fluorocarbon elastomer compound so as to conform to the requirements of this specification.

- 2.2 **Construction, Workmanship and Finish** -The gasket and seals shall be as per the relevant drawings. The surface finish shall be smooth, free from pin holes, blisters, porosities, embedded foreign matters and other visual flaws. In case 'O' rings, it shall be moulded in one endless piece, the spew trimmed to leave visible circumferential line and the measurement across the line to be within the specified tolerances shown in the relevant drawings. The moulded flash shall be removed in such a manner so that no groove is formed on the body of the components.

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

## 2.4 Tests

### 2.4.1 Physical properties

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

- |  |      |
|--|------|
| 1. Hardness (IRHD/Shore 'A')                                   | 75±5 |
| 2. Tensile strength (MPa), min.                                | 10.5 |
| 3. Elongation at break ( % ), min.                             | 175  |
| 4. Compression set ( % ) max, at 200 ± 2 °C for 24 + 0/-2 hrs. | 20   |

#### 2.4.2 Accelerated air ageing test

After ageing for  $72 \pm 0/-2$  hrs. at  $225 \pm 3$  °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<br>-0 |
| b. | Tensile strength        | $\pm 15\%$       |
| c. | Elongation at break (%) | + 10%<br>-20%    |

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%. |

### 2.4.3 Resistance to Fuels/Oils

2.4.3.1 The swelling by volume percent in reference fuel B containing 70 parts pure Isooctane (2,2,4-trimethyl pentane) and 30 parts pure toluene at  $27 \pm 1$  °C for 24 + 0 /-2 hrs shall be within +5/-0.

2.4.3.2 The swelling by volume percent in pure toluene at  $27 \pm 1$  °C for 24 + 0/-2 hrs shall be within +10/-0.

2.4.3.3 The swelling by volume percent in an oil (aniline point  $69.5 \pm 1$  °C, Say-bolt universal viscosity  $155 \pm 5$  at 100 °F and flash point  $330 \pm 5$  °F) at  $100 \pm 1$  °C for 72 +0/-2 hrs shall be within +5/-0.

2.4.3.4 The percent volume change in boiling water for immersion time of 72 +0/-2 hrs shall be within +2/-0.

## 3.0 SAMPLING AND CRITERIA FOR CONFORMITY

3.1.1 A minimum of six test samples or 0.5% of the lot offered for inspection whichever is higher, shall be drawn for tests indicated in this specification. In the event of number of samples drawn for tests are not adequate to carry out all the tests, as per the provisions given in the methods of tests, the Inspecting/Purchasing authorities at their discretion shall draw more samples as required. Should any of the test samples fail to meet the requirements, double the number of samples from the same lot shall be drawn for re-testing. Should any of the retest samples fail to comply with the requirements, the entire lot shall be rejected.

3.1.2 In the event of rejection after the re-testing of the samples, the entire lot offered for inspection shall be made unusable in the presence of Inspecting/Purchasing authorities.

3.1.3 The manner of distribution of samples for different tests shall be at the discretion of the Inspecting/Purchasing authorities.

## 4.0 Inspection and Testing Facilities

4.1.1 The Inspecting/Purchasing authorities shall have access at reasonable time to the works where material/components are being manufactured or where they are stored. The materials offered for inspection shall not be withdrawn during the

course of inspection. Any move to withdraw the materials or to interfere with the inspection in any way will render the entire lot being rejected. The manufacturers shall supply all equipment and chemicals required for testing free of charge, and shall be at their own cost, supply labour and apparatus for such tests as may be carried out at their works. Should the manufacturers fail to provide facilities at their works for carrying out the prescribed tests, they shall bear the cost of carrying out these tests, elsewhere by an approved testing authority, with the prior approval of the Inspecting/Purchasing authorities. Confirmatory test samples, in addition, may be drawn by the Inspecting/Purchasing authorities and submitted for tests to the approved testing authorities.

## 5.0 MARKING

- 5.1.1 Letters 'IRS', part number, manufacturer's name (initials/trade mark) and the quarter/year of manufacture shall be inscribed on each component where practicable on the locations shown in the drawings or marked with indelible ink. 'O' rings and other smaller components where even marking with indelible ink is not practicable, shall be packed suitably and sealed with tags, bearing the above markings.

## 6.0 PACKING

- 6.1.1 The components shall be dusted with French chalk and packed suitably to avoid movement or distortion or damage during transit and storage. The package shall bear the order number, quantity and marking similar to clause 5.1.1.

## 7.0 STORAGE

- 7.1.1 The rubber components shall be stored in a cool dry place, in their original packing. For guidance regarding proper storage of rubber components IS: 6713 : 2016 shall be referred .

8. "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.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.

-----