

SPECIFICATION No.RDSO/M&C/RP-180/2020 (Revision 1.0)

Government of India
Ministry of Railways

Indian Railway Standard Specification for
Moulded Polytetrafluoroethylene (PTFE) Components
(Revision 1.0)

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0. FOREWORD :

This specification is issued under fixed serial No. RDSO/M&C/RP-180/2020 (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 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 includes some optional requirements depending on the service conditions of the components, and therefore such requirements shall specifically be stipulated in the relevant drawings.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the results 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 This specification contained a code of practice for quality control and inspection of rubber & plastic components (Appendix 'A') to ensure satisfactory process and quality control at the works of the manufacturers. The provisions of this code shall applicable for all the rubber & plastic components being used on the railways.

1. SCOPE

This specification covers the requirement and methods of sampling and tests for Moulded Polytetrafluoroethylene (PTFE) components of rolling stock and track and other Railway equipment.

2. REQUIREMENTS

2.1 Material :

The moulded components shall be manufactured using as suitable grade of PTFE without any filler so as to conform to the requirements as laid down in this specification. Unless otherwise specified the material shall be in its natural colour.

2.2 Construction, Workmanship & Finish :

2.2.1 The component shall be as per the relevant drawing and shall be manufactured by compression moulding or extrusion processes followed by sintering, and subsequent machining as applicable. The surface finish of the components shall be smooth and substantially free from voids, porosities, blisters, laminations and any other surface defects.

2.3 Conditioning and Annealing :

The component shall be conditioned/annealed by manufacturers adopting a suitable process.

2.4 Dimensions and Tolerances :

2.4.1 Dimensions and tolerances of the components shall be as per the relevant drawings.

2.5 Tests :

2.5.1 Properties of Moulded PTFE

<u>SL. No.</u>	<u>Property</u>	<u>Value</u>	<u>Method of Test</u>
1.	Identification of material	Positive	Infra-red spectroscopy or any other conventional method.
2.	Specific Gravity	2.10-2.20	ASTM D-792
3.	Hardness (Shore D),	55	ASTM D-2240
4.	Tensile Strength*,MPa, Min	25.0	ASTM D-638
5.	Elongation at break*, %, Min	300	ASTM D-638
6.	Ash content (%) max.	0.25	Conventional method at 600° to 800° C

* Speed of Testing 50 mm / min.

Note : The tests specified under clause No. 2.5 shall be conducted on finished components wherever practicable or from the test specimens prepared under identical conditions using the same material.

Resistance to Heat :

- 2.6.1** Approximately 1 g of the material cut from the moulded components shall be accurately weighed and heated in an air oven for 6 hrs. at 300 ± 5 °C, and then cooled in a desiccator to room temp. and reweighed. Any loss in weight as a percentage of the original weight shall not exceed 0.5 percent.

2.7 Electrical Properties (Optional) :

- 2.7.1** Requirement of Electrical properties are optional and shall be applicable for components used for the purpose of insulation and shall comply with the stipulated values :

<u>SL No.</u>	<u>Property</u>	<u>Value</u>	<u>Method of Test</u>
1.	Dielectric Strength (KV/mm), min.	24	ASTM D-1457
2.	Surface resistivity (ohm), min.	10^{15}	ASTM D-257

2.8 Adhesion to metal (Optional)

- 2.8.1** This test is optional and applicable for components required to bonded to metal. The surface of the moulded PTFE component to be bonded, shall be sodium etched where surface roughness is essential for effective bonding with metal surface through adhesive. This sodium etching is not mandatory on the PTFE component when there is no chance of slipping out the component from its position.

A lap joint of 25x25 mm shall be formed with the metal using epoxy or any other suitable adhesives as recommended and agreed to by the supplier of PTFE components & users. The tests specimens of 1.5-2.0 mm thick of PTFE shall be prepared from the component where practicable or from the test slabs manufactured under identical conditions using the same material. The metal strip/plate to be used for he test shall be of same composition as that of the metal used in actual service.

The test for adhesion strength shall be carried out in an universal tensile testing machine at speed of 50mm/min. The adhesion strength calculated on lap area shall not be less than 5.0 Kg/cm².

2.9 Elastic Recovery (optional) :

2.9.1 This test is optional and is applicable for components such as bush, required to be press fit by mechanical expansion. The components with residual strain shall be expanded mechanically by 2-2.5% of its internal diameter and released after 5 minutes and allowed to recover at room temperature. The internal diameter measured after 30 minutes of recovery shall be within 0.5% of original diameter.

3. SAMPLING CRITERIA FOR CONFORMITY :

3.1 Tests :

3.1.1 The tests shall constitute type tests and acceptance tests.

3.1.2 Type Tests :

The type tests are carried out to prove conformity with the specification. The tests shall cover all the requirements including acceptance tests. These are intended to prove the general qualities, raw material and process control. The tests are mandatory for product approval or approval of manufacturers. However, approving / purchasing authority reserves the right to repeat the tests at their discretions at a certain time interval.

3.1.3 Acceptance Tests :

Tests shall be carried out on samples selected from a lot for the purpose of acceptance or otherwise of the lot. The acceptance tests shall constitute the following :

- a) Visual observation
- b) Dimensional Check
- c) Identification of material
- d) Specific gravity
- e) Resistance of heat
- f) Ash content

3.1.4 The lot shall consist 100 numbers (or 1000 numbers when the quantity ordered/ offered exceeds 1000 nos.) or part their of.

3.1.5 The no. of samples to be selected from the lot for acceptance tests shall be as under :-

- | | | |
|----|----------------------------|------------------------------|
| a) | Visual Observation. | Min. 10 or 1% of the |
| b) | Dimensional Check. | lot whichever is higher |
| c) | Identification of material | 3 Nos. (Destructive tests as |
| d) | Specific gravity | required) |
| e) | Resistance to heat) | |
| f) | Ash Content | |

Each sample undertaken for acceptance tests shall conform to the requirements as laid down in this specification. Should any one of the test samples fail to meet the requirements of acceptance tests, double the number of samples from the same lot shall be drawn for retesting. Should any of the retested samples fail, the entire lot shall be rejected.

In case of non-compliance in regard to dimensional check (clause 3.1.3 (b), the manufacturer shall be permitted to segregate the lot in respect of dimensions and re-offer.

3.1.6 In the event of rejection after retesting of the samples, the lot offered shall be made unusable in presence of purchasing/inspecting authorities.

4. MARKING

Each component shall be marked as moulded where practicable with the following legends on the portion shown in the relevant drawings :

- Manufacture's name/Initial/trade mark
- Year of manufacture.
- Drawing no.

5. PACKING

The components shall be securely packed in stout wooden boxes to avoid any damage in transit.

6. "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.
