SPECIFICATION No. RDSO/M&C/RP-169/2020(Revision 1.0)

Government of India

Ministry of Railways

Indian Railway Standard Specification for

20 mm thick Grooved Rubber Sole Plate for Ballastless Track (Revision 1.0)

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0. FORWORD:

0.1.1 This specification is issued under fixed Serial No RDSO/M&C/RP-169/2020 (Revision 1.0), the final number indicates year of adoption as standard or in case of revision, the year of last revision. This specification was first adopted in the year 1991.

0.1.2 This specification is intended to cover the technical provision relating to materials, constructions, and tests and does not include all the necessary provisions of the contracts.

0.1.3 This specification draws reference to some of the relevant IS and IRS specifications. Latest versions of these standards shall be taken as references.

0.1.4 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.

0.1.5 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 for 12 mm thick grooved rubber sole plate used in ballast less track of MTP, Calcutta.

0.1.6 This specification contains a code of practice for quality control and inspection of rubber components (Appendix 'A') to ensure satisfactory process and quality control at the works of the manufacturers. The provisions of this code shall be applicable for all the rubber components being used on the Railways. Similarly provisions on "Sampling and criteria for conformity" and "Inspection and testing facilities" shall be applicable for all rubber components.

1. SCOPE:

1.1.1 This specification covers the requirements, methods of sampling and approval & acceptance tests for grooved rubber sole plates placed beneath the bearing plates used in balastless track. The sole plates are subjected to compression both static and dynamic under extreme climatic conditions prevailing all over the country.

2. MANUFACTURE

2.1.1 Material:

Natural rubber or elastomers or a blend thereof suitably compounded shall be used for the manufacture of rubber sole plates for Ballastless Track so as to conform to the requirements stipulated in the specification.

3.0 FREEDOM FROM DEFECTS

3.1.1 The rubber sole plates shall have clean cut sides with no defects such as blowholes and other visual flaws and presence of any other extraneous matters; they must have smooth surface and the grooves must be unobstructed at the ends and along their whole length.

4.0 DIMENSION & TOLERANCES

4.1.1 The dimensions are tolerances of rubber sole plates shall be as per the relevant drawings. Unless otherwise specified, a tolerance of ± 5 mm shall be allowed on the length, +0/-2 mm on width and +0.5/-0

5.0 LOT SIZE AND SAMPLING

5.1.1 For the purpose of inspection, 1000 numbers of rubber sole plates or part thereof, in case ordered quantity is not a multiple of 1,000 numbers, shall constitute a lot. Five numbers of rubber sole plates shall be selected at random from each lot, and out of these a maximum of two may be subjected to destructive tests as required for conducting various tests specified. However, any deviation in the distribution of the samples for different tests shall be at the discretion of the Inspecting/Purchasing authority.

6.0 TESTS:

6.1.1 Hardness (clause 6.2.1) and compression set (clause 6.2.5), tests shall be carried out from the finished sole plate. All other tests shall be carried out from the prepared test slabs using the same compound and vulcanized to the same degree or test specimen prepared from the finished product without grooves approximately 4 to 6 mm thick.. The method of tests shall be as per IRS T-47-2006. The physical characteristics of the rubber shall comply with the requirements stipulated in clause 6.2.

6.2 **Physical characteristics of the rubber:**

Sl No.	Properties	Unit	Specified Value
(i)	Hardness, min.	Shore 'A'	55
(ii)	Tensile strength		
	a) Before ageing, min	kg/cm^2	150
	b) After ageing at 100 ± 1 °C for 96 + 0/-2 hrs. min.	kg/cm^2	125
	c) Percentage retention after ageing, min.	%	80
(iii)	Elongation at break		
	a) Before ageing, min.	%	350
	b) After ageing at 100 ± 1 °C for 96 hrs. + 0/-2, min.	%	270
	c) Percentage retention after ageing, min	%	70
(iv)	Modulus (relaxed) at 100% Elongation		
	a) Before ageing	Kg/cm^2	20-35
	b) Percentage change after ageing at 100 ± 1 °C for 96 hrs hrs+0/-2 min. .	%	± 40
(v)	Compression set (%), subjected to 50% compression at 100 ± 1 °C For 24 + 0/-2 hrs. max	%	25
(vi)	Tension set (%), subjected to 50% stretch at 100 ± 1 °C For 24 + 0/-2 hrs., max	%	20

6.3 Load- deflection characteristics

6.3.1 When tested in terms of Appendix F of IRS T-47-2006, the deflection for increment in stress value from 1.1 Kg/cm^2 to 18 Kg/cm^2 shall be 3 mm within the limit of ± 10%. The test shall be conducted on two specimens measuring 175 mm x 175 mm (approx) cut from two different 20 mm thick sole plates. The dimension shall be measured accurately and load to be applied for 'zero' setting at a stress value of 1.1 Kg/cm^2 shall be A x 1.1, where A is the area of the specimen in cm^2. The deflection is to be recorded at stress value of 18 Kg/cm^2, i.e., the load in kg shall be A x 18.

6.4 Dynamic properties

6.4.1 The tests as laid down in the clause shall be applicable for the purpose of product approval or approval of manufacturer and they shall, however, be repeated at specified interval by the approving/inspecting/purchasing authorities at their discretion. The method of tests shall be ASTM D 945.

Sl No.	Properties	Unit	Specified values
1.	Resilience at 20% deformation, min	%	80
2.	Static modulus at 20% deformation	kg/cm^2	55-65
3.	Effective dynamic modulus at 20% deformation	kg/cm^2	70-90
4.	Oscillating decay, min	-	0.35

7.0 RE-TEST

7.1.1 Should the samples fail to meet with the requirements of the tests of clause 6, the tests shall be repeated in the same manner with double the number of samples from the same lot comprising two sets of tests. Should any of the set of tests fail to meet the requirements, the entire lot represented by these test samples shall be rejected.

7.12 In the event of rejection of the entire lot, after the retest, the lot offered for inspection shall be made unusable in the presence of Inspecting/Purchasing authority.

8.0 Dimensional Check

8.1.1 The rubber sole plates complying with requirements of clauses 6 and 7 shall be arranged in lots of 1000 or part quantity thereof.

8.1.2 Minimum 2% of rubber sole plates subjected to a maximum of 5% shall be checked for dimensions and tolerances stipulated in the drawing.

8.1.3 If any of the sample rubber sole plates do not conform to the dimensions and tolerances as stipulated in drawing, twice the number of samples taken for check earlier shall be checked. Should any of these samples fail to meet the requirements of dimensions, the lot represented by these samples shall be rejected and or otherwise, the batch shall be accepted.

8.1.4 If the rubber sole plates do not meet the stipulations of clause 8.1.2 and 8.1.3, the manufacturer shall re-submit the quantity of rubber sole plates after sorting out the defective pieces. The quantities so offered shall meet the requirements of clauses 8.1.2 and 8.1.3.

9.0 Marking

9.1.1 Each rubber sole plate shall bear the following in 0.8 mm raised letters/figures placed in a recess on one of its surfaces:

a) Maufacturer's initial or trade mark as approved by the purchaser

b) Last two digits of the year of manufacture along with the quarter of manufacture.

c) Drawing Number.

10.0 Packing

10.1.1 The rubber sole plates shall be packed placed flat one upon another in stout wooden boxes to avoid any damage in transit. The packing inside the box should be such that no displacements of rubber pads occur during transit. The boxes shall be sealed and labeled bearing:

a) Name of the supplier

b) Order No. and date

c) Period of manufacture

d) Consignee

e) Quantity

11. "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.
