

Specification No. RDSO/M&C/RP-178/2020 (Revision 2.0)

Government of India
Ministry of Railways

Indian Railway Standard Specification for
Polyamide-6 (Nylon-6) components (Revision 2.0)

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0. **FOREWORD :**

- 0.1 This specification was first adopted on the Indian Railways in the year 1993 and was issued under fixed serial No. RDSO/M&C/RP-178/2020 (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 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 national and international specifications. Latest versions of these specifications shall be taken as reference.
- 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 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 In framing the specification due consideration has been given to the development in the field of polymeric materials and process technologies and serviceability requirements of the Indian Railways.
- 0.6 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 be applicable for all the rubber & plastic components being used on the railways.

1. **SCOPE**

- 1.1 This specification covers the requirements, methods of sampling and tests for polyamide-6 (Nylon-6) components of rolling stock & track and other railway equipment.

2. REQUIREMENTS

2.1 Material :

2.1.1 Polyamide-6 conforming to the requirements stipulated in this specification shall be used in the manufacture of the components. Unless otherwise specified the color of the material shall be its natural color.

2.2 Construction, Workmanship & Finish :

2.2.1 The component shall be as per the relevant drawing and shall be molded on an automatic screw type injection molding machine. The surface finish of the components shall be smooth and free from voids, porosities, warpages, blisters, laminations and any other surface defects.

2.3 Conditioning/Annealing:

2.3.1 The components shall be conditioned /annealed in hot/boiling water to a moisture level of 3% min by manufacturers.

2.4 Dimension & Tolerances :

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

2.5 Workmanship and Finish :

2.5.1 The surface finish shall be smooth (fine machine marks permitted), free from porosity, voids, lamination and other general molding defects.

2.6 Physical Properties of Polyamide-6 (Nylon-6) :

S. No.	Properties	Specified values	Method of Tests
1.	Specific gravity	1.12 to 1.15	ASTM D 792
2.	Tensile Strength* (MPa). min	70	ASTM D 638
3.	Elongation at break* (%)	20-60	ASTM D 638
4.	Hardness (Rockwell – R), min	110	ASTM D 785
5.	Melting Point (°C)	215 - 225	BS : 2782
6.	Water absorption (%) at 27±2°C for 24 hrs, min	2.0	ASTM D 570

- Note :
- i) Tests shall be carried out on finished products wherever practicable or from the prepared test specimens using the same material.
 - ii) The tests shall be conducted on 'as molded specimens'. 'As molded specimens' are defined as those which are defined as those which, upon immediate removal from the mold, are sealed in containers, impermeable to moisture.
 - iii) *The speed of testing shall be 5 mm/minute.

3. Sampling & Criteria of Conformity :

3.1 Tests:

3.1.1 The tests shall constitute type tests and acceptance tests.

3.1.2 Type tests: The type tests shall be conducted for all the requirements including acceptance tests as laid down in this specification and are mandatory for product approval or approval of manufacturers. However, approving/purchasing authority reserves the right to repeat the tests at their discretion at a certain time interval.

3.1.3 Acceptance Tests: The acceptance tests shall constitute the following:

- a) Visual observation
- b) Dimensional check
- c) Specific gravity
- d) Melting point

3.1.4 The lot shall consist 100 nos or 1000 nos when the quantity ordered/offered exceeds 1000 nos or part thereof.

3.1.5 The number of samples to be selected from the lot for acceptance test shall be as under:-

- | | | |
|----|---------------------|--|
| a) | Visual Observation. | |
| b) | Dimensional Check. | Min 10 or 1 % of the lot
whichever is higher. |
| c) | Specific gravity | } 3 Nos. (Destructive tests as
required) |
| d) | Melting point | |

- 3.1.6 Each sample undertaken for acceptance tests shall conform to the requirements as laid down in this specification. Should any one of the test samples fails 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.
- 3.1.7 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.
- 3.1.8 In the event of rejection of the entire lot after retesting of the samples, the lot offered shall be made unusable in presence of purchasing / inspecting authorities.

4. **MARKING**

- 4.1 Each component shall be marked as molded with the following legends on the portion shown in the relevant drawings.
- a) Manufacture's name/Initial/Trade mark
 - b) Year of manufacture
 - c) Drawing number

5. **PACKING**

- 5.1 The components shall be securedly 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

The manufacturers shall furnish to the purchasing/Inspecting Authorities information in respect of quality control systems in force at their works on various materials used in the manufacture of components.

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.
