

SPECIFICATION No. RDSO/M&C/RP-175/2020 (Revision 1.0)

Government of India
Ministry of Railways

Indian Railway Standard Specification for
Cast Nylon-6 for use as gears, (Revision 1.0)

M&C Directorate
Research Designs & Standards Organization
Lucknow - 226011

0. FOREWORD :

- 0.1** This specification is issued under fixed serial No. RDSO/M&C/RP-175/2020 (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.
- 0.1** 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 be applicable for all the rubber & plastic components being used on the railways.

1. SCOPE

- 1.1** This specification covers the requirements and methods of tests for Cast Nylon-6 for manufacture of gears for governor drive, idler arrangement of power take off unit, tacho generator etc. for diesel locomotives. The gears are used under lubricating condition.

2. REQUIREMENTS**2.1 Material :**

- 2.1.1** Cast Nylon-6 conforming to the requirements stipulated in this specification shall be used in the manufacture of the gears.

2.2 Size & Shape :

2.2.1 The size and shape of Cast Nylon-6 for use as gears shall be either in the form of a round rod/bar or any other shape for subsequent machining to shape it as gear by the manufacturers or purchasing authorities themselves. In the latter case the dimensions of the rod/bar shall be as specified by the purchasing authorities.

2.3 Conditioning and Annealing :

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

2.4 Workmanship and Finish :

Casting shall be free from voids, porosities, warpage, inclusion of foreign matters etc. and the surface finish of the gears shall smooth and free from above visual defects and cut marks.

2.5 Dimensions and Tolerances :

2.5.1 Dimensions and tolerances of the gear shall be as per the relevant drawings.

2.6 Physical Properties of Cast Nylon-6 :

<u>SL. No.</u>	<u>Properties</u>	<u>Value</u>	<u>Method of Test</u>
1.	Specific gravity	1.16±0.02	ASTM D-792
2.	Tensile Strength (Kg/mm ²), min.	7.5	ASTM D-638
3.	Elongation at break (%).	10-60	ASTM D-638
4.	Compressive Strength (Kg/mm ²) at 10% deformation, min.	7.5	ASTM D-695
5.	Hardness (Rockwell-R), min.	110	ASTM D-785

6.	Melting Point (°C)	215-230	BS : 2782
7.	Water Absorption (%) at 27±2°C for 24 hrs.	0.5 – 1.5	ASTM D-570

Note : Tests shall be carried out on finished products wherever practicable or from cast test specimens manufactured under identical conditions as that of the components using the same raw material.

The test shall be conducted on ‘as-cast specimens’. ‘As-cast specimens’ are defined as those that upon immediate removal from the mould, are sealed in containers, impermeable to moisture.

3. **SAMPLING, CRITERIA FOR CONFORMITY :**

3.1 **Tests**

3.1.1 The tests shall be constitute type test and acceptance test.

3.1.2 **Type test:**

The type test for all the requirements as laid down in this specification is 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 Test :**

The acceptance test shall constitute the following :-

- a) Visual Observation.
- b) Dimensional Check.
- c) Specific gravity.
- d) Hardness.
- e) Melting Point.

3.1.4 The lot shall consist 100 numbers or part thereof.

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

Visual Observation.	}	10 % of the lot.	
b) Dimensional Check.			
c) Specific gravity			2 Nos.
d) Hardness			(Destructive tests as required. In case of rod / bar, the test samples shall be taken from one end without damaging the entire product for acceptance).
e) Melting Point			

Each specimen undertaken for acceptance test shall conform to the requirements as laid down in this schedule. Should any one of the test samples fails to meet the requirements of acceptance test, 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 may be permitted one chance to segregate the lot for dimensional conformity.

In the event of rejection of the entire lot after retesting of the sample, the lot offered shall be made unusual in presence of purchasing / inspecting authorities.

4. MARKING

4.1 Each gear shall be marked with indelible ink with the following legends:

- Manufacture's name/Initial/Trade mark
- Year of manufacture.
- Drawing number.

5. PACKING

5.1 The gear 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.
