RESEARCH DESIGNS AND STANDARDS ORGANISATION

Manak Nagar, Lucknow-226011

Document No. **TDG 0043**

Document Title: **Schedule of Technical Requirements for manufacture and supply of High Density Polyethylene Dowels for Concrete sleeper**

1.0 Amendment History:

Amendment Date	Version	Reasons for Amendment
24.08.2018	1.0	First issue under new documentation system
30.05.2022	0.0	Decontrol of item vide Railway Board's letter no. 2022/TK-II/22/7/1 dated 09.02.2022 & 22.02.2022

GENERAL:

1.0 Purpose:

This document is based on IRS Specification for Polyethylene Dowels for concrete sleeper to serial no. T-57-2020 issued by RDSO. The purpose is to specifically define the technical requirement for manufacture & supply of High Density Polyethylene Dowels.

2.0 Scope of Application

This document shall be applicable for manufacturing & supply of High Density Polyethylene Dowels.

3.0 Procedure / Details

Procedure/details are annexed.

4.0 Referenced Documents:

i) IRS specification for Polyethylene Dowels for Concrete Sleeper, Serial No. T-57-2020

5.0 Referenced Documents of External Origin

None.

6.0 Associated Records

None.

7.0 Responsibility and Authority

Activity	Responsible	Approver	Supporting	Consulted	Informed
Creation, maintenance of this document	ED/Track-II/ Director/ Track-IV	PED/ INFRA-I	DD/AIE/ADE	M&C Dte.	
Compliance of directivescontained in this document	DD/ AIE/ ADE	Director/ Track Design -IV	-	-	-
Requirement of deviation from this directive	ED/Track-II/ Director/Track-IV	PED/ INFRA-I	DD/AIE/ADE	M&C Dte.	-

Abbreviations

PED/INFRA-I	Principal Executive Director/ INFRA-I
ED/Track-II	Executive Director/Track Design-II
RDSO	Research Designs & Standards Organization
DD	Dy. Director
AIE	Assistant Inspecting Engineer.
ADE	Assistant Design Engineer.

SCHEDULE OF TECHNICAL REQUIREMENTS OF FIRMS TO MANUFACTURE OF POLYETHYLENE DOWELS

1. SCOPE

The schedule of technical requirements covers the norms for manufacture of Polyethylene dowels to be used in permanent way track on Indian Railways.

2. GENERAL & MANUFACTURE FACILITIES

The manufacturer of Polyethylene Dowels shall comply with all the below mentioned requirements.

2.1 Covered area with adequate space for storage of raw material and finished product should be available which is free from dampness and humidity. They should have separate damp free secured bond room with adequate space for accommodating at least 50,000 nos. of such finished product.

2.2 De-humidifier with digital temperature and humidity controller & indicator of suitable capacity for pre-dehumidiation of raw material should be available.

2.3 Horizontal screw type fully automatic PLC based injection-moulding machine should be available for moulding; preferably 380 gms shot (granules) capacity.

2.4 Temperature of hydraulic oil and moulds should be kept controlled by suitable cooling system.

2.5 Electrical hoist/manual block & tackle for mounting & dismounting of moulds should be available.

2.6 For manufacturers of dowels should have dies/moulds of at least 2- cavity Vertical type with motorised unscrewing (inside) shank system.

2.7 All the moulds/die shall be of hardened steel including the mould for tensile test piece. The manufacturer's insignia, drg. No. and cavity no. shall have permanent engraving while the manufacturing year marking may be of injector-pin type.

2.8 Manufacturer of dowel should also have an electric heating- compression load type machine for providing slabs for tensile testing test piece preparation.

2.9 De-flashing tools of suitable design in adequate nos. to be available.

2.10 Minimum infrastructure for maintenance and polishing of dies & moulds should be available in-house.

2.11 Diesel Generator of adequate capacity should be installed to take up the load of the entire plant in case of power failure.

3. TESTING FACILITIES

3.1 Ambience in the testing laboratory should be suitably controlled for humidity and temperature with digital indicator facility.

3.2 Computerized tensile testing machine with extensometer or suitable measuring arrangement and all provisions in accordance with ASTM-D-638-14 & EN-ISO 527-1:2019 or testing strength and elongation percentage and speed gear system to suit the different testing speeds for different types/drg. No. should be available. Test fixture for checking cross breaking load should also be available.

3.3 Necessary apparatus for testing the melting point and specific gravity in accordance with IS:5762-1970 & BS EN ISO 1183-1:2019 respectively should exist with digital display for melting point. The weighing balance used for weighing sample in air/water should have digital display.

3.4 A single pa digital type chemical balance shall be available having capacity to read upto 4^{th} decimal.

3.5 Digital vernier calipers and three-point digital bore gauges (Min.2 nos. of each) should be available.

3.6 One shore 'D' hardness tester along with standard test block should be available for dowels.

3.7 One muffle furnace of capacity 0-1000ºC with temperature controller & indicator should be available along with sufficient numbers of desiccator and crucibles for checking glass filler by ash content (%).

3.8 Stopwatch with least count reading of 0.1 seconds should be available.

3.9 One melt-flow index test apparatus as per ASTM-D-1238-13 should be available for dowels.

3.10 Barometer & hygrometer in the laboratory should be available.

3.11 All measuring gauges of the products should be hardened/or chrome plated (two sets).

Minimum two sets of inspection gauges shall be manufactured by the supplier as per RDSO approved drawing / manufacturer's drawing as the case be and shall be got approved by Purchaser/Inspecting authority before use. Out of these, one set of inspection gauges shall be used as master gauge and preserved safely by the liner manufacturer. The second set shall be used by the inspecting officer during inspection. For internal quality checks the firm should use additional set of gauges as per drawing.

3.12 One magnifying glass of min 20x for checking surface finish and internal cavity should be available.

3.13 For checking calibration of tensile/ compression testing machine, preferably one number proving ring of min. 5t capacity duly calibrated by NPL should be available with suitable links for in-house calibration.

QUALITY CONTROL REQUIREMENTS

3.14 There should be a system to ensure the traceability of the product from raw material stage to finished product stage. This system should also facilitate to identify the raw material composition from the finish product stage.

3.15 Ensure that the system of First-in First-out is followed for raw material and the intermediate stage products.

3.16 Ensure that there is a Quality Assurance for the product detailing various aspects

- Organizational Chart
- Flow process chart
- Stage inspection details
- Non conformities in various parameters & control over them

3.17 There should be at least one plastic technologist having a minimum bachelor's degree in relevant field & 5 years experiences or a person with diploma in relevant field with 12 years experience. He should be free from day-to-day production, testing & quality control responsibility. He should be mainly responsible for development and regular production of the product, analysis of products, control over raw material, corrective action in case of difficulties in achieving the parameters.

3.18 Ensure that the in-charge of the quality control section is having a qualification of minimum bachelor's degree in the relevant field and have minimum five years experience or a diploma holder with minimum 8 years experience. He should be actively involved in day-to-day activities of quality control / stage inspection.

3.19 The firm should have acquired ISO: 9000 certification and the product for which an approval is sought should be broadly covered in the scope of the certification for manufacture and supply.

3.20 The quality manual of the firm for ISO: 9000 should clearly indicate at any stage the control over manufacturing and testing of the said railway product.

3.21 Ensure that proper analysis is being done on monthly basis to study the rejection at various internal stages and it is documented.

3.22 Ensure that all the relevant drawings, specifications, IS, BS standards, ASTM, ISO and test methods are available with the firm.

3.23 It is to be ensured that the dies and moulds are checked for accuracy for various critical predefined dimensions at least on weekly basis or after production of 500 pieces whichever is earlier and observations are recorded. The wear and tear of nozzle and barrels of injection moulding machine should also checked at least once in month or after 50,000 nos. production (whichever is earlier) & observation recorded & shall be rectified if warranted by such records.

3.24 Training need should be identified for all concerned officials & regular training shall be organized & imparted on maintenance of machine, quality assurance, safety parameters etc. & records maintained.