

ISO:9001-2015	Document No.: TM/SM/14	Revision-03	w.e.f. 16.06.2022
Document Title: Specification of Toe Load Measuring Device (Mechanical)			



**SPECIFICATION OF TOE LOAD MEASURING DEVICE
(MECHANICAL)**

(NO.TM/SM/14 REV. 01 of 2005)

Third revision, 2022.

Track Machines & Monitoring Directorate

**RESEARCH DESIGNS AND STANDARDS ORGANISATION
Manak Nagar, Lucknow-226011**

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1.0 SCOPE:

- 1.1 This specification covers the general requirements, inspection and testing of the Toe Load Measuring Device (Mechanical) (TLMD). Toe Load Measuring Device (Mechanical) will be termed as ‘**Device**’ in this specification.
- 1.2 This specification relates to the device adopted for use in track to measure the toe load of elastic rail clips in service.
- 1.3 Preference to make in India: compliance of the instruction contained in public procurement (preference to make in India) order-2017 “**Make in India**” and latest instructions issued on subject shall be ensured.
- 1.4 Supplier is fully responsible to maintain the quality of product supplied to Indian Railways.

2.0 REFERENCE DOCUMENT:

Following IS codes have been referred to in this specification. Updated copies of the same shall be available in the works of the manufacturer/Suppliers.

- (i) RDSO Drg. (Nos. TM/9528/1&2) pertaining to Toe Load Measuring Device (Mechanical) and its part details.
- (ii) IS-3195-1992 “Specifications for steel for the manufacture of Volute and Helical Spring”.
- (iii) IS-7906 (Pt. V) –1989 The static load testing shall be carried out in accordance.
- (iv) IS: 104-1962 followed by one coat of Red Oxide/Zinc Chromate primer to IS: 2074-1962 and two coats of synthetic enamel to IS: 2932-1964 or other approved painting system.

3.0 MATERIALS & MANUFACTURE :

- 3.1 The quality of materials of all the component parts of device shall conform to their respective specifications indicated in the drawing.
- 3.2 This shall conform to RDSO Drg. (Nos. TM/9528/1 & 2) pertaining to Toe Load Measuring Device (Mechanical) and its part details.
- 3.3 **Procurement of Raw Material:** The responsibility for obtaining the raw materials as specified in drawing required for the manufacture shall rest entirely with the supplier.

3.4 HELICAL SPRING:

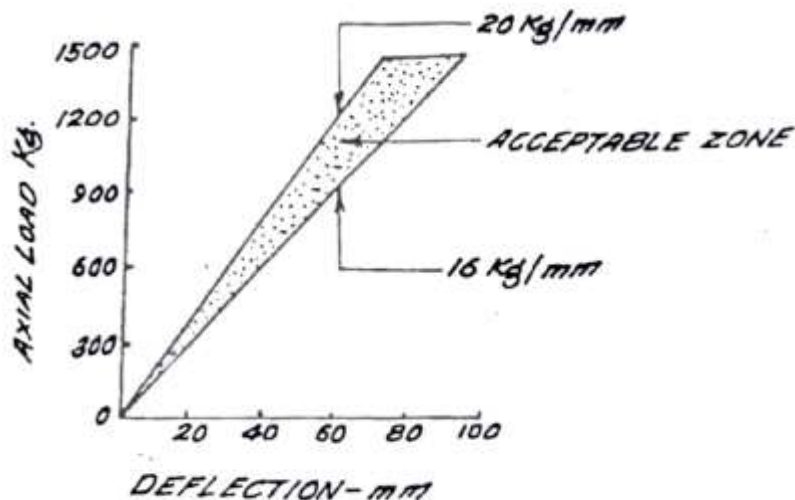
- 3.4.1 Main spring: The spring shall be made of silico manganese spring steel conforming to the Grade 55 of IS- 3195-1992 “Specifications for steel for the manufacture of Volute and Helical Spring”.

The static load testing shall be carried out in accordance with IS-7906 (Pt. V) –1989. In each case, before carrying out the static tests the spring shall be compressed 3 times in quick succession to the block length or to a length corresponding to the maximum permissible static stress value, whichever is more, if then it is scragged further there shall

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be no further change in height. The spring shall then perform as specified in the drawing and be able to withstand without permanent set a compressive load of 1450 kg and follow the characteristic curve (force deflection diagram) as given below:



3.4.2 Each individual MAIN SPRING shall be pre-calibrated. The calibration facility shall be provided by the Track Research Laboratory of T.M. Directorate, RDSO on payment in advance through Demand Draft payable to Executive Director/Finance, RDSO, Lucknow.

3.4.3 Manufacturer shall use only calibrated spring approved by RDSO.

4.0 FINCTIONAL & TECHNICAL REQUIREMENTS:

4.1 HEAT TREATMENT:

4.1.1 The springs shall be suitably heat treated to give the desired performance characteristics.

4.1.2 The tong shall be suitably heat treated to withstand a repetitive load cycle of 1400 kg without any sign of deformation/breakage.

4.1.3 The link hanger and rotation handle shall be heat treated as specified in drawing. After heat treatment, the hardness shall be in the range of 210-240 HB.

4.1.4 Steel Link Grips shall be as specified in the drawing.

4.2 **Protection:** All surfaces of the device shall be painted with one coat of Zinc Chromate primer to IS: 104-1962 followed by one coat of Red Oxide/Zinc Chromate primer to IS: 2074-1962 and two coats of synthetic enamel to IS: 2932-1964 or other approved painting system. The finish surface of the equipment shall be of yellow colour and the

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helical spring of red colour. Rotating handle, legs, link hanger, tong, nuts & bolts shall be of navy blue or black colour and the packing box of black colour.

5.0 ACCEPTANCE TEST:

Each spring of the device shall be calibrated by TM Directorate of RDSO before offering for inspection. The inspecting official shall ensure that each spring of the device is calibrated and passed by TM Directorate of RDSO. Following acceptance tests to be conducted on each device for which necessary arrangements (if required) to be made by the supplier at its premises/consignee place:

- 5.1 Freedom Form Defects: All metal surfaces shall be properly finished and shall be free from manufacturing defects. Edges shall be smooth and rounded.
- 5.2 Workmanship and Finish: All the working parts and the parts subjected to wear shall be accurately machined as specified in the drawing.
- 5.3 Dimensional Check: Each part of the device shall conform to the stipulated dimensions of the drawing.
- 5.4 Application Test: Each TLMD before acceptance shall be subjected to application test with complete assembly. Specified load will be given to helical spring 20 times. The assembly including helical spring shall withstand the load without any deformation. Tests indicated in Para 5.1 to 5.3 to be conducted at consignee place and test indicated in Para 5.4 & 5.5 to be conducted by the supplier at its premises.
- 5.5 Performance Test: The tong shall withstand a load of 1400 kg for 20 cycles during test without any sign of deformation/breakage. Performance of link hanger shall be checked with respect to condition of the threads damaged / worn out during inspection.

SN	Test	Acceptability	Rejection
1.	Visual and Dimensional Check	Each Device (As per Drawing No.9528/1&2)	If it fails, the device shall be rejected.
2.	Testing of Link Hanger and Tongs	Each Piece of Link Hanger and Tongs shall be checked as per Para 5.5	If it fails, the individual item shall be replaced.

5.6 INSPECTION:

Inspection of Toe Load Measuring Device against Zonal Railway's purchase order shall be carried out by the Purchaser/Railways or by authorized representative of the Purchaser/Railways. Minimum level of inspecting official shall be SSE.

- 5.7 Compliance of specification shall be verified at the time of inspection.

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6.0 SPARE PARTS & TOOLS:

- 6.1 Each device shall be supplied with 3 sets of tong as spares complete with steel link grip nuts and bolts as per specification and drawings. Hexagonal spare nut to suit the square thread of link hanger to be used during boxing.
- 6.2 Each Device shall be supplied with a complete kit of tools required by the operator in emergency and for normal working of the device.

7.0 WARRANTY AND AMC:

- 7.1 The supplier shall warranty the material covered by the specification to be free from defects in materials, and workmanship under ordinary use and service. His obligation under this warranty shall be limited to replace free of cost those parts which shall be found defective within one year for manufacturing defects and two years for material defects from the date of receipt by the consignee.
- 7.2 During procurement may be go the post-warranty AMC with the manufacturer/supplier for a pre-determined period as decided by the purchaser. This shall be incorporated in the tender document as a condition of contract.

8.0 DOCUMENTATION:

- 8.1 Copies of the maker's certificate guaranteeing the performance of the Device should be supplied in duplicate along with the delivery of each Device.
- 8.2 In order to facilitate subsequent maintenance in service, the manufacturer/ supplier shall supply two sets of schematic diagrams. These shall exhibit clearly the details of the various components.
- 8.3 Frequency of various maintenance operations like servicing overhauling etc. shall be indicated by the supplier.

9.0 MARKING & PACKING:

- 9.1 The device shall be legibly and indelibly marked with:
- i) Name, Contact no., initials and trade-marks of manufacturer.
 - ii) Serial number of device.
 - iii) Month & year of supply.
- 9.2 **Marking:** The Toe Load Measuring Device shall bear the spring constant, initials and marks of the manufacturer.
- 9.3 The device shall be packed in an Iron sheet box of 20 Gauge (1.0 mm thick) provided with proper locking arrangement and carrying handle.
- 9.4 The device shall be supplied packed according to best trade practice.

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