

**GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS**



सत्यमेव जयते

**SCHEDULE TECHNICAL REQUIREMENT (STR)  
FOR MANUFACTURE OF PANTOGRAPHS FOR  
ELECTRIC LOCOMOTIVES**

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**ELECTRICAL DIRECTORATE  
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**SCHEDULE OF TECHNICAL REQUIREMENTS FOR PANTOGRAPHS FOR ELECTRIC LOCOMOTIVES**

**1.0 General:**

- 1.1 This schedule of technical requirements covers the minimum requirement of M&P and testing facilities for development and manufacturing of pantographs for use on 25 kV AC Electric Locomotive.
- 1.2 List of M&P required shall be as per Annexure-I.
- 1.3 Measuring/checking instruments/Gauges / Jig & fixture:  
List of facilities for measurement and gauges required in Vendor's premises shall be as per Annexure-II. The accuracy and capacity of the measuring equipment shall be adequate to meet the requirements.
- 1.4 The measuring equipments / Gauges shall be duly calibrated and the validity of calibration should be verified by checking the calibration certificate issued by the Government Approved/ NABL accredited Calibration Agency from whom it was calibrated.

**2.0 OTHER FACILITIES:**

- 2.1 Trolleys for transportation of material & finished product.
- 2.2 Vendor should have separate area for finished product.
- 2.3 Air Compressor of adequate capacity.

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**ANNEXURE-I**

**IN-HOUSE MANUFACTURING AND TESTING FACILITIES**

**MANUFACTURING FACILITIES**

- 1.0 Facilities for lifting and weighing.
- 2.0 Suitable equipments and facilities for welding.
- 3.0 Suitable equipments and facilities for Tinning/Electroplating.
- 4.0 Suitable equipments and facilities for machining such as turning, drilling, boring and thread cutting.
- 5.0 Fabrication facilities, Vendors should have all the tools and jigs for assembly of Pantographs.

**TESTING FACILITIES**

- 1.0 Accurate surface table for checking of machined surfaces.
- 2.0 Facilities for checking the surface and internal defect on ferrous and nonferrous casting components, such as magna flux crack detector or die penetration testing.
- 3.0 Facilities for Air tightness tests on operating device cylinder.
- 4.0 Facilities for Testing of Static Contact force at different heights of pantograph.
- 5.0 Facilities for measuring of Contact force during raising and lowering operation of pantograph.
- 6.0 Facilities for testing of Load Vs Deflection test of Main Springs and Auxiliary Spring used in different applications, if applicable.
- 7.0 Facilities for testing of Transverse rigidity test at different heights of Pantograph.
- 8.0 Facilities for checking of the operating system of the pantographs at various air pressure with various static weights.
- 9.0 Facilities for endurance Tests with recording type arrangements.

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**ANNEXURE - II**

<b>S. No.</b>	<b>Calibration &amp; Measuring Instruments</b>
1.	Vernier Caliper
2.	Micrometers
3.	Dial bore gauge
4.	Thread gauge
5.	Height gauge
6.	Pressure gauge
7.	Spring Balance or Load cell
8.	Resistance Meter
9.	Weighing Machine
10.	Angle protector
11.	Dial Gauge
12.	Depth Gauge
13.	Hardness Tester
14.	Shore Hardness Tester
15.	Torque Wrench
16.	Bevel protector
17.	Spring tester
18.	Temperature measuring meters.
19.	Thickness Tester
20.	Sprit Level Gauge

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