

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

सत्यमेव जयते

**SCHEDULE TECHNICAL EQUIREMENT (STR)
FOR MANUFACTURE OF AIR COMPRESSOR
FOR ELECTRIC LOCOMOTIVES**

Approved By	Signature
PEDSE	

ISSUED Date : ~~JANUARY 2007~~ NOV 2020**ELECTRICAL DIRECTORATE
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**Schedule of Technical Requirements (STR) for
Air Compressors for Electric Locomotives**

1. General:

~~Indian Railways are procuring Air compressor of different capacity for Electric Locomotives as per RDSO's/CLW's Specifications, called "Specification" hereinafter. The Schedule of Technical Requirements mentioned here under is issued to serve as a guide to the manufacturers (called "the vender" hereinafter), and should be read in conjunction with the above said specification. The vender should satisfy themselves about having complied the requirements of the Specification and the Schedule of Technical Requirements. The Technical Requirements are meant to serve as guideline only and are not exhaustive. This schedule of technical requirements covers the minimum requirement of facilities for development and manufacturing of Air Compressors for use on 25 kV AC Electric Locomotive..~~

~~1.2 The Vendor should have currently valid ISO-9001:2000 certification including the subject item under its range of manufacture.~~

~~1.3 All the machines and measuring instrument/gauges should be properly calibrated when due. Calibration records for verification should be readily available.~~

~~1.4 Vendor should have technically qualified personnel in the field of design, manufacturing & testing of air compressors~~

~~1.5 The Vendor should have highly skilled qualified / experienced artisan for precision grinding, machining, welding, etc.~~

~~1.6 The vendor should preferably have its own Metallurgical & Chemical testing laboratory, otherwise services of a Government approved Test Laboratory can be availed.~~

~~1.7 The Vendor should have their Quality Assurance Plan containing the following as a minimum :-~~

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- a) ~~Organizational chart clearly bringing out the quality control set up.~~
- b) ~~Qualification log sheets of the personnel maintaining the quality control set up.~~
- c) ~~Process flow chart indicating the process of manufacture of compressors.~~
- d) ~~Details of sub-vendors :-~~
- ~~• Name of the item for which sub-vendor is approved.~~
 - ~~• The name of the approving agency.~~
 - ~~• Inspection criteria of the sub-vendor.~~
 - ~~• Whether the sub-vendor has ISO: 9001-2000 Certification.~~
 - ~~• The primary vendor approves QAP of the sub-vendor.~~
 - ~~• Sub-vendor should have submitted the quality manual to the primary vendor.~~
 - ~~• Sub-vendor has all the requisite infrastructure of manufacturing and testing facilities, preferably under one roof.~~
 - ~~• Periodical inspection schedule for sub-vendor is being followed strictly by the primary vendor.~~
- e) ~~The vendor should have full proof system of monitoring the customer complaints including warranty obligations with facility of traceability by the product identification no., locomotive number etc.~~

~~1.8 Quality Assurance System (Inspection & Testing Plan for brought out material)~~

- ~~• Incoming material~~
- ~~• Process control~~
- ~~• System control~~
- ~~• Gauging scheme in the format of each operation gauges should be maintained.~~

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2. Minimum Facilities :

2.1 M & P List of M&P required shall be as per Annexure-I. The list does not specify the capacity and quantity of various M&P which may vary according to the manufacturing capacity of the individual vender.

2.2. Measuring/Checking Instruments/Gauges:

List of facilities for measuring equipments and gauges required in vender's premises shall be as per Annexure-II. The accuracy and capacity of the measuring equipment shall be adequate to meet the requirements.

2.3 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 Calibration Agency from whom it was calibrated.

2.4 Testing and Other Facilities are mentioned in Annexure-III.

2.5 R&D Facilities :

The vender should have R&D facilities to investigate into the various types of failures and evolve necessary remedial measures to avoid failures in future. The vender should have the design details for their compressors which will include their own drawings with permissible tolerances, material specifications, treatment details etc. The vender will also have their own drawing for various assemblies and sub-assemblies.

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ANNEXURE-I**Manufacturing Facilities:**

Following minimum Machinery and Plants are required.

Sl. No.	Details Of Machine
1.	Lathe Machine
2.	Milling Machine
3.	Vertical/Horizontal Boring Machine
4.	Lapping Machine
5.	Horizontal Planer
6.	Vertical drilling Machine
7.	Pillar drilling machine
8.	Tapping tools
9.	Bench Grinding Machine
10.	Hand Grinder
11.	Angle grinder
12.	Tool Grinder
13.	Power Heck Saw
14.	Surface Table
15.	Cranes
16.	Welding Machine
17.	Weighing machine
18.	Honing machine

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ANNEXURE – II**Measuring Equipment/Gauges**

Sl. No.	Details Of Equipments/Gauges.
1.	Barometer.
2.	Outside Caliper.
3.	Inside Caliper.
4.	Vernier Caliper.
5.	Dial Bore Gauge.
6.	Dial Campus. Compass
7.	Dial Indicator.
8.	Combination Set.
9.	Bevel Protector.
10.	Spring Tester.
11.	Thermometer.
12.	Manometer/ Air Flow Meter.
13.	Psychrometer.
14.	Presser Gauges.
15.	Standard Nozzles.
16.	Ammeter.
17.	Volt Meter.
18.	Watt Meter.
19.	Frequency Meter.
20.	Tongue Tester.
21.	Techo Meter. Tachometer
22.	Torque Wrench.
23.	Reservoir.
24.	Stop Watch.
25.	Gauge Block.
26.	Hour Meter.
27.	Filler Gauges.
28.	Radius gauge
29.	Depth gauge
30.	Ring gauge
31.	Groove caliper
32.	Slip gauge
33.	Hardness tester

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Annexure-III**Testing Facilities :**

1. ~~—Facilities for lifting.~~
2. ~~—Suitable equipments and facilities for welding.~~
3. ~~—Accurate surface table.~~
4. Facilities for balancing and alignment checking of crank shaft and connecting rod.
5. Facilities for checking the surface and internal defect on piston pins, crank pin pump sheet and pistons etc. such as magnaflux crack detector **or** ultrasonic testing **or** die penetration testing etc.
6. Facilities for hydraulic testing of intercoolers, manifolds, cylinders, and cylinder heads etc.
7. Test rigs and fixtures for testing of piston rings for flatness, square ness, tension, light leakage and axial distribution tests.
8. ~~—Thermometer, thermocouples and pyrometers for measurement of temperature.~~
9. Pressure gauges and manometers for measurement of pressure/vacuum. and pressure drop testing.
10. ~~Recording type voltmeter, Hour meter, ampere meter & Techno meter/Speedometer, Stopwatch tongue tester, Electro magnetic counter, etc.~~
11. ~~Surface Treatment Facility~~
12. ~~Painting & cleaning facilities.~~
13. ~~Fabrication facilities.~~
14. Environmental Testing Facility.
15. Tilted Condition Testing Facility. (If applicable)
16. ~~Proper storage Facility for Incoming Material.~~
17. ~~Proper storage facility for finished products.~~
18. ~~Stand By Power Generator Facility.~~

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Other Facilities :

1. Surface Treatment Facility
2. Painting & cleaning facilities.
3. Fabrication facilities
4. Proper storage Facility for Incoming Material.
5. Proper storage facility for finished products.
6. Stand By Power Generator Facility.

~~C. R&D Facilities :~~

~~The vender should have R&D facilities to investigate into the various types of failures and evolve necessary remedial measures to avoid failures in future. The vender should have the design details for their compressors which will include their own drawings with permissible tolerances, material specifications, treatment details etc. The vender will also have their own drawing for various assemblies and sub-assemblies.~~

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