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GOVERNMENT OF INDIA

MINISTRY OF RAILWAYS

सत्यमेव जयते

SCHEDULE OF TECHNICAL REQUIREMENTS

OF BRAKE SYSTEM FOR THREE PHASE ELECTRIC LOCOMOTIVES

XXX-2019

Approved By	Signature
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RESEARCH DESIGNS AND STANDARDS ORGANISATION

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Revision History

S.N.	Date of Revision	Page no.	Revision	Reasons for Revision
1.	-	All	0	First Issue Rev '0' Nov'11
2	May' 2019	All	1	DG/RDSO note no. DG/Misc. dated 5.11.18 And Vigilance guidelines

Schedule of Technical Requirements of Brake System for Three Phase Electric Locomotives.

1.0 SCOPE:

This schedule of technical requirements covers the minimum requirement of M&P and testing facilities for development and manufacturing of brake system for use on 3-phase, 25 kV AC Electric Locomotive.

2.0 MANUFACTURING REQUIREMENTS:

2.1 CNC machining & turning centres for machining the various components of the brake system.

2.2 System to calibrate the CNC Machines, testing and measuring equipments and their records. Calibration should be done at least once in a year unless stated otherwise.

2.3 Adequate dry compressed regulated air supply for testing of the air brake valves & brake assemblies on test benches.

2.4 Facility of hot phosphating, Zn plating and anodizing plants to carry out the desired surface treatment processes with accuracy *should be available with vendor or sub vendor.* SCR recommended to add sand blasting facility. Stake holder may furnish their comments.

2.5 Facility of suitable capacity and size to achieve the desired flatness on the main panel plates before assembly.

2.6 Facility for press fitting of bushes in various components.

2.7 Test facilities for checking the Tri plate panel assemblies for internal leakages and also have suitable arrangement for checking air leakage of reservoirs.

3.0 Testing & Measuring Facilities

3.1 Distributor Valve Endurance test bench for one million cycles with application counter.

3.2 Test benches for testing the performance of all type of valves & sub assembly of the total system for Indigenized items of Brake Panel. For imported items OEM test certificate/ Quality certificate is mandatory.

3.3 A separate test bench for testing the complete brake panel in fully assembled condition. This facility should be able to simulate the actual performance conditions of the equipment as in locomotive.

3.4 Firms or Sub Vendors should have separate electronic assembly and test facilities for manufacturing, assembly and testing of the various electronic cards used in the brake control system. The electronic component card manufacturing and testing should be manned by qualified and experienced engineers/technicians to carry out the assembly and testing operations. Electronic cards assembly shall be carried out with precaution against electro static charge. In case electronic cards are not being manufactured in house, firm should have proof of OEM with certificates.

3.5 Adequate number of dimensional gauges with digital readout.

4.0 OTHER FACILITY AND DETAILS

4.1 Rubber/Rubber bonded items should be stored in a dark & dust proof area with humidity and temperature control. The use of these should follow 'first-in-first-out' system.

4.2 Adequate facilities for transportation like fork lifter with pallets, Cranes & hand trolleys etc. should be available for smooth handling of the products during various stages of manufacture and after final assembly.

4.3 Painting booth with facilities of spray painting of air brake equipment should be available.

4.4 The firm should have facility for carrying out Mechanical Shock & vibration tests or alternatively the firm should get it tested from a Government approved laboratory and submit the test certificate to RDSO for approval.

5.0 LABORATORY & TESTING FACILITIES.

5.1 Testing Machines

a) Spring Load testing machine to check various springs.
b) Hardness testing machine for checking hardness of casting and forging items (Rockwell and Brinell Hardness Testing Machine). *Testing from the NABL accredited lab may be considered.*
c) Shore Hardness tester for checking the hardness of rubber items.
d) Pressure gauge calibrator for calibration of Pressure gauges.
e) UTM (for checking tensile strength & elongation of the rubber slabs). *Testing from the NABL accredited lab may be considered.*
f) Profile Projector to check the profile of components.
g) Salt Spray test equipment for checking the plating/coating life. *Testing from the NABL accredited lab may be considered.*
h) Industrial Endoscopy Machine.
i) Coating thickness measuring instrument.
j) Surface roughness tester.

5.2 Measuring and calibrating Instruments

a) Surface Plate.
b) Vernier Callipers with dial and digital indicators.
c) Set of Gauges for measuring critical dimensions.
d) Digital Surface finish tester.
e) Digital Vernier type Height gauges.
f) Inside micrometers with digital readouts.
g) Outside micrometers with digital readouts.
h) Digital thickness tester for rubber items.
i) Digital three points bore gauge.
j) Plating / coating thickness gauge for checking layer of phosphating and plating.
k) Air pressure gauges of adequate capacities.
l) Three dimensional Co-ordinate measuring machines.

5.3 Test Benches

a) Test bench and leakage test stand for Distributor valve and the brake control unit.

b) Test bench for performance test of various brake valves individually.

c) Test bench for different type of Check Valves.

d) Loco simulation test rack for testing of complete brake system assembly including the "Input/output" electrical signal tests along with Blending signals & various traction signals required for proper functioning, including followings:

i. Cab activation signals.
ii. Parking Brake signals.
iii. Battery Positive & Negative Signals.
iv. Isolating cocks feedback signals.
v. Dynamic braking signals.
vi. Vigilance related signals.
vii. Brake blending signals.
viii. Different pressure feedback signals.
ix. Pneumatic braking effort demanding signals.
x. Speed inhibited signals.
xi. To bail off signal of Auto BC in Regenerative braking mode (DBI signal).
xii. To bail off Auto BC when PVEF is pressed except emergency brake application.
xiii. Emergency Brake pressure switches indication (Traction interlock).

e) Test facilities for testing of various PCBs in case of manufacturing in house otherwise test certificate from PCB manufacturer is mandatory.

f) Facility of testing/setting of various pressure switches as per RDSO SMI-0327.

g) SCR recommended to add following facility. Comments to be furnished:

The test facility shall be able to create various faults which are possible for logging in the brake system (DDS) in addition to the faults which will be logged in DDS of VCU. This will enable sheds to test the software integrity of the stand alone brake system.

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