Government of India
Ministry of Railways

QMS-14:2009
(Revision 0)

Infrastructure, manufacturing, testing & quality control requirements
For
Air Brake equipment for Carriage & Wagon Stock
(Specn. 02-ABR-02)

Inspection & Liaison Directorate
Research Designs & Standards Organisation
Manak Nagar Lucknow – 226011

March'2009 (Price Rs. 600/-)

1.0 SCOPE

1.1 The schedule of technical requirements covers the norms for manufacture of air brake equipment for coaching & wagon stock.

2.0 GENERAL & MANUFACTURING FACILITIES

The vendors seeking approval shall comply with all the below mentioned requirements.

2.1 Covered area with adequate space for Machine shop, Assembly Section, Performance test benches, Plants, Standards Room, Laboratory, storage of raw material and finished product should be available. The area earmarked for Assembly, Performance Test Benches, Standards Room and Laboratory should be air-conditioned and dust proof.

2.2 CNC machining centres and turning centres are essential for machining of distributor valve components. Minimum two such complete machining centres should be available.

2.3 Ensure that a system exist to calibrate the CNC Machines and record is maintained.

2.4 The rest of the components of the air brake sets should be machined at least on machines equipped with digital positional readouts. CNC machines are, however, certainly preferable for these components also. Adequate machining facilities for carrying out various machining operations like turning, facing, boring, milling, drilling, tapping and grinding should be available. The number of machines involved and detailed activities of the operations done on each machine should be indicated in the process flow chart along with the accuracy of the machine.

2.5 Adequate dry compressed air should be available at a minimum pressure of 10kg/cm^2 in the shop pipe line for testing of the air brake components on test benches. Suitable air dryers should be essentially installed in the air pipeline.

2.6 One hot phosphating & wax coating plant with suitable range temperature controller with digital display hooters & clocks should be available on each tank.

2.7 A high-pressure water jet arrangement should exist for cleaning of machined components before surface treatment.

2.8 Means should exist for fitting of bushes in various components by cooling and shrinkage method. However, the process of fitting each bush should be incorporated in the detailed process given in QAP.

2.9 A pressure-controlled device with suitable fixture should be available for fitting of air hose couplings & their clamping.

2.10 Minimum two nos. hydraulic pressure-testing machines of capacity 20kg/cm^2 to conduct hydraulic tests of air reservoirs should be available.

2.11 Minimum three hydraulically operated Pipe Bending Machines and an adequate number of Profile Fixtures should be available for forming and checking bends of Pipes.

2.12 The facility for checking the leakage in pipes and associated flange fittings with hydraulic pressure should be available.

2.13 One Endurance Test Stand each for one million cycles for wagon Distributor Valve and 5000 cycles for Passenger Distributor Valve with application counter and hour meter should be available.

2.14 A well-equipped Standards room should be an integral part of manufacturing premises. Cut and working models of all air brake components, elaborate diagrams and wall charts of the sub-assemblies along with complete technical literature should be available.

2.15 Ensure that adequate number of dimensional gauges with digital readout is available and these are calibrated at adequate intervals. Use of GO NO-GO gauges should be minimised essentially, in maintaining the dimensional accuracies in Distributor Valve.

2.16 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.

2.17 For smooth handling of the products during various stages of manufacture and after final machining, adequate facilities for transportation like fork lifter with pallets & hand trolleys etc. should be available.

2.18 Storage and movement of material should be palletised.

2.19 A name plate punching machine for perparing plates indicating the serial number & date of manufacturing to be fixed on air brake components should be available.

2.20 A painting booth with facilities of spray painting of air brake equipment should be available.

2.21 A system for packaging of ready material in pre-moulded thermocoal shock proof containers should exist. The cavity in the container should conforms to the shape of the component being packed in it and the component should fit in the cavity snugly.

3.0 QUALITY CONTROL REQUIREMENTS

3.1 There should be a system to ensure the traceability of the product from raw material stage to finished product stage. The system should help in identifying the raw material details – supplier, inspection details etc. from the finished product stage.

3.2 Ensure that the in-charge of the Quality Control Section is having a qualification of minimum engineering bachelor's degree in the relevant field & have min. 5 years experience or a diploma holder with min. 12 years experience. He should be actively involved in day-to-day activities of quality control/stage inspection/compliance of QAP etc.

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

3.4 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.

3.5 Ensure that proper analysis is being done on every rejection to study the rejection at various internal stages and it is documented. Out come of such analysis should result in better quality of product.

3.6 Ensure that all the latest versions relevant specifications, IS standards are available with the firm.

3.7 Ensure that adequate covered area for storage of final product, awaiting inspection is available and earmarked.

3.8 Ensure that proper record of complaints received from users (Railways) is being maintained and corrective action is taken. There should be a Service Department in the organization to follow up and address the customer complaint. Confirmation of complaint attention should be obtained and records maintained.

3.9 The record of calibration of gauges should be computerised in order to have fail-proof follow up action about their performance. A master recall regime should be in place to ensure that overdue calibration gauges do not continue in service.

3.10 A well-defined, adequate and objective system for vendor approval and their periodic appraisal should be in place. The records of vendor performance should be computerised in order to have quick follow up action based upon their performance. All sub-vendors should be approved by RDSO.

3.11 A system should exist to have control on product, process engineering and drawings.

3.12 In order to ensure the quality of the product, the Quality Control organisation should be independent from the responsibilities of the manufacturing. The head of Quality control should be directly reporting to the plant head.

3.13 A Quality Assurance Plan indicating following aspects should include:

(a) Organisation chart
(b) Inspection parameters
(c) Stage inspection details
(d) Process flow chart
(e) Control on non-conformities

3.14 Stage inspection parameters should be identified and adhered to. Work instructions should be displayed on machines in local language.

3.15 There should be a system to impart training to the technical staff in regard to knowledge of the product, change in drawings, customer complaints/failures and to control non-conformities.

3.16 Documentation for testing of incoming raw material with TC reference of supplier and audit checking from outside agency.

4.0 LABORATORY & TESTING FACILITIES

4.1 To have effective control on the quality of the product, the firm should have minimum one number of the following testing machines:

(a) Spring Load testing machine to check springs of DV, Check Valve, Emergency brake valve, Pull box & 8" brake cylinder.	**Vital**
(b) Hardness testing machine for checking hardness of casting and forging items (Rockwell and Brinell Hardness Testing Machine).	**Vital**
(c) Shore Hardness tester for checking the hardness of rubber items.	**Vital**

(d) Dead weight pressure gauge calibrator for calibration of Pressure gauges. **Essential**
(e) UTM (for checking tensile strength & elongation of the rubber slabs). **Essential**
(f) Dumbell cutting machine for rubber items. **Essential**
(g) Profile Projector to check the profile of components **Desirable**
(h) Salt Spray test equipment for checking the plating/coating life. **Essential**

4.2 In addition to above machines, the standards room should also have a minimum of two nos. of the following instruments:

(a) Surface Plate **Vital**
(b) Vernier Caliper of 8" & 12"with dial indicator **Vital**
(c) Four sets of gauges for measuring critical dimensions as defined in the QAP. One should be preserved as a master gauge set, one should be used in Standard room and two should be for regular use on shop floor. **Vital**
(d) Digital Surface finish tester **Essential**
(e) Digital Vernier type height gauges **Essential**
(f) Inside micrometers with digital readouts **Essential**
(g) Outside micrometers with digital readouts capable of measuring up to 100mm. **Essential**
(h) Digital thickness tester for rubber items **Essential**
(i) Digital three point bore gauge capable of measuring up to 400mm ID. **Essential**
(j) Plating/Coating thickness gauge for checking layer of phosphating **Essential**
(k) Multi channel recorder **Desirable**
(l) Air gauges of adequate capacity **Desirable**
(m) Three dimensional Co-ordinate measuring machine **Desirable**

4.3 Test Benches

To monitor the performance and conduct the leakage test of distributor valve & other sub-assemblies, it is mandatory to have following test benches equipped with 6" dial pressure gauges having a least count of 0.05 kg/cm^2. All test bench installations should be essentially leak proof and renovated from time to time.

(a) Minimum two nos. test benches and leakage test stands for Distributor Valve (for wagon & coach).
(b) Test bench for Leakage test for common pipe bracket with control chamber (for wagon & coach).
(c) Test bench for Air Hose Assembly (for wagon & coach).
(d) Test bench for Angle Cock (for wagon & coach).
(e) Test bench for Dirt Collector (for wagon & coach)
(f) Test bench for 14: Brake Cylinder (for wagon & coach)
(g) Test bench for Pull box and emergency brake valve (for coach)

(h) Test bench for Check Valve (for coach)
(i) Test bench for Drain Cock (for coach)
(j) Test bench for 8” Brake cylinder (for coach)
(k) Hydraulic test fixture for air reservoir (for wagon & coach).