

INDIAN RAILWAYS



Document content	Technical Specification-	Yes
	Schedule of Technical Requirement	Yes
Description of item	SPECIFICATION FOR DISTRIBUTOR VALVE WITH RELAY VALVE FOR AIR-BRAKE SYSTEM OF PASSENGER STOCK ON INDIAN RAILWAYS	
Remarks	Nil	

S. No.	Month/Year of Issue	Revision/Amendment	Page No.	Reason for Amendment
1.	August, 2002	-	-	First issue
2.	March, 2007	Amendment-1		Amendment-1 along with Corrigendum has been incorporated
3.	September, 2016	Amendment-2	3	To include the ISO Doc. No.QO-D-7.1-11, New sub clause No.1.2 added under clause no.1 of scope
4.	November, 2020	Rev.1	3 & 7	To make the specification more enabling with focus on functional requirements

Issued By:
Carriage Directorate
Research Designs and Standards Organization
Manak Nagar, Lucknow - 226011

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

INDEX

S.No.	Description	Page No.
1.	Scope	3
2.	Particular Requirements	3
3.	Equipment Design	4
4.	Material	4
5.	Performance Requirements	5
6.	Developmental Inspection	5
7.	Purchase Inspection	6
8.	Tests	6
9.	Warranty / Guaranty	8
10.	Painting	8
11.	Packing	8
12.	Appendix – I	9

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

Specification for Distributor Valve with Relay Valve for Air-Brake System of Passenger Stock on Indian Railways

1. SCOPE

1.1 This specification covers the technical requirements related to the performance, Inspection and testing of Distributor Valve with relay valve conforming to UIC specification No. 540,541-1 & 547. The specification also covers adaptor with isolating cock, Pipe bracket with Control Reservoir and gasket used on Air- brake system, of passenger stock and does not include other necessary provisions of the contract.

1.2 General:

1.2.1 Following shall be applicable when this item appears in RDSO's vendor directory:

“All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-7.1-11 dated 19.07.2016 (titled “Vendor-Change in approved status”) and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.”

1.2.2 The Govt. of India policy on 'Make in India' shall apply.

2. PARTICULAR REQUIREMENTS

2.1 Manufacturers willing to supply Distributor Valve, including adaptor with isolating cock, Pipe bracket with Control Reservoir and gasket for the use of Indian Railways shall register themselves with RDSO.

2.2 Manufacturers should provide evidence of technology received from principal as provided in para 3.1 and submit the same to RDSO.

2.3 The manufacturer would get all drawings/ specifications approved by principals/RDSO. The master list of drawings and specifications will also require the approval of RDSO.

2.4 The manufacturers shall have adequate facilities as listed in ~~IL:14:2000~~ **QMS:14:2000** for the manufacture and assembly of distributor valve including adaptor and Isolating cock, pipe bracket with control reservoir and gasket conforming to the laid down design and drawings. The manufacturer shall have facility for inspection and testing of individual components and assembly to ensure that these are manufactured strictly to the laid down design and quality standards.

2.5 Manufacturers shall have a well-documented 'Internal Quality Assurance System' to ensure sustained quality of products being manufactured. The Quality Assurance System' shall also cover the following.

2.5.1 The components shall be identified as imported, in house manufactured, semi-finished purchased from sub-let vendor, finished components purchased from sub-let vendor other than rubber item, rubber items and standard hardware item.

2.5.2 The system to ensure that correct raw material is being used for the components manufactured in house, purchased as semi-finished and purchased as finished.

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

- 2.5.3 System to ensure that components having manufacturing defects are identified and destroyed so that such components are not used during assembly.
- 2.5.4 System to ensure that bought-out components, finished or semi-finished are strictly as per requirement laid down in the specifications / drawings.
- 2.5.5 System to maintain strict control of dimension and workmanship of the components and assembled product.
- 2.5.6 Systems to test and establish that the items manufactured by the firm conform to the laid down requirements and meet the requirements of the relevant UIC specifications.
- 2.5.7 System of periodical calibration of the equipment gauges to ensure accuracy of the product.

3. EQUIPMENT DESIGN

3.1 Distributor Valve including adaptor and isolating cock.

3.1.1 The distributor valve design with Relay Valve will require the approval of RDSO. The design of the distributor valve should be proven and should have been obtained from a principal whose distributor valve with graduated release feature is approved by UIC. The following designs of distributor valve with relay valve are acceptable at present.

- Type KE1 of Knorr Bremse, Germany.
- Type C3W with or without relay valve of M/s SAB WABCO (Now M/s Faiveley Transport).
- Type SW4 with integral relay valve of M/s Faiveley Transport, France.
- Type C3W with Rel-10 relay valve of M/s Stone India Ltd., Kolkata.
- Type P4a with integral relay valve of M/s Westing House, UK.

3.1.2 The equipment shall be manufactured indigenously strictly to the laid down quality standard as per para 2.3. No change shall be done without the approval of RDSO.

3.2 Pipe bracket with Control reservoir and Gasket.

3.2.1 The general design and controlling dimensions of pipe bracket with Control reservoir and gasket shall conform to the latest revision of RDSO Drg.No.WD9-7951-S-10 and WD-83062-9-01 respectively.

3.2.2 The pipe bracket with control reservoir and gasket shall be manufactured indigenously strictly to the laid down quality standard as approved by RDSO.

4. MATERIAL

4.1 The material of distributor valve body shall be Aluminum to the grade and specification as recommended by the principal manufacturer / collaborator. The material for other Items, pipe

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

bracket with control reservoir and gasket shall be to the specification laid down by the principal manufacturer / collaborator.

5. PERFORMANCE REQUIREMENTS

- 5.1 The distributor valve shall be graduated release type and its performance shall conform to the latest revision of UIC specification 540, 541-1 and 547 for passenger train application.
- 5.2 The distributor valve shall be suitable for operation with the following locomotive brake control system
- 26 LV-1
 - 28 LAV-1
 - Dual Air Brake System of WSF
 - IR-AB-1 / IR-AVB-2 system of Indian Railways
- Note:- Details of Loco Brake System can be obtained from DG / Motive Power, RDSO, Lucknow.
- 5.3 The Distributor Valve shall also be suitable for fitment / operation with 25 mm. Brake / feed and 20 mm branch pipes and joints to RDSO specification No. 04-ABR-94.
- 5.4 The Distributor valve shall have fixed "P" position and shall cater for underframe mounted brake system of coaches with two 355 mm bogie dia. brake Cylinders and / bogie mounted brake system of coaches used on IR with four 203 mm dia. brake cylinders / Axle mounted Disc Brake for LHB coaches with eight 255 mm dia. Brake cylinder. Maximum brake cylinder pressure of Axle mounted Disc brake system shall be as per RDSO Specification no. RDSO/2011/CG-04 (Rev.1 or latest).
- 5.5 The Distributor Valve shall be suitable for fitment with pipe bracket and gasket to RDSO Drg.No.WD9-7951-S-10 and WD-83062-S-01 respectively.
- 5.6 The Distributor Valve body shall be, provided with appropriate size of casting tag at appropriate location so that it can be chipped off when required after fitment of the same on the coach.
- 5.7 The Distributor Valve shall be suitable for obtaining maximum brake cylinder pressure of $3.8 \pm 0.1 \text{ kg/cm}^2$ at full application. The maximum brake cylinder pressure should not increase even if the control reservoir pressure and the brake pipe pressure increase.
- 5.8 Vertical and horizontal position of the handle of isolating cock shall indicate open and closed position respectively.
- 5.9 The distributor valve offered shall be suitable to function with electro-pneumatic system if so required at a later date. This shall be possible without any major modification to the proposed distributor valve.

6. DEVELOPMENTAL INSPECTION

- 6.1 The developmental inspection shall be carried out at the time of registration of the firm with RDSO, and at the time of renewal of registration. In addition to the other requirements for registration, the Inspecting authority shall verify that the manufacture of the distributor valve is strictly controlled by

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

the 'Internal Quality Assurance System' conforming to the laid down and its components are in conformity with laid down specification and drawings.

- 6.2 Three nos. prototype Distributor valves shall be submitted to RDSO at the time of registration of the firm. Only one Distributor valve randomly selected out of three shall be subjected to performance test as per para 8.1 at RDSO and endurance test as per Annexure-I at RDSO or at the firm's premises in the presence of authorised representative of Inspecting Authority. However, at the time of renewal of registration of the firm the DV shall be tested for performance requirement mentioned in para 8.1 at firm's premises.

7. PURCHASE INSPECTION

- 7.1 The purchase inspection shall be carried out at the premises of the manufacturers who are cleared for the regular manufacture and registered with RDSO. The following procedure shall be followed: -
- 7.1.1 The Inspecting authority shall make audit checks of the manufacturing procedure / 'Internal Quality Assurance System' to ensure that the lot offered for inspection is manufactured strictly as per 'Internal Quality Assurance System' and the manufacturer has carried out all the tests / inspection during manufacturing stage to ensure that the items are manufactured strictly to the specification / drawing and quality standard of the collaborator.
- 7.2 Inspection Authority will ensure that endurance test at the rate of 6-10 cycle per minute on 100% of the DV's for 5000 cycles are being carried out by the manufacturer before offering for inspection. It shall be ensured during the endurance testing that the BC pressure gauge of endurance testing machine is registering 3.8 ± 0.1 Kg/cm² in each brake application and not more than 1.0 Kg/cm² pressure in each brake release. After having satisfied the quality standards, ten percent of each lot of 100 distributor valve shall be tested as per procedure given in para 8.1. Twenty-five percent of each lot of 100 pipe brackets with control reservoir and gasket in the assembled condition shall be tested at per procedure given at para 8.2.
- 7.3 One distributor valve will be opened and checked with respect to all dimensions mentioned in the drawings every three months.
- 7.4 Once in every year or every contract two distributor valves shall be subjected to endurance test as per the procedure given in Appendix-I.

8. TESTS

- 8.1 The distributor valve shall be mounted on the test bench and tested for the following features. All the test shall be conducted with twin pipe system.

S.No.	Check	Specified Values	As Observed
8.1.1	<u>Charging Time</u> a) Time for auxiliary reservoir (AR) pressure to rise from 0 to 4.8 kg/cm ² b) Time for Control reservoir (CR) pressure to rise from 0 to 4.8 kg/cm ² . Charging of AR and CR to be done at air pressure of 5 Kg/cm ² by brake pipe only		

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

8.1.2	<u>Leakage Test</u> Leakage from mounting of sub- assemblies during i) Release ii) Service Application iii) Emergency	No leakage No leakage No leakage	
8.1.3	Brake Cylinder (BC) filling time from 0 to *3.6 kg/cm ² under service and emergency application with two brake cylinders of 355 mm dia.	3 - 5 Sec	
8.1.4	Brake Cylinder (BC) filling time from 0 to *3.6 kg/cm ² under service and emergency application with four brake cylinders of 203 mm dia.	3 - 5 Sec	
8.1.5	Brake Cylinder draining time from 3.8 to 0.4 kg/cm ² after service and emergency application with two brake cylinders of 355 mm dia.	15 - 20 Sec	
8.1.6	Brake Cylinder draining time from *3.8 to 0.4 kg/cm ² after service and emergency application with four brake cylinders of 203 mm dia.	15 - 20 Sec	
8.1.7	Maximum Brake Cylinder pressure under service and emergency application.	*3.8 +/- 0.1 kg/cm ²	
8.1.8	<u>Sensitivity Test</u> Response of brakes when Brake pipe (BP) pressure is reduced at a rate of 0.6 kg/cm ² in six. Seconds when BP is isolated from main reservoir.	Brake should apply within 6 Sec	
8.1.9	<u>Insensitivity Test</u> Response of brakes when Brake pipe (BP) pressure is reduced at a rate of 0.3 kg/cm ² in 60 seconds when BP is isolated from main reservoir.	Brake should not apply	
8.1.10	<u>Refeeding Test</u> Response of valve when Brake cylinder pressure is slowly exhausted.	Refeeding should be available	
8.1.11	Brake Cylinder pressure attained when Brake pipe pressure is reduced in steps (at least seven steps).	-	
8.1.12	Maximum brake cylinder pressure at full application.	*3.8 +/- 0.1 kg/cm ²	
8.1.13	Brake pipe pressure when cylinder pressure is 0.4kg/cm ² .	4.85 kg/cm ² approx.	
8.1.14	Automatic exhausting of Brake Cylinder and Control reservoir test of quick release valve.	CR & BC pressure should automatically exhaust to zero.	

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

8.1.15	<u>Overcharge Protection</u> Overcharge Brake Pipe (BP) to 6 Kg/cm ² after full service "application"	Control Reservoir (CR) Pressure should not rise within 10 sec	
--------	---	--	--

Note:

- i. In case of any ambiguity regarding parameters above, UIC-540,541-1 & 547 provisions shall be used for guidance.
- ii. * For LHB DV, the provision of RDSO Specification no. RDSO/2011/CG-04 (Rev.1 or latest) shall be applicable.

Note:- Specified values of test Indicated at para 8.1.1(a), 8.1.1(b) & 8.1.9 shall be furnished by the manufacturer and approved by RDSO.

8.2 The Pipe bracket with control reservoir and gasket shall be mounted on a suitable test stand and tested for leakage at 10 kg/cm² air pressure. There shall be no leakage.

9. WARRANTY / GUARANTEE

The warranty / guarantee period will be 60 months from the date of supply or 48 months from the date of commissioning whichever is earlier for the distributor valve. In case a distributor valve with relay valve fails within the warranty, it shall be replaced by a new distributor valve.

10. PAINTING

The distributor valve with Relay Valve including adapter with isolating cock and pipe bracket with control reservoir shall be given suitable anti-corrosive treatment and the exterior excluding the flange faces shall be painted with black enamel paint.

11. PACKING

The manufacturer shall ensure that all-external ports of distributor valve and pipe bracket shall be suitably covered with protector caps and the complete assembly shall be adequately packed before dispatch to prevent damage in handling and storage.

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

APPENDIX - I**Scheme for Conducting Endurance Test on Distributor Valve**

The endurance test shall be conducted at the rate of 6-10 cycle per minute and the procedure to be followed for conducting endurance test on Distributor Valve to check the performance of distributor valve and rubber items are given below. It shall be ensured by inspecting authority during the endurance testing that the BC pressure gauge of endurance testing machine is registering 3.8 ± 0.1 Kg/cm² in each brake application and not more than 1.0 Kg/cm² pressure in each brake release.

1. The Inspecting authority shall select two DV's out of a lot of not less than 20 DV for endurance test and must put an identification mark on the DV.
2. Tests these DV one by one in the DV test rig and check all the parameters indicated below and record the values.
 1. Charging time for AR.
 2. Charging time for CR.
 3. Full service application time.
 4. Release time after full service application.
 5. Max. Brake Cylinder pressure after full service.
 6. Protection against overcharging of CR.
 7. Sensitivity.
 8. Insensitivity.
 9. Graduated application.
 10. Pressure tightness in brake released & applied condition.
 11. Graduated release
 12. Refeeding test.

These values should be strictly to UIC standard / manufacturer's / principals standard.

3. The DV and the counter of the testing machine shall be properly sealed to prevent any tampering during the course of testing. DV shall not be displaced or attended without permission of Jt. Director (I&L) and as per procedure of this scheme.
4. Conduct endurance test under accelerated condition upto 1 lakh brake applications and release.
5. After 1 lakh brake application and release the DV shall be removed from the testing machine in the presence of authorized representative of Inspecting Authority and all the tests indicated at para 2 above shall be conducted on the DV test rig.
6. If there is no significant variation in the values of test conducted with the values at the start of endurance test, the DV shall be again fitted back on the endurance test machine and the test continued upto 5 lakh of brake applications and release. If major variation is found, the DV shall be examined in detail and reasons for variation recorded. The test will end at this point if defects are due to failure of rubber components. Otherwise the DV shall be repaired and again put up on next stage of test.

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage

7. After 5 lakh of brake application and release, remove the DV from the testing machine in the presence of authorized representative of Inspecting authority and conduct all the test indicated at para 2 above on the DV test rig.

If major variation is found, the DV shall be examined in details and reasons recorded. The test will end at this point if defects are due to failure of rubber components. Otherwise repair the DV and again put up on next stage of test.

8. If there are no significant variations in the values of test conducted now with the initial test values, the DV shall be fitted back to the endurance test machine and the test continued upto 10 lakh brake applications and release.
9. After 10 lakh brake applications and release, the DV shall be removed in the presence of authorized representative of Inspecting Authority and all tests indicated at para 2 above will be carried out on the DV test rig and values recorded. There shall be no significant variation of the value obtained now from the initial test values. Similarly, second DV shall be tested for endurance.
10. Both the DV's shall then be dismantled in the presence of authorized representative of the Inspecting Authority and the rubber components examined. If there are no damages, the components and DV can be considered to have passed the endurance test by Jt. Director (I&L). The position shall be advised to RDSO, Lucknow.
11. In case during the course of the test the DV becomes defective, the matter should be referred to the Inspecting authority. The DV shall be removed in the presence of Inspecting Authority representative and dismantled. Items found defective shall be identified. If the failure has been on account other than failure of rubber components the fault may be rectified and the test can be continued till 10 lakh brake applications and release are completed as explained above after the DV is properly sealed.

Signature			
Name & Designation	Prepared by: D Kulshrestha JE/Carriage	Checked by: S.K.Singh SSE/Carriage	Approved by: S K Sharma Director/Carriage