(केवल कार्यालय प्रयोग हेतु)
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भारत सरकार . रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

डीजल एवं इलेक्ट्रिक लोकोमोटिव के IRAB ब्रेक सिस्टम में प्रयोग हेतु ब्रेक वाल्व (एन–1 रिड्यूसिंग वाल्व, ए–9 ऑटोमैटिक ब्रेक वाल्व C-2W रिले वाल्व 5mm/6mm चोक के साथ, 24ए–डबल चेक वाल्व और C-3W डिस्ट्रीबूटर वाल्व कंट्रोल रिसर्वोयर की विशिष्टि और तकनीकी आवश्यकताओं की अनुसूची

Specification & Schedule Of Technical Requirements for Brake Valves (N-1 Reducing Valve , A-9 Auto Brake Valve, C-2W Relay Valve With 5mm / 6mm Choke, 24A-Double Check Valve & C3W Distributor Valve With Control Reservoirs) For Its Use In IRAB Brake System Fitted On Diesel And Electric Locomotives

विशिष्टि संख्या एम.पी.0.01.00.15 (संशो.– 03)

अप्रैल – 2024

SPECIFICATION NO. MP.0.01.00.15 (REV- 03)

April-2024

अनुसंधान अभिकल्प एवं मानक संगठन
लखनऊ –226 011
RESEARCH DESIGNS & STANDARDS ORGANISATION
LUCKNOW - 226 011

LIST OF AMENDMENTS

S. No	Amendment Date	Rev.	Revised Para	Details
1.	September '2022	2	1, 4, 7	Para has been revised to include scope of other brake valves (A-9 Auto brake valve, C-2W relay valve with 5mm/6mm choke, C3W Distributor valve with control reservoirs & 24A-Double check valve)
			3.1.2.2	Ambient temperature has been revised in ref. to comments received from Electrical Dte
			3.1.3	Para has been revised to include alternate vibration method (as given in the earlier revision of specification). Accordingly, para has been revised.
			5	i The para 5 has been revised to include detail of technical requirements of other brake valves. ii Technical Requirements details of N-1 Reducing Valve is shifted from para 5 to Annexure-I.
			6	i The para 6 has been revised to include detail of Performance Test of other brake valves. ii Performance test details of N-1 Reducing Valve is shifted from para 6 to Annexure-I.
			7.2	Para has been revised for clarity.
			7.3, 7.4	Para has been revised for clarity.
			9.1.1	Deleted in view of duplication of para 9.1.8
			10	Addition of new Para to include STR requirements.
			Annexure-I	Technical Requirements and Performance Test of N-1 Reducing Valve is shifted from para 5 & 6 to Annexure-I.
			Annexure-II	Technical Requirements and Performance Test of A-9 Automatic Brake Valve has been Added.
			Annexure-III	Technical Requirements and Performance Test of C-2W Relay Valve with 5 mm/6 mm choke has been Added.
			Annexure-IV	Technical Requirements and Performance Test of 24A-Double check valve has been Added.
			Annexure-V	Technical Requirements and Performance Test of C3W Distributor Valve has been Added.
2.	April - 2024	3	1.6, 1.8 & drawing of Annexure IV	Para has been revised to update drawing no. SK.DP-4161 with Alt.1.
			2 of Annexure V	Para has been revised to incorporate the detail in testing procedure of C3 W distributor valve for better understanding.
			10	Para deleted & shifted to Part –B of this document. Accordingly para 11, 12 & 13 shifted to one place above & re-numbered.
			3 of Annexure V &Annexure VI	Detail of endurance test on C3W Distributor Valve has been added.
			7.1, 7.2	In view of M. P. Dte's note dt.19.03.2024, regarding "Vendor Approval Process ensuring transparency and competition' & Para 4.3.5.1.1 of ISO document QO-D-8.1-10 ver. 2.4, the para 7.1 has been revised & para 7.2 has been deleted. Accordingly para 7.3 to 7.8 have been shifted to one place above & re-numbered 7.2 to 7.7
			7.8	The document referred for Quantity of the valve for field trial and field trial period has been obsolete. The qualifying quantity and period is mentioned in UVAM. Accordingly, the para has been revised & re-numbered as 7.7 due to deletion of para 7.2
			2.7, 3.4, 4.1, 4.3, 4.6, 7.3, 7.7, 12, 1.9 of Annex-I & IV, 1.11 of Annex-II & 1.10 of Annex-III	Para has been revised to keeping in view of probable change in vendor approving agency.

CONTENTS

PART A- Specification for Brake Valves (N-1 Reducing Valve , A-9 Auto Brake Valve, C-2W Relay Valve With 5mm / 6mm Choke, 24A-Double Check Valve & C3W Distributor Valve With Control Reservoirs) for its use in brake system fitted on diesel and electric locomotives

PART B - Schedule of Technical requirements for Brake Valves (N-1 Reducing Valve , A-9 Auto Brake Valve, C-2W Relay Valve With 5mm / 6mm Choke, 24A-Double Check Valve & C3W Distributor Valve With Control Reservoirs) for its use in brake system fitted on diesel and electric locomotives

PART – A

Specification for Brake Valves (N-1 Reducing Valve , A-9 Auto Brake Valve, C-2W Relay Valve With 5mm / 6mm Choke, 24A-Double Check Valve & C3W Distributor Valve With Control Reservoirs) for its use in brake system fitted on diesel and electric locomotives

1. SCOPE:

This specification covers the purchase, acceptance and technical requirements related to the performance, inspection and tests of brake valves (N-1 Reducing valve, A-9 Auto brake valve, C-2W relay valve with 5mm choke & 6mm choke, C3W Distributor valve with control reservoirs & 24A-Double check valve) conforming to existing approved design. This valve is used in the twin pipe graduated release type brake system fitted on diesel and electric locomotives of Indian Railways.

2. DEFINITIONS

2.1 Tenderer -means firm/company from whom the offer for the supply of this air brake equipment is invited.

2.2 Contractor**-** means the present firm/company on whom the order for the supply of this air brake equipment is placed.

2.3 Purchaser- means the Indian Railways on behalf of the President of the Republic of India who are purchasing this air brake equipment.

2.4 Inspecting Authority- means the organisation or its representative nominated by the purchaser to inspect this air brake equipment.

2.5 The Research Designs and Standards Organization, Manak Nagar, Lucknow- 226011 is hereafter referred to as RDSO.

2.6 Indian Railways is hereafter referred to as I R.

2.7 In case, tenderer needs any clarification with respect to any clause of this specification or drawings, the tenderer may contact Motive Power Directorate, RDSO/Vendor Approving Agency.

3. GENERAL CONDITIONS:

3.1 Service Conditions

3.1.1 The valve/equipment shall be capable of operating efficiently inspite of dust, dirt, mist, torrential rains, sand storm and presence of oil vapours to which the locomotive is normally exposed in service.

3.1.2 The valve/equipment shall be capable of working satisfactorily under the site conditions indicated below:

.1 Altitude : Mean sea levels to an altitude of 1000m.

.2 Ambient temperature : - 10 ^{0}C to 55 ^{0}C. The air temperature in-side the equipment compartment may reach up to 70 ^{0}C.

.3 Relative Humidity : Up to 100%.

3.1.3 The valve/equipment with mounting arrangement shall be able to withstand the vibrations and shocks normally encountered during service. The conditions are indicated below:

Maximum vertical acceleration	1.0g.
Maximum longitudinal acceleration	3.0g.
Maximum transverse acceleration	0.5g.

('g' being acceleration due to gravity)

Or

Vibration testing shall be done in accordance with IEC-61373 (Category 1, Class A) or equivalent Indian Standards

3.2 Warranty

3.2.1 The contractor shall warrant the valve/equipment furnished hereunder, shall be free from all defects and faults in material, workmanship and manufacture and shall be of the highest grade.

3.2.2 The Warranty/Guarantee period will be 36 months from the date of delivery or 24 months from the date of commissioning whichever is earlier.

3.2.3 The contractor shall, if required, replace or repair the goods or such portion thereof as is rejected by the purchaser free of cost at the ultimate destination or at the option of the purchaser the contractor shall pay to the purchaser value thereof at the contract price.

3.2.4 All replacements and repairs that the purchaser shall call upon the contractor to deliver or perform under this warranty shall be delivered and performed by the contractor within six months (promptly and satisfactorily). If the Contractor so desires, the replaced parts can be taken over by him or his representative for disposal as he deems fit within a period of three months from the date of replacement of goods/parts. At the expiry of this period, no claim whatsoever shall lie on the Purchaser.

3.2.5 The decision of the purchaser in regard to contractor's liability and the amount, if any, payable under this warranty shall be final and conclusive.

3.3 After sales

3.3.1 Firm shall supply adequate no. of copies (soft & hard copy both) of the Operation & Maintenance Manuals and servicing instructions to the PU's whenever requested. Manual shall contain the details of the following information. Updated position of modifications, if any, shall also be incorporated:

i) Mounting arrangement
ii) Sub-assemblies
iii) Principle of operation
iv) Maintenance schedules during Trip/Monthly/Half Yearly/3 Yearly and POH
v) Trouble shooting
vi) Part catalogue
vii) Testing procedure
viii) Test equipment and tools

3.3.2 At least one set of wall charts showing pictorial view of components along with part nos.

will be given with every 5 sets. The copies of Maintenance Manual and wall charts are meant for wider circulation in Railways and fresh copies shall be furnished as stipulated even if there are no changes in the manual and wall charts furnished against earlier contract.

3.3.3 The contractor will impart training of working, operation and maintenance of the system to selected concerned personnels of Indian Railway.

3.4 Training

Sufficient number of technicians/engineers/officers shall be trained in consultation with the purchaser/RDSO/Vendor Approving Agency so that adequate trained personnel are available in the field for maintenance. This training shall be at the contractor's works for a suitable period and shall cover maintenance, testing, design and quality control.

The contractor shall undertake training of Indian Railway personnel free of cost.

3.5 Deviations

3.5.1 In case the offer does not correspond to this specification in any respect a "Deviation Statement" shall be submitted by the Tenderer. This statement shall clearly indicate the deviation CLAUSE-WISE with technical reasons.

3.5.2 The final decision regarding the acceptance of the deviations submitted by the contractor shall be at the discretion of the purchaser.

3.5.3 Clauses not covered in the Deviation Statement shall be deemed to be acceptable to the Tenderer in all respects. In case of Deviation Statement is not submitted it would be taken, as the complete specification is acceptable to the Tenderer.

4. GENERAL REQUIREMENTS:

4.1 Manufacturer willing to supply brake valves (N-1 Reducing valve, A-9 Auto brake valve, C-2W relay valve with 5mm choke & 6mm choke, C3W Distributor valve with control reservoirs & 24A-Double check valve) for the use in brake system of diesel and electric locomotives shall register themselves with RDSO/Vendor Approving Agency.

4.2 Manufacturer shall provide sufficient evidence of their capability in support of the technology of manufacturing above brake valves conforming to existing approved design in view of the interchangeability of the assembly.

4.3 The manufacturer shall submit one complete sets of manufacturing drawings of above brake valves to RDSO/Vendor Approving Agency. One set of drawings duly authenticated shall be returned to the manufacturer for record and to produce the same at the time of inspection.

4.4 The manufacturers shall have all drawings, process sheets, test specification and test rig arrangement for manufacturing and testing of the valve/equipment conforming to existing approved design.

4.5 The manufacturer shall have adequate facilities for the manufacturing, assembly and testing of above brake valves conforming to existing approved design. The manufacturers shall also have facilities for inspection and testing of individual components and sub-assembly.

4.6 Manufacturer shall have an "internal quality assurance system" with proper documentation to sustain quality of products being manufactured. Firm will also prepare quality assurance

plan as per ISO document of RDSO/Vendor Approving Agency

5. TECHNICAL REQUIREMENTS

5.1 The technical requirements of N-1 Reducing Valve is given in Annexure-I.

5.2 The technical requirements of A-9 Auto brake valve is given in Annexure-II.

5.3 The technical requirements of C-2W relay valve with 5 mm/ 6mm choke is given in Annexure-III.

5.4 The technical requirements of 24A-Double check valve is given in Annexure-IV.

5.5 The technical requirements of C3W Distributor valve with control reservoirs is given in Annexure-V.

6. PERFORMANCE TEST:

6.1 The performance test of N-1 Reducing Valve is given in Annexure-I.

6.2 The performance test of A-9 Auto brake valve is given in Annexure-II.

6.3 The performance test of C-2W relay valve with 5 mm/ 6mm choke is given in Annexure-III.

6.4 The performance test of 24A-Double check valve is given in Annexure-IV.

6.5 The performance test of C3W Distributor valve with control reservoirs is given in Annexure-V.

7. Type and Routine Test of brake valves (N-1 Reducing valve, A-9 Auto brake valve, C-2W relay valve with 5mm / 6mm choke, C3W Distributor valve with control reservoirs & 24A-Double check valve)

7.1 The valve/equipment shall be offered for type test. Any change in design found necessary during type test shall be carried out by the contractor free of cost to ensure satisfactory performance of the brake valve.

7.2 Type test shall be carried out on two samples of above brake valves. If RDSO/Vendor Approving Agency feels necessary to conduct type test on some more units, the samples will be picked up at random for further validations of design and drawings. Following shall comprise type tests:

S.N	Test	Details
1.	Dimensional check	As per respective Annexure
2.	Performance Test	As per respective Annexure
3.	Vibrations and shocks	As per para 3.1.3
4.	Any other test specified in the approved QAP as well as desired by purchaser	As per QAP or as specified by the purchaser

7.3 Routine test (for regular Inspection) shall consist of visual check and performance test of above brake valves and these tests shall be done on all or sample of lot. Sampling shall be done as per IS 2500 (part 1). Details of routine test are as under:

S.N	Test	Details
1.	Dimensional check	As per respective Annexure
2.	Performance Test	As per respective Annexure
3.	Any other test specified in the approved QAP as well as desired by purchaser	As per QAP or as specified by the purchaser

7.4 The contractor shall provide without extra charge, all material equipment tools, labour for tests of every kind, which the purchaser or his nominee shall require to be made on the

contractor's premises. The contractor shall also provide any other assistance, which the inspecting authority may consider necessary for any test, examination and dimensional checking.

7.5 At the time of inspection the supplier shall submit the internal test results necessary to prove that the above brake valves fulfills the technical requirements conforming to existing approved design for above brake valves.

7.6 If endurance test for components and sub-assemblies is required by RDSO, Lucknow/Vendor Approving Agency, the contractor will create facilities in his works for the same.

7.7 After inspection of the valve it will be subjected for field trials to monitor its performance on locomotive. Quantity of the valve for field trial and field trial period shall be mentioned in the UVAM portal. Field performance feedback format is as under:

S. No.	Shed/ Rly.	Loco No.	Date of fitment	Date of failure, if any	Reason of failure	Remarks

The acceptance criteria of field trial shall be the satisfactory field performance of equipment

8. Installation:

8.1 Installation and commissioning of the valve/ equipment of the first prototype shall be the responsibility of the supplier. Other equipment shall, however, be installed by purchaser. Assistance with regard to labour and other facilities which are available in the workshop would, however, be provided by the purchaser to the supplier. Additional equipment/fittings, not covered in the specification, if required, for installation of valve/ equipment, shall be supplied by the supplier.

The supplier shall submit tentative installation drawings along with the offer based on the availability of space in the locomotive. These drawings would, however, be finalised after fitment of the first prototype.

9. Technical Documents/Drawings

9.1 Following documents shall be submitted along with the offer:-

i) Technical literature covering design and principle of operation, to have a general idea of the valve/equipment offered.
ii) Detailed dimensional drawings indicating mounting arrangements, layout of valves, sub-assemblies etc.
iii) Clause wise comments on specification.
iv) Test program and details of testing facilities at manufacturer's works.
v) List of recommended spares for maintenance of valve/equipment for two years.
vi) List of special tools required for maintenance of valve/equipment.
vii) Latest Copy of bill of material of all brake items with Drg. No. of individual components.

9.2 One copy per five set of the following documents shall be supplied by the supplier as part of contract:-

i) Type and routine test specification and test reports.

10. Preference to Make In India

The Government of India policy on 'Make in India' shall apply.

11. Vendor Changes in Approved Status

All the provisions contained RDSO's ISO procedures laid down in Document No. QO-D-8.1-11, (latest version). (Titled "Vendor-changes in approved status") and subsequent version/amendment thereof/respective ISO procedure of Vendor Approving Agency, shall be binding and applicable on the successful vendor/vendors in the contract floated by Railways to maintain of products supplied to Railways.

12. Date of Enforcement

The date of enforcement of the specification is with immediate effect i.e. date of issue of specification.

Annexure-I

Technical Requirements and Performance Test of N-1 Reducing Valve

1. TECHNICAL REQUIREMENTS:

1.1. The N-1 Reducing valve shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.

1.2. N-1 Reducing valve shall be able to reduce the pressure of compressed air supply to a constant, predetermined value and deliver the same.

1.3. N-1 Reducing valve shall be self -lapping in nature and shall have pressure regulating device (regulating knob).

1.4. To adjust the setting of reducing valve, clockwise movement of adjusting screw should raise the pressure setting whereas anti clockwise movement should reduce the setting.

1.5. N-1 Reducing valve shall be suitable for both pipe mounted application as well as panel mounted application as per the requirements of the Railways.

1.6. It should have following ports:

a) Inlet Port to connect with supply.
b) Outlet Port to connect with delivery.

The location and size of port are shown in RDSO drawing. no. SK.DP-3582. The port mark "Supply (In) / Delivery (Out)" shall be cast on the pipe bracket/valve body and should be clearly visible. The N-1 Reducing valve shall be supplied with suitable pipe bracket (for pipe mounted version) and without pipe bracket (for panel mounted version).

1.7. Proper heat treatment shall be given to attain required hardness on wearing components.

1.8. The general shape, envelop size and mounting dimension of N-1 Reducing valve shall be as per RDSO drawing no. SK.DP-3582. The reducing valve should be fully interchangeable with respect to overall mounting dimensions & threads with valves of original manufacturer i.e. existing approved design.

1.9. Rubber components shall be procured from approved sources as given in UVAM portal and shall also conform to IRS.R-48-24 (latest) or equivalent rubber specification.

2. PERFORMANCE TEST

2.1 N-1 Reducing valve shall be tested on AB test rack or alternative arrangement conforming to AB test rack. However, the diagrammatic arrangement of AB test rack is shown in RDSO drawing. No. SK.DP- 2664.

2.2 Test set up

2.2.1 Mount the valve on the test rack as shown in figure 1.

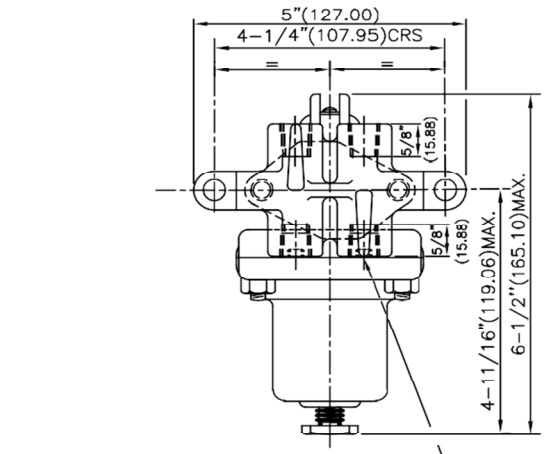
2.2.2 Maintain supply pressure between 155 to 160 Psi.

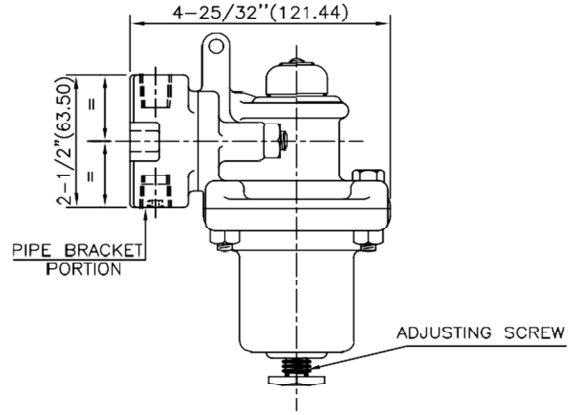
2.2.3 The feed valve of the test rack should be set at 140± 3 psi.

2.2.4 Conduct the test as per the test procedure given in table no. 1.

TABLE-1

Sl. No.	Test description	Standard values
1.	**DEVICE CONDITIONING** • Start the test with all cocks in closed position except the test rack supply cock. • Keep valve 'A' in position no. 8. • Open cock 9 and move valve 'A' handle in to position no. 3. • Open cock 5,19 and 20. • Turn the Device's adjusting screw (clockwise to increase or anti-clockwise to decrease) such that the Q.A.Chamber Gauge indication is 120 psi • Open cock 15 for 5 seconds then close it and repeat this operation five times for proper seating of the check valves. • Close cocks 19,20 and open cock16. • Move valve 'A' handle to position 1 and note ***Flow of air from Device's vent port.*** • Move valve 'A' handle to position 3 and note • ***Flow of air from Device's vent port.***	 ***Strong blow of air must occur.*** ***Blow of air must cease.***
2.	**LEAKAGE TEST** • Start the test with cocks 5,9,16 and the test rack supply cock open. • Keep valve 'A' handle in position no. 3. **(i) Leakage in exhaust check valve and diaphragm** • Close cock 9 & 16. • Partially open cock 6, and allow EMER. RES.GAUGE indication to decrease to the pressure of 100psi, then close cock 6.(If AUX. RES.GAUGE and EMER. RES.GAUGE equalize, that is acceptable) • Allow 20 seconds for temperature effect and then close cock 5 and note ***Decrease in AUX. RES.GAUGE and EMER. RES.GAUGE indication*** **(ii) Leakage in inlet check valve and inlet valve seat packing ring** • Open cocks 5 ,9 & 16. • Allow 20 seconds for temperature effect and then close cocks 5 & 16 and note ***EMER. RES.GAUGE indication*** **(iii) Leakage in casting and gasket** • Open cocks 5 and 16 and check ***Leakage in entire valve portion by applying soap solution*** • Close cock 16.	 ***1psi max. in 15 seconds*** ***1psi max drop in 15 seconds*** **No leakage**
3.	**CAPACITY TEST** • Start the test with cocks 5, 9 and the test rack supply cock open • Move valve 'A' handle to position no. 3 • Open cock 2 and note *Increase in AUX RES.. GAUGE indication* • Close cock 2.	 ***0-90 psi in 11 secs max.***
4.	**FUNCTION** • Start the test with cock 5, 9 and the test rack supply cock open • Move valve 'A' handle to position no. 3. • Open cock 16 • Move valve 'A' handle to position no. 5 and note ***B.P. Volume Gauge indication must not decrease*** • Move valve 'A' handle to position no. 3. • Close cock 16 and open cock 19, 20.	 ***By more than 8 psi***
5.	**Final Setting** • Open test rack supply cock and cock 5, 9, 19, 20. • Move valve 'A' handle to position no. 3. • **Turn the adjusting screw to indicate Q.A.Chamber Gauge indication as** • On completion of test close cock 5 and open cocks 2 and 15. • Move valve 'A' handle to position no. 8. • After all the test rack gauge indications have decreased to zero psi close all test rack cocks. • Remove the valve from the test rack.	 ***36 psi (2.5 Kg/cm2)***





NOTES:–

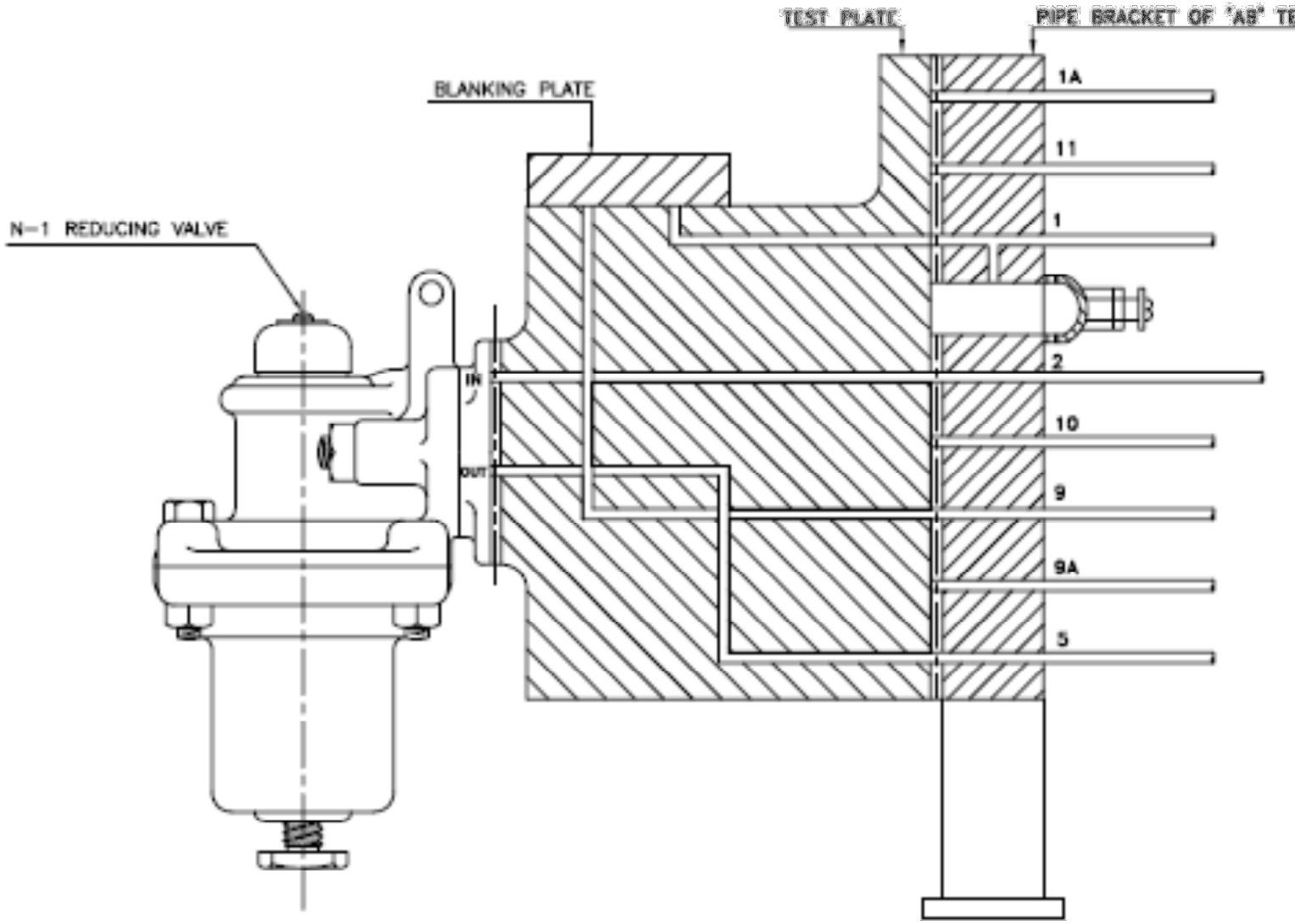
1. PIPE CONNECTION OPENINGS TO BE PLUGGED WITH PROTECTION CAP.
2. DIMENSIONS GIVEN IN BRACKET ARE IN mm.
3. APPROXIMATE WEIGHT = 2.041 Kg

D	RAVI KANT
C	S.P.COVIL
APPD	
Dt	03.2004

DATE	ALT	DESCRIPTION	ALT.NOTE NO.	SIGN

APPLICABLE FOR DSL/ ELEC. LOCOMOTIVE	N–1 REDUCING VALVE (OUT LINE)	
SCALE N.T.S.	REF:	FIRST ISSUED
INDIAN RLYS RDSO (MP)	DRG. NO. SK.DP–3582	SUPERSEDES
		SUPERSEDEDBY

SKDP–3582



MOUNTING ARRANGEMENT OF THE VALVE ON TEST RACK

Fig.-1

Annexure-II

Technical Requirements and Performance Test of A-9 Automatic Brake Valve

1. TECHNICAL REQUIREMENTS

1.1 The A-9 Automatic Brake valve shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.

1.2 A-9 Automatic Brake Valve shall be used for brake application of locomotive only for diesel and electric locomotives.

1.3 Two A-9 Automatic Brake Valves, one each on the two control stand is provided on the locomotive.

1.4 The A-9 Automatic brake valve consists of a self-lapping regulating portion, which supplies or exhausts the brake pipe pressure, and a vent valve which is actuated only when the brake valve handle is placed in Emergency position for the purpose of venting brake pipe pressure at an emergency rate.

1.5 A-9 Automatic brake valve is provided with an adjusting handle which serves to permit the proper adjustment of the automatic brake valve to supply brake pipe air to the required operating pressure

1.6 A-9 Automatic Brake Valve, when passing from the running position to the braking position of the operator must move the control device (i) In an anticlockwise direction on the horizontal plane (ii) towards the driver on the vertical plane.

1.7 The equipment shall work satisfactory with Main reservoir pressure up to 10 kg/cm^2.

1.8 The location and size of port is shown in RDSO drawing no. SK.DP-4158. The port numbers should be clearly legible,

1.9 Proper heat treatment shall be given to attain required hardness on wearing components.

1.10 The general shape, envelop size and mounting dimension of A-9 Automatic Brake valve shall be as per RDSO drawing no. SK.DP-4158. The A-9 Automatic Brake valve should be fully interchangeable with respect to overall mounting dimensions & threads with valves of original manufacturer i.e. existing approved design.

1.11 Rubber components shall be procured from approved sources as given in UVAM portal and shall also conform to IRS.R-48-24 (latest) or to equivalent rubber specification.

2. PERFORMANCE TEST

2.1 A-9 Automatic Brake Valve shall be tested on AB test rack or alternative arrangement conforming to AB test rack. However, the diagrammatic arrangement of AB test rack is shown in RDSO drawing. No. SK.DP- 2664.

2.2 Test set up

2.2.1 Mount the valve on the test rack.

2.2.2 Maintain supply pressure to 150 Psi minimum.

2.2.3 Close all test rack and test plate cocks.

2.2.4 Move valve “A” handle into position 8.

2.2.5 Open the test rack supply cock.

2.2.6 The feed valve of the test rack should be set at 130 ± 3 psi.

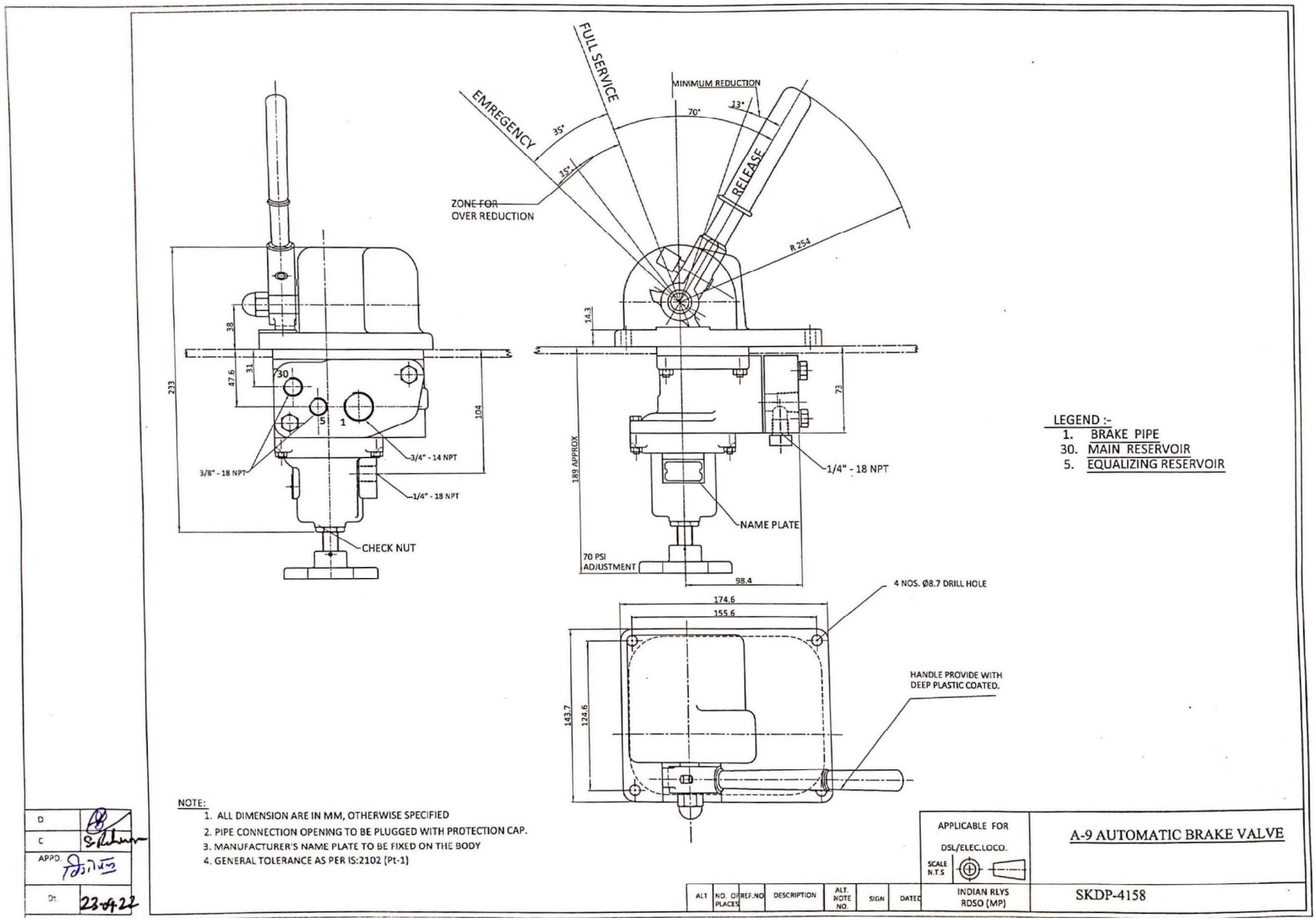
2.2.7 Conduct the test as per the test procedure given in table no. 2.

TABLE-2

Sl. No.	Test description	Standard values
1	**ADJUSTMENT** • All test rack and test plate cocks closed except the test rack supply cock. • Valve "A" handle in position 8. • Handle of the device is in release position. • Open cocks 2, 5, 9 and 17. • Operate the device by moving the handle between the RELEASE and EMERGENCY positions several times, finally leaving the handle in the RELEASE position. • Adjust the REGULATING SCREW of the device until the AUX.RES. indicates exactly 110 psi. • Move the handle of the device to the INITIAL REDUCTION position and note: **Aux. Res. Gauge – Indication** • Move the handle of the device to the RELEASE position and note: **Aux. Res. Gauge – Indication** • Move the handle of the device to the SERVICE position and note: **Aux. Res. Gauge – Indication** • Move the handle of the device to the RELEASE position and note: **Aux. Res. Gauge – Indication** • Move the handle of the device to the OVER REDUCION position and note: **Aux. Res. Gauge – Indication** **EMERGENCY VENT VALVE- does not open (as indicated by no further decrease in Aux. Res. Gauge Indication)** • Move the handle of the device to the EMERGENCY position and note: **Aux. Res. Gauge – Indication** • Move the handle of the device to the RELEASE position and note: **Aux. Res. Gauge – Indication**	**Decreases to between 106 and 103 psi.** **Increases to 110 psi.** **Decreases to between 87 and 84 psi.** **Increases to 110 psi.** **Decreases to between 76 and 64 psi.** **Decreases to zero psi.** **Increases to 110 psi.**
2	**LEAKAGE** • Cocks 2, 5, 9, 17 and the supply cocks are open. • Valve "A" handle is in position No. 8. • Handle of the device under test is in the RELEASE position. (i) <u>"O" Rings (Two located on strainer plug in port 5)</u> • Close cocks 2 and 17. • Open cock A, and note: **Cock "A" OPENING – soap test –** (ii) <u>Supply Valve and "O" Ring</u> • Close cock "A". • Open cocks 2 and 17.	**No leakage.**

	• Open cock 14, allow the AUX. RES. GAUGE increase 1 psi and then close cocks 14, 2, 17 and 5, and note: **EMER. RES., AUX. RES., AND Q. SER. GAUGES – 1 psi maximum decrease in indication**	**In 20 sec.**
	(iii) Exhaust Valve, Emergency Valve and "O" Ring	
	• Open cocks 2, 5 and 17.	
	• Move the handle of the device to the SERVICE position and note: **Aux. Res. Gauge – Indication**	**Decreases to between 87 to 84 psi.**
	• Open cock 7, allow the AUX. RES. GAUGE indication to decrease 1 psi, and then close cocks 7, 2, 17, 5 and note: **EMER. RES., AUX. RES., AND Q. SER. GAUGES – 1 psi maximum decrease in indication**	**In 20 sec.**
	• Open cocks 2, 5, and 17.	
	• Move the handle of the device to the OVER REDUCTION position and note: **Aux. Res. Gauge – Indication**	**Decreases to between 75 to 65 psi.**
	(iv) Emergency valve and "O" Ring	
	• Open cock 7, allow the AUX. RES. GAUGE indication to decrease 1 psi, and then close 7, 2,17,5, and note: **EMER. RES., AUX. RES., AND Q. SER. GAUGES – 1 psi maximum decrease in indication**	**In 20 sec.**
	• Open cocks 2, 5, and 17.	
	• Move the handle of the device to the RELEASE position and note:	
	(v) Castings and Gasket **ENTIRE DEVICE – soap test –**	**No leakage allowed**
3	**CAPACITY**	
	• Cocks 2, 5, 9, and 17 are open.	
	• Valve "A" handle is in position No. 8	
	• Handle of the device is in the RELEASE position.	
	(i) Port 1 to Exhaust	
	• Move the handle of the device to the SERVICE position and note: **AUX. RES. GAUGE – indicating must be within the limits**	**From 110 to 90 psi in 5 to 8 sec.**
	• Move the handle of the device to the RELEASE position.	
	• Close cock 17	
	(ii) Port 1 through Emergency Valve to EX.	
	• Move the handle of the device to the EMERGENCY position and note: **Aux. Res. Gauge – Indication**	**Decreases from 110 to 10 psi in 5 sec. max.**
	(iii) Port 30 to Port 1	
	• Open Cock 17.	
	• Move the handle of the device to the RELEASE position and note: **Aux. Res. Gauge – Indication**	**Increases from 0 to 80 psi in 8 to 10 sec.**
4	**SENSITIVITY**	
	• Cocks 2, 5, 9, and 17 are open.	
	• Handle of the device is in the RELEASE position.	
	• Valve "A" handle is in position No. 8.	

	• Move the handle of the device in several 3 psi steps toward the SERVICE position and note: **AUX. RES. GAUGE – indication must be decrease in corresponding steps of** • Move the handle of the device in several 3 psi steps towards the RELEASE position and note: **AUX. RES. GAUGE – indication must be increase in corresponding steps of** • Move the handle of the device to the SERVICE position. • Move the handle of the device towards the RELEASE position and allow the AUX. RES. GAUGE indication to increase to 100 psi. • Partly open cock A and allow the AUX. RES. GAUGE indication to decrease by 2 psi, then close cock A and note: **Aux. Res. Gauge – indication must be**	**Not more than 3 psi** **Not more than 3 psi** **Increase to 100 psi**
5	**COMPLETION OF TESTS** • Close cocks 2, 5, and 17. • Move the handle of the device to the EMERGENCY position. • Open cock 6. • After all test rack gauge indications (except MAIN RES. GAUGE) have decreased to zero psi, close all test rack cocks except the test rack supply cock. • Remove the tested device from the test rack.	


FULL SERVICE
EMREGENCY
MINIMUM REDUCTION
70°
13°
35°
15°
RELEASE
ZONE FOR OVER REDUCTION
R 254
38
31
47.6
233
30
5
1
104
3/8" - 18 NPT
3/4" - 14 NPT
1/4" - 18 NPT
CHECK NUT
14.3
73
189 APPROX
1/4" - 18 NPT
NAME PLATE
70 PSI ADJUSTMENT
98.4
4 NOS. Ø8.7 DRILL HOLE
174.6
155.6
HANDLE PROVIDE WITH DEEP PLASTIC COATED.
143.7
124.6
LEGEND :-
1. BRAKE PIPE
30. MAIN RESERVOIR
5. EQUALIZING RESERVOIR
NOTE:
1. ALL DIMENSION ARE IN MM, OTHERWISE SPECIFIED
2. PIPE CONNECTION OPENING TO BE PLUGGED WITH PROTECTION CAP.
3. MANUFACTURER'S NAME PLATE TO BE FIXED ON THE BODY
4. GENERAL TOLERANCE AS PER IS:2102 (Pt-1)
D
C
APPD.
Dt. 23.04.22
APPLICABLE FOR DSL/ELEC.LOCO.
SCALE N.T.S
A-9 AUTOMATIC BRAKE VALVE
ALT | NO. OF PLACES | REF.NO | DESCRIPTION | ALT. NOTE NO. | SIGN | DATED
INDIAN RLYS RDSO (MP)
SKDP-4158

Annexure-III

Technical Requirements and Performance Test of C-2W Relay Valve with 5 mm/6 mm choke

1. TECHNICAL REQUIREMENTS

1.1 The C-2W Relay Valve shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.

1.2 C-2W Relay Valve shall be used for brake application of locomotive only for diesel and electric locomotives.

1.3 The C-2 Relay Valve is a diaphragm operated, self-lapping valve. It is a high capacity remote controlled pneumatic device which serves to relay a large quantity main air reservoir pressure to the operating system or exhaust the latter in accordance with the control air supplied from another pneumatic device located at a distance.

1.4 C-2W Relay Valve with 5mm choke used to supply and exhaust brake cylinder air pressure during brake applications and release. It gets pilot air from SA9/ A9 and supply MR air to the brake cylinders at a pressure equal to the pilot air pressure at a higher rate. Thereby it applies and releases the brake.

1.5 C-2W Relay Valve with 6mm choke used to relay and maintain the Brake pipe (BP) air pressure requirement of the complete air braked train as initiated through the A-9 Automatic Brake Valve.

C-2-W Relay Valve with over charge feature assembly has an additional small piston with small diaphragm in the design.

1.6 The equipment shall work satisfactory with Main reservoir pressure up to 10 kg/cm^2.

1.7 The location and size of port is shown in RDSO drawing no. SK.DP-4159 (C-2W Relay Valve with 5mm choke) & SK.DP-4160 (C-2W Relay Valve with 6mm choke). The port numbers should be clearly legible.

1.8 Proper heat treatment shall be given to attain required hardness on wearing components.

1.9 The general shape, envelop size and mounting dimension of C-2W Relay Valve shall be as per RDSO drawings no. SK.DP-4159 (with 5mm choke) & SK.DP-4160 (with 6mm choke). The C-2W Relay Valves (with 5/6 mm choke) should be fully interchangeable with respect to overall mounting dimensions & threads with valves of original manufacturer i.e. existing approved design.

1.10 Rubber components shall be procured from approved sources as given in UVAM portal and shall also conform to IRS.R-48-24 (latest) or to equivalent rubber specification.

2. PERFORMANCE TEST

2.1 C-2W relay valve choke shall be tested on AB test rack or alternative arrangement conforming to AB test rack. However, the diagrammatic arrangement of AB test rack is shown in RDSO drawing. No. SK.DP- 2664.

2.2 Test set up

2.2.1 Mount the valve on the test rack.

2.2.2 Maintain supply pressure to 130 Psi minimum.

2.2.3 Close all test rack and test plate cocks.

2.2.4 Move valve "A" handle into position 8.

2.2.5 Open the test rack supply cock.

2.2.6 The feed valve of the test rack should be set at 110 ± 3 psi.

2.2.7 Conduct the test as per the test procedure given in table no. 3.

TABLE-3

Sl. No.	Test description	Standard values
1	**LEAKAGE** • All test plate and test rack cocks closed except the test rack supply cock. • Valve "A" handle in position 8. • Open cocks 5 and 9 and allow the Emer. Res. Gauge indication to increase to 110 psi. • Open cocks 1 and "A". • Operate the device by moving valve "A" handle from position 8 into position 1 and back into position 8 four (4) times, finally leave valve "A" handle in position 8. • Close cock A. (i) Supply Check Valve And "O" Ring • Open cock 8 and note: **Cock 8 Leakage Test Fitting – flowmeter** (ii) Exhaust Check Valve And "O" Ring • Close cock 8. • Move valve "A" handle into position 1 and allow the B.P. VOL. GAUGE indication to increase to 110 psi. • Open cock "A" and note: **COCK "A" OPENING - flowmeter** (iii) Casting, Gasket And "O" Ring **ENTIRE VALVE - Soap Test** (iv) Diaphragm • Close cock 5. • Open cocks 6 and 8 and allow the EMER. RES. and AUX. RES. GAUGE indications to decrease to zero psi. • Close cock 6 and note: **Cock 8 Leakage Test Fitting - Soap Test -** • Close cock 8. • Open cock 5.	**3 cu.in./min. maximum** **3 cu.in./min. maximum** **no leakage** **no leakage**

2	**CAPACITY** • Cocks 1, 5, 9 and "A" open. • Valve "A" handle in position 1. (i) <u>Supply Port Through Supply Check Valve To Delivery Port</u> • Open cock 2 and note: **Aux. Res. Gauge - Indication will dip from 110 to about 60 Psi** Note: Time is to be measure from the opening of cock. (ii) <u>Delivery Port Through Exhaust Check Valve To Exhaust.</u> • Close cocks 1. • Move valve "A" handle into position 8 and allow the B.P. VOL. Gauge indication to decrease to zero psi. • Open cock 1 and note: **Aux. Res. Gauge - Indication must decrease from l10 to 10 psi.**	**BUT MUST increase to 100 psi in 3 sec, max., and continue to increase to 110 psi.** **in 6 seconds maximum**
3	**SENSITIVITY** • Cocks 1, 2, 5, 9 and "A" open. • Valve "A" handle in position 8. • Move valve "A" handle partly into position 1, allow the B.P. VOL. GAUGE indication to increase to 10 psi and then move valve "A" handle into Position 3. • Increase the B.P. VOL. GAUGE indication to l5 Psi in 1 psi steps by moving valve "A" handle from position 3 into position 2 and back into Position 3 and note: **Aux. Res. Gauge - Indication must increase in corresponding steps** • Decrease the B.P. VOL. GAUGE indication to 13 psi by moving valve "A" handle from position 3 into position 4 and back into position 3. • Decrease the B.P. VOL. GAUGE indication to 8 psi in 1 psi steps by moving valve "A" handle from position 3 into position 4 and back to position 3, and note: **Aux. Res. Gauge - Indication must decrease in corresponding steps** • Move valve "A" handle partly into position 1, allow the AUX. RES. GAUGE indication to increase to 40 psi (and stabilize), then move valve "A" handle into position 3.. • Open cocks 7 and note: **Aux. Res. Gauge - Indication must remain**	**For each 1 psi increase in B.P. Vol. Gauge indication** **For each 1 psi decrease in the B.P. Vol. Gauge indication** **at 37 to 40 psi**
4	**COMPLETION OF TEST** • Move valve "A" handle into position 8. • Close cocks 5. • Open cocks 6 & 8. • After all test rack gauge indications (except MAIN RES.GAUGE) have decreased to zero psi, close all test rack and test plate cocks except the test rack supply cock. • Remove the tested Valve from the test plate.	

2.3 Test set up for **overcharge feature assembly**

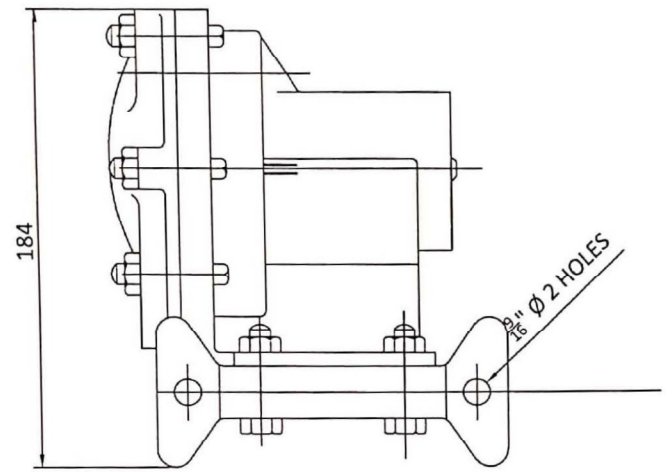
2.3.1 Remove the C2W Relay valve cover and fix the overcharge feature assembly.

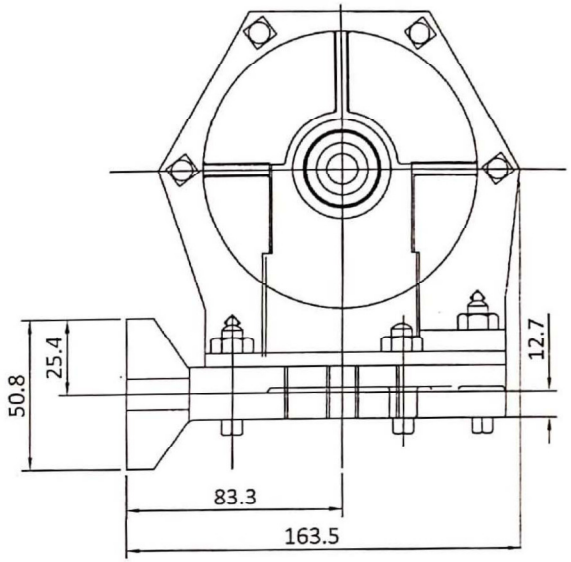
2.3.2 The feed valve of the test rack should be set at 85 ± 3 psi.

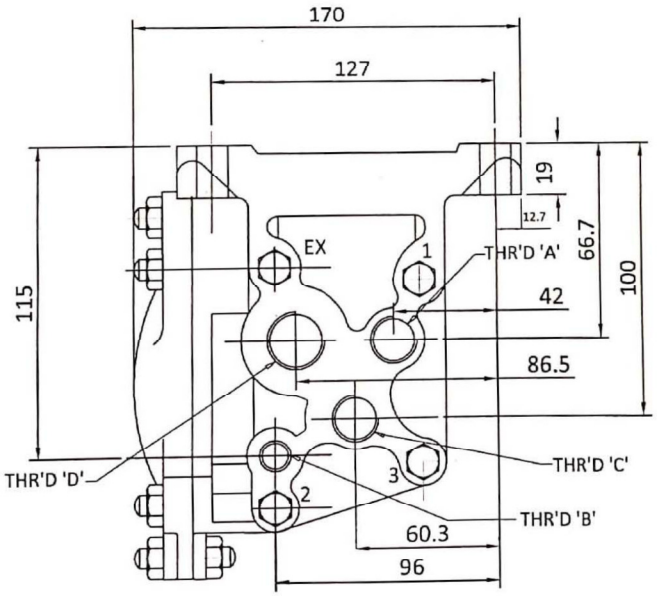
2.3.3 Conduct the test as per the test procedure given in table no. 4.

TABLE-4

Sl. No.	Test description	Standard values
1	**LEAKAGE** • All test rack cocks closed except the test rack supply cock. • Valve "A" handle in position 8. • Open cocks 5 and 9 and allow the Emer. Res. Gauge indication to increase to 85 psi. • Open cocks 1 and "A". • Move valve "A" handle to position No. 1. • Open and close cock B. Open and close cock C. Repeat for a few times and finally leave cock B open and cock C closed **Entire Portion especially on over charge feature assembly - Soap Test** • Close cock B and open cock C. • Valve "A" handle in position 8. Adjust the feed valve to 140 psi. Move valve "A" handle into position 1 and allow the BP reservoir Gauge 140 psi. **Entire over charge feature assembly especially at Ex. Port - Soap Test** • Valve "A" handle in position 8. • Readjust the test rack feed valve to 85 psi. MR drain cock may be opened to reduce the M.R Pressure.	**No Leakage.** **No Leakage.**
2	**FUNCTION** • Open Cocks 1, A and C. • Valve "A" handle in position 8. • Move valve "A" handle to position No. 2 and allow the B.P. Vol. Gauge to 70 psi and then move to Position 3 and note: **Ensure B.P. Vol. Gauge and Aux. Res. Gauge -** • Close cock C and open cock B. • Move valve A" handle partly into position 1, allow the B.P. Vol. Gauge to 70 psi and then move to Position 3 and note: **B.P. Vol. Gauge - Indication** **Aux. Res. Gauge - Indication** • Close cock B and open cock C. **Aux. Res. Gauge - Indication** • Valve "A" handle in position 8. • Close cock 5 and cock 6. • Remove the overcharge feature assembly and provide closure plugs and protection cover.	**70 psi** **70 psi** **75 to 76 psi** **70 psi**







NOTE:
1. ALL DIMENSION ARE IN MM, OTHERWISE SPECIFIED
2. PIPE CONNECTION OPENING TO BE PLUGGED WITH PROTECTION CAP.
3. MANUFACTURER'S NAME PLATE TO BE FIXED ON THE BODY
4. GENERAL TOLERANCE AS PER IS:2102 (Pt-1)

LEGEND

3	DELIVERY
2	CONTROL
1	SUPPLY
PORT NO.	DESCRIPTION

A	B	C	D	SIZE OF CHOKE
1/2 " - 14 NPT	1/4 " -18 N P T	1/2 " - 14 NPT	3/4"-14 NPT	5 MM

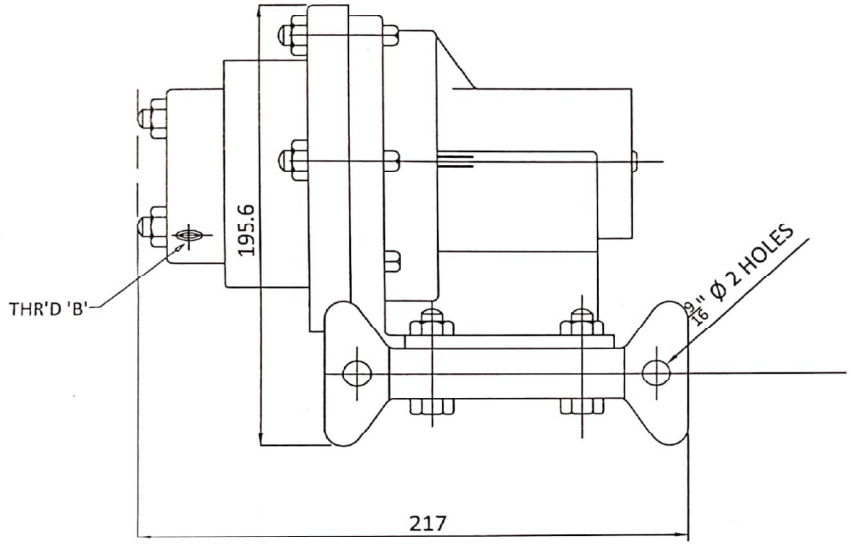
APPLICABLE FOR DSL/ELEC.LOCO. | C2W RELAY VALVE WITH 5 MM CHOKE

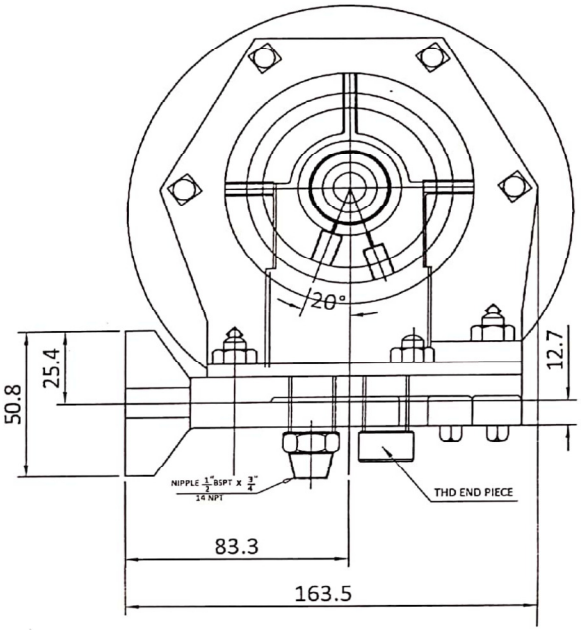
SCALE N.T.S

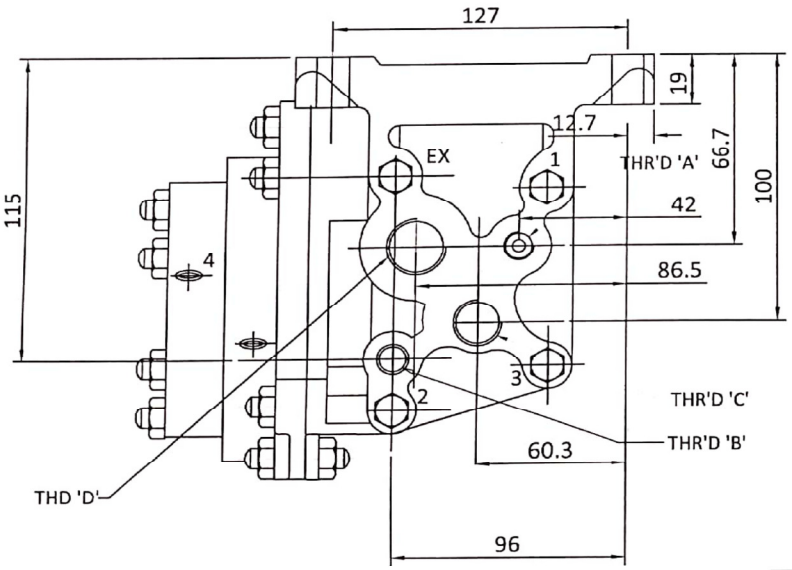
SKDP-4159 | INDIAN RLYS RDSO (MP)

ALT	NO. OF PLACES	REF.NO	DESCRIPTION	ALT. NOTE NO.	SIGN	DATED

D	
C	S.Rehman
APPD.	
Dt.	23.09.22







NOTE:
1. ALL DIMENSION ARE IN MM, OTHERWISE SPECIFIED
2. PIPE CONNECTION OPENING TO BE PLUGGED WITH PROTECTION CAP.
3. MANUFACTURER'S NAME PLATE TO BE FIXED ON THE BODY
4. GENERAL TOLERANCE AS PER IS:2102 (Pt-1)

LEGEND

PORT NO.	DESCRIPTION
1	SUPPLY
2	CONTROL
3	DELIVERY
4	ADDITIONAL PORT

3 /4 " -14 NPT	1/4 "-18 NPT	3/ 4 "-14 NPT	3/4"-14 NPT	WITHOUT NIPPLE & THD END PIECE	6MM
1 /2 " - BSPT	1/4 "-18 NPT	-	3/4"-14 NPT	WITH NIPPLE & THD END PIECE	6MM
A	B	C	D		SIZE OF CHOKE

APPLICABLE FOR DSL/ELEC.LOCO.	C2W RELAY VALVE WITH 6 MM CHOKE
SCALE N.T.S	
	SKDP-4160 INDIAN RLYS RDSO (MP)

ALT	NO. OF PLACES	REF.NO	DESCRIPTION	ALT. NOTE NO.	SIGN	DATED

D	
C	S. Rahman
APPD.	
Dt.	23.09.22

Annexure-IV

Technical Requirements and Performance Test of 24A-Double check valve

1. TECHNICAL REQUIREMENTS:

1.1 The 24-A Double Check Valve shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.

1.2 24-A Double Check Valve shall be used for brake application of locomotive only for diesel and electric locomotives.

1.3 The 24-A Double Check Valve is designed for in-line piping and consists of a body containing an internal floating check valve with "O" ring seals. The floating check valve responds to air pressure by directs the flow of air from one or the other of the two controlling devices to a common discharge. The Check Valve also seals air from flowing to the non-controlling device

1.4 The internal floating check valve moves to and fro depending on the intensity of the pressure in the two inlet ports and seals the port which has lower pressure, from the common deliver port. While doing so, the other inlet port with a higher pressure is connected to the common delivery port.

1.5 The equipment shall work satisfactory with Main reservoir pressure up to 10 kg/cm^2.

1.6 The location and size of port is shown in RDSO drawing no. SK.DP-4161 Alt. 1.

1.7 Proper heat treatment shall be given to attain required hardness on wearing components.

1.8 The general shape, envelop size and mounting dimension of 24-A Double Check Valve shall be as per RDSO drawing no. SK.DP-4161 Alt. 1. The 24-A Double Check Valve should be fully interchangeable with respect to overall mounting dimensions & threads with valves of original manufacturer i.e. existing approved design.

1.9 Rubber components shall be procured from approved sources as given in UVAM portal and shall also conform to IRS.R-48-24 (latest) or to equivalent rubber specification.

2. PERFORMANCE TEST:

2.1 24-A Double Check Valve shall be tested on AB test rack or alternative arrangement conforming to AB test rack. However, the diagrammatic arrangement of AB test rack is shown in RDSO drawing. No. SK.DP- 2664.

2.2 Test set up

2.2.1 Mount the valve on the test rack.

2.2.2 Maintain supply pressure to 100 Psi minimum.

2.2.3 Close all test rack and test plate cocks except the test rack supply cock

2.2.4 The feed valve of the test rack should be set at 80 ± 3 psi.

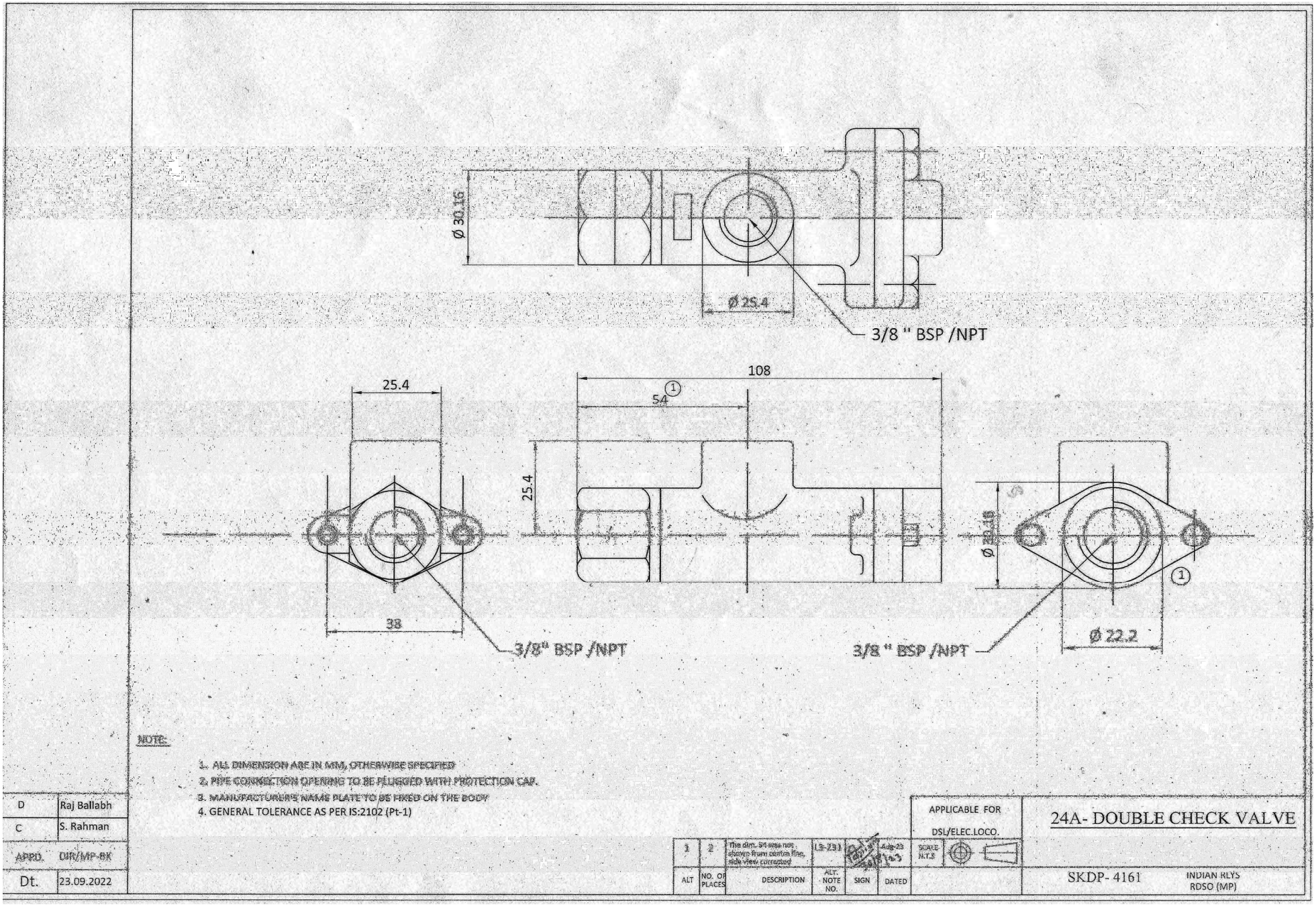
2.2.5 Move valve “A” handle into position 8.

2.2.6 Conduct the test as per the test procedure given in table no. 5.

TABLE-5

Sl. No.	Test description	Standard values
1	**FUNCTION** • Insert 3/8" pipe plug into pipe boss at side of body. • Open cocks 5 and 13. • Partially open cock 9 and charge emergency reservoir to10 psi. • Close cock 9. • Operate double check valve by alternately opening and closing cocks 3 and 4 several times to properly seat check valves. • Leave cock 4 closed, and cock 3 open • Close cock 13. • Open cocks 4 and 6, and drain brake cylinder and emergency reservoirs. • Close cocks 3 and 6.	
2	**LEAKAGE** (i) Check Valve "O" Ring (Low pressure) • Partially open cock 9 and charge Emergency Reservoir Gauge to 5 psi. • close cock 9 and note: **Cock 4 Leakage Test Fitting - Flowrator Meter** (ii) Check Valve "O" Ring (High pressure) • Open cock 9, (Emer. Res. Gauge charges to 80 psi) and note: **Cock 4 Leakage Test Fitting - Flowrator Meter** • Close cocks 4 and 5. • Open cocks 3 and 6. (iii) Check Valve "O" Ring (Low Pressure) • Partially open cock 13 and charge Brake Cylinder Reservoir Gauge to 5 psi. • Close cock 13, and note: **Cock 6 Leakage Test Fitting - Flowrator Meter** (iv) Check Valve "O" Ring (High Pressure) • Open cock 13, (B.C. Res. Gauge charges to 80 psi) and note: **Cock 6 Leakage Test Fitting - Flowrator Meter** • Close cock 6. (v) Casting and "O" Ring • Open cock 5, (EMER Res Gauge Charges to 120 psi, B.C. Gauge is charged to 120 psi) and note: **Entire Portion - Soap Test** • Close cocks 3 and 5. • Slowly open cocks 4 and 6 until both EMER Res. and B.C. Gauges have decreased to zero psi and then remove the pipe plug from port in side of body.	**No float rise.** **No float rise.** **No float rise.** **No float rise.** **No leakage.**

3	**CAPACITY** • Open cocks 4, 6, 9 and 13. • Close cocks 4 and 13. (i) <u>Port 9 to EX</u> • Open cock 3 and note: **B.C. Res. Gauge - Must initially rise and decrease to 10 psi** • Close cocks 3, 6 and 9. (ii) <u>Port 2 to EX</u> • Open cock 4. • Open cock 5 and note: **Emer. Res. Gauge - Must initially rise and then decrease to 40 psi** • Open cocks 3 and 6.	**In not more than 3 seconds.** **In not more than 7 seconds.**
4	**RESISTANCE** • Open cocks 3, 4, 5 and 6. • Close cock 4. • Partially open cock 13 and note: **B.C. Res. Gauge - Blow of air must occur at tapped opening in side of body before any pressure can be read on gauge.** • Close cocks 13, 3 and 6. • Open cock 4. • Partially open cock 9 and note: **Emer. Res. Gauge - Blow of air must occur at tapped opening in side of body Before any pressure can be read on gauge**	
5	**COMPLETION OF TEST** • Close cocks 9 and 4. • Open cock 6. • After all test rack gauge indications (except MAIN RES.GAUGE) have decreased to zero psi, close all test rack cocks except the test rack supply cock. • Remove the tested Valve from the test plate.	


Ø 30.16
Ø 25.4
3/8 " BSP /NPT
25.4
108
54
1
25.4
Ø 30.16
38
3/8" BSP /NPT
3/8 " BSP /NPT
Ø 22.2
NOTE:
1. ALL DIMENSION ARE IN MM, OTHERWISE SPECIFIED
2. PIPE CONNECTION OPENING TO BE PLUGGED WITH PROTECTION CAP.
3. MANUFACTURER'S NAME PLATE TO BE FIXED ON THE BODY
4. GENERAL TOLERANCE AS PER IS:2102 (Pt-1)
D Raj Ballabh
C S. Rahman
APPD. DIR/MP-BK
Dt. 23.09.2022
APPLICABLE FOR
DSL/ELEC.LOCO.
24A- DOUBLE CHECK VALVE
SCALE N.T.S
ALT
NO. OF PLACES
DESCRIPTION
ALT. NOTE NO.
SIGN
DATED
SKDP- 4161
INDIAN RLYS
RDSO (MP)

Annexure-V

Technical Requirements And Performance Test Of C3W Distributor Valve With Control Reservoirs

1. TECHNICAL REQUIREMENTS

1.1 The C3W Distributor Valve with Control Reservoirs shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.

1.2 C3W Distributor Valve with Control Reservoirs shall be used for brake application and release of locomotive only for diesel and electric locomotives.

1.3 The equipment shall work satisfactory with Main reservoir pressure up to 10 kg/cm2.

1.4 The general shape, envelop size, mounting dimension and pipe / port connection of C3W Distributor Valve shall be as per RDSO drawing no. SK.DP- 4162. The C3W Distributor Valve with Control Reservoirs should be fully interchangeable with respect to overall mounting dimensions & threads with valves of original manufacturer i.e. existing approved design

1.5 Proper heat treatment shall be given to attain required hardness on wearing components.

1.6 All rubber components used in the C3W Distributor Valve shall have minimum life of two year.

1.7 The Distributor Valve shall be suitable for obtaining maximum brake cylinder pressure of 3.8 ± 0.1 kg/cm² at full application. The maximum brake cylinder should not increase even if the control reservoir pressure and the brake pipe pressure increase.

1.8 The Distributor valve shall have Passenger / Goods change over position.

1.9 Controlling the times of application and release, depending on service conditions, i.e. for freight or passenger.

1.10 Facilitating complete discharge of air from the system with the help of the manual operating lever and thus complete release of brakes.

2. PERFORMANCE TEST:

2.1 C3W Distributor Valve shall be tested on Test Rack of C3W Distributor Valve. However, the diagrammatic arrangement of Test Rack of C3W Distributor Valve is shown in Sketch-A (For reference only).

2.2 Test set up

2.2.1 Mount the valve on the test rack.

2.2.2 Maintain supply pressure to 10 ± 0.2 kg/cm^2 minimum.

2.2.3 Close all test rack and test plate cocks.

2.2.4 Open the test rack supply cock.

2.2.5 The N1 & N2 should be set at 5 ± 0.1 kg/cm^2 & 6 ± 0.1 kg/cm^2 and N3- set at 10 ± 0.2 kg/cm^2 of the test rack.

2.2.6 Cock C1, C13, C15 and C19 are kept in open condition.

2.2.7 Conduct the test as per the test procedure given in table no. 6.

TABLE-6

S. No.	Test Description	Standard Value	
1.	**Charging time for Control Reservoir and Aux. Reservoir** Open cock C3 and measure time for filling up to CR and AR from 0 to 4.8 (95 % of max. BP pressure) kg/cm^2 and open Cock C17 CR=BP=AR = 5 kg/cm^2	CR	260 ± 20 sec
		AR	270 ± 30 sec
	Open cock C22 to charge AR	AR = 10 kg/cm2	
2.	**Pressure tightness in brake release condition** (Leakage test)		
	Apply soap at chokes and all joint	No leakage	
3.	**Full service application** (Pass)		
3.1	Close cock C3 and open cock C6 and make a drop of 1.6kg/cm^2 in B.P. pressure and close cock C6. Note the application time in sec to fill the B.C. pressure (3.6kg/cm^2±0.1kg/cm^2)	7 to 10 sec (Pass)	
3.2	Max B.C.	3.7 to 3.9 kg/cm2	
3.3	Apply soap at all joint	No leakage	
4	**Full service Release** (Pass)		
4.1	Open cock C3 and measure the release time for B.C. (from Max. BC to 0.4 kg/cm^2) release time in sec	15 to 20 sec (Pass)	
5	**Emergency application**		
5.1	Close cock C3 and open cock C6 and make a drop of 5kg/cm^2 in B.P. pressure. Note the application time in sec to fill the B.C. Pressure (3.6kg/cm^2±0.1kg/cm^2)	7 to 10 sec (Pass)	
5.2	Max B.C.	3.7 to 3.9 kg/cm2	
5.3	Apply soap at all joint	No leakage	
6.	**Emergency Release**		
6.1	Close cock C6, Open cock C3 and measure the release time for B.C. (from Max. BC to 0.4 kg/cm^2) in sec	15 to 20 sec (Pass)	
6.2	**Over Charge protection**		
	Close C3, reduce BP to 3.4 kg/cm^2 by using C6	BC>0	
	Overcharging the BP to 6 kg/cm2 by closing C1 & open C2 & C3	CR pressure should not increase by more than 0.1kg/cm2 in 15 sec-	
7	**Over charge reduction** (Pass) Close cock C2, open cock C1 and allow the B.P. to stabilize at 5 kg/cm2		
7.1	Pull the operating lever for 1 sec and note the fall in C.R. pressure BP and CR	A drop in CR pressure should be observed CR= BP =5kg/cm2	
7.2	Note B.P. and C.R. pressure	5 kg/cm2	
8.	**Full service application (Good)**		
8.1	Close cock C3 and open cock C6 and make a drop of 1.6kg/cm2 in B.P. pressure and close cock C6. Note the application time in sec to fill the B.C. pressure (3.6kg/cm2±0.1kg/cm2)	25 to 30 sec (Goods)	
8.2	Max B.C.	3.7 to 3.9 kg/cm2	

<table>
<tr><td>8.3</td><td>Apply soap at all joint</td><td>No leakage</td></tr>
<tr><td>9.</td><td>Full service Release (Good)</td><td></td></tr>
<tr><td>9.1</td><td>Open cock C3 and measure the release time for B.C. (from Max. BC to 0.4 kg/cm^2) release time in sec</td><td>45 to 60 sec (Goods)</td></tr>
<tr><td>10.</td><td>Emergency application (Good)</td><td></td></tr>
<tr><td>10.1</td><td>Close cock C3 and open cock C6 and make a drop of 5kg/cm2 in B.P. pressure. Note the application time in sec to fill the B.C. pressure (3.6kg/cm2$\pm$0.1kg/cm2)</td><td>25 to 30 sec</td></tr>
<tr><td>10.2</td><td>Max B.C.</td><td>3.7 to 3.9 kg/cm2</td></tr>
<tr><td>10.3</td><td>Apply soap at all joint</td><td>No leakage</td></tr>
<tr><td>11</td><td>Emergency Release (Goods)</td><td></td></tr>
<tr><td>11.1</td><td>Close cock C6, Open cock C3 and measure the release time for B.C. (from Max. BC to 0.4 kg/cm^2) in sec</td><td>45 to 60 sec</td></tr>
<tr><td>11.2</td><td>Over Charge protection</td><td></td></tr>
<tr><td></td><td>Close C3, reduce BP to 3.4 kg/cm^2 by using C6</td><td>BC>0</td></tr>
<tr><td></td><td>Overcharging the BP to 6 kg/cm2 by closing C1 & open C2 & C3</td><td>CR pressure should not increase by more than 0.1kg/cm2 in 45 sec</td></tr>
<tr><td>12</td><td>Over charge reduction (Goods)
Close cock C2, open cock C1 and allow the B.P. to stabilized at 5 kg/cm2</td><td></td></tr>
<tr><td>12.1</td><td>Pull the operating lever for 1 sec and note the fall in C.R. pressure BP and CR</td><td>A drop in CR pressure should be observed
CR= BP =5kg/cm2</td></tr>
<tr><td>12.2</td><td>Note B.P. and C.R. pressure</td><td>5 kg/cm2</td></tr>
<tr><td>13.</td><td>Graduated Application</td><td></td></tr>
<tr><td>13.1</td><td>Close C3, open C8 to decrease BP pressure in seven steps of 0.2kg/cm2 each time
The BC pressure should increase in seven steps as follows
<table>
<tr><th>Step</th><th>BP</th><th>BC</th></tr>
<tr><td>1</td><td>4.6</td><td>0.40 – 0.80</td></tr>
<tr><td>2</td><td>4.4</td><td>1.15 -1.45</td></tr>
<tr><td>3</td><td>4.2</td><td>1.75-2.05</td></tr>
<tr><td>4</td><td>4.0</td><td>2.35-2.65</td></tr>
<tr><td>5</td><td>3.8</td><td>2.95-3.25</td></tr>
<tr><td>6</td><td>3.6</td><td>3.30-3.70</td></tr>
<tr><td>7</td><td>3.4</td><td>3.70-3.90</td></tr>
</table></td><td>Corresponding increase in BC pressure to be recorded
<table>
<tr><th>Step</th><th>BC</th></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td></td></tr>
</table></td></tr>
<tr><td>14</td><td>Pressure tightness in brake applied condition</td><td></td></tr>
<tr><td>14.1</td><td>Apply soap all over the valve</td><td>No leakage permitted</td></tr>
<tr><td>14.2</td><td>Close C8 & open cock C3</td><td>BC =0 & BP = 5 cm2</td></tr>
<tr><td>15</td><td>Graduated release</td><td></td></tr>
<tr><td></td><td>Close C3 & open C6 to decrease the BP pressure to reaches 3.4 kg/cm^2 . Close C6 when pressure reaches 3.4 kg/cm2 .</td><td>Ensure BC = 3.8 $\pm$0.1 kg/cm^2</td></tr>
<tr><td>15.1</td><td>Operate cock C3 to increase the BP pressure in seven steps of 0.2kg/cm^2 each time. After operating the 7th step, C3 to be kept in open condition.</td><td>Corresponding drop in BC pressure to be</td></tr>
</table>

<table>
<tr><td></td><td>The BC pressure should drop in seven steps as follows
<table><tr><th>Step</th><th>BP</th><th>BC</th></tr><tr><td>1</td><td>3.6</td><td>3.30-3.70</td></tr><tr><td>2</td><td>3.8</td><td>2.95-3.25</td></tr><tr><td>3</td><td>4.0</td><td>2.35-2.65</td></tr><tr><td>4</td><td>4.2</td><td>1.75-2.05</td></tr><tr><td>5</td><td>4.4</td><td>1.15 -1.45</td></tr><tr><td>6</td><td>4.6</td><td>0.40 – 0.80</td></tr><tr><td>7</td><td>4.8</td><td>0.0- 0.20</td></tr></table></td><td>recorded
<table><tr><th>Step</th><th>BC</th></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td></td></tr></table></td></tr>
<tr><td>16</td><td>SENSITIVITY</td><td></td></tr>
<tr><td>16.1</td><td>Note: Handle position is in ‘P’ Mode.
Close C3. Reduce Brake Pipe pressure at the rate of 0.6kg/cm2 in 6 sec by opening cock C8.</td><td>BC should apply within 6 sec max</td></tr>
<tr><td></td><td>Close cock C8 and Open cock C3</td><td>BC=0 & BP= 5 kg/cm^2</td></tr>
<tr><td>17</td><td>INSENSITIVITY</td><td></td></tr>
<tr><td>17.1</td><td>Close cock C3 & Open Cock C7 such that BP pressure drops by 0.3 kg/cm^2 in 60 sec</td><td>The brake must not apply (BC=0)</td></tr>
<tr><td></td><td>Close Cock C7 and Open cock C3</td><td>CR = BP</td></tr>
<tr><td>18</td><td>Re-charging
Close cock C3 & open Cock C5 & C2 to build BP pressure to 0.2 kg/cm^2 & close cock C2, observe leakage at the exhaust of release valve. Close cock C5 & Open C3</td><td>No leakage permitted.</td></tr>
<tr><td>19</td><td>Re-feeding Test</td><td></td></tr>
<tr><td>19.1</td><td>Close cock C3 & Open Cock C6 to cause a pressure drop of 0.8 kg/cm2 in BP and wait for stabilization. Create a leak in BC through 2mm choke by opening Cock C14.</td><td>BC pressure should not drop more than 0.15kg/cm2 and again increases due to re-feeding.</td></tr>
<tr><td></td><td>Close C14 & Open C3, wait for stabilization for CR & BP pressure.</td><td>CR = BP</td></tr>
<tr><td>20</td><td>Air tightness of Brake capacities</td><td></td></tr>
<tr><td>20.1</td><td>Initial condition as in para 2.2.6, Close Cock C3. Open Cock C6 to make an Emergency brake application.</td><td>Instant drop in CR pressure 0.1kg/cm2 (max) allowed. No further drop allowed for 1 minute.</td></tr>
<tr><td>20.2</td><td>Apply soap foam all over the valve</td><td>No leakage is permitted</td></tr>
<tr><td>21.1</td><td>Emergency Application</td><td></td></tr>
<tr><td>21.2</td><td>Close cock C3 and open Cock C6. Note BP and BC pressure.

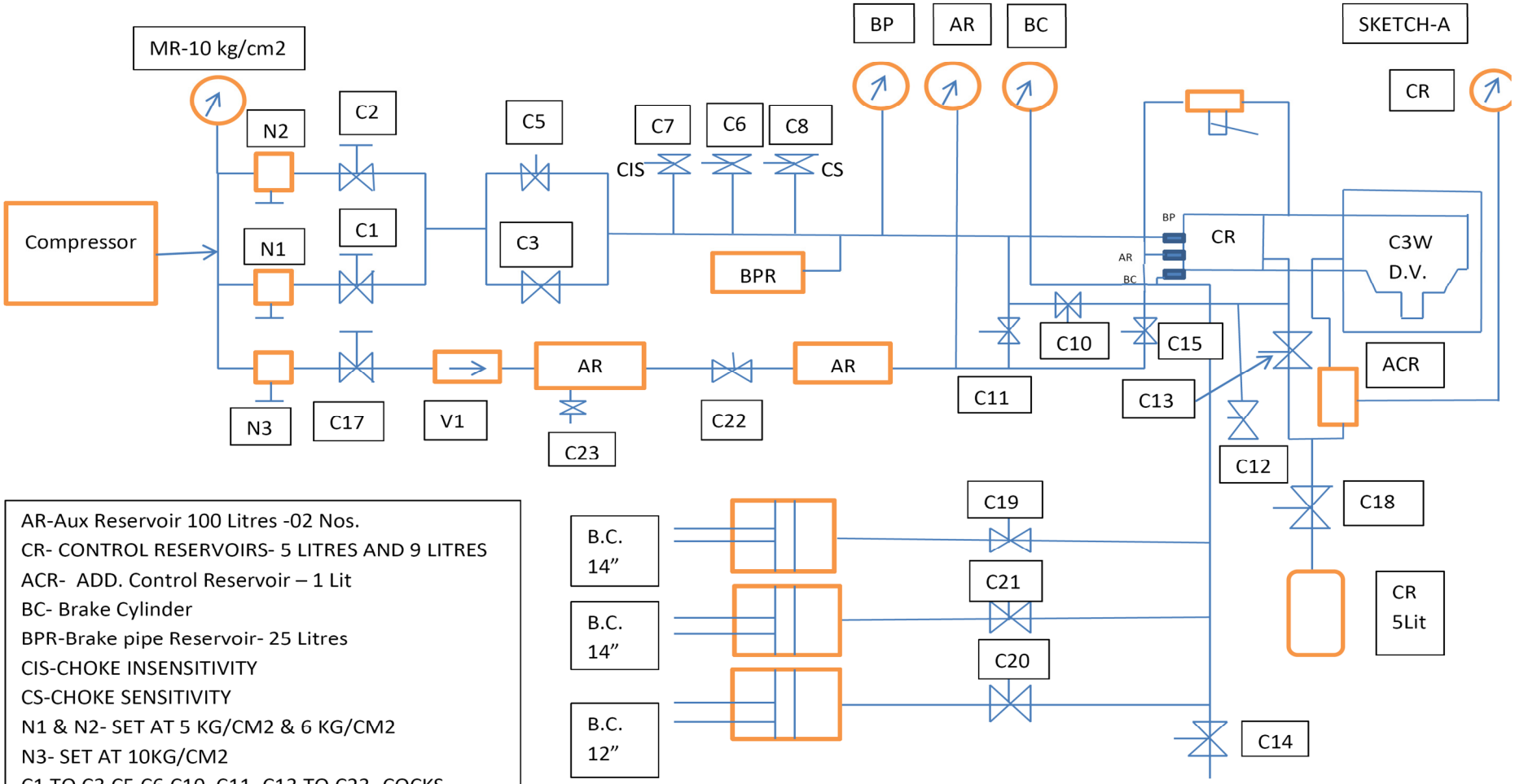
Pull briefly the operation lever and check for draining of CR fully.</td><td>BP=0,
BC=3.8kg/cm^2,
CR Emptying time should be </=65 sec</td></tr>
</table>

Control Reservoir Pipe Bracket (CRPB)

S. No.	Test Description	Standard Value
1.	Leakage Test: Check leak at CR port on Control Reservoir Pipe Bracket	No leakage permitted
2.	Check leak at BP port on CRPB	No leakage permitted
3.	Check leak at all over the Isolating cock body	No leakage permitted
4.	Check leak at BP port on CRPB face	No leakage permitted
5.	Open Isolating cock handle	Free flow of air from BP port
6.	Fix the blanking plate of C3W DV	Pressure on the gauge to be 10kg/cm2
7.	Check leak at all over the body	Pressure on the gauge to be 10kg/cm2
	Fix the C3W DV check all over the body	No leakage permitted
8.	After venting, check leak at vent port	No leakage permitted

3. Endurance Test:

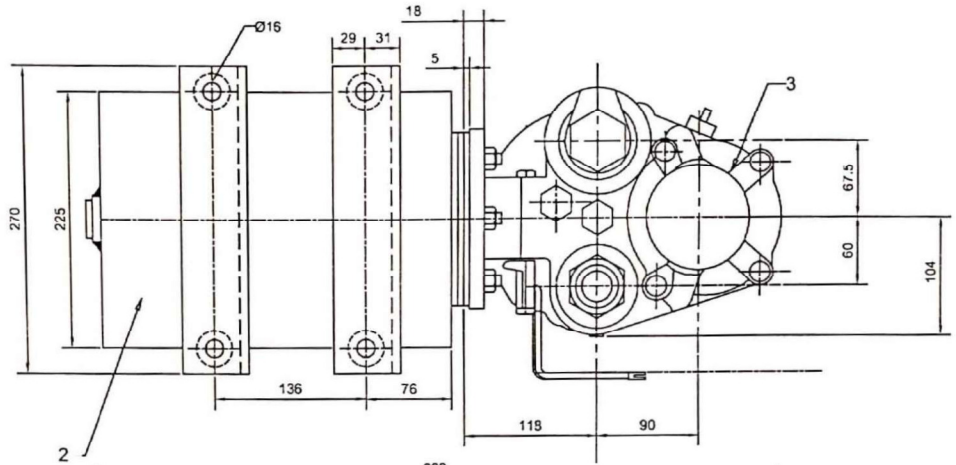
The endurance test shall be carried out on 2 nos., prototype distributor valves as per Annexure-VI.

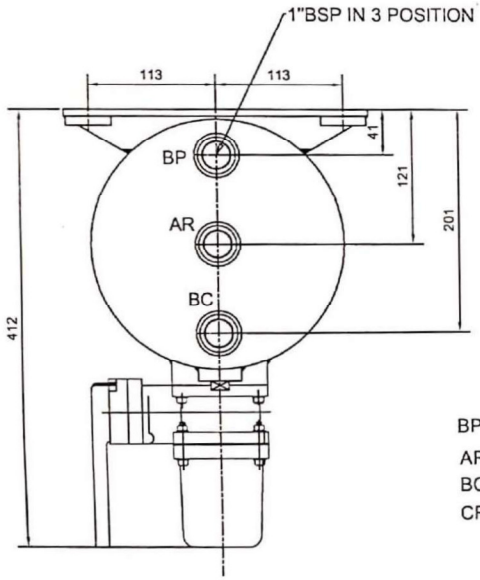


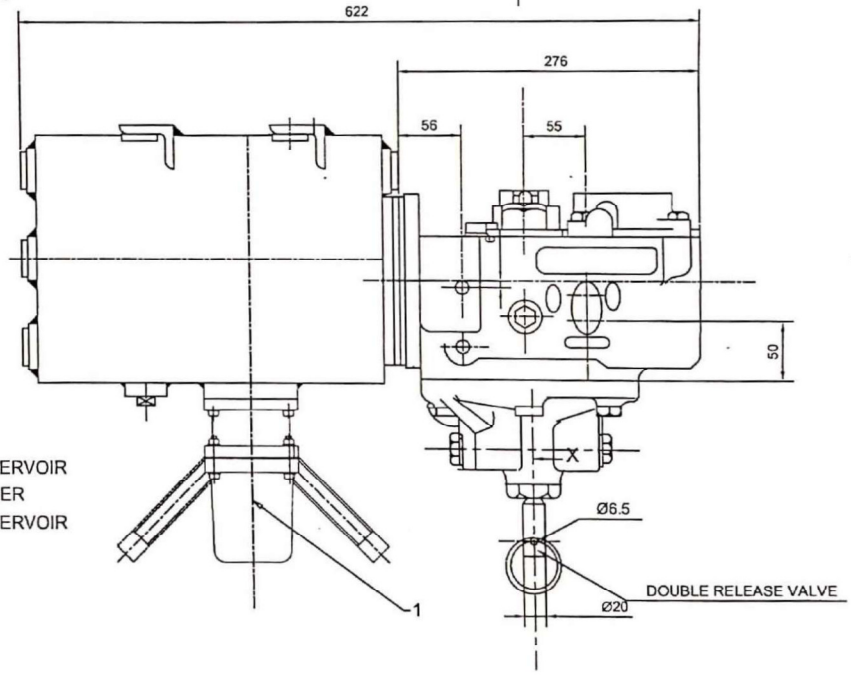
AR-Aux Reservoir 100 Litres -02 Nos.
CR- CONTROL RESERVOIRS- 5 LITRES AND 9 LITRES
ACR- ADD. Control Reservoir – 1 Lit
BC- Brake Cylinder
BPR-Brake pipe Reservoir- 25 Litres
CIS-CHOKE INSENSITIVITY
CS-CHOKE SENSITIVITY
N1 & N2- SET AT 5 KG/CM2 & 6 KG/CM2
N3- SET AT 10KG/CM2
C1 TO C3,C5,C6,C10, C11, C13 TO C23- COCKS
C7, C8 & C12- COCKES WITH BLEED HOLE
V1- CHECK VALVE
GAUGES:
BP, AR, CR- 0-10KG/CM2
BC- 0-5KG/CM2

SCHEMATIC FOR TEST BENCH FOR C3 W DISTRIBUTOR VALVE

SL. NO.	DESCRIPTION	QTY
3	C3W DISTRIBUTOR VALVE	1
2	CONTROL RESERVOIR 6 LTR	1
1	COMBINED SANDWICH PIECE ISOLATING COCK	1







BP - BRAKE PIPE
AR - AUXILARY RESERVOIR
BC - BRAKE CYLINDER
CR - CONTROL RESERVOIR

NOTE
1. ALL DIMENSION ARE IN MM, OTHERWISE SPECIFIED.
2. REMOVE ALL BARES & SHARP EDGES FROM FINISH PART.
3. ALL DIMENSION ARE AFTER PLATING.
4. MANUFACTURER'S NAME PLATE TO BE FIXED ON THE BODY.
5. GENERAL TOLERANCE AS PER IS:2102 (Pt-1)

D	
C	S. Rehman
APPD.	
Dt	23.09.22

NO OF PLACES	ALT No	REF No	DESCRIPTION	Alt.Note. No	SIGN	Dt

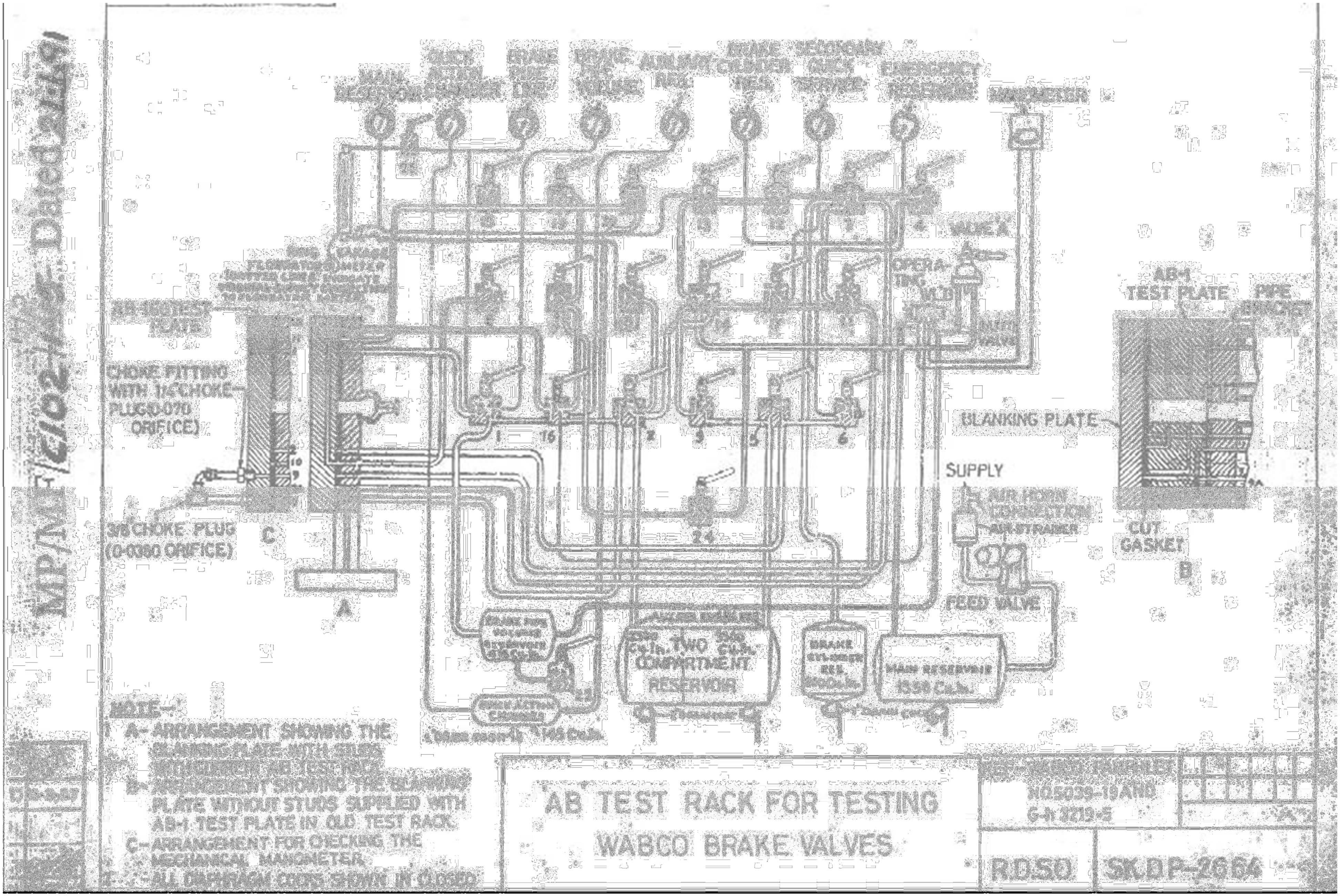
APPLICABLE FOR DSL/ELEC. LOCO	C3W DISTRIBUTOR VALVE WITH CONTROL RESERVOIR
SCALE N.T.S	
INDIAN RLYS RDSO (MP)	SKDP-4162

Annexure –VI

Endurance Test on C3W Distributor Valve

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: -

1. The endurance testing shall be carried out on two Distributor Valve.
2. Performance tests are to be carried on Distributor Valve one by one in the test rack as per clause 2 of Annexure – V and record the values.
3. The DV and the counter of the testing machine shall be properly sealed.
4. Conduct endurance test under accelerated condition till 1 lakh brake applications and release.
5. After 1 lakh brake application and release the DV shall be removed from the testing machine and conduct the performance test as per clause 2 of Annexure – V 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 and reasons recorded jointly with firm representative & inspecting authority. 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.
7. After 5 lakh of brake application and release, remove the DV from the testing machine and conduct the performance test as per clause 2 of Annexure – V. If major variation is found, the DV shall be examined and reasons recorded jointly with firm representative & inspecting authority. 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 and conduct the performance test as per clause 2 of Annexure – V on the DV test rig and values recorded jointly with firm representative & inspecting authority. 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 and the rubber components examined jointly with firm representative & inspecting authority. If there are no damages, the components and DV can be considered to have passed the endurance test.
11. In case during the course of the test the DV becomes defective, the DV shall be removed and dismantled. Items found defective shall be identified & details recorded jointly with firm representative & inspecting authority. 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.


MP/M/ C/02 ... Dated
MAIN RESERVOIR
QUICK ACTION CHAMBER
BRAKE PIPE LINE
BRAKE PIPE VOLUME
AUXILIARY RES.
BRAKE CYLINDER RES.
SECONDARY QUICK SERVICE
EMERGENCY RESERVOIR
MANOMETER
VALVE X
OPERATING VALVE
AB-1 TEST PLATE
AB-1 TEST PLATE
PIPE BRACKET
CHOKE FITTING WITH 1/4" CHOKE PLUG (0.070 ORIFICE)
BLANKING PLATE
SUPPLY
AIR HORN CONNECTION
AIR STRAINER
3/8 CHOKE PLUG (0-0380 ORIFICE)
C
A
B
CUT GASKET
FEED VALVE
TWO COMPARTMENT RESERVOIR
MAIN RESERVOIR 1550 Cu.In.
24
1
16
2
3
5
6
NOTE—
1. A– ARRANGEMENT SHOWING THE BLANKING PLATE WITH STUDS
B– ARRANGEMENT SHOWING THE BLANKING PLATE WITHOUT STUDS SUPPLIED WITH AB-1 TEST PLATE IN OLD TEST RACK.
C– ARRANGEMENT FOR CHECKING THE MECHANICAL MANOMETER.
AB TEST RACK FOR TESTING
WABCO BRAKE VALVES
R.D.S.O.
SK.D.P-2664

PART – B

Schedule of Technical requirements for Brake Valves (N-1 Reducing Valve , A-9 Auto Brake Valve, C-2W Relay Valve With 5mm / 6mm Choke, 24A-Double Check Valve & C3W Distributor Valve With Control Reservoirs) for its use in brake system fitted on diesel and electric locomotives

1. Minimum Requirements of Infrastructure, Manufacturing, Testing & Quality Control for Approval of Manufacturer

13.1 The manufacturer shall have at least the following infrastructure and manufacturing facilities:

13.1.1 The Manufacturer shall have adequate space and covered area with proper floor to accommodate the following:

- Dust & Damp-free space for storage of raw materials.
- Manufacturing Activities.
- Finishing, Assembly
- Inspection and Testing.
- Storing and dispatch of finished products.

13.1.2 **M & P requirement:**

The following is the indicative list of Machineries and Plant to be available with the firm or its sub-vendor, as the case may be. The capacity of the machines shall be suitable for manufacturing the required job:

a) Machine(s) having facilities of Bending, Cutting, Machining, Punching, Lapping and shearing facility
b) Grinding Machine
c) Drilling Machine
d) Air compressor
e) Humidifier or other facility (For storage of Rubber items)
f) Painting Equipment

13.1.3 **List of Measuring and Testing Equipment**

The firm shall have facilities and major equipment's needed for conducting test as follows:

a) Test Bench for Functional Testing of Brake Valves
b) Surface Table
c) Digital Vernier Caliper
d) Dial Gauge
e) Micrometer
f) Measuring tapes
g) Thread Plug Gauges
h) Ring Gauges
i) Steel Scale
j) Digital Weigh scale
k) Stop watch
l) Torque Wrench
m) Height Gauge
n) Depth Micrometer

13.2 Quality Control Requirements

a) The manufacturer shall have a system of easy traceability of the product from raw material stage to finished product stage.

b) The manufacturer shall have a system to ensure that Equipment's are checked dimensionally and functionally prior to release for production and records of these checks are maintained.

c) The calibration of the Testing/Measuring Equipment's/Weighing machines should be done at least once in a year unless stated otherwise.

d) The manufacturer shall have a system of review of rejections detailing rejection rate, cause of rejection, corrective action taken etc. on regular basis and records thereof should be maintained.

e) The manufacturer shall have a system of documentation in respect of rejection at customer end, warranty replacement and failure of brake valve in service.

f) The manufacturer should have a system of recording plant, machinery & control equipment remaining out of service, nature of repairs done etc.

g) Latest versions of relevant specifications and drawings shall be available with the manufacturer.