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भारत सरकार . रेल मंत्रालय

**GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS**

डीजल एवं इलेक्ट्रिक लोकोमोटिव के ब्रेक सिस्टम में प्रयोग  
हेतु एसए-9 इंडिपेंडेन्ट ब्रेक वाल्व की विशिष्टि और तकनीकी  
आवश्यकताओं की अनुसूची

**SPECIFICATION & SCHEDULE OF TECHNICAL  
REQUIREMENTS FOR SA-9 INDEPENDENT BRAKE VALVE  
FOR ITS USE IN BRAKE SYSTEM FITTED ON DIESEL AND  
ELECTRIC LOCOMOTIVES**

विशिष्टि संख्या . एम.पी.0.0100.36 (संशो.-01)

जून - 2024

**SPECIFICATION NO. MP.0.01.00.36 (REV- 01)**

**June - 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.	June - 2024	1	2.7, 3.4, 4.1, 4.3, 4.6, 5.11, 7.6, 12(now 11)	Para has been revised to keeping in view of probable change in vendor approving agency.
			3.1.3	Revised, the standard for vibration & shock test has been referred as alternate method.
			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. of ISO document QO-D-8.1-10 ver. 2.4, the para 7.1 & 7.2 has been revised.
			7.7	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.
			10	Para deleted & shifted to Part –B of this document. Accordingly para 11, 12 & 13 shifted to one place above & re-numbered.

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**PART A- Specification for SA-9 Independent Brake valve 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 SA-9 Independent Brake 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 : -5 deg. C to 55 deg. C. The air temperature in-side the equipment compartment may reach up to 70 deg. 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. Contractor shall supply one set of maintenance manual with every 5 sets of the equipment. 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 personnel 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.

### 35. 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 SA-9 Independent Brake 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 SA-9 Independent Brake valve conforming to existing approved design in view of the interchangeability of the assembly.
- 4.3. The manufacturer shall submit complete sets of GA (General Arrgt) drawing of SA-9 Independent Brake valve to RDSO/Vendor Approving Agency.
- 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 SA-9 Independent Brake valve 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 SA-9 Independent Brake valve shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.
- 5.2. Independent Brake Valve SA-9 shall be used for brake application of locomotive only for diesel and electric locomotives.
- 5.3. Two SA-9 Independent Brake Valves one each on the two control stand is provided on the locomotive.

- 5.4. The SA-9 independent brake valve consists of a self-lapping regulating portion, which supplies or exhausts the air pressure for piloting the graduated application and release of brake cylinder pressure on locomotive.
- 5.5. The SA-9 independent brake valve is provided with an adjusting handle which serves to permit the proper adjustment of the maximum compressed air for locomotive independent brake application.
- 5.6. SA-9Independent 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.
- 5.7. The equipment shall work satisfactory with Main reservoir pressure up to 10 kg/cm<sup>2</sup>.
- 5.8. The location and size of port is shown in RDSO drawing no. SK.DP-4153.The port numbers should be clearly legible,
- 5.9. Proper heat treatment shall be given to attain required hardness on wearing components.
- 5.10. The general shape, envelop size and mounting dimension of SA-9 Independent Brake valve shall be as per RDSO drawing no. SK.DP-4153. The SA-9 Independent Brake valve should be fully interchangeable with respect to overall mounting dimensions & threads with valves of original manufacturer i.e. existing approved design.
- 5.11. 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.

## 6. PERFORMANCE TEST:

- 6.1. SA-9 Independent Brake valve 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.
- 6.2. Test set up
  - 6.2.1. Mount the valve on the test rack.
  - 6.2.2. Maintain supply pressure to 140 Psi/10 Kg/cm<sup>2</sup> minimum.
  - 6.2.3. Close all test rack and test plate cocks.
  - 6.2.4. Move valve “A” handle into position 8.
  - 6.2.5. Open the test rack supply cock.
  - 6.2.6. The feed valve of the test rack should be set at 120 psi.
  - 6.2.7. Conduct the test as per the test procedure given in table no. 1.

TABLE-1

Sl. No.	Test description	Standard values
1.	<p><b>REGULATNG VALVE ADJUSTMENT</b></p> <ul style="list-style-type: none"> <li>• All cocks closed except the test rack supply cock.</li> <li>• Valve “A” handle is in position 8.</li> <li>• Move Valve “A” handle to position 3.</li> <li>• Open cocks 3, 5, 9, 13 and 16.</li> <li>• Operate the device by moving the handle from “Application” to “Independent Release” position several times, finally leaving the handle in the “Full Application” position.</li> <li>• Adjust the regulating screw of the device until a 40 psi reading is</li> </ul>	

	<p>obtained on the Auxiliary Reservoir Gauge.</p> <ul style="list-style-type: none"> <li>• Move the handle of the device to “Release” position and note <b>Aux. Res. Gauge - Indication</b></li> <li>• Move the handle of the device to “Full Application” and note: <b>Aux. Res. Gauge - Indication</b></li> <li>• Move the handle of the device to the "Release position.</li> </ul>	<p><b>Reduces to zero psi.</b></p> <p><b>Increases to 40 psi</b></p>
<p><b>2.</b></p>	<p><b>LEAKAGE</b></p> <ul style="list-style-type: none"> <li>• Cocks 3, 5, 9, 13 and 16 open.</li> <li>• Valve "A" handle in position 3.</li> <li>• Handle of the device is in “Release” position.</li> <li>• Close cock 3.</li> <li>• Open cocks 4 and 8.</li> <li>(i) <u>Supply Valve and “O” Ring</u> <ul style="list-style-type: none"> <li>• Close cock 5 and note: <b>Emerg. Res. Gauge - Indication must not drop more than</b></li> </ul> </li> <li>(ii) <u>Exhaust Valve And “O:” Ring</u> <ul style="list-style-type: none"> <li>• Open cock 5.</li> <li>• Move the handle of the device to “Full Application” position.</li> <li>• Close cocks 16 and 5 and note: <b>Emerg. And Aux. Res. Gauge - Indication must not drop more than</b></li> </ul> </li> <li>(iii) <u>Gasket Leakage</u> <ul style="list-style-type: none"> <li>• Open cocks 5 and 16, then note: <b>Cock 4 leakage test fitting - Flowrator</b></li> </ul> </li> <li>(iv) <u>Independent Release Valve "O" Ring</u> <ul style="list-style-type: none"> <li>• Close cock 4, open cock 3, then note: <b>Cock 8 leakage test fitting - Flowrator</b></li> </ul> </li> <li>(v) <u>Casting and Gasket</u> <ul style="list-style-type: none"> <li>• Close cocks 8 and 16.</li> <li>• Open cocks 1 and 2.</li> <li>• Move valve "A" handle to position 1, and note: <b>Entire Device - Soap Test</b></li> </ul> </li> <li>(vi) <u>Independent Release Valve "O" Ring</u> <ul style="list-style-type: none"> <li>• Move the handle of the device into the "Independent Release" position and hold there.</li> <li>• Close cocks 1 and 3, then note: <b>B.P. Line Gauge</b></li> <li>• Release the handle of the device.</li> <li>• Move valve “A” handle to position 3.</li> <li>• Open cocks 3 and 8, then note: <b>Cock 8 leakage test fitting - Flowrator</b></li> <li>• Open cock 1.</li> </ul> </li> </ul>	<p><b>1 psi in 10 seconds.</b></p> <p><b>1 psi in 10 seconds.</b></p> <p><b>No float rise.</b></p> <p><b>No float rise.</b></p> <p><b>No Leakage.</b></p> <p><b>No pressures drop in 10 seconds.</b></p> <p><b>No float rise</b></p>

<p><b>3.</b></p>	<p><b>CAPACITY</b></p> <ul style="list-style-type: none"> <li>• Cocks 1, 2, 3, 5, 8, 9 and 13 open.</li> <li>• Handle of the device is in "Release" position.</li> <li>• Valve "A" handle in position 3.</li> </ul> <p>(i) Port 30 to 20</p> <ul style="list-style-type: none"> <li>• Move the handle of the device to the "Full Application" position and note: <b>Aux. Res. Gauge - Indication - increases from 0 to 30 psi in</b></li> </ul> <p>(ii) Port 20 to Exhaust:</p> <ul style="list-style-type: none"> <li>• Allow Aux. Res. to fully charge to 40 psi.</li> <li>• Move the handle of the device to the "Release" position and note: <b>Aux. Res. Gauge - Indication - decreases from 40 to 10 psi</b></li> </ul> <p>(iii) Port 7 to 1</p> <ul style="list-style-type: none"> <li>• Close cock 8</li> <li>• Move the handle of the device to the "Independent Release" position, hold there then note: <b>B.P. Vol. Gauge - Indication - increase from 0 to 110 psi</b></li> </ul>	<p><b>Not more than 6 seconds.</b></p> <p><b>In 6 to 9 seconds.</b></p> <p><b>In 9 to 13 seconds.</b></p>
<p><b>4.</b></p>	<p><b>SENSITIVITY</b></p> <ul style="list-style-type: none"> <li>• Cocks 1, 2, 3, 5, 9 and 13 open.</li> <li>• Handle of the device is in the "Release" position.</li> <li>• Valve "A" handle is in position 3.</li> <li>• Close cocks 1 and 2, open cock 16.</li> <li>• Move the handle of the device toward the application position to begin charging the Aux. Res. Charge the Aux. Res. to 8 psi then move the handle to the release position and note: <b>Aux. Res. Gauge - Indication</b></li> <li>• Move the handle of the device in several small steps toward the "Application" position and note : <b>Aux. Res. Gauge – Indication - increases in correspondingly small steps of</b></li> <li>• Move the handle of the device in several small steps toward the "Release" position and note: <b>Aux. Res. Gauge - Indication - decreases in correspondingly small steps of</b></li> <li>• Move the handle of the device toward the "Application" position and charge the AUX. RES. To 35 psi. Move valve "A" handle to Position 4 and note: <b>Aux. Res. Gauge - Indication is maintained with a reduction of</b></li> </ul>	<p><b>Decreases to Zero psi.</b></p> <p><b>Not more than 3 Psi</b></p> <p><b>Not more than 3 Psi</b></p> <p><b>Not more than 5 Psi</b></p>
<p><b>5.</b></p>	<p><b>COMPLETION OF TESTS</b></p> <ul style="list-style-type: none"> <li>• Move Brake Valve handle to "Release" position.</li> <li>• Close cocks 3 and 5.</li> <li>• Move valve "A" handle to position 8.</li> <li>• Open cocks 4, 6 and 8 and allow the AUX. RES. to drain to 0 psi.</li> <li>• 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.</li> <li>• Remove the tested device from the test plate.</li> </ul>	

## 7. Type and Routine Test

- 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 valve.
- 7.2. Type test shall be carried out on two samples of SA-9 independent brake valve. 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 para 5.10
2.	Performance Test	As per para 6
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 SA-9 independent brake valve 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 para 5.10
2.	Performance Test	As per para 6
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 valve fulfils the technical requirements conforming to existing approved design for SA-9 Independent Brake valve.
- 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 as 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 GA (General Arrgt) drawings indicating mounting arrangements.
  - 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

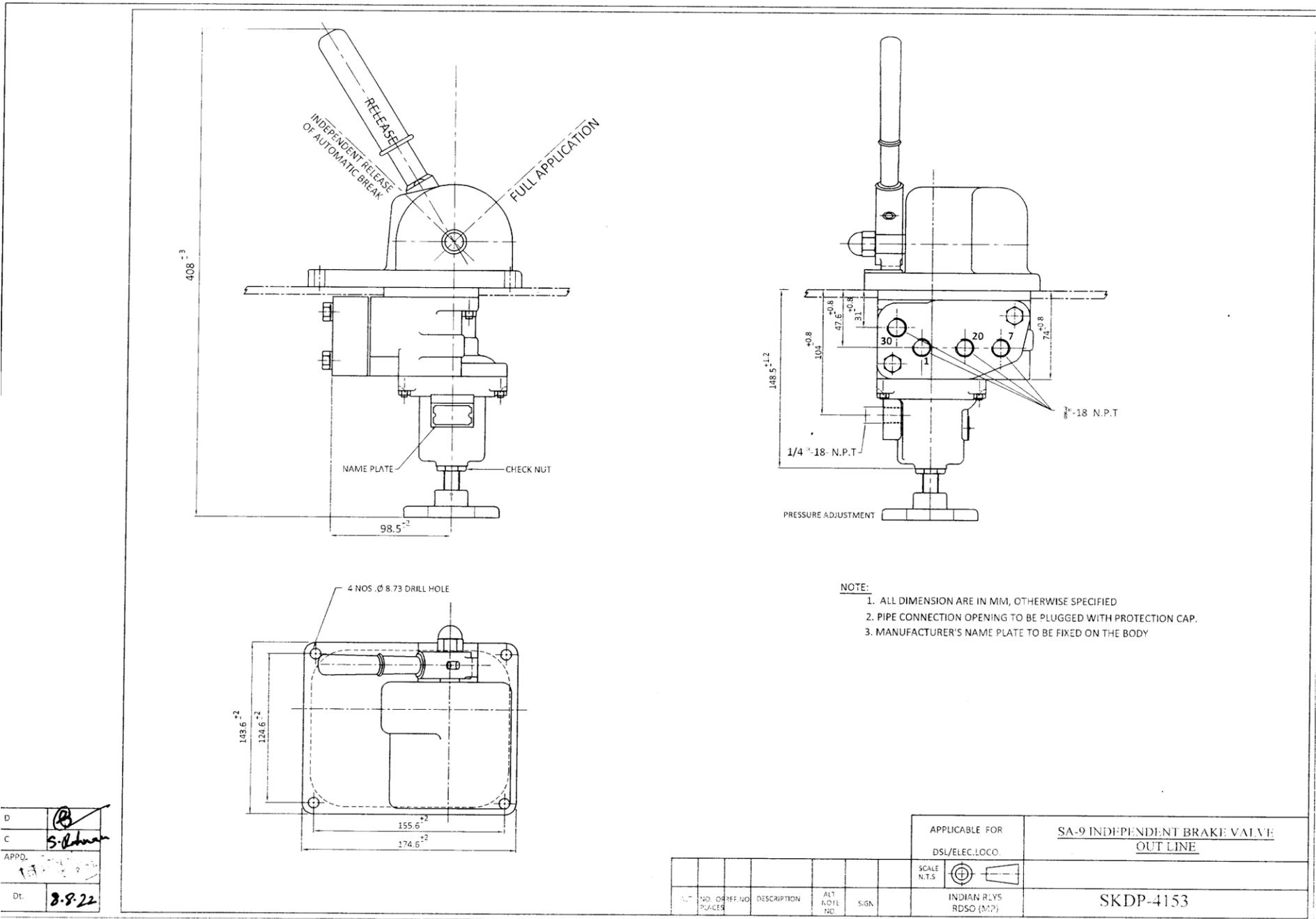
All the provisions contained RDSO's ISO procedures laid down in Document No. QO-D-8.1-11, dated (latest version). (Titled "Vendor-changes in approved status") and subsequent version/amendment thereof/respective ISO procedure of Vendor Approving Agency, shall be binding and applicable on the successful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

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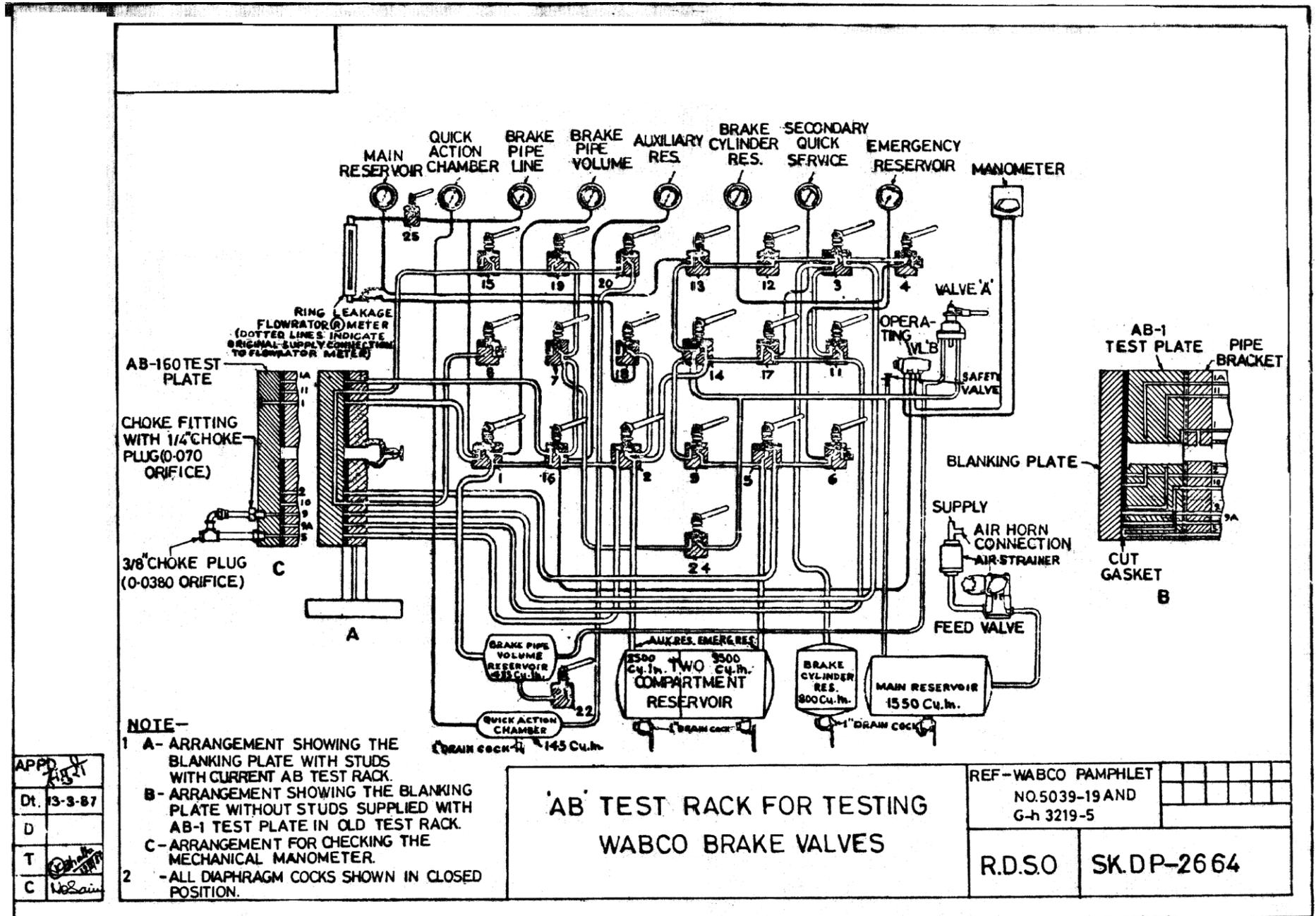
Specification & Schedule of Technical Requirements for SA-9 Independent Brake valve for its use in brake system fitted on diesel and electric locomotives



D	
C	<i>S. Sharma</i>
APPD.	<i>1.7</i>
DT.	8-8-22

APPLICABLE FOR	SA-9 INDEPENDENT BRAKE VALVE OUT LINE
SCALE	N.T.S.
INDIAN RLYS RDSO (M.P.)	SKDP-4153

NO.	OR REF. NO.	DESCRIPTION	ALT. NO. OF NO.	SIGN.



APPD	<i>[Signature]</i>
Dt.	13-3-87
D	
T	<i>[Signature]</i>
C	<i>[Signature]</i>

<h3>'AB' TEST RACK FOR TESTING WABCO BRAKE VALVES</h3>		REF-WABCO PAMPHLET	
		NO.5039-19 AND G-h 3219-5	
		R.D.S.O	SK.DP-2664

## **PART B –**

### **Schedule of Technical requirements for SA-9 Independent Brake valve 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**

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

1.1.1. 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.

#### 1.1.2. **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

#### 1.1.3. **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

12. **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.