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भारत सरकार . रेल मंत्रालय  
**GOVERNMENT OF INDIA**  
**MINISTRY OF RAILWAYS**

डीजल एवं इलेक्ट्रिक लोकोमोटिव के ब्रेक सिस्टम में प्रयोग  
हेतु एन-1 रिड्यूसिंग वाल्व की विशिष्टि

**SPECIFICATION FOR N-1 REDUCING VALVE FOR ITS USE IN  
BRAKE SYSTEM FITTED ON DIESEL AND ELECTRIC  
LOCOMOTIVES**

विशिष्टि संख्या एम.पी.0.01.00.15 (संशो.-01)  
मार्च - 2021

**SPECIFICATION NO. MP.0.01.00.15 (REV- 01)**  
**March - 2021**

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	March' 2021	1	1, 4.2, 4.4, 4.5, 5.8, 5.9, 6.1, 7.5	Para has been revised to address restrictive/narrow eligibility criteria.
			3.1.3	The standard for Vibration & shock test has been referred. Accordingly, para has been revised.
			3.2	Clause 4.3.1 of RDSO ISO Apex document no. QO-D-8.1-5, Ver. 2.1- Application for registration of vendor, covers the requirement of ISO certification. Accordingly, para has been deleted.
			3.5	RDSO ISO Apex document no. QO-D-8.1-13, Ver. 1.3- Quality Audit of Approved Vendor, covers the requirement of quality audit. Accordingly, para has been deleted.
			4.2	"components" word deleted in the sentence to address restrictive/narrow eligibility criteria..
			4.5	"conforming to WABCO requirements" has been removed from para to address restrictive/narrow eligibility criteria
			4.6	RDSO ISO document no-QM-RF-8.1.3 (Ver-1.0) - Guidelines for preparing QAP during registration, is referred in the para. Accordingly, para has been revised
			4.7	Clause 4.13 of RDSO ISO Apex document no QO-D-8.1-6, Ver.3.2 - Vendor application processing, covers the requirement for review/upgradation of QAP. Accordingly, para has been deleted.
			5.8	'Interchangeability of individual components, rubber kit and springs' has been removed from para to address restrictive/narrow eligibility criteria.
			7	Heading has been changed from 'Developmental inspection' to 'Type and Routine Test'.
			7.1	As stage inspection not required, Para has been revised for better clarity.
			7.3	Para has been revised to define type test and for better clarity. No. of samples also include for type test.
			7.4	Addition of new Para added to define routine test.
			7.8	Field trial quantity and field trial period are defined as per RDSO document no-MP-M-8.1-1 (latest version) and Field trial performance feedback format & acceptance criteria are added.
			9.1	"5 copies" word deleted in the sentence.
			10.	Clause 4.11.2 of RDSO ISO Apex document no. QO-D-8.1-6, Ver.3.2- Vendor application processing, covers the requirement of 'Procurement of Raw Material/sub-assembly from Approved Source'. Accordingly, para has been deleted.
11( Now 10)	Addition of new Para (Preference to Make In India) in compliance of directives issued by GOI for promotion of Make in India policy.			
12 (Now 11)	Addition of new Para (Vendor Changes in Approved Status) in compliance to Vigilance cell note no. 13/Vig/Policy dated 08.09.2016.			

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## **Specification for N-1 Reducing 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 N-1 Reducing 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.

### **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. 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 personnels of Indian Railway.

### 3.4 Training

Sufficient number of technicians/engineers/officers shall be trained in consultation with the purchaser/RDSO 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 N-1 Reducing valve for the use in brake system of diesel and electric locomotives shall register themselves with RDSO.

4.2 Manufacturer shall provide sufficient evidence of their capability in support of the technology of manufacturing N-1 Reducing valve conforming to existing approved design in view of the interchangeability of the assembly.

4.3 The manufacturer shall submit three complete sets of manufacturing drawings of N-1 Reducing valve to RDSO. 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 N-1 Reducing 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 RDSO ISO document no-QM-RF-8.1.3 (latest version) - Guidelines for preparing QAP during registration.

**5. TECHNICAL REQUIREMENTS:**

- 5.1 The N-1 Reducing valve shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.
- 5.2 N-1 Reducing valve shall be able to reduce the pressure of compressed air supply to a constant, predetermined value and deliver the same.
- 5.3 N-1 Reducing valve shall be self-lapping in nature and shall have pressure regulating device (regulating knob).
- 5.4 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.
- 5.5 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.
- 5.6 It should have following ports:
- i) Inlet Port to connect with supply.
  - ii) 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).

- 5.7 Proper heat treatment shall be given to attain required hardness on wearing components.
- 5.8 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.
- 5.9 Rubber components shall be procured from RDSO approved sources and shall also conform to IRS.R-48-88 (latest) or equivalent rubber specification. All rubber components used in the safety valves shall have minimum life of one and half year.

**6. PERFORMANCE TEST:**

- 6.1 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.
- 6.2 Test set up
- 6.2.1 Mount the valve on the test rack as shown in figure 1.
  - 6.2.2 Maintain supply pressure between 155 to 160 Psi.
  - 6.2.3 The feed valve of the test rack should be set at 140 psi.
  - 6.2.4 Conduct the test as per the test procedure given in table no. 1.

TABLE-1

Sl. No.	Test description	Standard values
1.	<p><b>DEVICE CONDITIONING</b></p> <ul style="list-style-type: none"> <li>Start the test with all cocks in closed position except the test rack supply cock.</li> <li>Keep valve 'A' in position no. 8.</li> <li>Open cock 9 and move valve 'A' handle in to position no. 3.</li> <li>Open cock 5,19 and 20.</li> <li>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</li> <li>Open cock 15 for 5 seconds then close it and repeat this operation five times for proper seating of the check valves.</li> <li>Close cocks 19,20 and open cock 16.</li> <li>Move valve 'A' handle to position 1 and note <b>Flow of air from Device's vent port.</b></li> <li>Move valve 'A' handle to position 3 and note <b>Flow of air from Device's vent port.</b></li> </ul>	<p><b>Strong blow of air must occur.</b></p> <p><b>Blow of air must cease.</b></p>
2.	<p><b>LEAKAGE TEST</b></p> <ul style="list-style-type: none"> <li>Start the test with cocks 5,9,16 and the test rack supply cock open.</li> <li>Keep valve 'A' handle in position no. 3.</li> </ul> <p><b>(i) Leakage in exhaust check valve and diaphragm</b></p> <ul style="list-style-type: none"> <li>Close cock 9 &amp; 16.</li> <li>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)</li> <li>Allow 20 seconds for temperature effect and then close cock 5 and note <b>Decrease in AUX. RES.GAUGE and EMER. RES.GAUGE indication</b></li> </ul> <p><b>(ii) Leakage in inlet check valve and inlet valve seat packing ring</b></p> <ul style="list-style-type: none"> <li>Open cocks 5 ,9 &amp; 16.</li> <li>Allow 20 seconds for temperature effect and then close cocks 5 &amp; 16 and note <b>EMER. RES.GAUGE indication</b></li> </ul> <p><b>(iii) Leakage in casting and gasket</b></p> <ul style="list-style-type: none"> <li>Open cocks 5 and 16 and check <b>Leakage in entire valve portion by applying soap solution</b></li> <li>Close cock 16.</li> </ul>	<p><b>Ipsi max. in 15 seconds</b></p> <p><b>Ipsi max drop in 15 seconds</b></p> <p><b>No leakage</b></p>
3.	<p><b>CAPACITY TEST</b></p> <ul style="list-style-type: none"> <li>Start the test with cocks 5, 9 and the test rack supply cock open</li> <li>Move valve 'A' handle to position no. 3</li> <li>Open cock 2 and note <b>Increase in AUX RES. GAUGE indication</b></li> <li>Close cock 2.</li> </ul>	<p><b>0-90 psi in 11 secs max.</b></p>
4.	<p><b>FUNCTION</b></p> <ul style="list-style-type: none"> <li>Start the test with cock 5, 9 and the test rack supply cock open</li> <li>Move valve 'A' handle to position no. 3.</li> <li>Open cock 16</li> <li>Move valve 'A' handle to position no. 5 and note <b>B.P. Volume Gauge indication must not decrease</b></li> <li>Move valve 'A' handle to position no. 3.</li> <li>Close cock 16 and open cock 19, 20.</li> </ul>	<p><b>By more than 8 psi</b></p>
5.	<p><b>Final Setting</b></p> <ul style="list-style-type: none"> <li>Open test rack supply cock and cock 5, 9, 19, 20.</li> <li>Move valve 'A' handle to position no. 3.</li> <li><b>Turn the adjusting screw to indicate Q.A.Chamber Gauge indication as</b></li> <li>On completion of test close cock 5 and open cocks 2 and 15.</li> <li>Move valve 'A' handle to position no. 8.</li> <li>After all the test rack gauge indications have decreased to zero psi close all test rack cocks.</li> <li>Remove the valve from the test rack.</li> </ul>	<p><b>36 psi (2.5 Kg/cm<sup>2</sup>)</b></p>



**7. Type and Routine Test**

- 7.1 The valve/equipment shall be offered for type test (developmental inspection). Any change in design found necessary during inspection shall be carried out by the contractor free of cost to ensure satisfactory performance of the reducing valve.
- 7.2 The inspection of the valve/equipment shall be carried out by Motive Power Directorate of RDSO during developmental stage, at the contractor’s premises during the manufacture and before despatch. Timely intimation (at least 2 weeks notice) should be given to the inspecting authorities.
- 7.3 Type test shall be carried out on two samples of N-1 reducing valve. If RDSO 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 5.8
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

- 7.4 Routine test (for regular Inspection) shall consist of visual check and performance test of N-1 reducing 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 5.8
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

- 7.5 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.
- 7.6 At the time of inspection the supplier shall submit the internal test results necessary to prove that the reducing valve fulfils the technical requirements conforming to existing approved design for N-1 Reducing valve.
- 7.7 If endurance test for components and sub-assemblies is required by RDSO, Lucknow, the contractor will create facilities in his works for the same.
- 7.8 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 per RDSO document no- MP-M-8.1-1 (latest version). 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:-

- .1 List of equipment with part catalogue numbers and drawing numbers.
- .2 Technical literature covering design and principle of operation, to have a general idea of the valve/equipment offered.
- .3 Detailed dimensional drawings indicating mounting arrangements, layout of valves, sub-assemblies etc.
- .4 Clausewise comments on specification.
- .5 Test program and details of testing facilities at manufacturer's works.
- .6 List of recommended spares for maintenance of valve/equipment for two years.
- .7 List of special tools required for maintenance of valve/equipment.
- .8 Latest Copy of bill of material of all brake items with Drg. No. of individual components.

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

- .1 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**

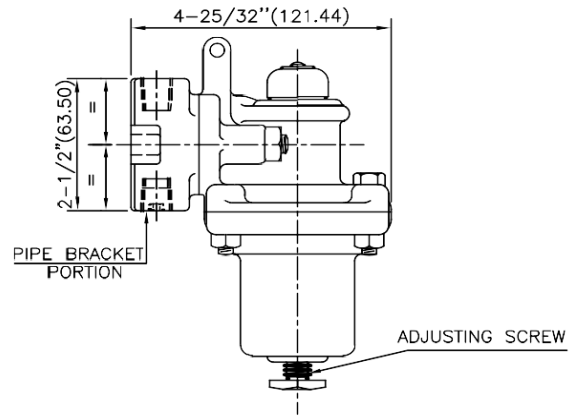
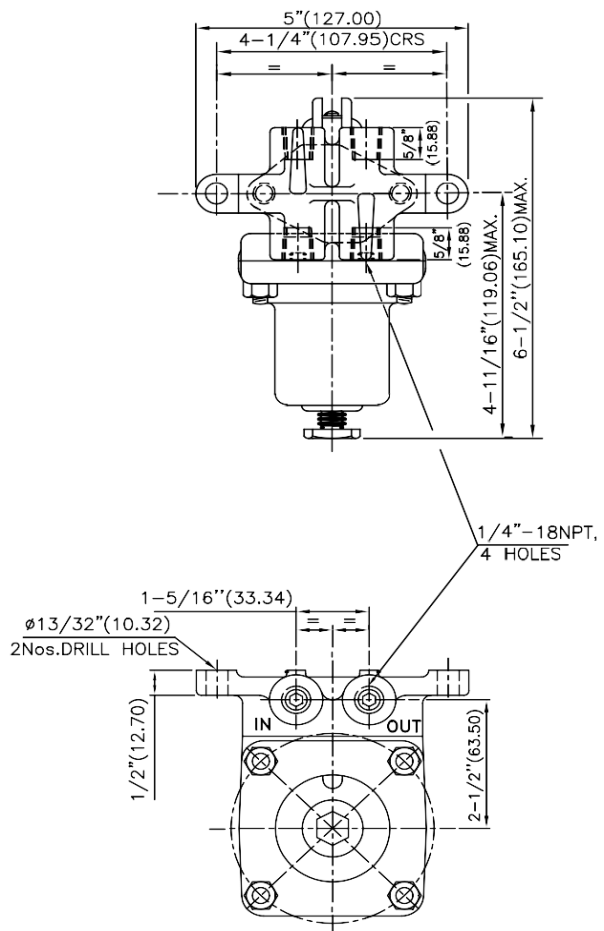
All the provisions contained RDSO’s ISO procedures laid down in Document No. QO-D-8.1-11, dated 22.01.2021 (Titled “Vendor-changes in approved status”) and subsequent version/amendment thereof, shall be binding and applicable on the successful vendor/vendors in the contract floated by Railways to maintain of products supplied to Railways.

**12. Date of Enforcement**

The date of enforcement of the specification is with effect from 1st May'2021.

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Specification for N-1 Reducing valve for its use in brake system fitted on diesel and electric locomotives

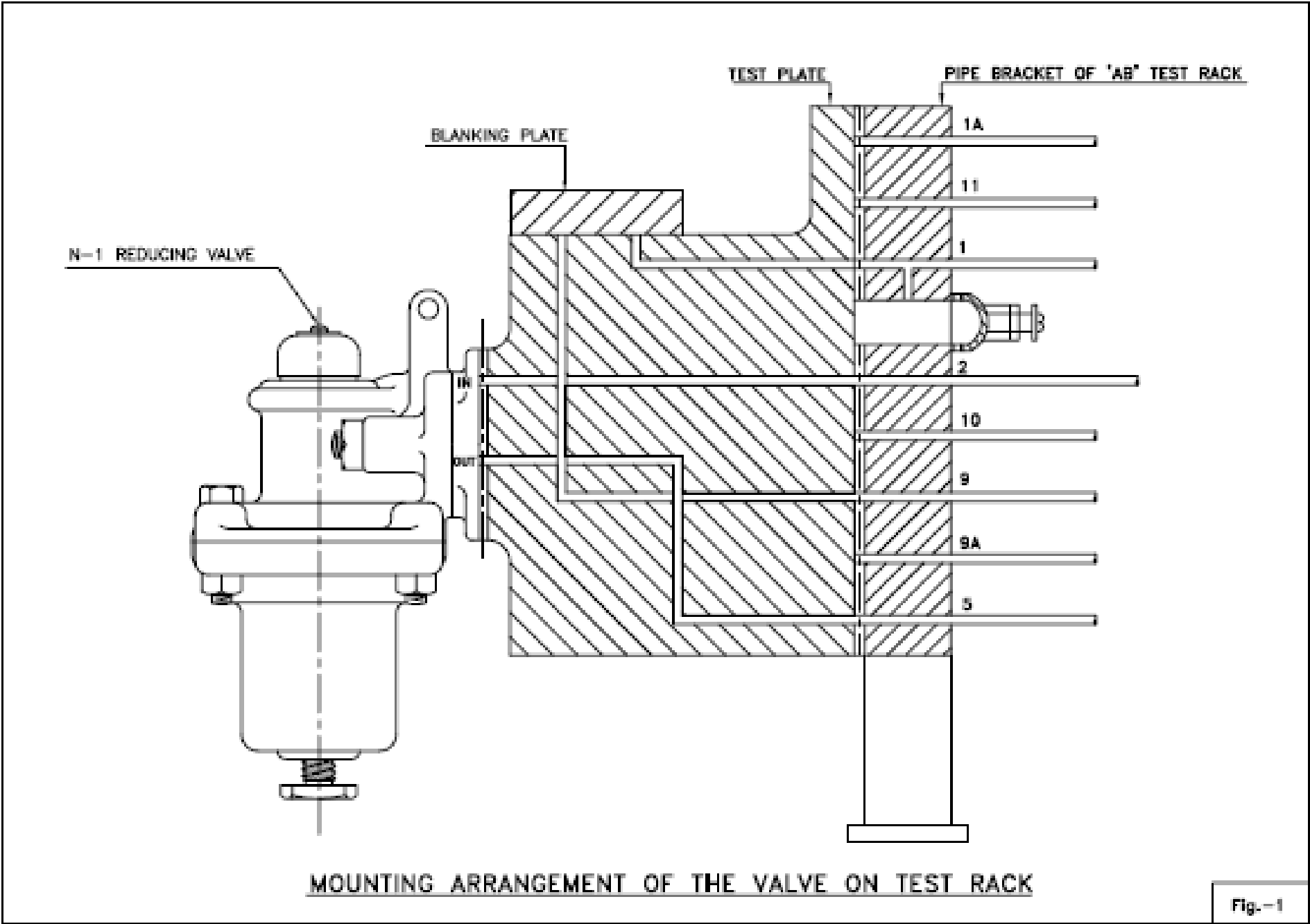


- NOTES:-
1. PIPE CONNECTION OPENINGS TO BE PLUGGED WITH PROTECTION CAP.
  2. DIMENSIONS GIVEN IN BRACKET ARE IN mm.
  3. APPROXIMATE WEIGHT = 2.041 Kg

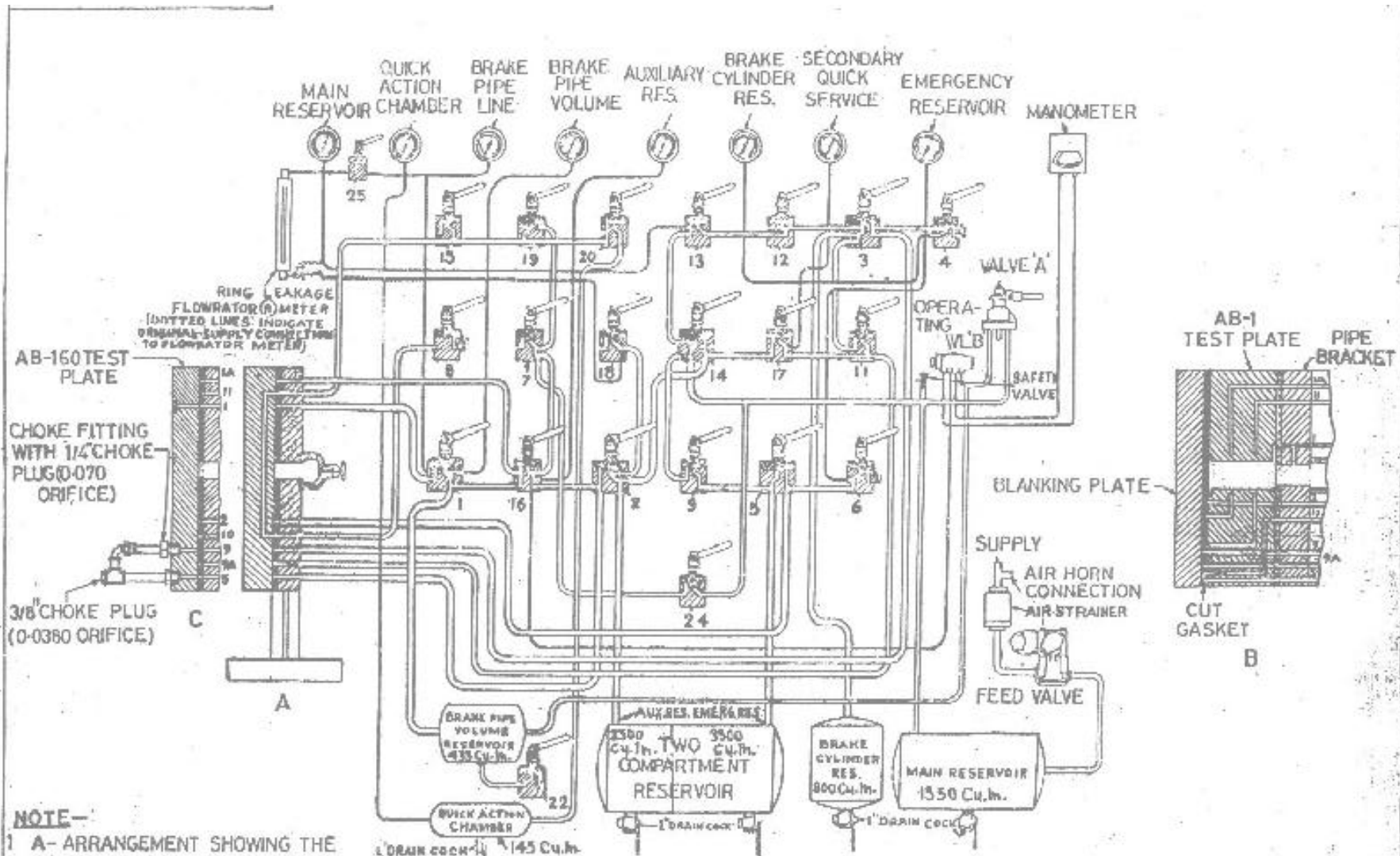
D	RAVI KANT
C	S.P.GOVIL
APPD	
Dt	03.2004

SKDP-3582

		APPLICABLE FOR DSL/ELEC. LOCOMOTIVE		N-1 REDUCING VALVE (OUT LINE)		REF:		FIRST ISSUED	
		SCALE N.T.S.				INDIAN RLYS RDSO (MP)		DRG. NO.	
DATE	ALT	DESCRIPTION	ALT. NOTE NO.	SIGN	SK.DP-3582				



MP/MF/C102-145 Dated 21.4.91



**NOTE-**

- 1 A- ARRANGEMENT SHOWING THE BLANKING PLATE WITH STUDS WITH CURRENT AB TEST RACK.
- 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.
- 2 - ALL DIAPHRAGM COCKS SHOWN IN CLOSED

**AB TEST RACK FOR TESTING WABCO BRAKE VALVES**

REF-WABCO PAMPHLET  
NO.5039-19 AND  
G-h 3219-5

R.D.S.O

SK.DP-2664