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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

डीजल एवं इलेक्ट्रिक लोकोमोटिव के ब्रेक सिस्टम में प्रयोग हेतु ऑटो ड्रेन वाल्व की विशिष्टि और तकनीकी आवश्यकताओ की अनुसूची

SPECIFICATION & SCHEDULE OF TECHNICAL REQUIREMENTS FOR AUTO DRAIN VALVE FOR ITS USE IN BRAKE SYSTEM FITTED ON DIESEL AND ELECTRIC LOCOMOTIVES

विशिष्टि संख्या एम.पी.0.01.00.26 (संशो.–02)

जून – 2024

SPECIFICATION NO.MP.0.01.00.26 (REV- 02**)**
June – 2024

अनुसंधान अभिकल्प एवं् मानक संगठन
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LIST OF AMENDMENTS

S. No	Amendment Date	Rev.	Revised Para	Details
1	March'2021	1	1	Reference of old Instruction bulletin has been deleted for better clarity.
			4.4	The standard for Vibration & shock test has been referred. Accordingly, para has been revised.
			7	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.
			10	Clause 4.1 of RDSO ISO Apex document no. QO-D-8.1-5, Ver. 2.1 - Application for registration of vendor, covers the requirement of vendor registration process. Accordingly, para has been deleted.
			11	Heading has been changed from 'Inspection, Testing and Approval' to 'Inspection and Testing'
			11.1	Vendor approval process is defined in the RDSO ISO document no QO-D-8.1-6, Ver.3.2 - Vendor application processing. Accordingly, para has been deleted.
			11.2.1	As stage inspection not required, para has been revised for better clarity.
			11.2.2	Para has been revised to define type test and for better clarity
			11.2.3	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.
			11.2.4.1	Para has been revised to incorporate details of regular Inspection (routine test) and for better clarity.
			13.1	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.
			13.2	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.
			15 (Now 13)	Addition of new Para (Preference to Make In India) in compliance of directives issued by GOI for promotion of Make in India policy.
			16 (Now 14)	Addition of new Para (Vendor Changes in Approved Status) in compliance to Vigilance cell note no. 13/Vig/Policy dated 08.09.2016.
2	June' 2024	2	3.8, 6.2, 11(now 10), 12(now 11), 14(now 13)	Para has been revised to keeping in view of probable change in vendor approving agency.
			5, 7 & 10.2	As the RDSO drawing & Testing procedure has already given in the specification. Hence, the para 5 has been revised & para 7 & 10.2 has been deleted. Accordingly, paras have been re-numbered.
			9.1 (Now 8.1)	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 has been revised
			9.3 (Now 8.3)	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:
			Part B	STR requirements included as Part-B.

PART- A

Specification for Auto Drain Valve for its use in brake system fitted on diesel and electric locomotives

1. INTRODUCTION:

Earlier D-1 Auto drain valve to WABCO part no. 55116 and WABCO test specification no. T-2202-0 was being used for automatic draining of moisture from Main Air Reservoirs in Diesel and Electric locomotives. But in WDG-4 & WDP-4 locomotives a different type of auto drain valve, as per DLW part No.17390059, is being used. Based on experience with the working of this type of Auto-drain valve on WDG4/WDP4 locos, it was decided to replace the existing D-1 Auto Drain Valve with modified Auto Drain Valve to DLW part No.17390059 (WDG-4/WDP-4 type) with immediate effect. In this regard, an Instruction bulletin no. MP.IB.BK.05.19.08 Rev. 01 has also been issued to all Zonal Railways & PU's vide this office letter no. SD.DEV.28LAV-1 dated 29.12.2008/ 07.01.09.

2. SCOPE:

This specification covers the purchase, inspection, testing, acceptance and technical requirements of the "Auto drain valve for diesel and electric locomotives" as per RDSO drawing no. SK.DP- 4070 Rev-00 for use in Diesel and Electric locomotives in Indian Railways.

3. DEFINITIONS, ABBREVIATIONS AND CLARIFICATIONS:

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

3.2 Supplier**-** means the present firm/company on whom the order for the supply of the air brake equipment is placed/will be placed.

3.3 Purchaser- means the Indian Railways on behalf of the president of the Republic of India who are purchasing the air brake equipment.

3.4 Inspecting Authority- means the organisation or its representative nominated by the purchaser to inspect the auto drain valve on his behalf.

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

3.6 Indian Railways is hereafter referred to as IR.

3.7 Main Reservoirs is hereafter referred to as MR. In locomotives compressed air from air compressor is being supplied to MR and from MR, air is being supplied to brake system & other applications.

3.8 In case of tenderer needs any clarification in respect of any clause of this specification or regarding the drawings the tenderer shall obtain it from Motive Power Directorate, RDSO/Vendor Approving Agency for clarification.

4. CLIMATIC AND ENVIRONMENTAL CONDITIONS OF OPERATION:

4.1 Altitude:

Mean sea level to an altitude of 1000 meters above mean sea level.

4.2 Temperature:

0^{o}C to 55^{o}C. The air temperature around equipment may reach as high as 70^{o}C.

4.3 Relative Humidity = Up to 100%.

4.4 Vibrations And Shocks :

The auto drain valve should be capable to withstand, without damage, 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.

4.5 Other Conditions:

Equipment shall be capable of operating efficiently in spite of dirt, dust, mist, torrential rain, heavy sand or stone storms and presence of oil vapours and radiant heat etc. to which the rolling stock is normally exposed in service.

5. WARRANTY:

The equipment shall work satisfactorily for a period of 36 months from the date of delivery or 24 months from time of fitment on locomotive, whichever is earlier. Any equipment which fails during the warranty period shall be replaced free of cost by the supplier.

6. AFTER SALES:

6.1 Supplier shall arrange to supply along with the equipment, maintenance manuals and coloured wall charts showing pictorial view of components along with part nos (in case of supply quantity being more than 5, minimum one set each for every 10 sets of equipment) of the equipment. Manual shall contain information pertaining to detailed dimensional drawings indicating mounting arrangement layout, sub-assemblies, principle of operation, maintenance schedules, trouble shooting, and details of special tools if required, parts catalogue and testing procedure of the equipment being supplied. Updated position of modifications will also be incorporated.

6.2 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 cover maintenance, testing, design and quality control. The contractor shall undertake training of Indian Railway personnel free of cost.

7. TECHNICAL REQUIRMENTS:

7.1 The general shape, envelope size and mounting dimension of Auto drain valve shall be as per RDSO drawing no. SK.DP- 4070 Rev-00.

7.2 It must be capable of handling compressed air condensate including all contaminants associated with locomotive air service, such as oil, carbon, varnish, pipe scale, etc.

7.3 The functional requirement of Auto drain valve is to remove (discharge) the condensate from the main reservoir automatically during unloading cycle as well as loading cycle of compressor. Auto drain valve shall remain open to eliminate condensate for 1 to 3 secs during loading (when MR pressure increases from 8 kg/cm² to 10 kg/cm²) as well as during unloading cycle (when MR pressure decreases from 10 kg/cm² to 8 kg/cm²) of the compressor in co-ordination with compressor loading-unloading Governor.

7.4 It should be capable of draining a minimum volume of condensate per single operation cycle (meaning actuation during unloading cycle of compressor and return during loading), should be between 400ml to 600ml at 8 to 10 kg/sq cm² operating pressure of Main Reservoir (MR). The draining of this minimum volume of condensate should take place within short time of 1 to 3 second during loading and 1 to 3 second during

unloading. During this time only auto drain valve will be venting air from MR to atmosphere along with the condensate.

7.5 It should also have facility to drain condensate manually.

7.6 It should have following ports:

i) One Port to connect it to main reservoir.

ii) Two Ports ¼"NPT (in opposite face as per drawing SK.DP- 4070 Rev-00.) to receive actuating (signal) pressure from compressor loading-unloading Governor.

iii) Two Ports 3/8" NPT (in opposite face as per drawing SK.DP- 4070 Rev-00.) to drain condensate automatically (auto drain).

iv) Two Ports 3/8" NPT (in opposite face as per drawing SK.DP- 4070 Rev-00.) to drain condensate through manual drain valve.

The location and size of ports are shown in RDSO drawing. no. SK.DP- 4070 Rev-00. The port numbers shall be cast on the pipe bracket/valve body and should be clearly visible.

7.7 The construction of the Auto drain valve must be such that it is corrosion resistant and withstand pneumatic pressures to 10.6 kg/cm2 with a safety factor.

7.8 All rubber components used in the brake valves shall have a minimum life of two year and it should normally not require overhauling before that period.

7.9 The Auto drain valve shall be suitable for the brake system provided on diesel and electric locomotives on Indian Railways.

7.10 Testing of auto drain valve shall be done as per Annexure-I. The Schematic layout of test bench is given in Drg no. SK.DP- 4069 Rev-00.

8. INSPECTION AND TESTING:

8.1 Prototype Inspection:

The Prototype test will be conducted at least on five auto drain valves.

8.2 Following shall comprise type tests:

S.N	Test	Details
1.	Dimensional check	As per para 7.1
2.	Performance Test	As per para 7.10
3.	Vibrations and shocks	As per para 4.4
4.	Any other test specified in the approved QAP as well as desired by purchaser	As per QAP or as specified by the purchaser

8.3 Field Trial of Auto Drain Valve on Locomotives:

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

8.4 Regular Inspection

8.4.1 Inspection of the Auto Drain Valve shall be carried out by the purchaser or his nominee. The supplier shall provide, without extra charges, for material, equipment, tools and any other assistance, which the purchaser or his nominee may consider necessary for any test and examination. The supplier shall make available manufacturing drawings and material specifications of the components to the inspecting authority at the time of inspection. Details of regular Inspection (routine test) are as under;

S.N	Test	Details
1.	Dimensional check	As per para 7.1
2.	Performance Test	As per para 7.10
3.	Any other test specified in the approved QAP as well as desired by purchaser	As per QAP or as specified by the purchaser

8.4.2 Supplier will offer Auto Drain Valve for inspection after complete checking by them. The test results of every Auto Drain Valve will be submitted to the inspecting authority. Inspecting authority shall carry out all tests necessary to prove that the Auto Drain Valve fulfills the technical requirements, covered in this specification.

8.4.3 Sample Size

Sample size for various tests is given below:

Lot size	For tests	
	Sample size	Number of rejection acceptable
Upto 25	3	0
25-50	5	0
50-75	8	0
75-100	10	0
More than 100	10% of the lot	0

Samples should be picked up at random from the lot. If rejection number is more than the acceptable limit, inspection will be stopped and entire lot will be tested again by the firm. After checking the firm will re-offer the lot for re- inspection. Again sample checking will be done by the inspecting authority. If second time also rejection is more than the acceptable limit, entire lot will be rejected.

9. INSTALLATION:

9.1 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.

10. QUALITY ASSURANCE PLAN (QAP):

The Firm 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.

11. DEVIATIONS:

The supplier shall submit list of deviations to RDSO/Vendor Approving Agency, if any, with reasons thereof.

12. PREFERENCE TO MAKE IN INDIA

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

13. 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.

14. DATE OF ENFORCEMENT

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

Annexure-I

Test procedure

i) Mount the valve on the test rack as shown in drawing.
ii) Maintain supply pressure to 10.0 kg/cm² minimum.
iii) Conduct the test as per the test procedure given below.

Sl.no.	Description	Standard value	Observed Value
Leakage Test			
1.	Attach valve as per test rig and supply air at 10.0 kg/cm² at inlet.(cock 2,7, closed and cock 6 open). Apply soap solution to Exhaust port.	No leakage should occur.	
2.	Supply air at 10.0 kg/cm² at actuating port and close inlet air. (cock 6,7, closed, cock 2 open and MV energised for 60 Sec & de-energised for 35 sec.). Contaminated air will be exhausted then after Apply soap solution to Exhaust port.	No leakage should occur.	
Functional Test:			
3.	Auto Drain On (Threaded part is projected out side at the place of Knob) and set as following. (cock 6 closed, cock 2,7 open and MV energised for 60 Sec & de-energised for 35 sec.).check with each of the following i.) Inlet pressure 8.0 kg/cm², Pilot Pressure 8.0 kg/cm². ii) Inlet pressure 10.0 kg/cm², Pilot Pressure10kg/cm².	Actuated and drained momentarily for 1 to 3 second in both energised and de-energised condition of MV.)	
4.	Manual Drain On (threaded part is not projected out side at the place of Knob but approximately match with the face.) (cock 2,6 closed and cock 7 open).	Moisture drained.	
5.	Auto Drain Off (threaded part is not projected out side at the place of Knob but fully inside with the face. Cock 6 closed and cock 2,7 open, MV energised for 60 Sec & de-energised for 35 sec.). i.) Inlet pressure 8.0 kg/cm², Pilot Pressure 8.0 kg/cm². ii) Inlet pressure10.0 kg/cm², Pilot Pressure 10.0 kg/cm².	Moisture does not drain during energisation & de-energisation of MV	

Minimum Pilot Pressure Test			
6.	Set the Inlet pressure from 5.0 kg /cm² to 10.0 Kg/cm² at interval of 1.0 kg//cm² and then increase the actuating pressure from 0 to inlet pressure value.	Valve actuate at minimum actuating pressure at least 1.0 Kg//cm² below inlet pressure value	
Water Discharge test (Add water 5.7 lit in tank of capacity 7 litre)			
7.	i) Inlet pressure 9.0 kg/cm², actuating Pressure 9.0 kg/cm². Magnet valve (MV) energised for 60 Sec. Measure the amount of discharge water collected and the time of actuation of the Valve. ii) Inlet pressure 9.0 kg/cm², actuating Pressure 9.0 kg/cm². MV de-energised for 35 Sec. Measure the amount of discharge water collected .	* The water discharge in energised condition of MV should be less than water discharge in de-energised condition of MV. * The total quantity of discharge water collected during energisation and de-energisation of the MV should be between 400 ml to 600 ml.	

PART – B

Schedule of Technical requirements for Auto Drain 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

1.2 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.

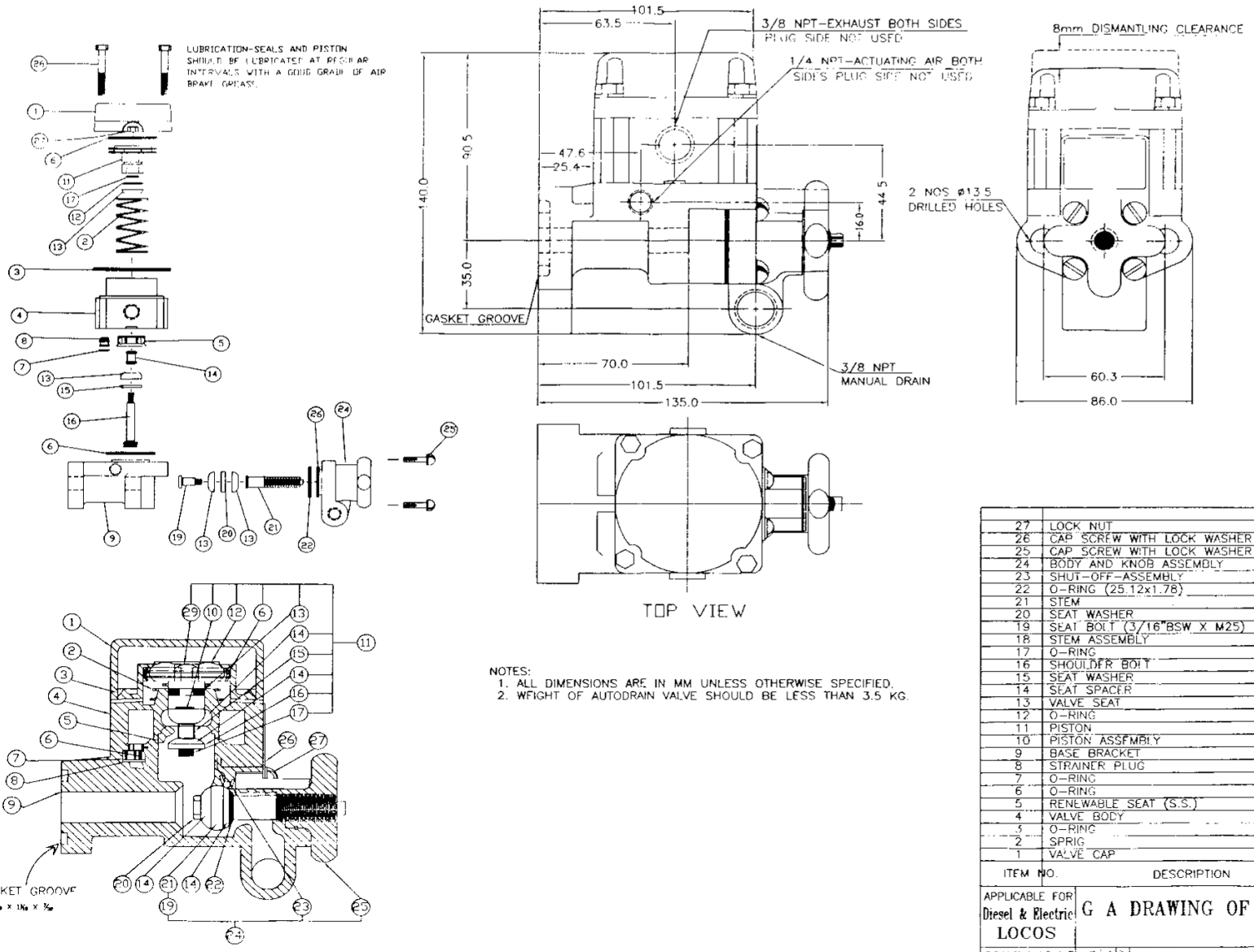
c) The calibration of the Testing/Measuring Equipment's/Weighing machines should be done at least once in a year unless stated otherwise.

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 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.



NOTES:
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. WEIGHT OF AUTODRAIN VALVE SHOULD BE LESS THAN 3.5 KG.

ITEM NO.	DESCRIPTION	MATERIAL	QUANTITY
27	LOCK NUT	HTS	1
26	CAP SCREW WITH LOCK WASHER	HTS	4
25	CAP SCREW WITH LOCK WASHER	HTS	4
24	BODY AND KNOB ASSEMBLY	GCI25	1
23	SHUT-OFF-ASSEMBLY	–	1
22	O-RING (25.12x1.78)	NITRILE	1
21	STEM	SS 304	1
20	SEAT WASHER	BRASS	1
19	SEAT BOLT (3/16"BSW X M25)	HTS	1
18	STEM ASSEMBLY	–	1
17	O-RING	NITRILE	1
16	SHOULDER BOLT	HTS	1
15	SEAT WASHER	SS 304	1
14	SEAT SPACER	SS 304	1
13	VALVE SEAT	TEFLON	4
12	O-RING	NITRILE	1
11	PISTON	GC 125	1
10	PISTON ASSEMBLY	–	1
9	BASE BRACKET	GCI25	1
8	STRAINER PLUG	BRASS	1
7	O-RING	NITRILE	1
6	O-RING	NITRILE	2
5	RENEWABLE SEAT (S.S.)	SS 304	1
4	VALVE BODY	GCI 25	1
3	O-RING	NITRILE	1
2	SPRIG	SS 304	1
1	VALVE CAP	GCI 25	1

APPLICABLE FOR Diesel & Electric LOCOS

G A DRAWING OF AUTO DRAIN VALVE

SCALE:1:10,1:5 | REF:NO.

FIRST ISSUED

SUPERSEDES

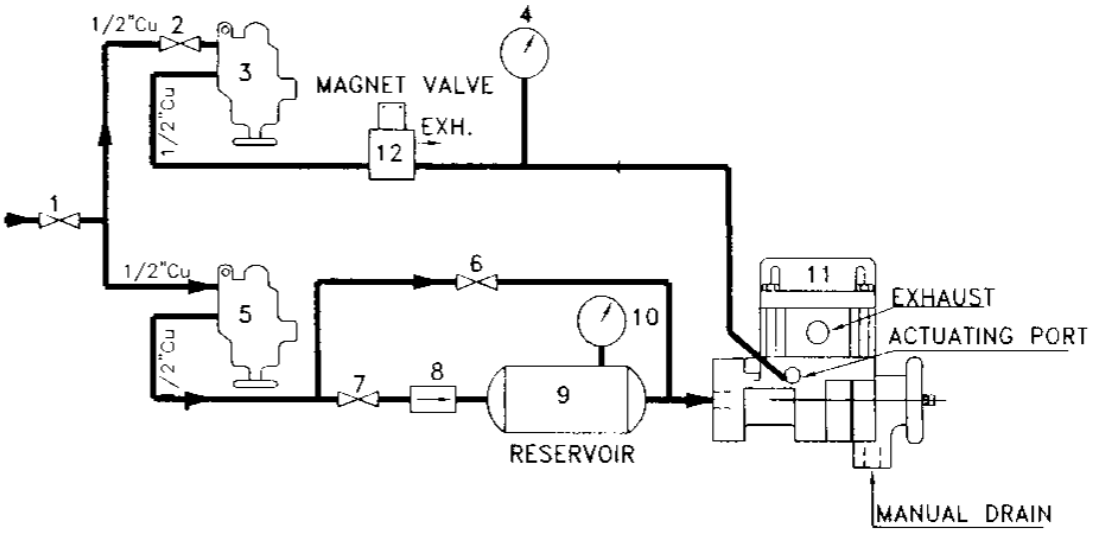
SUPERSEDED BY

INDIAN RLYS RDSO(VDG) DRG. NO. SK.DP-4070

ALT.	NO. OF PLACES	REF:NO.	DESCRIPTION	ALT.NOTE NO.	SIGN.	DATE

DRN.BY | CK'D.BY | APPROVED BY: DIR/Brake | DATE

INDIAN RLYS RDSO(MP)	APPLICABLE FOR DIESEL LOCOMOTIVE	



TEST RIG TO TEST AUTO DRAIN VALVE

ITEM NO.	DESCRIPTION	REQD NOS.
1, 2 6, 7	1/2" COC	4
3, 5	LIMITING VALVE (0-12 kg/cm2)	2
4, 10	GAUGE (0-12 kg/cm2)	2
8	CHECK VALVE	1
9	RESERVOIR 7 LIT	1
11	AUTODRAIN VALVE	1
12	2/3 WAY MAGNET VALVE NORMALLY CLOSED	1

D RAV. KANT								SCALE NTS	REF: SCHEMATIC LAYOUT OF TEST BENCH.	
APPD									DRG. NO. SKDP- 4069	
DT. 23.5	ALT:	NO OF PLACES	REF. NO.	DESCRIPTION	ALT. NOTE NO.	SIGN:	DATE	FIRST ISSUED	SUPERSEDES	SUPERSEDED BY