भारतीय मानक
Indian Standard

IS 13604 : 2014

स्वचल वाहन — वायु ब्रेक तंत्र — द्विब्रेक वाल्वों के लिए कार्यकारिता अपेक्षाएं

(पहला पुनरीक्षण)

Automotive Vehicles — Air Brake Systems — Performance Requirements for Dual Brake Valve

(First Revision)

ICS 43.040.40; 83.140.50

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September 2014 **Price Group 3**

Automotive Braking and Steering Systems, Vehicle Testing and Performance Evaluation Sectional Committee, TED 04

FOREWORD

This Indian Standard (First Revision) was adopted by Bureau of Indian Standards, after the draft finalized by the Automotive Braking and Steering Systems, Vehicle Testing and Performance Evaluation Sectional Committee had been approved by the Transport Engineering Division Council.

Braking system components play a vital role in the functioning of a vehicle. This standard specifies the performance requirements for dual brake valve used in automotive air brake system.

This standard was first published in 1992. This revision has been taken up to update based on latest technology available in the field. This standard is one in the series of Indian Standards being developed for air brake components. This standard forms an important adjunct to IS 11852 : 2012 'Automotive vehicles — Uniform provisions concerning the approval of vehicles of categories M, N and T with regard to braking (s*econd revision*)', for the performance requirements of braking systems for automotive vehicles.

The composition of the Committee responsible for the formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AUTOMOTIVE VEHICLES — AIR BRAKE SYSTEMS — PERFORMANCE REQUIREMENTS FOR DUAL BRAKE VALVE

(First Revision)

1 SCOPE

This standard covers the performance requirements and tests for brake valves used in dual circuit air brake systems.

2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of the standards. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
9000 (Part 16) : 1983	Basic environmental testing procedures for electronic and electrical items: Part 16 Driving rain test
9844 : 1981	Methods of testing corrosion resistance of electroplated and anodized aluminium coating by neutral salt spray test

3 DIMENSIONS

The actual size, dimensions and features shall be as agreed to between the supplier and the purchaser. The installation details are shown in Fig. 1.

4 TESTS

4.1 The performance and reliability test requirement shall be as agreed to between the supplier and the purchaser. In the absence of any such agreement the following life tests shall be carried out on the specimen:

a) Leak test,
b) Output performance test,
c) Endurance test,
d) Low temperature leak test,
e) High temperature leak test,
f) Corrosion resistance test,
g) Over pressure test,
h) Water spray test,
j) Vibration test, and
k) Port thread integrity test.

4.2 Working Conditions

a) Working medium : Dry air
b) Other conditions shall be as agreed to between the supplier and the purchaser. In the absence of any such agreement the following values shall be applicable:
   1) Normal working pressure : 800/1 000 kPa (8/10 bar)
   2) Maximum working pressure : 1 000/ 1 200 kPa (10/12 bar)
   3) Thermal range of operation : –40 to + 80°C

4.3 Leak Test

The test requirement must be as agreed to between the supplier and the purchaser. In the absence of any such agreement, the following test condition and acceptance level is used:

Test pressure : Full working pressure
Temperature : ambient condition
Leakage permitted : 10 cc/min
(in travelling and braking position)

4.4 Output Performance Test

The performance test shall be conducted after the leak test. The valve shall have a graduated delivery pressure with respect to the input stroke / pedal movement / FBV push rod effort. Pedal travel/Input push rod effort at crack off pressure needs to be added. In one circuit failed condition, input push rod travel and effort for maximum delivery pressure need to be added.

The actual characteristics of this delivery pressure *versus* stroke, as well as other performance parameters, shall be as agreed to between the supplier and the purchaser.

4.5 Endurance Test

The test consists of subjecting the specimen to repeated actuation for a specified number of times. Reservoirs of appropriate volumes shall be connected to the delivery ports of primary and secondary sections. The

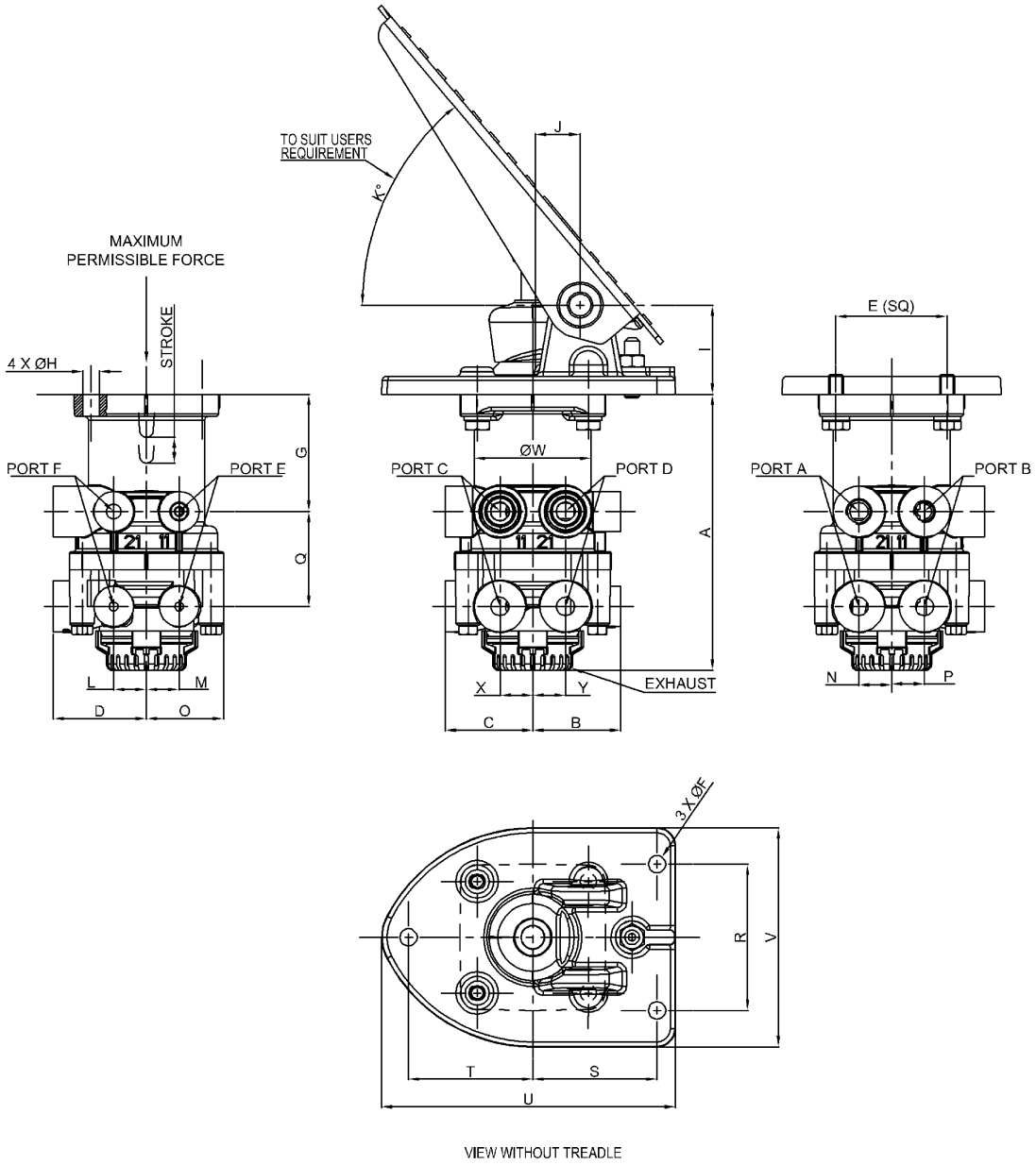

FIG. 1 INSTALLATION DETAIL

actual testing conditions and acceptance criteria post test shall be as agreed to between the supplier and the purchaser. In the absence of such an agreement the following values shall be used:

Total no of operations : 1×10^6
Frequency : 16 cycles / min
Distribution of cycles : 0 to 200 kPa; 6 times
0 to full pressure; 1 time.

Repeat the sequence at the following temperature:

Phase 1 : Ambient temperature (450 000 cycles)
Phase 2 : –40°C (50 000 cycles)
Phase 3 : +80°C (50 000 cycles)
Phase 4 : Ambient temperature (450 000 cycles)

Acceptance criteria:

a) Leakage rate not to exceed 1 500 cc/min when tested as per **4.3**.
b) Performance as agreed to between the supplier and the purchaser.

Repeat the sequence at ambient condition.

4.6 Low Temperature Test

The unit shall be kept in a chamber maintained at a temperature of –40°C for 16 h. After this period, it shall meet the following acceptance criteria:

a) Leakage rate not to exceed 1 500 cc/min when tested as per **4.3**.

b) Performance shall be within ± 30 kPa (0.3 bar) with respect to before test values when tested as per **4.4**.

4.7 High Temperature Test

The unit shall be kept in a chamber maintained at a temperature of +80°C for a duration of 16 h. After this period, it shall meet the following acceptance criteria:

a) Leakage rate not to exceed 10 cc/min when tested as per **4.3**.
b) Performance shall be within ± 30 kPa (0.3 bar) with respect to before test values when tested as per **4.4**.

4.8 Salt Spray Test

The part shall be subjected to salt spray test for 96 h as per IS 9844. At the end of the test, there shall not be any corrosion of parent material of structural parts. Further, the unit shall meet the performance test as per **4.3** and **4.4**.

4.9 Over Pressure Test

The unit shall be subjected to pneumatic or hydraulic pressure of 2 MPa (20 bar), for a duration of minimum 1 min. At the end of the test, there shall not be any permanent damage of structural parts which may cause safety concerns for the personnel handling the unit.

4.10 Water Spray Test

The unit shall be subjected to a driving rain test as per IS 9000 (Part 16). At the end of the test, the unit shall meet the performance test as per **4.3** and **4.4**.

4.11 Vibration Test

The unit shall be subjected to a vibration acceleration level of ±3.5 g at 67 Hz, for 8 h in three mutually perpendicular directions (4 h in main orientation and 2 h each in other two orientations) or as mutually agreed to between the supplier and the purchaser At the end of the test, the unit shall not have any structural damage. Further, the unit shall meet performance test as per **4.3** and **4.4**.

4.12 Thread Integrity Test

All threaded ports shall be checked for thread strength integrity test by alternately tightening and loosening, to a value specified for the respective port or as agreed between the supplier and the purchaser, for 25 times. At the end of the test, there should not be visible damage to the threads of the port. Further, shall meet the leakage test as per **4.3**.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Automotive Braking and Steering Systems, Vehicle Testing and Performance Evaluation Sectional Committee, TED 4

Organization	*Representative(s)*
National Automotive Testing and R&D Infrastructure Project (NATRIP), Indore	Dr N. Karuppaiah (***Chairman***)
Ashok Leyland Ltd, Chennai	Shri S. Arun Shri A. Joseph Selvaraj (*Alternate*)
Association of State Road Transport Undertakings, New Delhi	Shri S. K. Patra Shri D. C. Mishra (*Alternate*)
Automotive Component Manufacturers Association of India, New Delhi	Shri K. N. D. Nambudripad Shri A. K. Gupta (*Alternate*)
Automotive Research Association of India, Pune	Shri A. Akbar Badusha Shri P. D. Betgeri (*Alternate*)
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Bosch Chassis Systems India Limited, Pune	Shri Suhas Patil Shri Amol Chandwadkar (*Alternate*)
Brakes India Ltd, Chennai	Shri P. Venugopal Shri K. N. Balaji (*Alternate*)
Central Farm Machine Training & Testing Institute, Budni	Shri V. N. Kale Shri C. V. Chimote (*Alternate*)
Central Institute of Road Transport, Pune	Shri S. N. Dhole Shri S. Hassan Ali (*Alternate*)
Central Road Research Institute, New Delhi	Shri P. V. Pardeep Kumar Shri Sudesh Kumar (*Alternate*)
Daimler India Commercial Vehicles (P) Ltd, Chennai	Shri Suderson S V Shri A Murali (*Alternate*)
Force Motors Ltd, Pune	Shri C. S. Maikhuri Shri R. M. Kanitkar (*Alternate*)
General Motors India (P) Ltd, Pune	Shri Neeraj Gupta Shri Rajendra Khile (*Alternate*)
Hero Motocorp Ltd, Dharuhera	Shri Harjeet Singh Shri Harsh Aggarwal (*Alternate*)
ICAT, Manesar	Shri U. V. Bhat Shri K. P. Singh (*Alternate*)
Indian Institute of Petroleum, Dehra Dun	Shri M. K. Shukla Shri Sunil Pathak (*Alternate*)
Knorr-Bremse System for Commercial Vehicles India (Pvt) Ltd, Pune	Shri Arun Bisht
Mahindra & Mahindra Ltd, Nashik	Shri Z. A. Mujawar Shri P. V. Jadhav (*Alternate*)
Maruti Udyog Ltd, Gurgaon	Shri Rajnish Kumar Shri Vivek Trivedi (*Alternate*)
Ministry of Heavy Industries & Public Enterprises, New Delhi	Shri V. C. Mathur Shri B. N. Das (*Alternate*)
Representing Ministry of Road Transport and Highway, New Delhi	Shri Shrikant R Marathe
NATRIP, Indore	Dr P. P. Chattaraj Shri Sagar Bendre (*Alternate*)
Ordinance Factory Board, Jabalpur	Shri Umesh Kumar Shri Vikas Purwar (*Alternate*)

Organization	*Representative(s)*
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Renault Nissan Technology and Business Centre, Chennai	SHRI N. BALASUBRAMANIAN SHRI T. VIMALANANTHAN (*Alternate*)
Society of Indian Automobile Manufacturers, New Delhi	SHRI K. K. GANDHI
Sundaram Brake Linings Ltd, Chennai	SHRI S. BALAJI SHRI R. RAMKUMAR (*Alternate*)
Swaraj Mazda Ltd, Ropar	SHRI S. R. AGARHARI
Tata Motors Limited, Pune	SHRI P. K. BANERJEE SHRI S. M. PANSE (*Alternate*)
Toyota Kirloskar Motors Pvt Ltd, Bangalore	SHRI V. RAMESH SHRI H. V. NAGENDRA (*Alternate*)
Tractor Manufacturers Association, New Delhi	SHRI S. LAKSHMIPATHY SHRI K. KANNIBARAN (*Alternate)*
TVS Motor Co Ltd, Hosur	SHRI S. RAMIAH
Vehicle Research & Development Establishment, Ahmednagar	SHRI K KAMRAJ SHRI SAM SHAIKH (*Alternate*)
VE Commercial Vehicles, Pithampur	SHRI SHYAM BUTE SHRI GIRISH CHANDRA
Volvo Buses India Pvt Ltd, Bangalore	SHRI KARTHIK N SARMA SHRI P. K. HUGAR (*Alternate*)
Wabco-TVS Ltd, Chennai	SHRI S. NARAYANAN SHRI D PRABHAKARAN (*Alternate*)
BIS Directorate General	SHRI P. C. JOSHI, Scientist F and Head (TED) [Representing Director General (*Ex-officio*)]

Member Secretary
SHRI P. S. MUJRAL
Scientist F (TED), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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