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मानक

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IS 11852-8 (2001): Automotive Vehicles - Brakes and Braking Systems, Part 8: Test Procedures [TED 4: Automotive Braking Systems]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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IS 11852 (Part 8) : 2001

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भारतीय मानक

स्वचल वाहन — ब्रेक और ब्रेकिंग प्रणाली

भाग 8 परीक्षण कार्यविधि

( पहला पुनरीक्षण )

*Indian Standard*

**AUTOMOTIVE VEHICLES — BRAKES AND  
BRAKING SYSTEMS**

**PART 8 TEST PROCEDURES**

*( First Revision )*

(Incorporating Amendment No. 1)

ICS 43.040.40

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**BUREAU OF INDIAN STANDARDS**  
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**Price Group 7**

## FOREWORD

This Indian Standard (Part 8) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Braking Systems Sectional Committee had been approved by the Transport Engineering Division Council.

This Indian Standard on brakes and braking systems which was earlier issued in eight parts, has now been revised and issued in nine parts which are as under:

Part 1 Terminology

Part 2 General functions and features

Part 3 Performance requirements and evaluation

Part 4 Compressed air and air assisted brakes — Special requirements

Part 5 Compressed air and air assisted brakes — Pressure test connections

Part 6 Vacuum braking systems — Special requirements

Part 7 Inertia dynamometer test method for brake linings

Part 8 Test procedures

Part 9 Requirements for vehicles equipped with Anti-lock braking devices

IS 11852 (Part 7) : 1995 'Automotive Vehicles — Recommendations for brakes and braking systems: Part 7 Model test report' has been withdrawn in this revision and has been replaced with a part covering 'Inertia dynamometer test methods for brake linings'. Part 9 covering the requirements for vehicles equipped with anti-lock braking devices has been added.

The composition of the committee responsible for formulating this standard is given in Annex C.

This edition 2.1 incorporates Amendment No. 1 (November 2003). Side bar indicates modification of the text as the result of incorporation of the amendment.

*Indian Standard*AUTOMOTIVE VEHICLES — BRAKES AND  
BRAKING SYSTEMS

## PART 8 TEST PROCEDURES

*( First Revision )***1 SCOPE**

This standard (Part 8) provides the procedures for testing and establishing compliance to braking systems.

**2 REFERENCES**

**2.1** The following standards contain provisions which through reference in this text, constitute provision of this standard. 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:

<i>IS No.</i>	<i>Title</i>
11852	Automotive vehicles — Brakes and braking systems:
(Part 2) : 2001	General functions and features ( <i>first revision</i> )
(Part 3) : 2001	Performance requirements and evaluation ( <i>first revision</i> )
(Part 4) : 2001	Compressed air and air assisted brakes — Special requirements ( <i>first revision</i> )
(Part 5) : 2001	Compressed air and air assisted brakes — Pressure test connections
(Part 9) : 2001	Requirements for vehicles equipped with anti-lock braking devices
14599 : 1999	Automotive vehicles — Performance requirements (measurement of power, SFC, opacity) of positive and compression ignition engines — Method of test

**3 TECHNICAL SPECIFICATIONS OF VEHICLE**

**3.1** Technical specifications of vehicle as relevant to brake system shall be declared by vehicle manufacturer and shall contain at least the details given in Annex A.

**3.2** If this information has been declared for type approval of the vehicle it is not necessary to submit the information again.

**4 MODIFICATIONS/CHANGES**

**4.1** Every functional modification pertaining to technical specifications of brake system of vehicle declared in accordance with **3.1** shall be intimated to the testing agency.

**4.1.1** Testing agency may then consider:

- Vehicle with modifications complies with specified performance requirements, or
- Any testing is required to establish compliance.

**4.2** For considering whether testing is required or not, guidelines in Annex B shall be followed.

**4.3** In case of **4.1.1(b)** tests for those parameters which are affected by the modifications only need to be carried out.

**4.4** In the event of **4.1.1(a)** or in case of **4.1.1(b)**, after successful compliance to performance requirements, the test report shall be validated for the modified specification.

**5 CLASSIFICATION OF VEHICLES**

**5.1** For the purpose of this standard, the definitions given in IS 11852 (Part 2) shall be referred.

**5.2 Applicability of the Tests**

Depending on the type of braking systems, following tests are to be considered.

**5.2.1 Hydraulic Brake System****STATIC TEST**

- Line Pressure in the front and rear to be measured against the pedal force in steps of 10 kgs up to 70 kgs.
- Reaction time.

**DYNAMIC TEST**

- P Test with engine disconnected — See **3.2.2.1** of IS 11852 (Part 3).
- P Test with engine connected — See **3.2.2.2** of IS 11852 (Part 3).
- Secondary brake test — See **4.1.2** of IS 11852 (Part 3).

## IS 11852 (Part 8) : 2001

- d) Residual brake test — See 4.1.4 of IS 11852 (Part 3).
- e) Parking brake test — Dynamic test wherever applicable — See 4.1.3 of IS 11852 (Part 3).
- f) F Test — See 3.3 of IS 11852 (Part 3).
- g) H Test (Applicable for M3 and N3 only) — See 3.4 and 3.5 of IS 11852 (Part 3)

### 5.2.2 Hydraulic Brake System with Vacuum Assistance

#### STATIC TEST

- a) Line pressure in the front and rear to be measured against the pedal force in steps of 10 kgs up to 70 kgs.
- b) Pedal force *versus* line pressure without vacuum assistance.
- c) Capacity of storage devices — See 4 of IS 11852 (Part 5), if applicable.
- d) Reaction time.

#### DYNAMIC TEST

- a) All dynamic tests same as 5.2.1.
- b) p test, engine disconnected without vacuum assistance [if 5.2.2 (c) is not carried out].

### 5.2.3 Hydraulic Brake System with Air Assistance

#### STATIC TEST

- a) Line pressure in the front and rear to be measured against the pedal force in steps of 10 kgs up to 70 kgs.
- b) Pedal force *versus* line pressure without air assistance.
- c) Capacity of energy sources — See 4 of IS 11852 (Part 4).
- d) Capacity of reservoirs — See 3 of IS 11852 (Part 4).
- e) Reaction time test — See 5 of IS 11852 (Part 4).
- f) Spring brake — See 7 of IS 11852 (Part 4).
- g) Automatic braking — See 4.2.3 of IS 11852 (Part 3).
- h) Release system — See 7.2 of IS 11852 (Part 4).
- j) System independence.
- k) Depletion test.

#### DYNAMIC TEST

- a) All dynamic tests as given in 5.2.1.

### 5.2.4 Air Brake System

#### STATIC TEST

- a) All static tests as given in 5.2.3.

#### DYNAMIC TEST

- a) All dynamic tests as given in 5.2.1.

### 5.2.5 Vehicle with Anti-lock Brake System

For the test related with ABS, see IS 11852 (Part 9).

## 6 VISUAL CHECKS

### 6.1 Check and verify at least for the following:

- a) Two independent controls are readily accessible to driver from the driver seat while wearing safety belt.
- b) It is possible to actuate the service brake control even with both hands on steering wheel even while wearing safety belts.
- c) Service, secondary, and parking brake surfaces are permanently connected to the wheels except transmission parking brake.
- d) It is possible to actuate the secondary brake control while keeping at least one hand on steering wheel and even while wearing safety belts.
- e) It shall be possible to lock the parking brake by a purely mechanical device.
- f) All brakes shall be provided with manual or automatic adjustment for wear. Provision for assessment of condition of liner shall be present. Alternatively, acoustical or optical devices, warning the driver about lining replacement may be fitted. The wear shall be checked as per 4.2.1.11 of IS 11852 (Part 2).

### 6.2 In case of hydraulic braking system following conditions shall be met.

#### 6.2.1 Filling port of reservoir is readily accessible.

6.2.2 It shall be possible to check fluid level without opening the filling port. Where this condition is not fulfilled, a red tell-tale lamp shall warn the driver. The tell-tale shall be visible during daylight and satisfactory functioning shall be easily verifiable.

6.2.3 The failure of the part of the hydraulic transmission system shall be signaled to the driver by a red tell-tale lamp lighting up immediately on actuation of a control and remaining lit as long as the failure persists and the ignition switch is in 'ON' position. This tell-tale may be common with above signal.

### 6.3 In case of air or air assisted brakes, the following conditions shall be met.

**6.3.1** At least two energy reserves with independent transmission are available.

**6.3.2** Energy reserves are fitted with independent warning device in addition to the pressure gauge.

**6.3.3** If service and secondary brakes have common control, check for gradual parking brake control.

**6.4** In case of trailers following conditions shall be met.

**6.4.1** Pneumatic link with the trailer shall be with minimum two lines. However, in all cases, all the requirements of this standard shall be satisfied by the use of only two lines.

**6.4.2** Shut off devices which are not automatically actuated are not permitted.

**6.4.3** In the case of articulated vehicles combinations, the flexible hoses shall be a part of the towing vehicle. In all other cases, the flexible hoses shall be a part of the trailer.

**7 INSTRUMENTATION**

**7.1** Accuracies and least count of the instruments shall be as below or better:

<i>Sl No.</i>	<i>Parameter</i>	<i>Accuracy</i>	<i>Least Count</i>
i)	Time	± 0.01 sec	0.01 sec
ii)	Pneumatic line pressure	± 0.2 bar	0.1 bar
	Hydraulic line pressure	± 2 bar	1 bar
iii)	Control force	± 2 kg	1 kg
iv)	Speed	± 1% of the measured value	0.1 km/h
v)	Distance	± 0.2% of the measured value	0.1 m
vi)	Deceleration	± 0.01% of the measured value	0.01 m/s <sup>2</sup>
vii)	Temperature	± 2°C	1°C
viii)	Wind velocity	± 0.5% of the measured value	0.5 m/s
ix)	Towing load		
	a) up to 1.5 t	10 kg	10 kg
	b) above 1.5 t	20 kg	20 kg
x)	Weigh bridge		
	a) up to 1.0 t	10 kg	10 kg
	b) above 1.0 t to 12.0 t	50 Kg	
c) Above 12.0 t	100 Kg		

NOTE — It is recommended to use only pressure transducers.

**7.2** Ensure that the instruments/equipments are calibrated as per the manufacturer's recommendation.

**7.3** Any other instruments can be used after confirmation of satisfactory performance.

**8 TEST TRACK**

**8.1** The road surface shall be dry with a coefficient of adhesion not less than 0.8,

particularly in the region where the test is to be conducted. If the test surface is of tar, it shall not be traffic smooth and surface shall not have become soft due to heat. Longitudinal and lateral slopes of the track shall not exceed 1 percent and 3 percent respectively. The track shall have sufficient length and width for achieving the test speed and carrying out the test safely.

**8.2** If the tests are carried out at the test track of the vehicle manufacturer, the conditions specified for the test track are deemed to be complied with if the manufacturer issues a certificate to that effect.

**8.3** For parking brake test, gradient of the track shall be constant within ± 0.5 percent.

**9 VEHICLE PREPARATION**

**9.1** Before testing the vehicle, ensure that the vehicle is run in as per manufacturers recommendation and that the brakes are properly bedded in for brake liner/pad contact.

**9.2** Tyres which have covered at least 500 km and not more than maximum 10 percent of their expected life shall be fitted on the vehicle. At the start of the test, tyres shall be cold and

shall be inflated to the pressure specified by vehicle manufacturer for respective load condition of the vehicle.

**9.3** Weight of the testing personnel and instrumentations shall be considered as 180 kg actual weight during testing shall not exceed specified laden or unladen weight by more than ± 15 percent of described weight.



## IS 11852 (Part 8) : 2001

**9.4** The distribution of weight among axles shall be as specified by the vehicle manufacturer. If sum of recommended maximum axle weights exceeds the gross vehicle weight, the actual weight on the axle shall be in the same proportion of the ratios of the gross vehicle weight to the sum of the maximum recommended axle weights. Actual load condition shall be recorded in the report.

**9.5** Weight of the testing personnel and instrumentation shall be considered as part of the vehicle load and shall be 180 kg in the case of unladen test.

**9.6** In the case of tractive units for semi-trailers the required laden condition shall be achieved by loading the tractive unit and not by using a semi-trailer.

**9.7** Where the vehicle is not having standard production body or is having more than one version of standard production body, the following cab/body allowance shall apply:

<i>Allowance in Weight</i>		
G. V. W. Range kg	Load Body weight kg	Cab Weight kg
Up to 3 000	120	400
Above 3 000 but below 4 000	200	400
Above 4 000 but below 6 000	400	400
Above 6 000 but below 10 000	700	400
Above 10 000	1 000	400

**9.8** In the case of incompletely built vehicle (such as drive away chassis) suitable arrangements for safety of testing personnel such as temporary cab, seat, safety belts shall be provided. The weight of such provisions shall be part of the load prescribed in **9.7**.

**9.9** In the case of vehicles where overall height is more than 3.8 m; the test shall be carried out on the fully built vehicle.

### 10 SEQUENCE OF TESTING

**10.1** All the static tests the result of which are required in dynamic test are to be done before the dynamic tests.

**10.2** There is no preferred sequence during static tests.

**10.3** If more than one type of dynamic tests are

to be carried out, sequence of tests shall be P test, F and H test. There is no preferred sequence among the various P tests.

### 11 REQUIREMENTS DURING TESTING

**11.1** The initial speed at the instant of the actuation of brake control shall be within  $\pm 5$  percent of the specified speed.

**11.2** Brake shall not be applied prior to the test within 800 m immediately before the point at which test commences.

**11.3** During the test, force applied to brake controls, shall not exceed maximum values laid down in IS 11852 (Part 3). Values for force measured at speeds below 5 km/h shall not be considered.

**11.4** The test shall be conducted with wind speed less than 5 m/s in any direction. The ambient temperature shall be between 15 to 45°C.

**11.5** The test shall be valid if vehicle does not go out of the lane width one and half times the width of the vehicle. Wheel locking towards the end of deceleration in last three meter shall be permitted.

**11.6** In the case of diagonal split secondary brake system the force required at the time of steering wheel to hold a straight course shall be measured and, if felt excessive, shall be recorded in the test report.

#### 11.7 Final Result of the test

Number of readings to be taken during the test shall be as follows:

- For all P type tests arithmetic average of the three readings which are within  $\pm 5$  percent of the arithmetic mean shall constitute the results.
- For static test as per **5.2.3(b)** capacity of the energy source - arithmetic average of the three readings which are within  $\pm 5$  percent of the arithmetic mean shall constitute the result.
- All dynamic tests other than P test shall be conducted only once and the result obtained during the test shall be the final result.
- All static tests other than capacity of the energy source shall be conducted only once and the result obtained during the test shall be the final result.

### 12 TEST RESULTS

**12.1** The compliance of the standard is established if the test results are within the limit specified in the standard.

**ANNEX A**

( Clause 3.1 )

**TECHNICAL SPECIFICATION OF THE VEHICLE**

**A-1 DETAILS OF VEHICLE MANUFACTURER**

- A-1.1 Manufacturer's Name and Address** :
- A-1.2 Telephone No.** :
- A-1.3 Fax No.** :
- A-1.4 E-Mail Address** :
- A-1.5 Contact Person** :
- A-1.6 Name of the Model and Variants** :
- A-1.7 Plant(s) of Manufacturer** :

**A-2 VEHICLE TYPE**

- A-2.1 Type of Vehicle** :
- A-2.1.1 Usage ( Goods/ Passenger/ Both/ Tractor/ Trailer/ Others )** :
- A-2.1.2 Control( Forward/ Semi-forward/ Normal/ Others )** :
- A-2.1.3 Drive( 4 × 2 or 4 × 4 or 4 × 6 or Others )** :
- A-2.1.4 Cab Type( Fully Built Cab/ Sleeper Cab/ Cowl/ Front End Structure/ With Wind shield/ Without Wind Shield** :
- A-2.1.5 Load Body ( Fitted/ Not Fitted )** :
- A-2.2 Category of Vehicle** :
- As per IS 11852 (Part 2). :

**A-3 ENGINE**

- A-3.1 Type** :
- A-3.2 Manufacturer's Name** :
- A-3.3 Working Principle (4/2 Stroke)** :
- A-3.4 Model Name (If any)** :
- A-3.5 Type of Fuel Used** :
- A-3.6 Swept Volume, cc** :
- A-3.7 Compression Ratio (Specify Tolerance)** :
- A-3.8 Engine Performance** :
- A-3.9 Maximum Net Power of the Engine (kW) (Specify Tolerance)** :
- A-3.10 Engine RPM at Maximum Power (Specify Tolerance)** :

NOTE — In case of diesel engines, the maximum power and maximum torque shall be specified as per conditions given in IS 14599.

**A-4 VEHICLE PERFORMANCE**

- A-4.1 Maximum Designed Speed, km/h**

## IS 11852 (Part 8) : 2001

### A-5 WEIGHTS

<b>A-5.1 Vehicle Kerb Weight, kg</b>	:
<b>A-5.1.1 Front Axle, kg</b>	:
<b>A-5.1.2 Rear Axle, kg</b>	:
<b>A-5.1.3 Total, kg</b>	:
<b>A-5.2 Gross Vehicle Weight, kg</b>	:
<b>A-5.2.1 Maximum Permissible Weight</b>	:
<b>A-5.2.2 Front Axle</b>	:
<b>A-5.2.3 Rear Axle</b>	:
<b>A-5.3 Reference mass, kg</b>	:
<b>A-5.4 Seating Capacity</b>	:
<b>A-5.4.1 Maximum ( Including Driver )</b>	:
<b>A-5.4.2 Crew ( Including Driver )</b>	:

NOTE — In case of incompletely built vehicles, this shall be manufacturer's recommendations for completely built vehicles.

### A-6 TYRES

<b>A-6.1 No. and Arrangement of Wheels</b>	:
<b>A-6.1.1 Front</b>	:
<b>A-6.1.2 Rear</b>	:
<b>A-6.1.3 Other</b>	:
<b>A-6.2 Tyre Type (Radial/Cross Ply), Size/Ply Rating</b>	:
<b>A-6.2.1 Front</b>	:
<b>A-6.2.2 Rear</b>	:
<b>A-6.2.3 Other</b>	:
<b>A-6.3 Rolling Radius, mm</b>	:
<b>A-6.3.1 Static</b>	:
<b>A-6.3.2 Dynamic ( If data is available )</b>	:
<b>A-6.4 Inflation Pressure (Laden)</b>	:
<b>A-6.4.1 Front</b>	:
<b>A-6.4.2 Rear</b>	:
<b>A-6.4.3 Other</b>	:
<b>A-6.5 Inflation Pressure (Unladen)</b>	:
<b>A-6.5.1 Front</b>	:
<b>A-6.5.2 Rear</b>	:
<b>A-6.5.3 Other</b>	:

### A-7 TRANSMISSION

<b>A-7.1 Type (Manual/Automatic/Semi-Auto)</b>	:
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NOTE — If Automatic, give all pertinent data.

- A-7.2 Clutch Type (Wet/Dry/Single Plate/Multi plate/Hydraulic)** :
- A-7.3 Gear Box** :
- A-7.3.1 Type** :
- A-7.3.2 Model Name( If Any )** :
- A-7.3.3 Gear Shifting Control System** :
- A-7.3.4 No. of Gears** :
- A-7.4 Stall Ratio of Torque Converter** :
- A-7.5 Sub Transmission** :
- A-7.5.1 Type** :
- A-7.5.2 Control System** :
- A-7.5.3 Gear Ratio** :
- a) High :
- b) Low :
- A-7.6 Final Drive(Crown wheel)** :
- A-7.6.1 Type** :
- A-7.6.2 Reduction Ratio** :
- A-7.6.3 Differential Type** :
- A-7.6.4 Final Drive Ratio** :
- A-7.7 Gear Ratio** :

	G/B Ratio	Overall Ratio
1st		
2nd		
3rd		
4th		
5th		
6th		
Over drive		
Reserve		

**A-8 NO. OF AXLES**

- Steered*                      *Non-Steered*
- a) Driven
- b) Non-driven

**A-9 VEHICLE DIMENSIONS**

- A-9.1 Length, mm** :
- A-9.2 Width, mm** :
- A-9.3 Height (Unladen), mm** :
- A-9.4 Wheel Base, mm** :
- A-9.5 Wheel Track, mm** :

## IS 11852 (Part 8) : 2001

<b>A-9.5.1</b> <i>Front</i>	:
<b>A-9.5.2</b> <i>Rear</i>	:
<b>A-9.6</b> <b>Body Overhang, mm</b>	:
<b>A-9.6.1</b> <i>Front end</i>	:
<b>A-9.6.2</b> <i>Rear end</i>	:
<b>A-9.7</b> <b>Frame overhang (in case of vehicle without complete body), mm</b>	:
<b>A-9.7.1</b> <i>Front end</i>	:
<b>A-9.7.2</b> <i>Rear end</i>	:
<b>A-10</b> <b>SERVICE BRAKE</b>	
<b>A-10.1</b> <b>Name of Producer</b>	:
<b>A-10.2</b> <b>Type (Mechanical/Hydraulic/Air/Air assisted/Others)</b>	:
<b>A-10.3</b> <b>Location and No. of Braking Wheels</b>	:
<b>A-10.4</b> <b>Schematic Layout indicating</b>	
a) Method of split of brake system	:
b) Location of valves, reservoirs, etc	:
<b>A-11</b> <b>LINING OR PAD</b>	
<b>A-11.1</b> <b>Area (cm<sup>2</sup>) Total Per Braked Wheel,</b>	:
<b>A-11.1.1</b> <i>Front Wheel</i>	:
<b>A-11.1.2</b> <i>Rear Wheel</i>	:
<b>A-11.1.3</b> <i>Others</i>	:
<b>A-11.2</b> <b>Make and Material Designation</b>	:
<b>A-11.2.1</b> <i>Front Wheel</i>	:
<b>A-11.2.2</b> <i>Rear Wheel</i>	:
<b>A-11.2.3</b> <i>Others</i>	:
<b>A-12</b> <b>BRAKE DRUM OR DISC</b>	
<b>A-12.1</b> <b>Effective dia, mm</b>	:
<b>A-12.1.1</b> <i>Front Wheel</i>	:
<b>A-12.1.2</b> <i>Rear Wheel</i>	:
<b>A-12.1.3</b> <i>Others</i>	:
<b>A-12.2</b> <b>Material (If The Braking Surface is Not Ferrous)</b>	
<b>A-12.2.1</b> <i>Front Wheel</i>	:
<b>A-12.2.2</b> <i>Rear Wheel</i>	:
<b>A-12.2.3</b> <i>Others</i>	:
<b>A-13</b> <b>MASTER CYLINDER OR BRAKE</b>	
<b>A-13.1</b> <b>Name of Producer</b>	
<b>A-13.2</b> <b>Type</b>	

<b>A-13.3 Inner Dia of Master Cylinder, mm</b>	:
<b>A-13.4 Type of Supply Tank</b>	:
<b>A-14 WHEEL CYLINDER</b>	
<b>A-14.1 Dia, mm</b>	:
<b>A-14.1.1 Front</b>	:
<b>A-14.1.2 Rear</b>	:
<b>A-14.1.3 Others</b>	:
<b>A-14.2 Type (Single/Double Acting)</b>	:
<b>A-14.2.1 Front</b>	:
<b>A-14.2.2 Rear</b>	:
<b>A-14.2.3 Others</b>	:
<b>A-15 BOOSTER</b>	
<b>A-15.1 Name of Producer</b>	:
<b>A-15.2 Type</b>	:
<b>A-15.3 Boost Ratio</b>	:
<b>A-16 VACUUM OR AIR ASSISTANCE</b>	
<b>A-16.1 Pressure, Kg/cm<sup>2</sup></b>	:
<b>A-16.1.1 Nominal Pressure, P<sub>2</sub></b>	:
<b>A-16.1.2 Cut In Pressure</b>	:
<b>A-16.1.3 Cut Out Pressure, P<sub>Max</sub></b>	:
<b>A-16.2 Type Vacuum Pump/Air Compressor</b>	:
<b>A-16.2.1 Free Air Delivery, lit/min</b>	:
<b>A-16.3 Type of Pressure Regulator</b>	:
<b>A-16.4 No. of Reservoirs</b>	:
<b>A-16.5 Reservoir Capacity, l</b>	:
<b>A-17 BRAKE HOSE</b>	
<b>A-17.1 Make and Identification</b>	:
<b>A-17.2 Length(s) of Hoses</b>	:
<b>A-17.3 Nominal Bore Dia</b>	:
<b>A-17.4 End Fitting Type</b>	:
<b>A-18 FAILURE WARNING DEVICE FOR BRAKING</b>	
<b>A-18.1 Type (Visual/Audible/Others)</b>	:
<b>A-18.2 Operation Pressure, kg/cm<sup>2</sup></b>	:
<b>A-18.3 Type of Safety Device</b>	:
<b>A-19 PARKING BRAKE</b>	
<b>A-19.1 Type (Mechanical/Spring Brake/Graduated/Non Graduated)</b>	:
<b>A-19.2 Acting on Transmission/Wheel</b>	:
<b>A-19.3 Braking Wheel</b>	:

## IS 11852 (Part 8) : 2001

**A-19.4 Lining/Pad** :

**A-19.4.1 Name of Producer** :

**A-19.4.2 Area, cm<sup>2</sup>** :

**A-19.4.3 Material** :

**A-19.4.4 Dia of Brake Drum/Disc, mm** :

**A-19.4.5 Control( Hand/Foot operated )** :

### **A-20 SECONDARY BRAKE**

**A-20.1 Type** :

**A-20.2 Description** :

### **A-21 ADDITIONAL RETARDING DEVICES**

**A-21.1 Type** :

**A-21.2 Description** :

**A-21.3 Deceleration at 30 m/s<sup>2</sup>** :

(For M3 and N3 Only) :

### **A-22 BRAKE FLUID**

**A-22.1 Name of Producer** :

**A-22.2 Trade Name** :

**A-22.3 Specification /Grade as per IS** :

**A-22.4 Brake Fluid Level Indicator** :

(Yes/No) :

### **A-23 BRAKE ADJUSTMENT**

**A-23.1 Type (Manual/Auto)** :

**A-23.2 Lever Length** :

### **A-24 PROVISION OF LINER WEAR INDICATOR**

**A-24.1 Type (Window/Acoustic/Optical)** :

### **A-25 PNEUMATIC BRAKE ACTUATOR**

**A-25.1 Type (As per IS)** :

### **A-26 LOAD DISTRIBUTION**

	Laden kg	Unladen kg	Unladen Front/Rear Ratio
Front Axle			
Rear Axle 1			
Rear Axle 2			
Total			

### **A-27 PROPORTIONING/APPORTIONING/LOAD SENSING/'G' VALVE**

**A-27.1 Name of Manufacturer**

**A-27.2 Identification** :

**A-27.3 Characteristics** :

**LADEN CONDITION**

Pedal Effort kg	Line Pressure, kg/cm <sup>2</sup>	
	Front	Rear
10		
20		
30		
40		
50		
60		
70		

**UNLADEN CONDITION**

Pedal Effort kg	Line Pressure, kg/cm <sup>2</sup>	
	Front	Rear
10		
20		
30		
40		
50		
60		
70		



**ANNEX B**

( Clause 4.2 )

**GUIDELINES FOR DECIDING TEST**

**B-1** In the case of following changes, tests which are necessary for establishing compliance are listed below:

<i>Parameter and Change</i>	<i>Test to be Conducted</i>
Change of vehicle category (as defined in IS 11852)	If the requirement of new category is more arduous, all applicable tests to be done. If earlier test results are meeting arduous requirement, test need not be repeated.
Increase in G.V.W. not exceeding 10 percent	If the deceleration calculated from the previous type P engine disconnected test, corrected for new G.V.W, using the formula given in <b>B-1.1</b> is within limits, no tests need to be done. Otherwise all dynamic tests.
Increase in G.V.W. exceeding 10 percent	All dynamic tests.
Change in number of axles Unladen weight	All tests. All dynamic tests in the unladen condition, if the ratio (in unladen condition) of front axle weight to rear axle weight is increased in excess of 10 percent.
Suspension changes affecting the axle load distribution or control of load sensing valves	Same as above for unladen weight.
Decrease in wheel base	All dynamic tests.
Increase in wheel base	Reaction time and depletion tests. These tests may be conducted on a shorter wheel base variant by simulating the piping for the longer wheel base.
Maximum speed	All type 'P' test, if the test speed is affected in excess of 6 percent. All 'F' tests if the maximum speed has increased in excess of 6 percent.
Engine, gear box, overall transmission	If the contribution of the engine braking (such as engine type changes from compression ignition to spark ignition; decrease in number of cylinders) is reduced, 'F' test to be conducted. Also changes in the transmission ratio in the test gear which decreases engine rpm in excess of 8 percent 'F' test to be conducted.
Changes in the brake transmission components affecting the performance	All tests which are affected. For alternative make of valves, etc, only static tests need to be done.
Reservoir capacity for individual circuits	If increased, charging time to be tested. If decreased, depletion tests to be done.
Compressor	If capacity is decreased, charging time.
Tyres : increase in rolling radius in excess of 5 percent	All dynamic test to be done.

<i>Parameter and Change</i>	<i>Tests to be Conducted</i>
Tyres : changes affecting adhesion such as (change from radial ply to cross ply or high aspect ratio to low aspect ratio)	All 'P' type tests to be done.
Supplementary braking system: if performance is reduced	All 'H' type tests to be conducted.
Brake lining material Foundation brake and changes in line pressure within $\pm 15$ percent	Either a) All applicable dynamic tests on vehicle; or b) Verification on inertia dynamo. If the performance of brake system for which type approval is to be extended, established on inertia dynamometer is within $\pm 15$ percent of the performance of the lining already type approved, established on inertia dynamometer, no tests need be conducted on vehicle.
Vacuum booster ratio, any decrease	All 'P' test except booster disconnection test.

**B-1.1** The stopping distance or the mean fully developed deceleration shall be corrected to the condition of new specified mass by following formulae:

$$S_{\text{ext}} = \{ (S_{\text{ta}} - 0.1 V_s) \times (M_{\text{ext}}/M_{\text{ta}}) \} + 0.1 V_s$$

$$d_{\text{ext}} = d_{\text{ta}} \times M_{\text{ta}}/M_{\text{ext}}$$

where

$S_{\text{ta}}$  = Stopping distance reported in the earlier type approval test,

$S_{\text{ext}}$  = Stopping distance calculated for the new G.V.W for which extension is sought,

$M_{\text{ta}}$  = Mass (kg) specified mass (kg) for the earlier type approval test.

$M_{\text{ext}}$  = Mass (kg) for which extension is sought,

$d_{\text{ta}}$  = Mean fully developed deceleration ( $\text{m/s}^2$ ) reported in the earlier type approval test, and

$d_{\text{ext}}$  = Mean fully developed deceleration ( $\text{m/s}^2$ ) calculated for the new G.V.W for which extension is sought.

$V_s$  = Specified test speed.

**B-1.2** Changes other than those listed above, are considered to be having no adverse effect on the brake performance.

**ANNEX C**

( Foreword )

**COMMITTEE COMPOSITION**

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( Continued on page 15 )

( Continued from page 14 )

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