



INDIAN STANDARDS ON AUTOMOTIVE BRAKING AND STEERING SYSTEMS

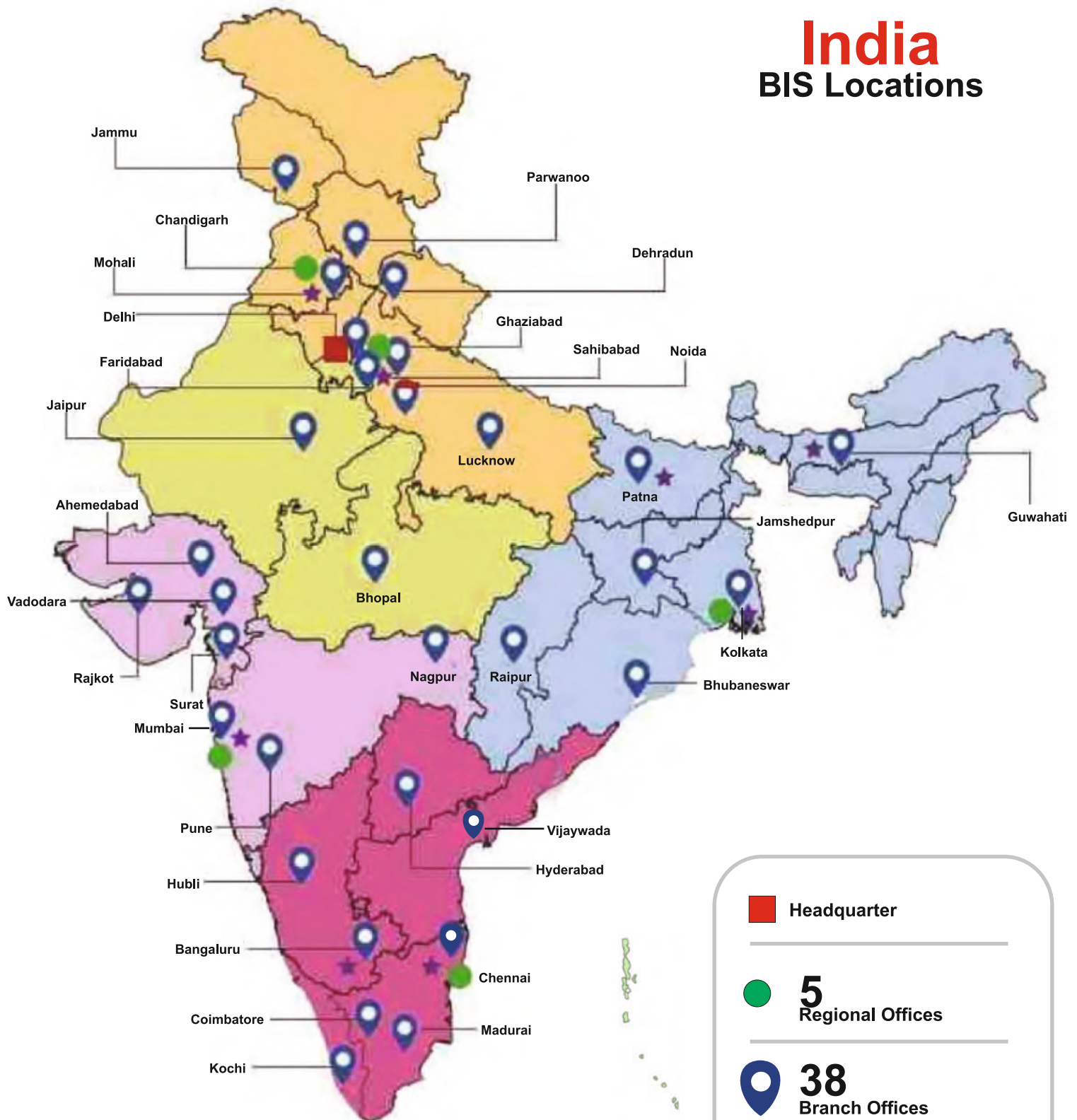
BUREAU OF INDIAN STANDARDS
Ministry of Consumer Affairs
Food and Public Distribution
Government of India

भारतीय मानक ब्यूरो
उपभोक्ता मामले, खाद्य और
सार्वजनिक वितरण मंत्रालय
भारत सरकार

NORTHERN CENTRAL EASTERN WESTERN SOUTHERN

India

BIS Locations



-  **Headquarter**
-  **5**
Regional Offices
-  **38**
Branch Offices
-  **8**
Laboratories
-  **Training Institute (NITS)**





ABOUT BIS

Bureau of Indian Standards (BIS), the National Standards Body (NSB) of India was established under the *BIS Act, 1986* and came into existence on 1 April 1987 assuming the functions of the erstwhile Indian Standards Institution (ISI). The ISI was established on 6 January 1947. *The BIS Act, 2016* came into force on 12 October 2017 superseding *BIS Act 1986*. *The BIS Act, 2016* provides for the establishment of a national standards body for the harmonious development of the activities of standardization, conformity assessment and quality assurance of goods, articles, processes, systems and services and for matters connected therewith or incidental thereto.

BIS through its core activities of standardization and conformity assessment, has been benefiting the national economy by providing safe, reliable and quality goods; minimizing health hazards to consumers; protecting the environment; controlling over proliferation of varieties; promoting exports and imports substitutes, etc. The standardization and conformity assessment schemes of BIS apart from benefitting the consumers and industry also support various public policies especially in areas of product safety, consumer protection, food safety, environment protection, building and infrastructure development, etc.

BIS also represents India in international standards bodies like International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) and participates actively in the international standardization work undertaken by these bodies. BIS presents the national viewpoints on new areas taken up for international standardization and on various draft international standards during the process of development of these standards so that the country's interest is protected and reflected in these standards. This also enables the BIS technical committees to consider adoption of the international standards as Indian Standards, with or without modifications, in order to enable our products and services to integrate with global trade and commerce.

What are Standards?

Standard is a document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.

Importance of Standardization

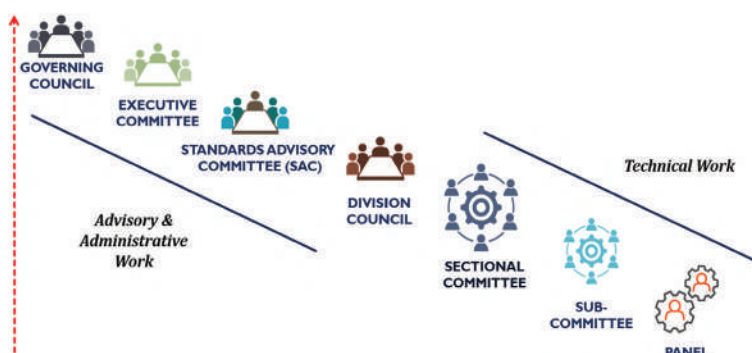
Standardization is the process of developing technical standards through consensus of different parties. This standardization aims to address one or all of compatibility, interchangeability, variety control, safety, environment protection, product protection and fitness for purpose. Standards provide numerable benefits to the technologists, producers, consumers and traders besides defining purpose for each of these entities.

Standards can be formulated at various levels ranging from an individual through National (IS) to International level (ISO). Also, depending on the subject in hand, standards can be made on various aspects such as terminology, specification, sampling, testing, code of good practice, systems and services.

STANDARDIZATION ACTIVITY OF BIS

Standardization Structure

There are 16 Technical Departments formulating standards in various subject areas. Corresponding to these departments, 16 division councils exist. Each division council has several sectional committees working under it. The standards cover important segments of economy and help the industry in upgrading the quality of their goods and services.

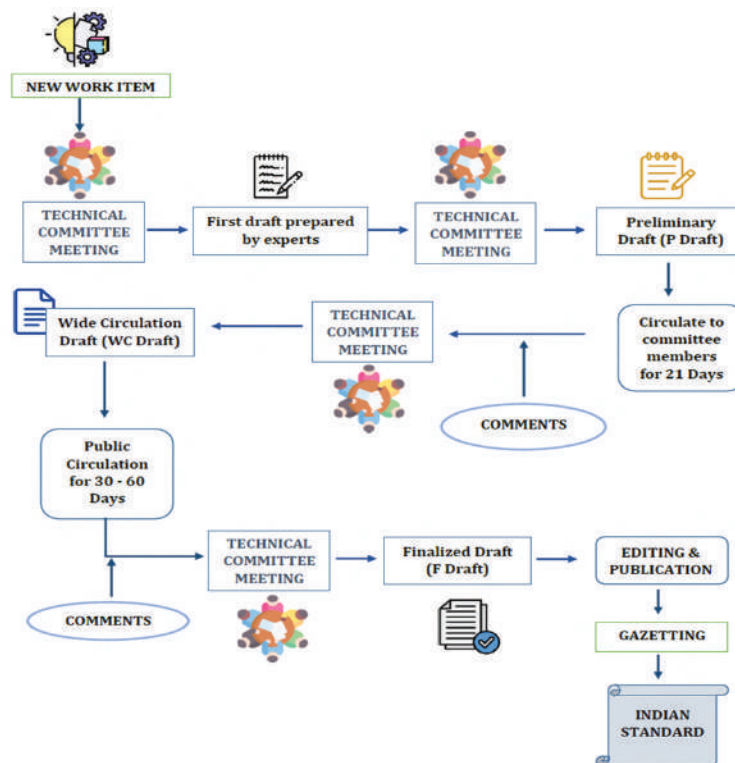
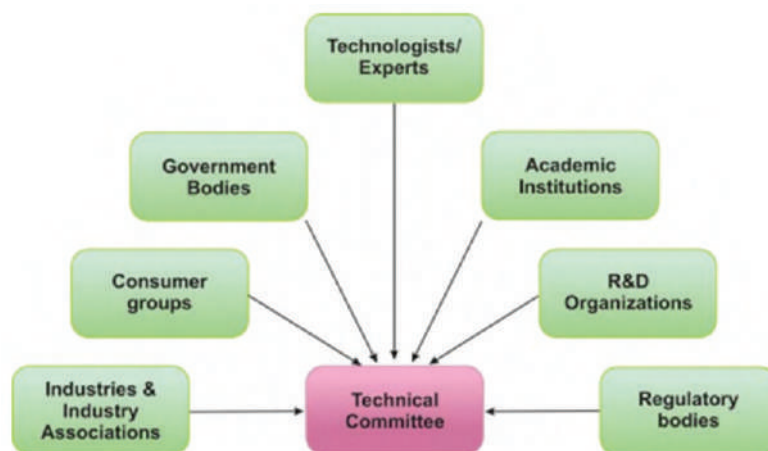


Ayush Division Council (AYDC)	Chemical Division Council (CHDC)	Civil Engineering Division Council (CEDC)	Electro-Technical Division Council (ETDC)
Electronics & Telecommunication Division Council (LITDC)	Food and Agriculture Division Council (FADC)	Mechanical Engineering Division Council (MEDC)	Management and Systems Division Council (MSDC)
Metallurgical Engineering Division Council (MTDC)	Medical Equipment & Hospital Planning Division Council (MHDC)	Petroleum, Coal & Related Products Division Council (PCDC)	Production and General Engineering Division Council (PGDC)
Transport Engineering Division Council (TEDC)	Textile Division Council (TXDC)	Water Resources Division Council (WRDC)	Service Sector Division Council (SSDC)

Standards Formulation Process

The Indian Standards are developed by technical committees that are representative of various stakeholders having interest in the relevant subject of standardization under the scope of such committees through a process of consultation so that views of all are given due consideration and a consensus is evolved in formulating a standard. The stakeholders involved in national standardization can broadly be categorized as industry, consumers/users, technologists (R&D and scientific institutions, academia, individual subject experts, etc) and government departments/regulators.

The process of standards development of BIS is aligned with accepted international best practices that are based on the core principles of openness, transparency, impartiality and consensus. The process begins with the identification of the standardization needs of the given sector or subject following which the development of the standard is taken up and planned by the relevant technical committee. Apart from consultation within the technical committees, draft standards are also open for public views/comments.



Standards Development Process Flow



Introduction to Transport Engineering Department (TED), BIS

TED is one of the 16 technical departments of BIS with the scope “Standardization in the field of Transport Engineering covering air, water, road and rail transport, diesel engines for stationary application, freight containers, transport packaging, road and transport safety, etc.

Total standards published by TED: **1273**

List of Technical Committees working under TED

Sl No.	TITLE
1.	TED 2 : Automotive Primemovers, Transmission Systems and Internal Combustion Engine
2.	TED 4 : Automotive Braking Systems, Vehicle Testing, Steering and performance Evaluation
3.	TED 6 : Automotive Body, Chassis and Accessories
4.	TED 7 : Automotive Tyres, Tubes and Rims
5.	TED 11 : Automotive Electrical Equipment and Instruments
6.	TED 14 : Air and Space Vehicles
7.	TED 16 : Bicycles
8.	TED 17 : Shipbuilding
9.	TED 18 : Inland, Harbour Crafts And Fishing Vessels
10.	TED 19 : Marine Engineering and Safety Aids
11.	TED 22 : Transport Tractors, Trailers And Industrial Trucks
12.	TED 24 : Transport Packages, Packaging Codes and Pallets
13.	TED 26 : Automotive Vehicles Running on Non-Conventional Energy Sources
14.	TED 27 : Electric and Hybrid Vehicles
15.	TED 28 : Intelligent Transport Systems
16.	TED 29 : Passive Safety Crash Protection Systems
17.	TED 31 : In service Vehicle Inspection, Certification and Garage Equipment
18.	TED 32 : Unmanned Aerial Vehicles
19.	TED 33 : Freight Containers
20.	TED 34 : Springs and Suspension Systems
21.	TED 35 : Road Safety



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

Scope:

Standardization of automotive braking systems, steering systems and their components, testing of vehicles as a whole for performance evaluation and road worthiness

Co-ordination of work with :

ISO/TC 22 and TC 22/SC 38

Stakeholders of TED 04 Sectional Committee:

Chairman of TED 04: Shri A. Akbar Badusha, Sr. Deputy Director, Automotive Research Association of India, Pune

Manufacturers and Industry Association (Ashok Leyland Limited, Automotive Research Association of India, Brakes India Limited and ACMA)

R&D organization and Testing Institutes (ARAI, GARC & ICAT)

Aspect-wise breakup of Standards formulated by TED 04

Product	: 13
Code of Practices	: 1
Methods of Test	: 47
Safety Standard	: 1
Dimensions	: 2
Terminology	: 4
Others	: 8
Total standards	: 76



Brief Introduction of Automotive Braking and Steering Systems:

Automotive braking is a fundamental aspect of vehicle safety and control. It involves the systems and components responsible for slowing down or stopping a vehicle's motion. Here's a brief introduction to automotive braking:

Braking Systems:

Automotive braking systems are designed to convert the kinetic energy of a moving vehicle into heat energy, ultimately slowing down or stopping the vehicle.

Two primary types of automotive braking systems are used: hydraulic and mechanical (also known as drum brakes).

Hydraulic Braking System:

Most modern vehicles employ hydraulic braking systems, which use a fluid (usually brake fluid) to transmit force from the driver's input to the brake components at each wheel.

Key components of a hydraulic brake system include the brake pedal, master cylinder, brake lines, brake calipers (or wheel cylinders), brake pads (or brake shoes), and brake rotors (or drums).

When the driver presses the brake pedal, hydraulic pressure is generated in the master cylinder and transmitted through the brake lines to the brake calipers (or wheel cylinders). This pressure causes the brake pads (or shoes) to clamp onto the brake rotors (or drums), creating friction and slowing down the vehicle.

Mechanical Braking System (Drum Brakes):

Some older or smaller vehicles still use mechanical drum brakes, which rely on a mechanical linkage between the brake pedal and the brake shoes inside the brake drums.

When the brake pedal is pressed, the mechanical linkage forces the brake shoes to expand against the inside of the brake drums, creating friction and slowing down the vehicle.

Parking Brake (Handbrake):

The parking brake is a secondary braking system designed for parking and emergency use.

It can be a hand-operated lever or foot pedal that engages the brakes at the rear wheels, helping to secure the vehicle in a parked position.

Brake Maintenance:

Regular brake maintenance is crucial for safety and performance.

This includes inspecting and replacing brake pads, rotors, drums, brake fluid, and ensuring that the braking system is free of leaks and malfunctions.

Automotive braking systems are a critical aspect of vehicle safety, and their proper functioning is essential to prevent accidents and ensure driver and passenger safety.



Indian Standards on Automotive Braking and Steering Systems:

S No.	IS No.	Title
1.	IS 2742 (Part 1)	Automotive vehicles - Brake linings (Non - Rubberized): Part 1 specification
2.	IS 2742 (Part 2)	Automotive vehicles - Brake linings - Rubberised: Part 2 specification
3.	IS 2742 (Part 3)	Automotive vehicles - brake linings: Part 3 methods of test
4.	IS 2742 (Part 4)	Automotive vehicles - Brake linings: Part 4 coefficient of friction - method of test
5.	IS 2742 (Part 5)	Automotive vehicles - - Brake linings: Part 5 internal shear strength - Method of test
6.	IS 2742 (Part 6)	Automotive vehicles - Brake linings: Part 6 compressive strain test methods
7.	IS 2742 (Part 7)	Automotive vehicles - Brake linings: Part 7 shear test procedure for disc brake pad and drum brake shoe assemblies
8.	IS 3028 (Part 1)	Automotive vehicles - Noise emitted by moving vehicles - Specification and method of measurement: Part 1 L 2 category
9.	IS 3028 (Part 2)	Automotive Vehicles Noise Emitted by Moving Vehicles Specification and Method of Measurement Part 2 Other Than L2 And L5 Category
10.	IS 3028 (Part 3)	Automotive vehicles - Noise emitted by moving vehicles - Specification and method of measurement: Part 3 L 5 category
11.	IS 7065	Specification for steering wheels
12.	IS 7079	Automotive vehicles - Brake hose assemblies forhydraulicbraking systems used with non - Petroleum base brake fluid specification
13.	IS 9211	Terms and definitions of weights of road vehicles other than 2 and 3 wheelers
14.	IS 9435/ ISO 612 (E)	Terms and Definitions Relating to Dimensions of Road Vehicles Other than 2 and 3 Wheelers
15.	IS 10278	Motorcycles - Measurement of maximum speed
16.	IS 10399	Automotive Vehicles- Noise Emitted By Stationary Vehicles-Method Of Measurement
17.	IS 10407	Automotive vehicles - Two wheelers - Acceleration performance - Method of evaluation
18.	IS 10881	Automotive vehicles - Mopeds, scooters and motorcycles method of evaluation of fuel consumption
19.	IS 11029	Specification for steering ball races for mopeds
20.	IS 11422	Terms and definitions of weights of two wheeled motor vehicles



21.	IS 11432	Terms and definitions of dimensions of two wheeled motor vehicles
22.	IS 11739	Method of recording dust ingress in automotive vehicles
23.	IS 11825	Method of weighment of automotive vehicles
24.	IS 11827	Automotive vehicles - Calibration of speedometer - Method of evaluation
25.	IS 11839	Procedure for splash proof testing of automotive vehicles
26.	IS 11849	Method of determination of centre of gravity of automotive vehicles
27.	IS 11850	Automotive vehicles - Odometer systems - Method of evaluation
28.	IS 11851	Method of evaluation of acceleration of automotive vehicle
29.	IS 11852	Automotive vehicles - Uniform provisions concerning the approval of vehicles of categories m2, m3, N and t with regard to braking
30.	IS 11865	Automotive vehicles - Method of conducting waterproofing test
31.	IS 11877	Automotive Vehicles - Maximum Speed of Automotive Vehicles — Method of Evaluation
32.	IS 11921	Automotive Vehicles - Method of Evaluation of Constant Speed Fuel Consumption
33.	IS 11948	Automotive vehicles - Steering effort - Method of evaluation
34.	IS 12105	Methods of test for valves of automotive air brake systems
35.	IS 12159	Method of evaluation of accuracy of parameters of steering geometry of automotive vehicles
36.	IS/ISO 12161	Road Vehicles - Endurance Braking Systems of Motor Vehicles and Towed Vehicles - Test Procedures
37.	IS 12218	Method of measurement of approach, departure and ramp angles of automotive vehicles
38.	IS 12222	Automotive vehicles - Turning circle and maneuverability requirements
39.	IS 12695	Automotive vehicles - Three wheeled vehicles - Determination of centre of gravity
40.	IS 12793	Motorcycles - Measurement method for location of centre of gravity
41.	IS 12821	Automotive vehicles - Braking system, tube connections - Dimensions
42.	IS 12831	Automotive vehicles - Braking systems - Banjo bolt connections dimensions
43.	IS 12832	Automotive vehicles - Interior noise - Method of measurement and requirements
44.	IS 12851	Automotive vehicles - Hydraulic brake systems tubings - Performance requirements

45.	IS 12884	Automotive vehicles - Braking systems, rubber boots for brake wheel cylinders - Performance requirements
46.	IS 13207	Automotive vehicles - Hydraulic braking systems - Wheel cylinder performance requirements
47.	IS 13224	Automotive vehicles - Hydraulic braking systems - Master cylinder performance requirements
48.	IS 13225	Automotive vehicles - hydraulic braking systems - Rubber cups - Specification
49.	IS 13249	Automotive vehicles - Braking systems - Rubber seal for disc brake cylinder - Performance requirements
50.	IS 13363	Automotive vehicles - Air brake systems - Performance requirements for drain valves
51.	IS 13453	Automotive vehicles - Braking systems - Method of test on brake dynamometer for two and three wheelers
52.	IS 13476	Automotive vehicles - Mechanical steering gear - Methods of test
53.	IS 13492	Automotive vehicles - Two wheelers - Method of evaluation of brake pedal strength requirements
54.	IS 13603	Automotive vehicles - Air brake systems - Performance requirements for brake chamber
55.	IS 13604	Automotive vehicles - Air brake systems - Performance requirements for dual brake valve
56.	IS 13988	Automotive vehicles - Starting gradeability - Method of measurement and requirement
57.	IS 14269	Automotive vehicles - Integral power steering gear - Method of test
58.	IS 14283	Automotive vehicles - Accelerator control systems - Safety requirements
59.	IS 14346 (Part 1)	Automotive Vehicles - Passenger Cars - Verification of Drivers Direct Field of View - Part 1 : Vehicle Positioning for Static Measurement
60.	IS 14346 (Part 2)	Automotive vehicles - Passenger cars verification of drivers direct field of view (Part 2) Method of test
61.	IS 14382	Automotive vehicles - Speed limitation devices - Specification
62.	IS 14557	Automotive vehicles - Cooling performance - Method of measurement
63.	IS 14610	Automotive vehicles - Fuel consumption on chassis dynamometer – Method of measurement



64.	IS 14664	Automotive vehicles - Performance requirements and testing procedure for braking system of two and three wheeled motor vehicles
65.	IS 14785	Automotive vehicles - - Determination of road - Load constants by coast down test method
66.	IS 15702	Automotive vehicles - Air brake hose - Specification
67.	IS 15708	Road vehicles - Brake linings - Shear test procedure for disc brake pad and drum brake shoe assemblies
68.	IS 15783	Road vehicles - Brake control levers for two and three wheeled motor vehicles - Specification
69.	IS 15986	Automotive vehicles - Uniform provisions concerning the approval of vehicles of categories m1 and n1 with regard to braking
70.	IS 16137 (Part 1)	Automotive vehicles - Methods of measurement of braking coefficient of road surfaces: Part 1 srtt method
71.	IS 16137 (Part 2)	Automotive vehicles - Methods of measurement of braking coefficient of road surfaces
72.	IS 17128 (Part 1)	Automotive vehicles — vehicle dynamics test methods: Part 1 general test conditions
73.	IS 17128 (Part 2)	Automotive Vehicles — Vehicle Dynamics Test Methods Part 2 Steady-State Test Procedure for Vehicle Stability and Controllability” Open-Loop and Closed Loop Test
74.	IS 17128 (Part 3)	Automotive Vehicles- Vehicle Dynamics Measurements Test Procedure Part-3: Transient Response Test Procedure Open Loop and Closed Loop Test
75.	IS 17132	Guideline Specifications for Replacement Brake Lining Assemblies and Drum Brake Linings for Power-Driven Vehicles and Their Trailers
76.	IS 17871	Automotive Vehicle Noise Emitted By Stationary Vehicles Method of Measurment Non-Original Replacement Exhaust Silencing Systems Ress for Two and Three Wheeled Vehicles

Important Standards on Springs and Suspension Systems

Standards on DISC Brake

IS 13249 — Automotive vehicles - Braking systems - Rubber seal for disc brake cylinder - Performance requirements

This standard specifies the performance requirements for elastomeric seals used in automotive vehicles disc brake calipers using a non-petroleum base hydraulic brake fluid. Seals covered under this may be solid section type (square, rectangular, ring, etc.) mounted stationary in cylinder bore or on the movable portion of disc brakes.

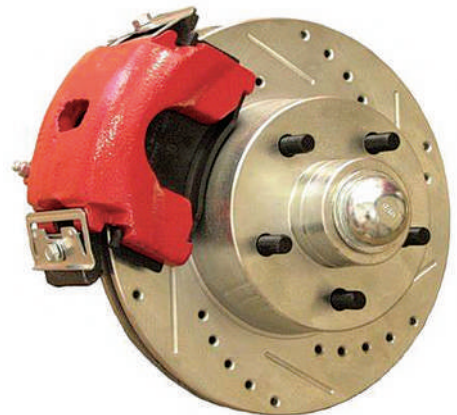
Performance Requirements :

- Cycling Humidity,
- Low Temperature,
- Stroking Test etc



IS 2742 (Part 7) — Automotive vehicles - Brake linings: Part 7 shear test procedure for disc brake pad and drum brake shoe assemblies

This Standard (Part 7) specifies a method for measuring the strength of the bond connection between the lining material and the carrier in disc brake pad and drum brake shoe assemblies (shear strength). This Standard is applicable to assemblies that are integrally moulded, bonded or that use mechanical retention systems (MRS) of both types used for brakes on road vehicles. This Standard does not apply to riveted assemblies.



IS 15708 — Road vehicles - Brake linings - Shear test procedure for disc brake pad and drum brake shoe assemblies

This standard specifies a method for measuring the strength of the bond connection between the lining material and the carrier in disc brake pad and drum shoe assemblies (shear strength). This standard is applicable to integrally moulded, riveted and bonded assemblies of both types of brake on road vehicles.



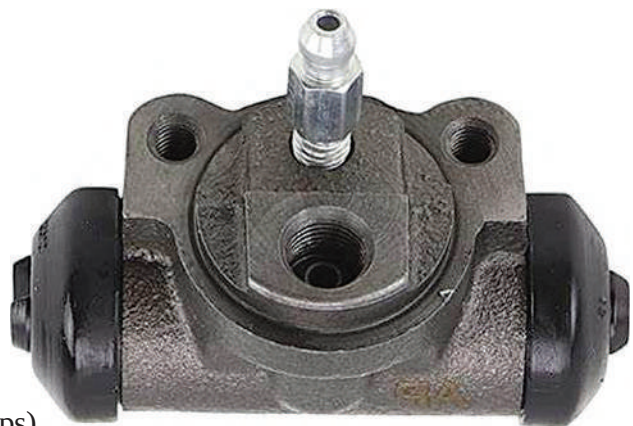
Standards on Hydraulic Brake

IS 12851 — Automotive vehicles - Hydraulic brake systems tubings - Performance requirements

- This standard specifies the performance requirements for metallic tubings used in automotive hydraulic brake systems
- Performance Requirement: Bursting strength, Bending, Expansion, Flaring, Flattening, Fatigue resistance, Resistance to heat, Resistance to corrosion, Resistance to salt spray, Resistance to impact, Hydraulic test, and Compatibility with brake fluid.

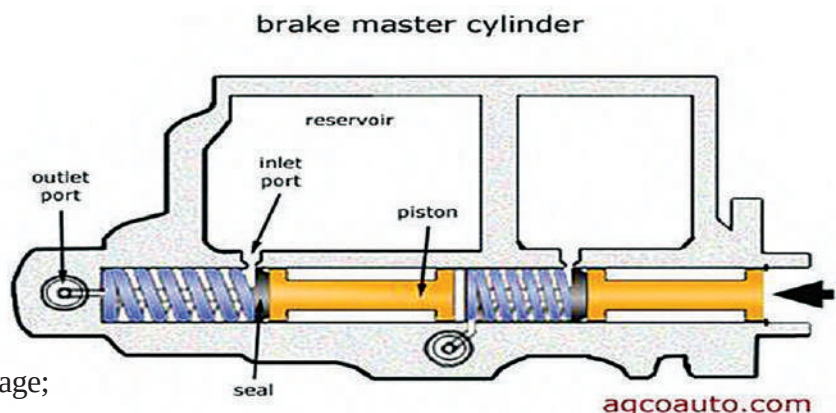
IS 13207 — Automotive vehicles - Hydraulic braking systems - Wheel cylinder performance requirements

- This standard specifies the performance requirements and test method for wheel cylinders used in automotive hydraulic braking systems.
- Performance Requirement:
 - a) Strength
 - b) Humidity operation
 - c) Storage corrosion
 - d) Static leakage
 - e) Heat pressure stroking (for rubber cups)
 - f) Low temperature performance (for rubber cups)
 - g) Ozone resistance (for rubber cups)



IS 13224 — Automotive vehicles - Hydraulic braking systems - Master cylinder performance requirements

- This standard specifies the performance requirements and test methods for both single and dual output master cylinder assemblies used in hydraulically operated braking systems of automobiles.
- Performance Requirement:
 - a) Full stroke test;
 - b) Applied leakage;
 - c) Heat pressure stroking;
 - d) Fluid displacement;
 - e) Strength;
 - f) Corrosion resistance in storage;
 - g) Reservoir Capacity and leakage;
 - h) Humidity;
 - i) Low temperature performance.



IS 13225 — Automotive vehicles - hydraulic braking systems - Rubber cups - Specification

- This standard specifies the general and performance requirements of moulded cups upto 51 mm diameter used in master and wheel cylinders used in hydraulically operated braking systems of automotives.
- Performance Requirement:
 - a) Resistance to Fluid at Elevated Temperatures;
 - b) Precipitation;
 - c) Oven Ageing ;
 - d) Corrosion resistance;
 - e) Storage corrosion;
 - f) Heat Pressure Stroking (master & wheel cylinder);
 - g) Ozone Resistance (master and wheel cylinder rubber cup).



IS 7079 —Automotive vehicles - Brake hose assemblies for hydraulic braking systems used with non - Petroleum base brake fluid specification

- This standard specifies the performance requirements, test procedures and methods of sampling of brake hose assemblies to be used in hydraulic braking systems of automotive vehicles having nominal internal diameter upto 5 mm.
- It applies to brake hose assemblies made of a hose fabricated from cord and natural or synthetic elastomers and assembled with metal end fittings for use with nonpetroleum-base brake fluids in accordance with IS 8654. The hose assemblies may also have metal centre fittings, rubber grommets, spring guards or any other protective parts.
- This standard does not cover requirements for the end fittings, centre fittings; protective parts, etc, except for salt spray test
- TESTS:
 - a) Pressure Test;
 - b) Bursting Strength test;
 - c) Whip Test;
 - d) Tensile Test;
 - e) Water Absorption Test;
 - f) Salt Spray Test;
 - g) Cold Bend Test; and
 - h) Static and dynamic Ozone Resistance Test.



Standards on Air Brake

IS 12105 — Methods of test for valves of automotive air brake systems

- Specifies the methods of test for valves used in air brake systems of automotive vehicles designed to operate up to 8.5 bar nominal pressure.
- **Test Procedures:**
 - a) Performance Test;
 - b) Leak Test;
 - c) Endurance Test;
 - d) Low Temperature test; and
 - e) High Temperature Test.



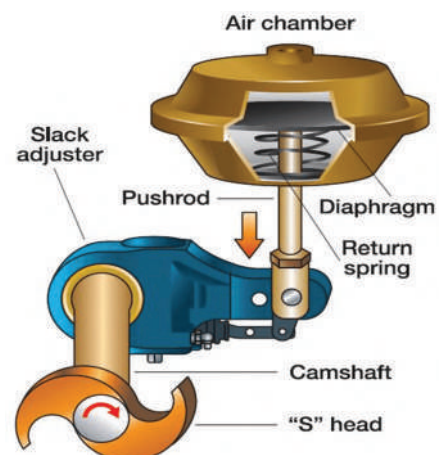
IS 13363 — Automotive vehicles - Air brake systems - Performance requirements for drain valves

- This standard covers the performance requirements, installation dimensions and tests for drain valves used in air brake systems.
- **TESTS:**
 - a) Leak test;
 - b) Output performance test;
 - c) Endurance test;
 - d) Low temperature test;
 - e) Dry heat test;
 - f) Salt spray test;
 - g) Over pressure test;
 - h) Water spray test; and
 - i) Vibration test.



IS 13603 — Automotive vehicles - Air brake systems - Performance requirements for brake chamber

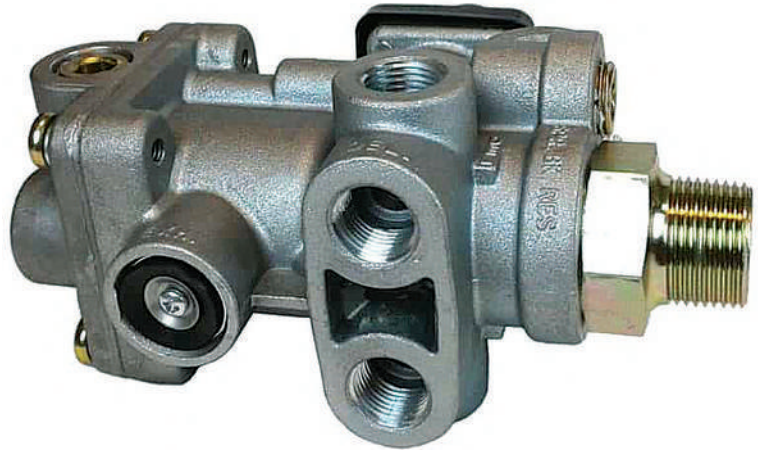
- This standard covers the performance requirements and tests for brake chambers used in air brake systems.
- **TESTS:**
 - a) Leak test;
 - b) Output performance test;
 - c) Endurance test;
 - d) Low temperature leak test;
 - e) High temperature leak test;
 - f) Corrosion resistance test;
 - g) Burst pressure test;
 - h) Water spray test;



- i) Vibration test; and
- j) Port thread integrity test

IS 13604 — Automotive vehicles - Air brake systems - Performance requirements for dual brake valve

- This standard covers the performance requirements and tests for brake valves used in dual circuit air brake systems.
- **TESTS:**
 - 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;
 - i) Vibration test; and
 - j) Port thread integrity test.



Standards on Brake lining

IS 2742 (Part 1) — Automotive vehicles - Brake linings (Non - Rubberized): Part 1 specification

- This standard (Part 1) covers the terminology, dimensional tolerances and other performance requirements of non-rubberized brake linings of drum brakes.
- **TEST REQUIREMENTS** — The following properties shall be specified by the manufacturer.
 - a) Normal friction coefficient;
 - b) Hot friction coefficient
 - c) Specific gravity;
 - d) Hardness
 - e) Cross breaking strength;
 - f) Acetone extract
 - g) Water swell;
 - h) Loss of weight on ignition
 - i) Heat swell; and
 - j) Shear strength



IS 2742 (Part 2) — Automotive vehicles - Brake linings - Rubberised: Part 2 specification

- This standard (Part 2) covers the terminology, dimensional tolerances and performance requirements for rubber based brake linings.
- TEST REQUIREMENTS — The following properties shall be specified by the lining manufacturer.
 - a) Density;
 - b) Shore hardness,
 - c) Tensile strength;
 - d) Acetone extract,
 - e) Water swell;
 - f) Loss of weight on ignition,
 - g) Heat swell test, and
 - h) Frictional test :
 - 1) Normal co-efficient of friction;
 - 2) Hot co-efficient of friction.

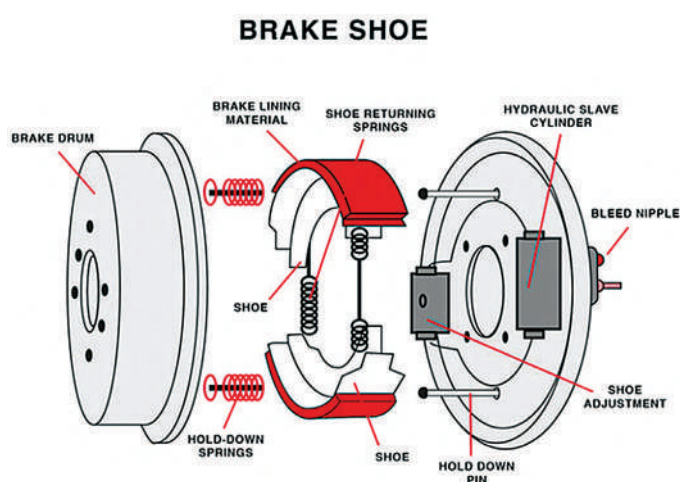


IS 2742 (Part 3) — Automotive vehicles - Brake linings: Part 3 methods of test

- This standard (Part 3) covers the methods of test to determine the physical and chemical properties of brake linings.
- **TESTS:**

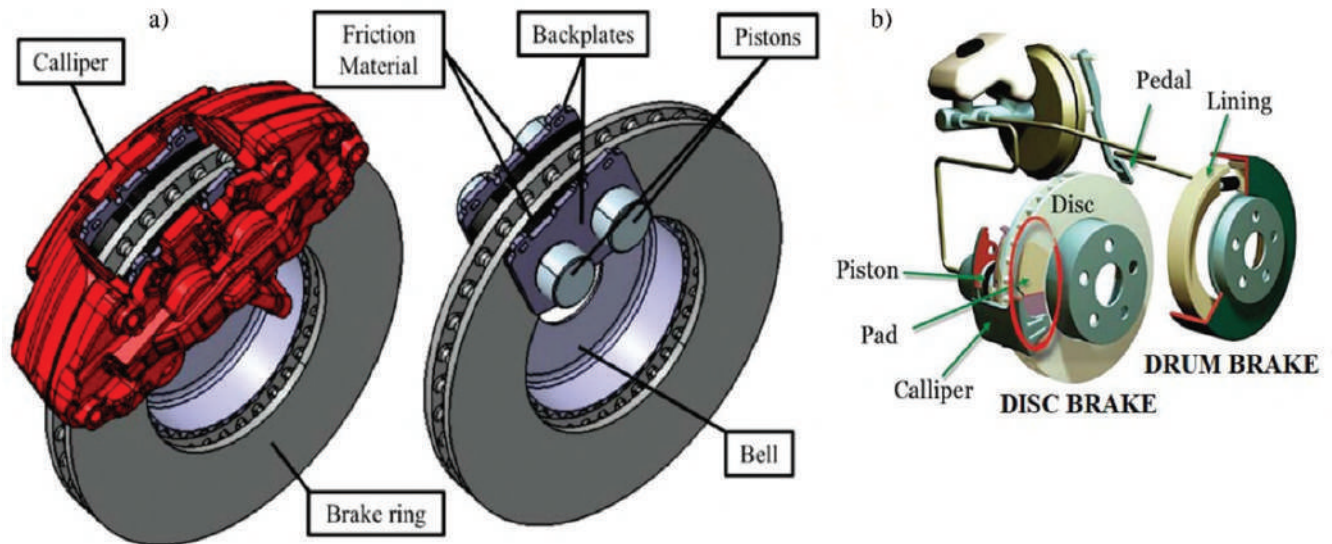
The following tests shall be carried out to determine the properties of the linings:

- a) Specific gravity;
- b) Rockwell hardness;
- c) Shore hardness;
- d) Cross breaking strength;
- e) Acetone extract;
- f) Water swell;
- g) Loss of weight on ignition;
- h) Heat swell;
 - 1) Friction co-efficient (Normal and Hot) [see IS 2742 (Part 4)]; and
 - 2) Internal shear strength [see IS 2742 (Part 5) : 1994].



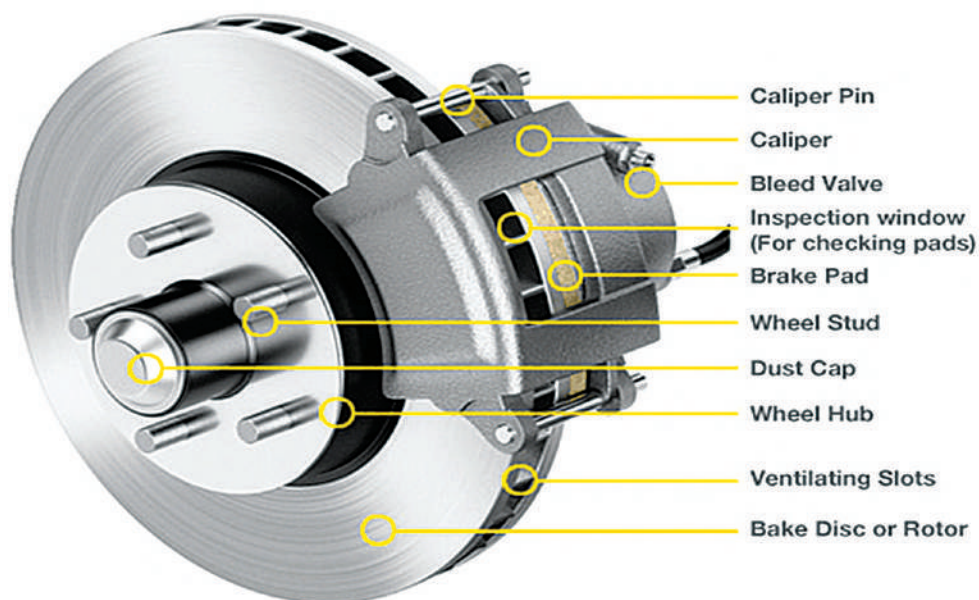
IS 2742 (Part 4) — Automotive vehicles — Brake linings: Part 4 coefficient of friction - method of test

- This standard specifies the method of evaluation of friction coefficient of brake linings by a friction material test machine (popularly known as 'Chase' machine).



IS 2742 (Part 5) — Automotive vehicles — Brake linings: Part 5 internal shear strength - Method of test

- This standard specifies the method of measuring the internal shear strength (stress) of brake lining materials for disc brake pads and drum brake linings used in automotive vehicle brakes.



Disc Brake Components

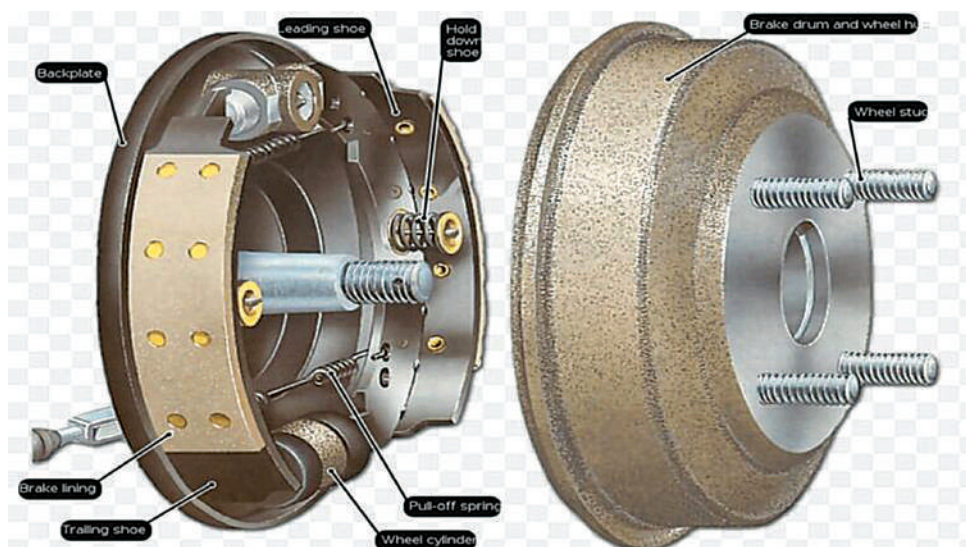
IS 2742 (Part 6) — Automotive vehicles — Brake linings: Part 6 compressive strain test methods

- This Standard specifies a method for test and measurement of the compressive displacement of brake linings or brake pad assemblies due to loading and temperature.
- This Standard applies to disc brake pad assemblies or coupon samples cut from the friction material.



IS 17132 — Guideline Specifications for Replacement Brake Lining Assemblies and Drum Brake Linings for Power-Driven Vehicles and Their Trailers

- This standard applies to replacement service brake lining assemblies intended for use in friction brakes forming part of the braking system of power-driven vehicles and their trailers and semi-trailers authorized for use on public roads.
- Replacement brake lining assemblies may be approved for fitment and use on power-driven vehicles and their trailers and semi-trailers having type approval in accordance with IS 11852 or IS 14664. Replacement drum brake linings designed to be riveted to a brake shoe may be approved for fitment and use on powerdriven vehicles and trailers having type approval in accordance with IS 11852 and classified in categories M3, N2, N3, T3 and T4



General Standards

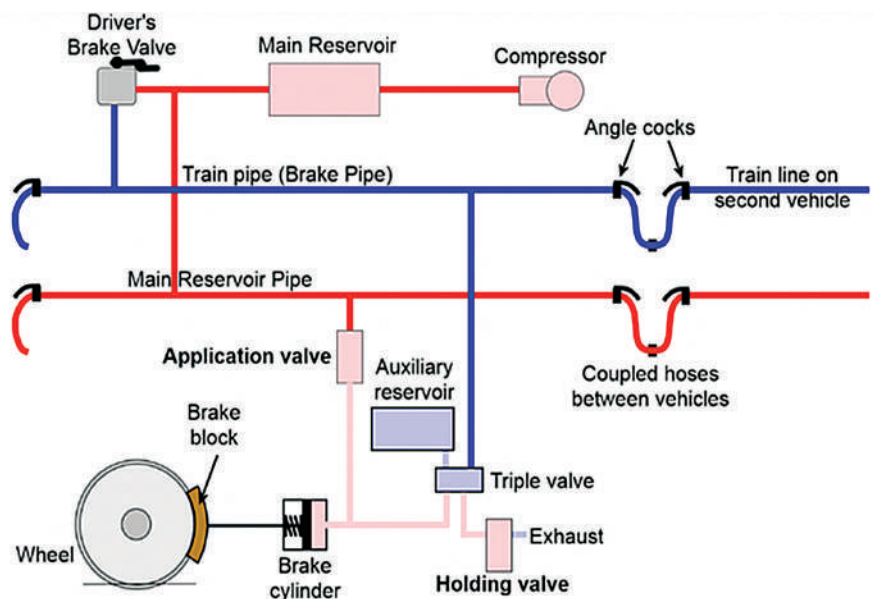
IS 11852 — Automotive vehicles — Uniform provisions concerning the approval of vehicles of categories m2, m3, N and t with regard to braking

- This standard applies to the braking of power-driven vehicles individually and to trailers individually of categories M2, M3, N and T as defined in IS 14272.
- This standard does not cover:
 - a) Vehicles with a maximum design speed not exceeding 25 km/h;
 - b) Trailers which may not be coupled to power-driven vehicles with a design speed exceeding 25 km/h; and
 - c) Vehicles fitted for invalid drivers.



IS 12821 — Automotive vehicles - Braking system, tube connections - Dimensions

- This standard covers the recommended dimensions of tubing with flared ends used in hydraulic brake systems of automobiles
- DIMENSIONS —
 - a) Tubing and Flares
 - b) Threaded Ports (Tube Nuts)
 - c) Male Tube Nuts (Fittings)



IS 12831 — Automotive vehicles - Braking systems - Banjo bolt connections dimensions

- This standard specifies dimensional requirements for threaded ports and banjo bolts for interconnection of major components in automotive hydraulic brake systems.

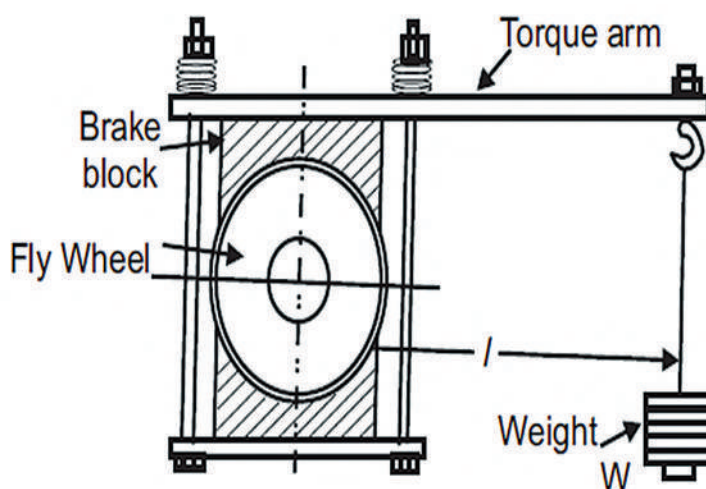


IS 12884 — Automotive vehicles — Braking systems, rubber boots for brake wheel cylinders - Performance requirements

- This standard specifies the performance requirements and test methods for rubber boots at the end of wheel cylinders (used in drum brakes) to prevent the entrance of impurities like dirt and moisture.

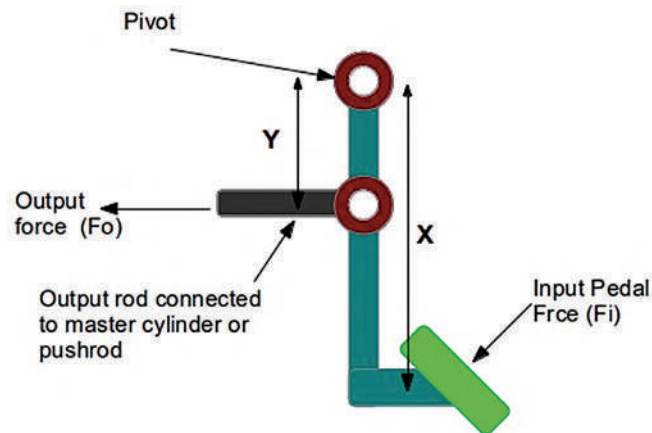
IS 13453 — Automotive vehicles — Braking systems - Method of test on brake dynamometer for two and three wheelers

- This standard covers method of test on brake dynamometer for two and three wheelers such as mopeds, scooters, motorcycles and three wheeled motor vehicles with maximum recommended mass not exceeding 1 000 kg, fitted with drum or disc brakes.
- **TYPE OF TESTS** - The following type tests shall be carried out on dynamometer to assess brake performance:
 - a) Type D1 test (Performance test);
 - b) Type D2 test (Fade test); and
 - c) Type D3 test (Wet/dry test) (Applicable for two wheelers only).



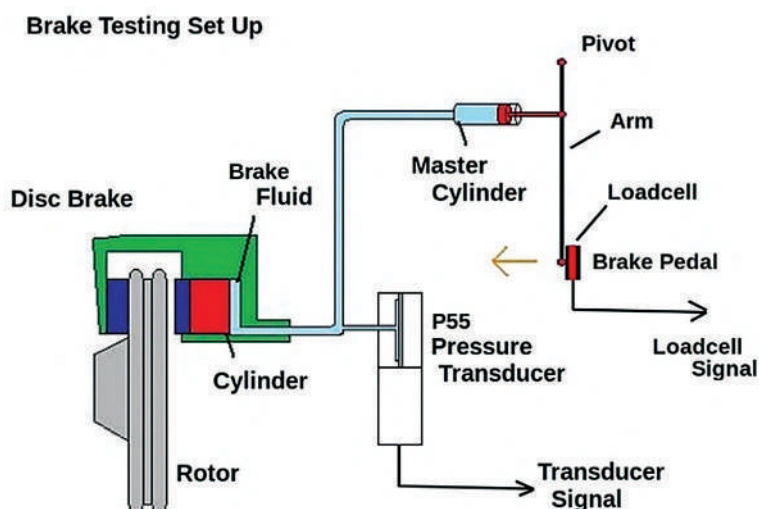
IS 13492 — Automotive vehicles — Two wheelers — Method of evaluation of brake pedal strength requirements

- This standard specifies the method for evaluating the static strength requirements of brake pedals used in mopeds, scooters and motorcycles.
- The brake lever strength requirements are covered in IS 13493.



IS 14664 — Automotive vehicles – Performance requirements and testing procedure for braking system of two and three wheeled motor vehicles

- This standard specifies requirements for service brake systems and where applicable, associated parking brake systems of power driven vehicles with two or three wheels of category 3-1, 3-2, 3-3, 3-4 and 3-5, as defined in 3.28 to ensure safe braking performance under normal and emergency riding conditions. These categories do not include,
 - vehicles with a V_{max} of < 25 km/h; and
 - vehicles equipped for disabled riders.
- This standard is also applicable to three wheeled vehicle designed to draw a semi-trailer. In case of three wheeled vehicles designed to draw a semitrailer, the maximum weight to be considered shall be the maximum weight of the drawing vehicle (prime mover) in running order plus the maximum weight transferred to the drawing vehicle (prime mover) by the laden semi-trailer (in static condition).



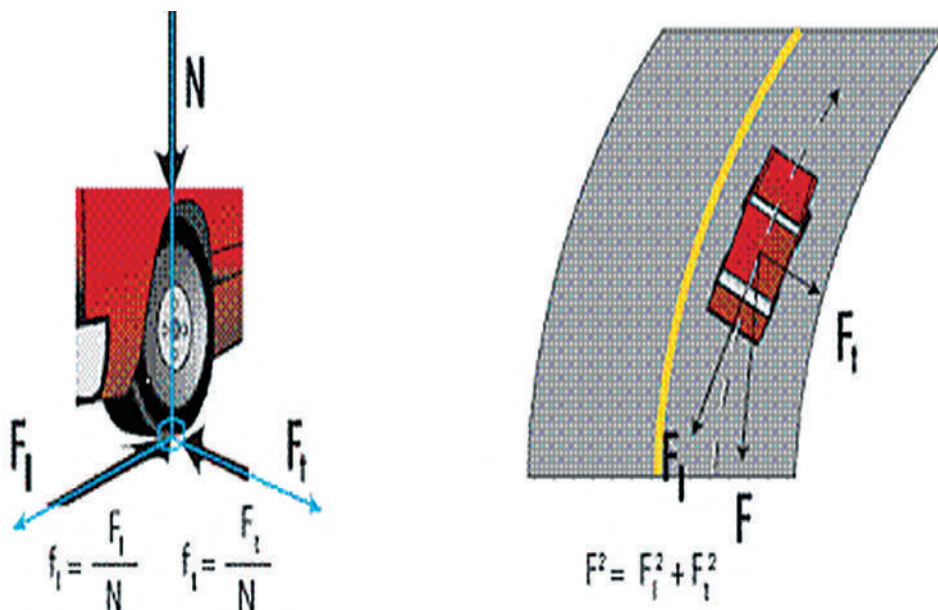
IS 15783 — Road vehicles – Brake control levers for two and three wheeled motor vehicles – Specification

- This standard specifies requirements of hand-operated levers used for control of brake system of two and three wheeled motor vehicles fitted with handle bar.
- The control levers complying with the requirements of this standard may be used as clutch control levers at the option of the vehicle manufacturer provided these are suitable to the application.



IS 16137 (Part 1) — Automotive vehicles – Methods of measurement of braking coefficient of road surfaces — Part 1 SRTT method

- This standard specifies test method for measurement of longitudinal Peak Braking Coefficient (PBC) of road surfaces using a Standard Reference Test Tyre (SRTT) primarily to be used for demonstrating compliance of the PBC to statutory requirements.



IS 16137 (Part 2) — Automotive vehicles — Methods of measurement of braking coefficient of road Surfaces — Part 2 Pendulum Method

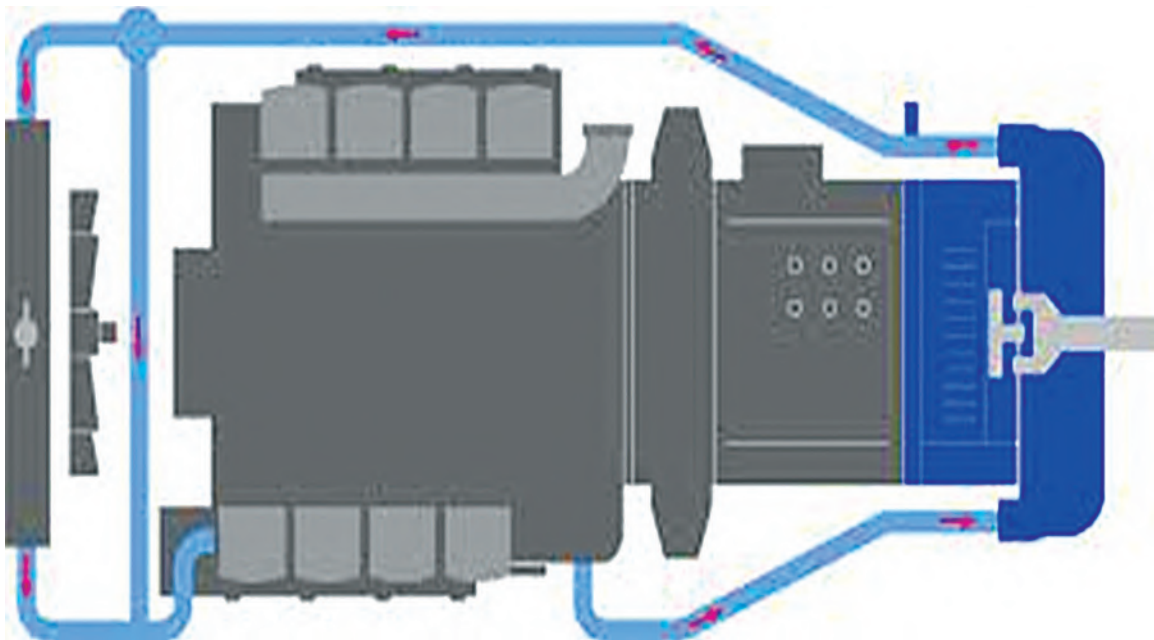
- This standard specifies test method for quick and periodical measurements of skid resistance of road surfaces using pendulum tester.

IS 15986 — Automotive vehicles – Uniform provisions concerning the approval of vehicles of categories m1 and n1 with regard to braking

- This standard specifies uniform alternative provisions concerning the approval of vehicles of categories M1 and N1 as defined in IS 14272 with regard to braking as per IS 11852.
- This standard does not cover
 - a) vehicles with a design speed not exceeding 25 km/h; and
 - b) vehicles fitted for invalid drivers.

IS/ISO 12161 — Road Vehicles — Endurance Braking Systems of Motor Vehicles and Towed Vehicles - Test Procedures

- This Standard specifies methods for testing the endurance braking systems of vehicles of categories M N and O (excluding M1, N1, O1 and O2) which are designed to comply with ECE-R 13/09 with supplement 1 to 6. The values given in square brackets are taken from ECE Regulation No. 13 for information.
- All endurance test procedures are based on the principle of equivalent energy absorption and procedures which are not suitable to support this principle are not considered.
- The principle of equivalent energy allows the base test parameters to be adapted to the variations occurring under real conditions compared to theoretical values.
- Typical sources are:
 - a) The variation of the gradient of downhill test track; or
 - b) The variation of retarding force during drag tests or indoor test.



IS 11852 — Automotive Vehicles – Uniform Provisions Concerning the Approval of Vehicles of



Categories M, N and T with Regard to Braking

- This standard applies to the braking of power-driven vehicles individually and to trailers individually of categories M, N and T as defined in IS 14272 Automotive vehicles — Types — Terminology.
- This standard does not cover:
 - a) Vehicles with a maximum design speed not exceeding 25 km/h;
 - b) Trailers which may not be coupled to powerdriven vehicles with a design speed exceeding 25 km/h; and
 - c) Vehicles fitted for invalid drivers.

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