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Third edition
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Road vehicles — Brake linings — Shear test procedure for disc brake pad and drum brake shoe assemblies

Véhicules routiers — Garnitures de freins — Méthode d'essai de cisaillement des ensembles de plaquettes de freins à disque et segments de freins à tambour

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6312 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 2, *Braking systems and equipment*.

This third edition cancels and replaces the second edition (ISO 6312:2001), which has been technically revised.

Introduction

The shear property relates to stresses at the area of contact between lining and carrier in disc brake pad and drum brake shoe assemblies.

The specification for the average rate of load and the recommendation for variations in the instantaneous rate of load given in this International Standard take into account current practice, based upon an examination of equipment in use.

This third edition of this International Standard incorporates technical updates generated in the course of harmonization efforts during the development of ISO 15484.

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

1 Scope

This International 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 brake shoe assemblies (shear strength). This International 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 International Standard does not apply to riveted assemblies.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 611, *Road vehicles — Braking of automotive vehicles and their trailers — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 611 and the following apply.

3.1
lining
friction material component of a brake lining assembly

3.2
carrier
component of a brake lining assembly to which the friction material is attached

3.3
bond area
A
contact area between lining and carrier

3.4
mechanical retention system
MRS
attachment method where mechanical protrusions on the backing plate aid the retention of the friction material or the underlayer

3.5
shear force at failure
F
total load applied at the time of shear failure

3.6
shear strength at failure
τ
ratio of the load at failure divided by the bond area

4 Symbols and units

The symbols and preferred units used in this International Standard are given in Table 1. See Clause 8.

Table 1 — Symbols and units

Quantity	Symbol	Unit
Shear force at failure	F	N
Bond area	A	mm^2
Shear strength at failure	τ	MPa

5 Sampling and conditioning

This procedure can also apply for samples during product development, on finished products, or after special treatment (such as that covered by ISO 6314) or usage (inertia-dynamometer testing or field use) with the appropriate preparation.

Perform the testing on a complete assembly or a section (coupon) of the assembly. When testing a section or coupon, apply the load in the radial or tangential direction relative to the vehicle mounting position. Indicate the test orientation on the test report.

If needed, prepare the sample edges to ensure good contact with the loading and fixed tools. Remove noise insulating shims before the test.

When testing a lined shoe, the test area may cover the full assembly or segments of an assembly confined by saw cutting down to the carrier (see Figure 1).

Use five samples for standard testing.

NOTE The test procedure applies a load in a direction that might not be in accordance with the loading direction of the product in service. A high aspect ratio, chamfered, or slotted pads might influence the shear behaviour of the pad assembly.

6 Test rig and fixtures

6.1 Test rig

The test rig shall be a compression or tensile testing machine or similar (shear testing) machine of sufficient capacity to apply the shearing load by activating a ram.

The test rig shall provide equipment to register the exact load applied at the instant of shear failure.

The load application rate shall be controlled in such a way that the load increases at an average rate of $(4\,500 \pm 1\,000)$ N/s (as determined from typical vehicle-based evaluation). If a constant crosshead speed machine is being used, the load rate shall be set to (10 ± 1) mm/min. Indicate on the test report the type of machine control (load rate or crosshead speed) used for the test, so that it allows comparisons of results between different test rigs. Avoid any shock loading during the test.

Dimensions in millimetres

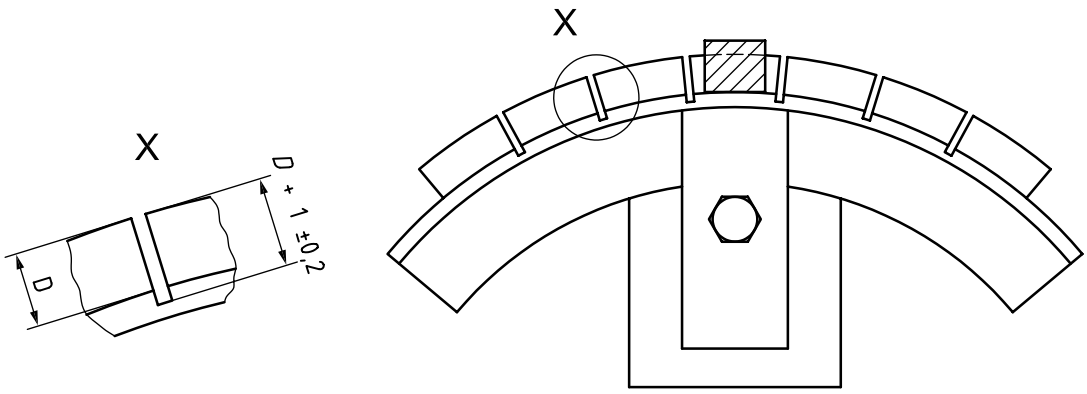

Figure 1 — Lined shoe in segmental test condition

6.2 Fixtures

6.2.1 General

The shearing test fixture shall have the means to hold a test sample such that it is parallel to the loading tool. To avoid sharp edges, this tool shall have a radius of 2 mm or less at the part in contact with the test sample. If a specific radius is used, note it on the test report as a deviation from the test procedure. If the surface area of the loading tool includes the draft angle of the friction material, note it on the test report.

6.2.2 Drum brake shoe assembly

The fixture (see Figure 2) shall be designed so that the loading tool is in contact with the edge of the lining for the full sample length and thickness within (1 ± 0,2) mm of the shoe platform.

The load application on the loading tool shall be in a direction parallel to the plane of the shoe platform. Support the shoe to maintain uniform loading along the length of the lining sample.

The width of the loading tool shall be greater than the width, W, of the lining.

6.2.3 Disc brake pad

Design the test fixture (see Figure 3) such that:

— the location of the plane of the backplate is parallel to the plane of the loading tool;

— the loading tool is in contact with the edge of the lining within (1 ± 0,2) mm of the backing plate (carrier) and conforms to the sample lining profile, including as optional draft angles from the moulding process;

— the loading tool is self-aligning;

— the loading tool is in contact with the full sample length of the lining edge parallel to the backplate support;

— the load-bearing edge of the backing plate rests against a rigid support with a thickness no greater than that of the backing plate;

— in order to prevent assembly movement under testing, a pressure fixture applies a face load of (0,5 ± 0,15) N/mm^2 of the lining area at a right angle to the shear load;

— the face load is applied in such a way that friction force is minimized and does not significantly influence the shear load measurement.