
International Standard



6310

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Road vehicles — Brake linings — Compressibility — Test procedure

Véhicules routiers — Garnitures de freins — Compressibilité — Procédure d'essai

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Descriptors : road vehicles, brake linings, tests, determination, compressibility.

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6310 was developed by Technical Committee ISO/TC 22, *Road vehicles*, and was circulated to the member bodies in February 1980.

It has been approved by the member bodies of the following countries :

Austria	Italy	Spain
Belgium	Japan	Sweden
Bulgaria	Korea, Dem. P. Rep. of	Switzerland
China	Korea, Rep. of	United Kingdom
Czechoslovakia	Netherlands	USA
Egypt, Arab Rep. of	Poland	USSR
France	Romania	
Germany, F.R.	South Africa, Rep. of	

The member body of the following country expressed disapproval of the document on technical grounds :

Brazil

Road vehicles — Brake linings — Compressibility — Test procedure

1 Scope

This International Standard specifies a method for testing and measuring the compressibility of brake linings.

2 Field of application

This International Standard applies to disc brake pads, brake shoe assemblies and friction materials without a backing plate to be used in road vehicles.

3 Reference

ISO 611, *Braking of motor vehicles and their trailers* — Terminology.

4 Definition

4.1 compressibility : The percentage reduction on the thickness of the brake lining due to the compression forces and temperatures given in this International Standard. It is measured in the direction of the application force, perpendicular to the friction surface.

(For other definitions, see ISO 611.)

5 Symbols

d_0 : thickness of the sample in millimetres;

d_1, d_2, d_3 : reduction of thickness on the sample under different loads;

d_4 : final reduction of thickness;

d'_1, d'_2, d'_3 : deflection of the test device under loads.

6 Equipment

The test device consists of :

- a) a chromium plated heating plate, flat or curved;
- b) a ram with ball joint;

c) a loading device, which is able to compress the lining between the ram and the plate;

d) a device to measure the compressive force between the plate and ram;

e) a gauge for measuring to an accuracy of 0,01 mm the reduction of thickness on the sample attached to the plate and in contact with the ram near its centre line;

f) a micrometer.

7 Test rig specifications

7.1 Loading

The maximum force required is that which will give a lining pressure against counter material at the friction surface, of 8 000 kPa for a disc brake pad and 3 000 kPa for a drum brake lining.

The load shall increase at a rate of 4 kN s⁻¹.

7.2 Heating plate

Maximum temperature on the surface : 400 °C (in special cases higher). For drum brake linings the plate shall have a curvature equal to that of the lining.

7.3 Loading ram

7.3.1 Sample type I (see figure 1)

The face of the ram shall be flat and the periphery shall at least circumscribe the periphery of the sample.

7.3.2 Sample type II (see figure 2)

The face of the ram shall have the same curvature as the lining and shall at least circumscribe the periphery of the sample.

7.3.3 Sample type III (see figure 3)

The surface of the ram shall have the same form and location as the actual contact surface of the piston(s) or caliper in the brake to which the pad is fitted.

7.3.4 Sample type IV (see figure 4)

The ram shall have the same curvature as the inside curvature of the shoe.

8 Sampling and preparation of samples

Samples shall be taken from production at random. At least five samples shall be measured.

NOTE — The surface roughness of the samples shall be the roughness of the normal production.

8.1 Unmounted brake lining without carrier

8.1.1 Disc brake pad — Sample type I

The sample shall be separated from the backing plate so that it has the greatest possible thickness. Size of the sample : 25 mm × 25 mm. If the width of the brake lining is less than 25 mm, the width of the sample shall be the width of the lining. The length of the sample shall be 25 mm.

8.1.2 Drum brake lining — Sample type II

Specifications as sample type I (see 8.1.1).

8.2 Brake lining assemblies

8.2.1 Disc brake pad — Sample type III

The pad assembly.

8.2.2 Drum brake lining — Sample type IV

Cut a sample according to the following dimensions :

- width : the actual width of the shoe but not greater than 80 mm;
- length : equal to the width of the sample.

This sample includes a section of the shoe (see figure 4). In the case of a riveted lining, two edges of the sample must be parallel to the line of the rivets.

9 Test procedure

- a) Measure the thickness of the sample at several points with a micrometer. Calculate the mean value d_0 of this thickness;
- b) Put the sample on the plate at room temperature with its friction surface against the surface of the plate with the ram correctly located;
- c) Compress the sample with the ram in order to get a pressure of 500 kPa between sample and plate;
- d) Attach the gauge for measuring compressibility and set it to zero;

e) In the case of sample types I and III :

- increase the compression load up to 4 000 kPa and read the reduction of thickness d_1
- then, increase the compression load to 6 000 kPa and read d_2
- finally, increase the compression load to 8 000 kPa and read d_3 ;

In the case of sample types II and IV :

- increase the compression load to 1 500 kPa and read the reduction of thickness d_1
- then, increase the compression load to 3 000 kPa and read the reduction of thickness d_2 .

These operations must be completed within one minute and the rate of load increase must be approximately 4 kN s⁻¹;

- f) Decrease the compression load to zero;
- g) Apply a compression load five times from zero to 8 000 kPa in cases of sample types I and III, 3 000 kPa in the case of sample types II and IV, then return to zero;
- h) Apply a compression load to get a pressure of 500 kPa and set the gauge back to zero;
- j) Increase the load to 8 000 kPa in the case of sample types I and III, 3 000 kPa in the case of sample types II and IV and measure the final reduction of thickness d_4 ;
- k) Remove the sample from the heating plate;
- m) Heat the plate to a stabilized surface temperature of 200 ± 10 °C. Put the sample on the heating plate and apply a preload of 500 kPa to ensure good thermal contact. Maintain the temperature at 200 °C for 10 min;
- n) If necessary, reset the preload to 500 kPa and then measure the reduction of thickness as in d), e), f), g), h), and j) above;
- p) For sample types I and III only :

Remove the sample from the heating plate and heat the plate to a stabilized temperature of 400 ± 10 °C (in special cases where the pad temperature is very high, the test temperature may be above 400 °C). Put the sample on the heating plate and apply a preload of 500 kPa to ensure good thermal contact. Maintain a temperature of 400 °C for 10 min. If necessary, reset the preload to 500 kPa and then measure the reduction of thickness as in d), e), f), g), h) and j) above.

10 Calibration of the test devices

The deflection of the test device itself is measured by loading the ram on the base plate without sample, then reading the gauge at the different pressures as in e) in clause 9.

For sample types I or III : d'_1 , d'_2 and d'_3 are the deflections of the test device under the loads, which correspond to pressures of 4 000, 6 000 and 8 000 kPa.

For sample types II or IV : d'_1 and d'_2 are the deflections of the test device under the loads which correspond to pressures of 1 500 and 3 000 kPa.

11 Report

The test report should record :

- Manufacture and designation of brake lining.
- Type of sample (type I, II, III or IV) and reference to this International Standard.
- Quality, size of the sample and designation of material.
- Number of samples.
- Thickness d_0 in millimetres, with an accuracy of 0,1 mm.

- The mean value for cold compressibility :

$$\frac{d_1 - d'_1}{d_0} \quad \text{at 4 000 or 1 500 kPa depending on the type of samples}$$

$$\frac{d_2 - d'_2}{d_0} \quad \text{at 6 000 or 3 000 kPa depending on the type of samples}$$

$$\frac{d_3 - d'_3}{d_0} \quad \text{at 8 000 kPa for sample types I and III only.}$$

$$\frac{d_4 - d'_3}{d_0} \quad \text{at 8 000 kPa or}$$

$$\frac{d_4 - d'_2}{d_0} \quad \text{at 3 000 kPa depending on the type of samples.}$$

- The mean value for hot compressibility at 200 °C and at different pressures as in e) and j) in clause 9.

- The mean value for hot compressibility at 400 °C and at different pressures as in e) and j) in clause 9 except for sample types II and IV.

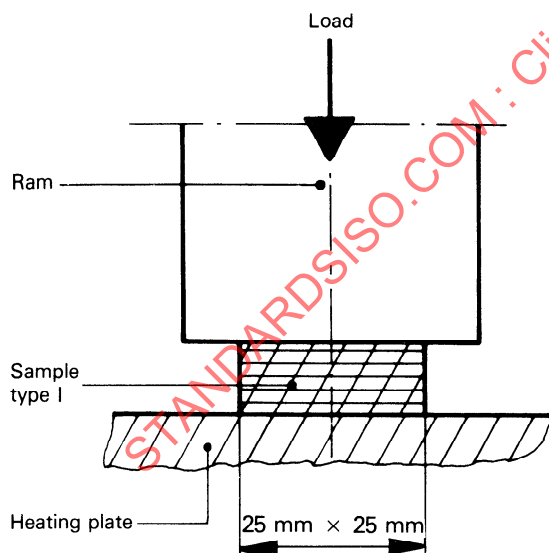


Figure 1 — Friction material for disc brake pad

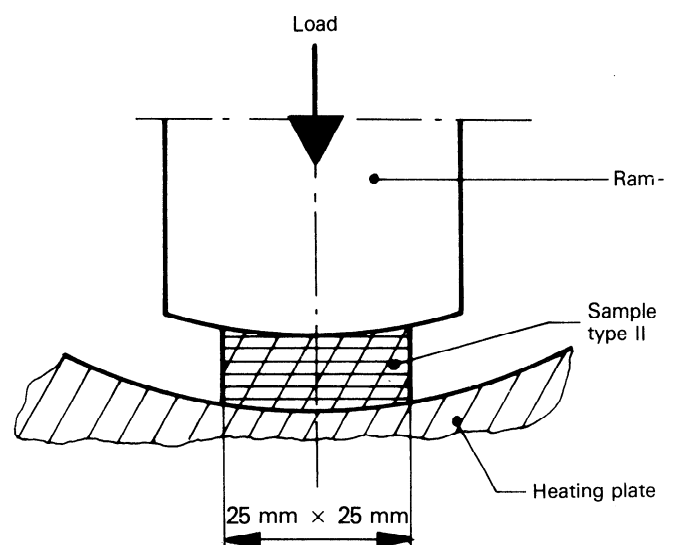


Figure 2 — Friction material for drum brake lining

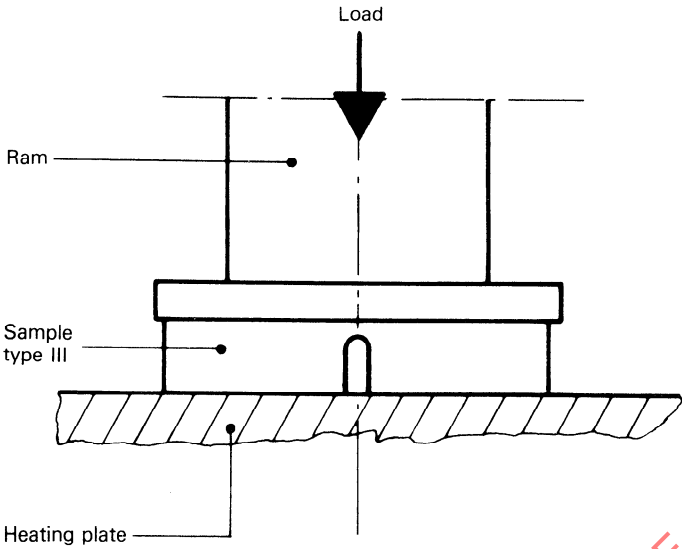


Figure 3 — Disc brake pad assembly

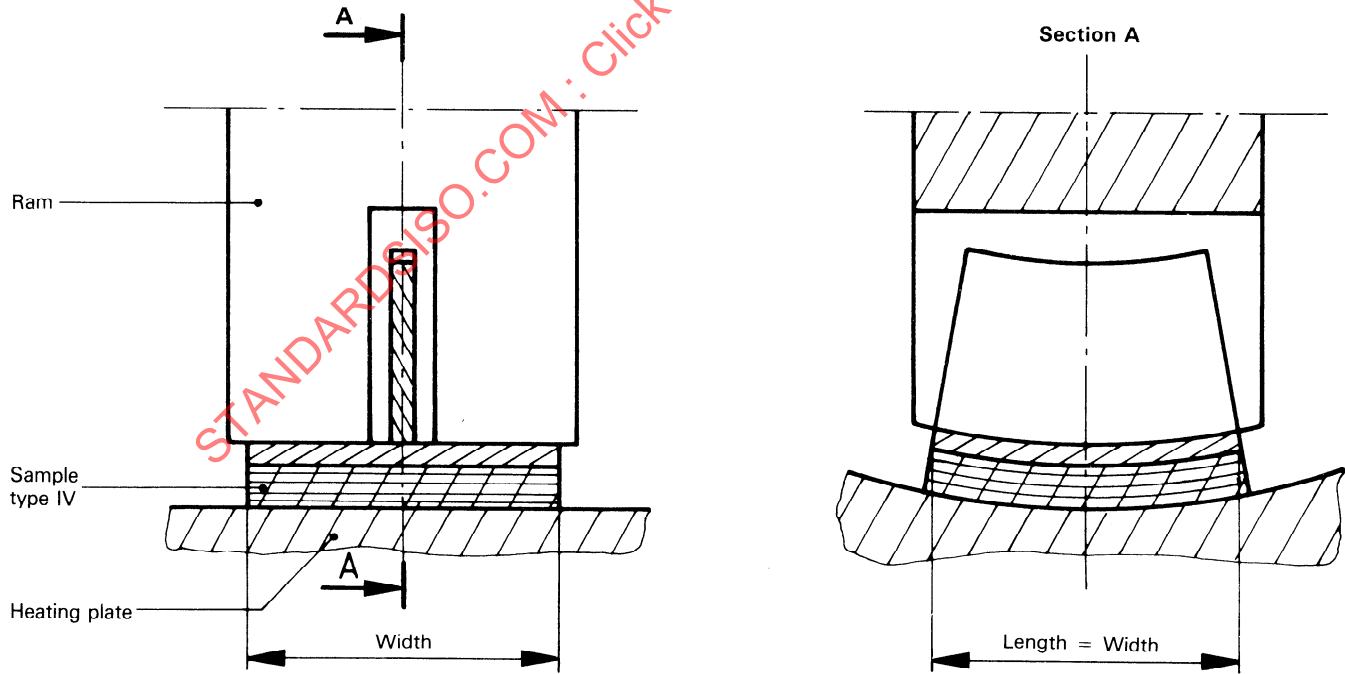


Figure 4 — Drum brake lining assembly