

Road vehicles — Brake lining assemblies — Inertia dynamometer test method

ICS 43.040.40

National foreword

This British Standard reproduces verbatim ISO 11157:2005 and implements it as the UK national standard. It supersedes BS ISO 11157:1999 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee AUE/11, Braking systems, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

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Summary of pages

This document comprises a front cover, an inside front cover, the ISO title page, pages ii to iv, pages 1 to 20, an inside back cover and a back cover.

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Road vehicles — Brake lining assemblies — Inertia dynamometer test method

*Véhicules routiers — Ensembles de garnitures de frein — Méthode
d'essai sur banc dynamométrique à inertie*



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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 11157 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 2, *Braking systems and equipment*.

This second edition cancels and replaces the first edition (ISO 11157:1999), which has been technically revised.

Road vehicles — Brake lining assemblies — Inertia dynamometer test method

1 Scope

This International Standard specifies a dynamometer test method to homologate alternative types of brake linings (including pads) mounted on original equipment, in accordance with UN-ECE Regulation No. 13-09, Annex 15.

This International Standard is applicable to road vehicles of categories M, N and O (see 3.1) as defined in UN ECE *Consolidated resolution of the construction of vehicles*, R.E.3, Annex 7.

Application for approval corresponding to this test method is to be made by the vehicle manufacturer (in the case of vehicles of category O the application is to be made by the axle or brake manufacturer) or by his duly accredited representative.

The values in square brackets, i.e. [], are taken from UN-ECE Regulation No. 13-09.

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 611:2003, *Road vehicles — Braking of automotive vehicles and their trailers — Vocabulary*

ISO 1176:1990, *Road vehicles — Masses — Vocabulary and codes*

ISO 3833:1977, *Road vehicles — Types — Terms and definitions*

UN-ECE Regulation No. 13, Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to braking, incorporating the 09 series of amendments.

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms, definitions and symbols given in ISO 611, ISO 1176, ISO 3833 and the following apply.

3.1.1

category M

power-driven vehicles having at least four wheels and used for the carriage of passengers

3.1.2

category N

power-driven vehicles having at least four wheels and used for the carriage of goods

3.1.3

category O

trailers (including semi-trailers)

3.2 Symbols

Symbol	Unit	Description
d_i, d_j	m/s ²	mean deceleration within the time window i resp. j
d_m	m/s ²	mean fully developed deceleration (MFDD)
$d(t), d(T)$	m/s ²	deceleration in dependence of time t resp. T
f_d	—	required accuracy of the MFDD
f_S	—	required accuracy for the measurement of the stopping distance
f_v	—	required accuracy for the measurement of the prescribed speed
I	kg/m ²	rotational inertia
i, j	—	index characterizing all events which can be consecutively allocated to a time window with a given duration t_d
m	kg	mass acting on the ground for the wheel(s) under consideration
n_i	—	number of pulses within the time window i
r	m	dynamic tyre rolling radius
S_d	m	stopping distance travelled between v_b and v_e
S_i	m	distance travelled within the time window i
S_{pb}	m	stopping distance travelled between v_p and v_b
S_{pe}	m	stopping distance travelled between v_p and v_e
t, T	s	time used as a variable in different functions
t_b	s	time at the beginning of the evaluation range for a braking action
t_d	s	time window in which values of interest are measured
t_e	s	time at the end of the evaluation range for a braking action
T_i	N·m	mean torque within the time window i
t_S	s	time at the end of a braking action
v_{air}	km/h	velocity of the cooling air
v_b	km/h	vehicle speed at 0,8 v_p
v_e	km/h	vehicle speed at 0,1 v_p
v_i	km/h	mean speed within the time window i
v_{max}	km/h	max. vehicle speed
v_p	km/h	prescribed vehicle speed
v_t	km/h	vehicle test speed at initiation of braking
v_1	km/h	initial speed at beginning of braking for heating procedures with repeated braking
w_S	—	necessary pulse-rate of one revolution for the measurement of the stopping distance
w_v	—	necessary pulse-rate of one revolution for the measurement of the speed
w_d	—	necessary pulse-rate of one revolution for the measurement of the deceleration

4 General

4.1 The test method described can be applied in the event of a modification of vehicle type resulting from the fitting of alternative types of brake linings on the original equipment of vehicles which have been approved in accordance with UN-ECE Regulation No. 13-09.

4.2 The alternative types of brake linings shall be checked by comparing their performance with that obtained from the brake linings with which the vehicle was equipped at the time of approval and conforming to the components identified in the relevant information document, a model of which is given in UN-ECE Regulation No. 13-09, Annex 2.

4.3 The technical service which is responsible for conducting approval tests may, at its discretion, require that comparison of the performance of the brake linings be carried out in accordance with UN-ECE Regulation No. 13-09, Annex 4.

4.4 Application for approval by comparison shall be made by the vehicle manufacturer (in the case of category O vehicles the application shall be made by the axle or brake manufacturer) or by the manufacturer's duly accredited representative.

4.5 For the purposes of this International Standard, the term "vehicle" means the vehicle type which has been approved according to UN-ECE Regulation No. 13-09, and for which the comparison is required to lead to satisfactory results.

4.6 The vehicle (or axle/brake) manufacturer shall ensure that all requirements of UN-ECE Regulation No. 13-09 for the vehicle (or axle/brake) fitted with the alternative types of linings are fulfilled.

5 Test equipment

5.1 An inertia dynamometer having the characteristics specified in 5.2 to 5.5 shall be used for the test.

5.2 The dynamometer shall be capable of generating the inertia specified in 6.1 and have the capacity to meet the requirements specified in 1.5, 1.6 and 1.7 of UN-ECE Regulation No. 13-09, Annex 4, with respect to Type-I, Type-II and Type-III tests.

5.3 The brake fitted shall be identical with that of the original vehicle type. Inconsequential changes to the lining configuration are permitted e.g. chamfers, slots, wear indicators, anti-noise devices).

5.4 Air cooling, if provided, shall be in accordance with 6.4.

5.5 The instrumentation for the test shall be capable of providing at least the following data:

- a) continuous recording of disc or drum rotational speed;
- b) number of revolutions completed during a stop, with a tolerance as described in Annex B;
- c) stopping time;
- d) continuous recording of the temperature measured at the centre of the path followed by the lining or at mid-thickness of the disc or drum or lining;
- e) continuous recording of control line pressure or force during brake application;
- f) continuous recording of brake output torque.