

Method of test for

Effect of braking on steady state cornering behaviour of road vehicles

[ISO title: Road vehicles — Braking in a turn — Open loop test
procedure]

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Committees responsible for this British Standard

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- Association of Trailer Manufacturers
- Caravan Club
- Department of Transport (Highways)
- Metropolitan Police
- Motor Industry Research Association
- National Caravan Council Limited
- Royal Automobile Club
- Society of Motor Manufacturers and Traders Limited

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National foreword

This British Standard has been prepared under the direction of the Automobile Standards Committee and is identical with ISO 7975:1985 “*Road vehicles — Braking in a turn — Open loop test procedure*” prepared by Technical Committee ISO/TC 22, Road vehicles, and published by the International Organization for Standardization (ISO).

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “British Standard”.

Cross-references

International Standard	Corresponding British Standard
ISO 4138:1982	BS AU 189:1983 <i>Method of test for steady state cornering behaviour for road vehicles</i> (Identical)

There are no British Standards corresponding to ISO 1176, ISO 2416 and ISO 3833 to which references are made in the text. The Technical Committee has reviewed the provisions of these International Standards and has decided that they are acceptable for use in conjunction with this standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

0.1 General remarks

The road holding ability of a road vehicle is a most important part of active vehicle safety. Any given vehicle, together with its driver and the prevailing environment, forms a unique closed loop system. The task of evaluating road holding ability is therefore very difficult because of the significant interaction of these driver-vehicle-road elements, each of which is in itself complex. A complete and accurate description of the behaviour of the road vehicle must necessarily involve information obtained from a number of tests of different types.

Because they quantify only a small part of the whole handling field, the results of this test can only be considered significant for a correspondingly small part of the overall vehicle handling behaviour.

Moreover, nothing is known about the relationship between the results of this test and accident avoidance. Considerable work is necessary to acquire sufficient and reliable data on the correlation between handling properties in general, and accident avoidance.

It is therefore not possible to use this procedure and test results for regulation purposes at the moment.

The best that can be expected is that the braking in a turn test is used as one among many other mostly transient tests, which together cover the field of vehicle dynamic behaviour.

0.2 Object of the test

The primary object of this test is to determine the effect of braking on the directional behaviour of a vehicle, whose steady state circular motion is disturbed by the braking action only.

This procedure requires the measurement of vehicle behaviour when braking in a turn under conventional conditions and not during real traffic situations. Conventional conditions are considered those of steady state circular motion. Tests are conducted with the steering wheel fixed in the position required by initial steady state turning and then applying a constant braking effort.

It is therefore necessary to measure

	Symbol
— steering wheel angle	δ_H
— pressure in the brake circuit which activates at least one of the front wheel brakes	p_B
or brake pedal force	F_p
or brake pedal travel	s_p
— lateral acceleration (see note to 3.2.5)	a_y
— longitudinal deceleration	a_x
— forward velocity	v_x
— yaw velocity	$\dot{\psi}$

It is desirable to measure

— stopping distance	s_B
— vehicle roll angle	φ
— vehicle pitch angle	ϑ
— sideslip angle	β
— lateral velocity	v_y
— lateral deviation of the centre of gravity from the reference path ^a	$s_y - s_{y, \text{ref}}$

NOTE Terminology and symbols given in this International Standard will be revised on publication of a future International Standard covering these subjects; it is currently in preparation.

^a Reference condition is the condition of a vehicle slowing down with the same longitudinal deceleration time history as the test vehicle without any deviation of the vehicle centre of gravity from the initial circular trajectory.

1 Scope and field of application

This International Standard specifies a test method to determine the effect of braking on the directional behaviour of a vehicle whose steady state movement is altered only by the braking.

It applies to passenger cars as defined in ISO 3833.

2 References

ISO 1176, *Road vehicles — Masses — Vocabulary*¹⁾.

ISO 2416, *Passenger cars — Load distribution*.

ISO 3833, *Road vehicles — Types — Terms and definitions*.

ISO 4138, *Road vehicles — Steady state circular test procedure*.

3 Instrumentation

3.1 Description

Those of the variables listed in **0.2** which are selected for test purposes shall be monitored using appropriate transducers, and the data shall be recorded on a multi-channel recorder having a time base. This does not obligatorily apply to stopping distance, which can be measured directly after the test has been completed. The normal operating ranges and recommended maximum errors of the transducer/recording systems are as shown in Table 1.

NOTE Some of the listed transducers are not widely available and are not in general use. In addition, many such instruments are developed by users. If any system error exceeds the maximum values recommended, this fact and the actual maximum error shall be stated in the general data.

The values in Table 1 are tentative and provisional until more experience is available. The minimum overall bandwidth of the entire measurement system including transducers and recorder shall be 8 Hz. Digitization shall be performed at a rate of at least 20 samples per second.

3.2 Installation

Transducer installation and orientation will vary according to the type of instrumentation used. However, if a transducer does not measure the required variable directly, appropriate corrections for linear and angular displacement shall be made to its signals so as to obtain the required level of accuracy.

3.2.1 Steering wheel angle

A transducer shall be installed as specified by the manufacturer so as to obtain steering wheel angle relative to the sprung mass.

3.2.2 Pressure of the braking system

A transducer shall be installed as specified by the manufacturer so as to measure the pressure at master cylinder output.

3.2.3 Brake pedal force

A transducer shall be installed as specified by the manufacturer.

3.2.4 Brake pedal travel

A transducer shall be installed as specified by the manufacturer.

¹⁾ At present at the stage of draft. (Revision of ISO 1176:1974.)