
**Passenger cars — Steady-state circular
driving behaviour — Open-loop test
methods**

*Voitures particulières — Tenue de route en régime permanent sur
trajectoire circulaire — Méthodes d'essai en boucle ouverte*



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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 4138 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 9, *Vehicle dynamics and road-holding ability*.

This fourth edition cancels and replaces the third edition (ISO 4138:2004), which has been technically revised.

Introduction

The main purpose of this International Standard is to provide repeatable and discriminatory test results.

The dynamic behaviour of a road vehicle is a very important aspect of active vehicle safety. Any given vehicle, together with its driver and the prevailing environment, constitutes a closed-loop system that is unique. The task of evaluating the dynamic behaviour is therefore very difficult since the significant interactions of these driver–vehicle–environment elements are each complex in themselves. A complete and accurate description of the behaviour of the road vehicle must necessarily involve information obtained from a number of different tests.

Since this test method quantifies only one small part of the complete vehicle handling characteristics, the results of these tests can only be considered significant for a correspondingly small part of the overall dynamic behaviour.

Moreover, insufficient knowledge is available concerning the relationship between overall vehicle dynamic properties and accident avoidance. A substantial amount of work is necessary to acquire sufficient and reliable data on the correlation between accident avoidance and vehicle dynamic properties in general and the results of these tests in particular. Consequently, any application of this test method for regulation purposes will require proven correlation between test results and accident statistics.

Passenger cars — Steady-state circular driving behaviour — Open-loop test methods

1 Scope

This International Standard specifies open-loop test methods for determining the steady-state circular driving behaviour of passenger cars as defined in ISO 3833 and of light trucks, such behaviour being one of the factors comprising vehicle dynamics and road-holding properties. The open-loop manoeuvres included in these methods are not representative of real driving conditions, but are nevertheless useful for obtaining measures of vehicle steady-state behaviour resulting from several specific types of control inputs under closely controlled test conditions.

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

ISO 8855:2011, *Road vehicles — Vehicle dynamics and road-holding ability — Vocabulary*

ISO 15037-1:2006, *Road vehicles — Vehicle dynamics test methods — Part 1: General conditions for passenger cars*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8855 and the following apply.

3.1

low-speed path radius

radius of the circular path transcribed by the origin of the vehicle axis system when the vehicle is operated at constant speed with a given fixed steering-wheel angle and with approximately zero lateral acceleration

4 Principle

4.1 Test methods

Three test methods are specified:

- Method 1, the constant-radius test method;
- Method 2, the constant steering-wheel angle test method;
- Method 3, the constant-speed test method.

Each method is presented with two variations and differs in requirements for testing space, driver skill and instrumentation. Methods 1 and 3 depend upon the path-keeping ability of the driver to minimize instrumentation requirements. Method 2 uses fixed steering-wheel angle and calculates path radius from measures of inertial instruments.