



International
Standard

ISO 28580

**Passenger car, truck and bus tyre
rolling resistance measurement
methods — Single point test and
correlation of measurement results**

*Méthodes de mesure de la résistance au roulement des
pneumatiques pour voitures particulières, camions et autobus —
Essai à condition de mesure unique et corrélation des résultats de
mesure*

**Third edition
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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by ISO/TC 31, *Tyres, rims and valves*.

This third edition cancels and replaces the second edition (ISO 28580:2018), which has been technically revised.

The main change is as follows:

- addition of [Annex G](#) with optional test conditions regarding sensitivity to test speed, tyre load and inflation pressure.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Passenger car, truck and bus tyre rolling resistance measurement methods — Single point test and correlation of measurement results

1 Scope

This document specifies methods for measuring rolling resistance, under controlled laboratory conditions, for new pneumatic tyres designed primarily for use on passenger cars, trucks and buses.

This document is not applicable to tyres intended for temporary use only. This document also specifies a method for correlating measurement results to allow inter-laboratory comparisons.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 4000-1:2024, *Passenger car tyres and rims — Part 1: Tyres (metric series)*

ISO 4209-1, *Truck and bus tyres and rims (metric series) — Part 1: Tyres*

ISO 4223-1, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres*

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

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4223-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 rolling resistance

F_r

loss of energy (or energy consumed) per unit of distance travelled

Note 1 to entry: The SI unit conventionally used for the rolling resistance is the newton metre per metre (N m/m). This is equivalent to a drag force in newtons (N).

3.2 rolling resistance coefficient

C_r

ratio of the rolling resistance to the load on the tyre

Note 1 to entry: Rolling resistance is measured in newtons (N).

Note 2 to entry: Load on the tyre is measured in kilonewtons (kN).

Note 3 to entry: Although this quantity is dimensionless, it is conventionally expressed in N/kN.

3.3

capped inflation

process of inflating the tyre to the required cold pressure and allowing the inflation pressure to build up as the tyre is warmed up while running

3.4

parasitic loss

loss of energy (or energy consumed) per unit distance excluding internal tyre losses, and attributable to aerodynamic loss of the different rotating elements of the test equipment, bearing friction and other sources of systematic loss which can be inherent in the measurement

Note 1 to entry: This document describes which of them are to be excluded from the result of the measurement.

3.5

skim test reading

type of parasitic loss measurement, in which the tyre is kept rolling, without slippage, while reducing the tyre load to a level at which energy loss within the tyre itself is virtually zero

3.6

moment of inertia

ratio of the torque applied to a rotating body, such as a tyre assembly or machine drum, to the rotational acceleration of this body

Note 1 to entry: See [Annex B](#).

3.7

new test tyre

tyre which has not been previously used in a rolling deflected test which elevates the tyre's temperature to higher than that generated in rolling resistance tests or has not been exposed to a temperature higher than 40 °C

Note 1 to entry: Repetition of allowed test procedures is permitted.

Note 2 to entry: See examples in this document and in ISO 18164, SAE J1269, and SAE J2452.

3.8

correlation of measurement results

computations on a set of rolling resistance measurements to be carried out on a regular time basis by separate laboratories in order to allow direct comparisons between their rolling resistance results

Note 1 to entry: The results of these measurements are used to compute "alignment" corrective coefficients and permit calculation of aligned rolling resistance measurement, $C_{r \text{ aligned}}$ (see [Clause 10](#)).

3.9

reference machine

any machine considered as a reference for an alignment

Note 1 to entry: Every tyre testing spindle in one specific measurement method is considered a machine for the purposes of this document. For example, two spindles acting on the same drum shall not be considered as one machine. One spindle able to measure tyre rolling resistance through different methods shall not be considered as one machine.

3.9.1

physical reference machine

machine (and its corresponding laboratory quality systems) used to set alignment values

3.9.2

virtual reference machine

several machines (and their corresponding laboratory quality systems) used to set alignment values

3.10**candidate machine**

machine intended to measure new test tyres, with alignment to a reference machine

3.11**alignment tyres**

set of tyres measured by both the candidate and reference machines to perform machine alignment

3.12**laboratory control tyre**

tyre used by an individual laboratory to control machine behaviour, e.g. machine drift, as a function of time

3.13**measurement repeatability**

σ_m
dispersion of the results obtained on one machine for different measurements performed on the same tyre(s) over a short period of time under the same testing conditions

Note 1 to entry: Measurement repeatability is estimated by measuring $n + 1$ times the whole process described in [Clause 7](#) ($n \geq 3$) for p alignment tyres, assuming that the variances of the alignment tyres are homogeneous:

$$\sigma_m = \sqrt{\frac{1}{p} \cdot \sum_{i=1}^p \sigma_{m,i}^2} \quad \text{with} \quad \sigma_{m,i} = \sqrt{\frac{1}{(n-1)} \cdot \sum_{j=2}^{n+1} \left(c_{ri,j} - \frac{1}{n} \sum_{j=2}^{n+1} c_{ri,j} \right)^2}$$

where

- p is the number of alignment tyres;
- i is the counter from 1 to p for the alignment tyres;
- j is the counter from 2 to $n + 1$ for the n last repetitions of each measurement of a given alignment tyre;
- $n + 1$ is the number of repetitions of tyre measurements ($n + 1 = 4$ for reference laboratories and $n + 1 \geq 4$ for candidate laboratories). The last n measurement results are used for the computation.

3.14**machine drift**

change in the measured value over time which can be attributed to systematic (or progressive) sources of variation

3.15**passenger car tyre**

tyre of a group intended for application on 4-wheeled vehicles designed primarily for carrying fewer than 10 persons

Note 1 to entry: See [Annex D](#) for a list of standards which identify this tyre type.

3.16**truck and bus tyre**

tyre of a group intended for application on vehicles designed primarily for the transportation of property or for carrying more than 10 persons

Note 1 to entry: Such tyres are normally primarily designed for use on light trucks, trucks, buses and their trailers and include those tyres marked with "LT", "C", "ST", "CP".

Note 2 to entry: See [Annex D](#) for a list of standards which identify this tyre type.

3.16.1**smaller truck and bus tyre**

truck and bus tyre with a load index of 121 and smaller or, where the load index is not marked, a maximum load of 1 450 kg and lower