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**Motorcycle tyres — Measurement of tyre  
rolling circumference — Loaded new tyres**

*Pneumatiques pour motocycles — Mesurage de la circonférence de  
roulement — Pneumatiques neufs en charge*

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13328 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 10, *Cycle, moped, motorcycle tyres and rims*.

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# Motorcycle tyres — Measurement of tyre rolling circumference — Loaded new tyres

## 1 Scope

This International Standard specifies a method for measuring the rolling circumference and revolutions per unit distance (kilometre) for new tyres, under loaded conditions, made for use on motorcycles and mopeds. The values obtained according to this method are not intended for use as levels of performance or quality.

This International Standard is applicable to all motorcycle and moped tyres designed and intended for use on the road.

NOTE Since most speedometers and odometers on motorcycles are activated from the front wheel, the test tyres will largely fall into sizes applicable for front wheel use. However, it is accepted that rear tyres will also be measured.

## 2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

## 3 Terms and definitions

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

### 3.1

#### revolutions per unit distance

number of tyre revolutions (and portions thereof) that occur when the (axle) centre of the tyre is moved exactly the unit distance of 1 km, under the conditions specified in this International Standard

### 3.2

#### rolling circumference

distance that the (axle) centre of the tyre moves during one revolution of the tyre, under the conditions specified in this International Standard

## 4 Principle

The measurement method consists of loading a test tyre mounted on a free axle against a driven road wheel (drum) of specified diameter. Tests are carried out at a constant speed, but with the capability of covering a range of speeds. Tyre and drum revolutions are counted and used in the formula for determining tyre rolling circumference.

## 5 Measurement

### 5.1 Test equipment

The equipment to be used for reference purposes, shall consist of a standard laboratory drum having a diameter of  $(1,7 \pm 0,017)$  m, together with a free axle capable of holding and loading a tyre against the driven drum.

Care shall be taken to avoid tyre galloping during the measurement.

### 5.2 Laboratory temperature

Tests shall be carried out at a reference room temperature of  $(25 \pm 5)$  °C. No temperature correction shall be required.

### 5.3 Test speed

In order to establish basic reference rolling circumferences for all tyres, the following drum speed shall be used:

$(80 \pm 0,5)$  km/h for tyres marked with a speed symbol above "L";

$(50 \pm 0,5)$  km/h for tyres marked with a speed symbol "L" and below.

### 5.4 Test equipment accuracy

The minimum number of impulses per revolution of both the tyre and the drum shall be 10. The overall error in the revolution counting equipment, including start and stop errors, shall not exceed 0,1 %.

## 6 Tyre parameters

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### 6.1 Test load

Because the front tyres on motorcycles are lightly loaded relative to rear tyres, the test load shall be computed from:

65 % for light and standard load versions;

80 % for reinforced/extra load version;

of the maximum load capacity of the tyre (corresponding to the load index moulded on the tyre sidewall) and shall be kept within a tolerance of  $\pm 20$  N.

Due to the radius of curvature of the 1,7 m driven drum, a load correction factor of 0,885 is included in the above percentages. For drums differing from 1,7 m, and comprised between 1,5 m and 3 m, corresponding load correction factors shall be used.

### 6.2 Tyre inflation pressure

The inflation pressure of the tyre at ambient temperature shall be:

$(200 \pm 3)$  kPa for light and standard load versions;

$(250 \pm 3)$  kPa for reinforced version.

### 6.3 Test rims

The rims shall be of the size and type recommended by the tyre manufacturer for use with the test tyre in highway service. In the absence of such a rim, a rim nearest or equivalent to the standardized measuring rim shall be used.

## 7 Procedure

**7.1** Prior to the test, the tyres shall be conditioned by running 1 h at the speed specified in 5.3 and at the load and inflation pressure specified in 6.1 and 6.2, respectively.

**7.2** For future comparisons, record the overall diameter of the new tyres.

**7.3** After the tyres have been broken in as indicated in 7.1, allow the tyres to stand inflated at the ambient temperature of the test area for at least 3 h. During this time, the tyre and wheel assembly may be installed on the test equipment.

**7.4** Adjust the inflation pressure to the value specified in 6.2. The load shall be that specified in 6.1.

**7.5** Drive the drum at the test speed for approximately 30 min to warm up the tyres. After warm-up, the inflation pressure shall not be readjusted: the test is run with pressure build-up ("capped pressure") to simulate normal service conditions.

**7.6** Record the number of revolutions (and portions thereof) of the test tyre,  $N_t$ , and of the drum,  $N_d$ , that occur during the test duration of 2 min.

**7.7** Repeat the measurements of 7.6 after 5 min.

**7.8** If the number of revolutions on the second run differs from that recorded in the first run by more than 0,2 %, repeat the test until two runs are obtained with the number of revolutions within 0,2 % for each tyre.

## 8 Expression of results

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### 8.1 Tyre rolling circumference

The tyre rolling circumference,  $C$ , in millimetres, is calculated by averaging the revolutions recorded for the two successful runs (*run1* and *run2*) by using the formula below:

$$C = \pi \left[ \left( \frac{N_d}{N_t} \right)_{\text{run1}} + \left( \frac{N_d}{N_t} \right)_{\text{run2}} \right] \times R$$

where

$N_d$  is the number of revolutions of the drum;

$N_t$  is the number of revolutions of the tyre;

$R$  is the radius of the drum, in millimetres.

### 8.2 Revolutions per unit distance

The number of revolutions per kilometre,  $N_{km}$ , is calculated by:

$$N_{km} = (1/C) \times 10^6$$

where  $C$  is the tyre rolling circumference, in millimetres.

## Bibliography

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