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Truck and bus tyres — Method for measuring relative wet grip performance — Loaded new tyres

Pneumatiques pour camions et autobus — Méthode de mesure de l'adhérence relative sur revêtement mouillé — Pneumatiques neufs en charge

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Foreword

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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 documents 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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 31 Tyre, rims and valves. This second/ edition cancels and replaces the first edition ISO 15222:2011 been technically revised.

The main changes compared to the previous edition are as follows: 4139-92a7-

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- Change of SRTT for tracks validation (from SRTT 14" to SRTT 16" due to SRTT 14" discontinuation);
- Revision of SRTT selection rules (wide SRTT or narrow SRTT);
- Clarification and simplification of test results calculations and validation;
- Alignment of wording and designations with ISO 23671 for better consistency.

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 <u>www.iso.org/members.html</u>.

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Truck and bus tyres — Method for measuring relative wet grip performance — Loaded new tyres

1 Scope

This International Standard specifies the method for measuring relative wet grip braking performance index to a reference under loaded conditions for new tyres for use on commercial vehicles on a wet-paved surface.

The methods developed in this International Standard are meant to reduce the variability. The use of a reference tyre is necessary to limit the variability of the testing method procedures.

This International Standard applies to all commercial vehicle, truck and bus tyres.

This international Standard does not apply to:

- tyres fitted with additional devices to improve traction properties (e.g. studded tyres).
- Professional Off Road tyres

2 Normative references STANDARD PREVIEW

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 <u>15222</u>

ISO 4209-1, Truck and bus tyres and rims (metric series) 57 Part 1: Tyres

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

ASTM E965-15Standard Test Method for Measuring Pavement Macrotexture Depth Using a Volumetric Technique

ASTM F2493, Standard Specification for P225/60R16 97S Radial Standard Reference Test Tire

ISO 23671:20, Passenger car tyres — Method for measuring relative wet grip performance — Loaded new tyres

ASTM 2870Standard Specification for 315/70R22.5 154/150L Radial Truck Standard Reference Test Tire

ASTM 2871 Standard Specification for 245/70R19.5 136/134M Radial Truck Standard Reference Test Tire

ASTM 2872Standard Specification for 225/75R16C 116/114S M+S Radial Light Truck Standard Reference Tire

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 terminological databases for use in standardization at the following addresses:

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

3.1

test run

single pass of a loaded tyre over a given test surface

3.2

candidate tyre (set)

Т

test tyre (or a test tyre set) that is part of an evaluation programme

3.3

reference tyre (set)

R

Standard Reference Test Tyre (3.16) (set) that is used as a benchmark in an evaluation programme

Note 1 to entry: These tyres usually have carefully controlled design features to minimize variation.

3.4

control tyre (set)

С

intermediate tyre (set) that is used when the candidate tyre and the reference tyre cannot be directly compared on the same vehicle

3.5

braking force

longitudinal force between a tyre and the road resulting from braking torque application

Note 1 to entry: It is expressed in newtons.

3.6

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Braking Force Coefficient *BFC*

<u>ISO/DIS 15222</u>

3.7

dynamic tyre braking force coefficient

 $\mu(t)$

<trailer (or tyre test vehicle) method> ratio between the *braking force* (<u>3.7</u>) and the *vertical load* (<u>3.13</u>) acquired in real time

3.8

peak braking force coefficient

μ_{peak}

trailer (or tyre test vehicle) method> maximum value of the *dynamic tyre braking force coefficient* (3.7) that occurs prior to the *lockup of a wheel* (3.9) as the braking torque is progressively increased

3.9

lockup of a wheel

condition of a wheel in which its rotational velocity about the wheel spin axis is zero and it is prevented from rotating in the presence of applied wheel torque

3.10

vertical load

normal force (Z-direction) of a tyre exerted on the road resulting from the mass supported by the tyre

Note 1 to entry: It is expressed in newtons.

3.10.1

trailer or tyre test vehicle

special purpose tyre evaluation vehicle which has instruments to measure the vertical and longitudinal forces on one tyre during braking

3.11

coupling (hitch) height

height when measured perpendicularly from the centre of the articulation point of the trailer towing coupling or hitch to the ground, when the towing vehicle and trailer are coupled together

Note 1 to entry: to entry: The vehicle and trailer shall be standing on level pavement surface in its test mode complete with the appropriate tyre(s) to be used in the particular test

3.12

braking test

series of a specified number of *test runs* (3.1) of the same tyre repeated within a short time frame

3.13

braking test cycle

series of *braking tests* (3.12) that consist of an initial braking test of the *reference tyre set* (3.3), of up to three braking tests of *candidate tyre sets* (3.2) and/or *control tyre sets* (3.4) and a final braking test of the same reference tyre set

3.14

tyre set

< vehicle method> four (4) or six (6) tyres depending on the test vehicle

3.15

3.16

tyre set <trailer (or a tyre test vehicle) method> one (1) or two (2) tyres

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Standard Reference Test Tyre (standards.iteh.ai)

tyre that is produced, controlled and stored in accordance with ASTM International standards ISO/DIS 15222

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Note 1 to entry: These tyres usually have carefully controlled design features to minimize variation.

3.16.1

SRTT16C *Standard Reference Test Tyre* (3.16) as defined in ASTM F2872

Note 1 to entry: It has the designation 225/75R16C 116/114S.

3.16.2

SRTT19.5 *Standard Reference Test Tyre* (<u>3.16</u>) as defined in ASTM F2871

Note 1 to entry: It has the designation 245/70R19.5 136/134M.

3.16.3

SRTT22.5

Standard Reference Test Tyre (3.16) as defined in ASTM F2870

Note 1 to entry: It has the designation 315/70R22.5 154/150L.

3.16.4 SRTT16

Standard Reference Test Tyre (3.16) as defined in ASTM F2493

Note 1 to entry: It has the designation P225/60R16 97S.

4 Methods for measuring wet grip

Relative wet grip braking performance for loaded commercial vehicle new tyres travelling straight ahead on a wet, paved surface can be measured by one of the following methods:

- a vehicle method consisting of testing a tyre set mounted on a standard vehicle;
- a test method using a trailer or a tyre test vehicle equipped with a test tyre set.

5 General test conditions

5.1 Track characteristics

5.1.1 General

The surface shall be a dense asphalt surface with a uniform gradient of not more than 2 % and shall not deviate more than 6 mm when tested with a 3 m straight edge.

The test surface shall have a pavement of uniform age, composition, and wear. The test surface shall be free of loose material or foreign deposits.

The maximum chipping size shall be from 8 mm to 13 mm.

The macro texture depth MTD of the area of the track to be used for the wet grip test shall be measured as specified in ASTM E965-15 and shall be $(0,7 \pm 0.3)$ mm. D PREVIEW

In order to verify the wetted frictional properties of the surface, the following method in 5.1.2 shall be used.

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5.1.2 Standard Reference Test Tyre (SRTT) methodds/sist/6652337f-162b-4f39-92a7-

This method uses the Standard Reference Test Tyre SRTT16.

Perform at least six (6) valid measurements of the peak braking force coefficients (μ peak) with the Standard Reference Test Tyre SRTT16 using a trailer or special purpose tyre evaluation vehicle test procedure as specified in <u>Clause 7</u> of this standard or in ISO 23671:2020 at 65 km/h and 180 kPa.

The average ($\mu_{\text{peak,ave}}$) of the measured peak braking force coefficients shall be corrected for the effects of temperature as follows:

$$\mu_{\text{peak,corr}} = \mu_{\text{peak,ave}} + 0,002 \frac{1}{\circ C} \times (\vartheta - 20^{\circ} \text{C})$$

where ϑ is the wetted track surface temperature in degrees Celsius.

The temperature corrected average peak braking force coefficient ($\mu_{peak,corr}$) shall be not less than 0,65 and not greater than 0,90.

The test shall be conducted using the lanes and length of the track to be used for the wet grip test.

For the trailer method, testing is run in such a way that braking occurs within 10 m distance in length of where the surface was characterized.

5.2 Wetting conditions

The surface may be wetted from the track-side or by a wetting system incorporated into the test vehicle or the trailer.

If "external watering" is used, water the test surface at least half an hour prior to testing in order to equalize the surface temperature and water temperature. External watering should be supplied continuously throughout testing.

For both external watering and self watering systems, for the braking lanes used, the water depth shall be not less than 0,5 mm and not greater than 2,0 mm measured from the peaks of the pavement.

5.3 Atmospheric conditions

The wind conditions shall not interfere with wetting of the surface (wind-shields are allowed).

The ambient and the wetted surface temperatures shall be between 5 °C and 35 °C and shall not vary during the test by more than 10 °C.

5.4 Reference tyre

In order to cover the range of tyre sizes fitting the commercial vehicles the three Standard Reference Test Tyres SRTT16C, SRTT19.5 and SRTT22.5 shall be used to measure the relative wet grip index according to Table 1.





6 Measurement of tyre wet grip on a standard vehicle

6.1 **Principles**

The test method covers a procedure for measuring the deceleration performance of commercial vehicle tyres during braking, using a commercial vehicle having an Antilock Braking System (ABS).

Starting with a defined initial speed, the brakes are applied hard enough on the two axles at the same time to activate the ABS. The Braking Force Coefficient (BFC) is calculated between the initial speed of 60 km/h and the final speed 20 km/h