TECHNICAL REPORT

ISO/TR 16377

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Further clarification of ISO 28580

Précisions concernant l'ISO 28580

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Foreword

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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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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/TR 16377 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves.*

Introduction

ISO 28580, *Passenger car, truck and bus tyres — Methods of measuring rolling resistance — Single point test and correlation of measurement results*, was published in 2009. During the approval process, several suggestions were made for clarification which were supported by ISO/TC 31/WG 6 and are included in this Technical Report.

Further clarification of ISO 28580

1 Scope

This Technical Report seeks to document elements of clarification to ISO 28580:2009 where consensus exists. Other suggestions for clarification will demand further work and consensus building and are not included in this Technical Report. Although it is expected that these clarifications will be adopted in future revisions to ISO 28580, they are intended only as guidance for the user.

2 General

The meaning of terms “larger truck and bus tyres” and “smaller truck and bus tyres” is not clear. It is proposed that the terms “larger” and “smaller”, as used in these phrases, be removed, and that the Load Index (LI) reference be used to distinguish these tyre sizes, so that smaller truck and bus tyres are those with LI $\leq$ 121 and larger truck and bus tyres are those with LI $>$ 121.

3 Clause 3, Terms and definitions

3.1 Additional definition: candidate machine

A term and definition should be added as follows:

candidate machine
machine intended to measure new test tyres, with alignment to a reference machine, in accordance with ISO 28580

3.2 Definition 3.13: deviation of alignment tyre

The definition should read: “difference in terms of time compared with the mean rolling resistance coefficient results for a given alignment tyre with the appropriate number of repetitions, after correction for any machine drift”.

4 Clause 6, Test conditions

4.1 Subclause 6.2, Table 1, and subclause 6.4, Table 2

In Tables 1 and 2, clarify the column heading “Truck and bus” by replacing “Truck and bus” with “Truck and bus (including C, LT)” in each case.

4.2 Subclause 6.4, Table 2

Footnote a in Table 2 is related to pressure, not load. It should therefore be removed from the value 80 under the column headings “Standard load” and “Reinforced or extra load” and the footnote reference “[a]” added to the row heading “Inflation pressure”.

To be consistent with ISO 4000-1 and 4209-1, the load capacity should be clearly indicated as a tyre load, by wording such as: “maximum single-tyre load-carrying capacity” (in Table 2, including footnotes b and c).

A footnote d should be added to the column heading “Truck and bus” which reads: “If there are multiple values given, the highest load and pressure should be selected, not taking into account additional service markings which may exist in a circle.”.

5 Clause 7, Test procedure

5.1 Subclause 7.4, Table 3

In Table 3, clarify the column heading “Truck and bus” by replacing “Truck and bus” with “Truck and bus (including C, LT)” in each case.

5.2 Subclause 7.6.2, Note 1

For clarity, add a sentence at the end of this note which reads: “For the force method, the measured value includes the bearing and aerodynamic losses of the wheel and the tyre.”.

5.3 Subclause 7.6.3, list item a)

For completeness, the sentence under list item a) should read: “Remove the tyre from the test surface while running at a speed greater than the test speed.”.

6 Subclause 8.1, Determination of parasitic loss

For clarity, the parameters of parasitic loss should be distinguished from those of rolling resistance. Using subscripted “p” to indicate “parasitic” in subclauses 8.1.2, 8.1.3 and 8.1.4 (reproduced below) would clarify the intended meaning.

8.1.2 Force method at tyre spindle

The parasitic losses, F_{pl}, expressed in newtons, are calculated by means of Formula (1):

$$F_{\mathrm{pl}} = F_{\mathrm{tp}} \frac{\left(1 + r_{\mathrm{Lp}}\right)}{R} \tag{1}$$

where

F_{tp} is the tyre spindle force, in newtons (see 7.6.2);

r_{Lp} is the distance from the tyre axis to the drum outer surface under steady-state conditions, in metres;

R is the test drum radius, in metres.

8.1.3 Torque method at drum axis

The parasitic losses, F_{pl}, expressed in newtons, are calculated by means of Formula (2):

$$F_{\mathrm{pl}} = \frac{T_{\mathrm{tp}}}{R} \tag{2}$$

where

T_{tp} is the input torque, expressed, in newton-metres (see 7.6.2);

R is the test drum radius, expressed in metres.

8.1.4 Power method at drum axis

The parasitic losses, F_{pl}, expressed in newtons, are calculated by means of Formula (3):

$$F_{pl} = \frac{\left(3{,}6 \times V_p \times A_p\right)}{U_n} \tag{3}$$

where

V_p is the electrical potential applied to the machine drive, expressed in volts;

A_p is the electric current drawn by the machine drive, expressed in amperes;

U_n is the test drum speed, expressed in kilometres per hour.

7 Subclause 10.2, Conditions for reference machine, and subclause 10.3, Conditions for candidate machine

Clarifications to subclauses 10.2 and 10.3 are shown below in **bold** type.

10.2 Conditions for reference machine

10.2.1 The laboratory operating the reference machine shall comply with either ISO/TS 16949 or ISO/IEC 17025.

10.2.2 Monitoring of the reference machine laboratory control tyre shall be carried out at intervals no greater than one month. Monitoring shall include a minimum of three separate measurements taken during this one-month period. The **averaged value and standard deviation (σ)** of the three measurements taken during a given one-month period shall be evaluated for **machine drift and repeatability** from one monthly evaluation to another. **The reference machine maintains a value of $\sigma \leq 0{,}05$ N/kN using the control tyre.**

10.2.3 The laboratory shall ensure that, based on ~~**a minimum of**~~ three measurements, the reference machine maintains a value of $\sigma_m \leq 0{,}05$ N/kN. This may be done using the **alignment** tyres (as specified in **10.5.2**).

10.3 Conditions for candidate machine

10.3.1 The laboratory operating the candidate machine shall comply with either ISO/TS 16949 or ISO/IEC 17025.

10.3.2 Monitoring of the candidate machine laboratory control tyre shall be carried out at intervals no greater than one month. Monitoring shall include a minimum of three separate measurements taken during this one-month period. The **averaged value and standard deviation (σ)** of the three measurements taken during a given one-month period shall be evaluated for **machine drift and repeatability** from one monthly evaluation to another. **The candidate machine maintains the standard deviation (σ) using a control tyre not greater than σ_m, measured by alignment procedure.**

10.3.3 The laboratory shall ensure that, based on ~~**a minimum of**~~ three measurements, the candidate machine maintains the following values of σ_m, as measured **using alignment tyres**:

— $\sigma_m \leq 0{,}075$ N/kN for passenger car and small truck and bus tyres (LI $\leq$ 121);

— $\sigma_m \leq 0{,}060$ N/kN for larger truck and bus tyres (LI $>$ 121).

If the above requirement for σ_m is not met, the formula specified in Formula (13) shall be applied to determine the minimum number of measurements, n (rounded to the immediate superior integer value), that are required by the candidate machine to qualify for conformance with this International Standard.

$$n = \left(\frac{\sigma_m}{x} \right)^2 \tag{13}$$

where

$x = 0{,}075$ for passenger car and small truck and bus tyres (LI $\leq$ 121);

$x = 0{,}060$ for larger truck and bus tyres (LI $>$ 121).