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Item 7 (d) of the provisional agenda

Tyres: UN Regulation No. 117 (Tyre rolling resistance, rolling noise and wet grip)

Proposal for Supplement 2 to the 04 series of amendments to UN Regulation No. 117

Submitted by the experts from the European Tyre and Rim Technical Organization*

The text reproduced below was prepared by the experts from the European Tyre and Rim Technical Organization (ETRTO) and is meant to complete the amendment proposal adopted at the seventy-eight session of the Working Party on Noise and Tyres (GRBP) (informal document GRBP-78-05 replacing ECE/TRANS/WP.29/GRBP/2023/19). The modifications to the existing text of the UN Regulation are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2023 as outlined in proposed programme budget for 2024 (A/78/6 (Sect. 20), table 20.5), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.



I. Proposal

Table of Contents, amend to read:

"...

6. ~~Specifications~~**Requirements**.....
7. Modifications of the type of ~~pneumatic~~ tyre and extension of approval.....
- ..."

Paragraph 1., footnote 1, amend to read:

- "¹ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3), ~~document ECE/TRANS/WP.29/78/Rev.4, para. 2. –~~
www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html"

Paragraph 2., footnotes 2 to 4, amend to read:

- "² Class C1 tyres correspond to "passenger car tyres" in ISO 4000-1:2010**2021**.
- ³ The International System of Units (SI) unit conventionally used for the rolling resistance is the newton-metre per metre, which is equivalent to a drag force in ~~newton~~**newtons**.
- ⁴ The rolling resistance is expressed in ~~newton~~**newtons** and the load is expressed in kilo-newton. The rolling resistance coefficient is dimensionless."

Paragraph 2.11., amend to read:

- "2.11. "Reinforced tyre" or "extra load tyre" of class C1 means a tyre structure designed to carry more load at a higher inflation pressure than the load carried by the corresponding standard version tyre at the standard inflation pressure as specified in ISO 4000-1:2010**2021**.²"

Paragraph 2.13., amend to read:

- "2.13. "Snow tyre" means a tyre whose tread pattern, tread compound or ~~structure~~**construction** is primarily designed to achieve in **mud and/or** snow conditions a performance better than that of a normal tyre with regard to its ability to initiate ~~or maintain~~**and control** vehicle motion."

Paragraph 2.18., amend to read:

- "2.18. "Standard Reference Test Tyre" or "SRTT" means a tyre that is produced, controlled and stored in accordance with the standards of ASTM International:
- (a) E1136 – ~~4719~~ for the size P195/75R14 and referred to as "SRTT14",
 - (b) F2493 – ~~2023~~ for the size P225/60R16 and referred to as "SRTT16",
 - (c) F3611 – ~~22e1~~ for the size P225/60R16 in worn state and referred to as "moulded SRTT16 worn",
 - (d) F2872 – ~~4619~~ for the size 225/75R16C and referred to as "SRTT16C",
 - (e) F2871 – ~~4623~~ for the size 245/70R19.5 and referred to as "SRTT19.5",
 - (f) F2870 – ~~4623~~ for the size 315/70R22.5 and referred to as "SRTT22.5"."

Paragraph 5.2.2., amend to read:

- "5.2.2. The communication form mentioned in paragraph 5.3. below shall identify specific performance parameters of UN Regulation No. 117 by the following suffixes:
- S To identify additional conformity to the requirements on tyre rolling sound emissions;
 - W To identify additional conformity to the requirements on adhesion on wet surfaces of tyres in new state;

- R To identify additional conformity to the requirements on tyre rolling resistance;
- B To identify additional conformity to the requirements on adhesion on wet surfaces of tyres in worn state.

S will be followed by the suffix "2" for compliance to stage 2 while, taking into account that two stages are defined for adhesion on wet surfaces of tyres in new state and rolling resistance ~~specifications~~ **requirements** in paragraphs 6.2. and 6.3. below, W will be followed either by the suffix "1" for compliance to stage 1 or by the suffix "2" for compliance to stage 2 and R will be followed either by the suffix "2" for compliance to stage 2 or by the suffix "3" for compliance to stage 3."

Paragraph 6, title, amend to read:

"6. ~~Specifications~~ **Requirements**"

Paragraph 8.3.2., amend to read:

"8.3.2. In the case of verification tests with regard to approvals in accordance with paragraph ~~6.4.6.5.~~ of this Regulation, these shall be carried out using the same testing method (see Annex 7 to this Regulation) as that adopted for original approval."

Annex 1, item 8.1., amend to read:

"8.1. Sound level of the representative tyre size, see paragraph 2.7. of this Regulation, as per item 7. of the test report in Appendix 1 to Annex 3: dB(A) at reference speed of ~~70/80~~ **70 km/h or 80 km/h** ²"

Annex 6,

Paragraph 2.2., amend to read:

"2.2. Measuring rim

The tyre shall be mounted on a steel or light alloy measuring rim, as follows:

- (a) For class C1 tyres, the width of the rim shall be as defined in ISO 4000-1:~~2010~~ **2021**,
- (b) For classes C2 and C3 tyres, the width of the rim shall be as defined in ISO 4209-1:2001.

In cases where the width is not defined in the above mentioned ISO Standards, the rim width as defined by one of the standards organizations as specified in Appendix 4 may be used."

Paragraph 4.5., amend to read:

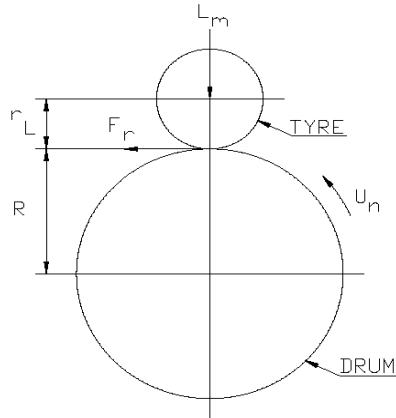
"4.5. Measurement and recording

The following shall be measured and recorded (see Figure 1):

- (a) Test speed U_n ;
- (b) Load on the tyre normal to the drum surface L_m ;
- (c) The initial test inflation pressure as defined in paragraph 3.3. above;
- (d) The coefficient of rolling resistance measured C_r , and its corrected value C_{rc} , at 25 °C and for a drum diameter of 2 m;
- (e) The distance from the tyre axis to the drum outer surface under steady state $r_{L,}$;
- (f) Ambient temperature t_{amb} ;
- (g) Test drum radius R;
- (h) Test method chosen;

- (i) Test rim (size and material);
- (j) Tyre size, manufacturer, type, identity number (if one exists), speed category symbol, load index, DOT number (Department of Transportation).

Figure 1



All the mechanical quantities (forces, torques) will be orientated in accordance with the axis systems specified in ISO 8855:1994/2011.

The directional tyres shall be run in their specified rotation sense."

Paragraphs 5.1.1. and 5.1.2., amend to read:

5.1.1. General

The laboratory shall perform the measurements described in paragraph 4.6.1. above for the force, torque and power methods or those described in paragraph 4.6.2. above for the deceleration method, in order to determine precisely in the test conditions (load, speed, temperature) the tyre spindle friction, the tyre and wheel aerodynamic losses, the drum (and as appropriate, engine and/or clutch) bearing friction, and the drum aerodynamic losses.

The parasitic losses related to the tyre/drum interface F_{pl} expressed in ~~newton~~newtons shall be calculated from the force F_t torque, power or the deceleration, as shown in paragraphs 5.1.2. to 5.1.5. below.

5.1.2. Force method at tyre spindle

Calculate: $F_{pl} = F_t (1 + r_L/R)$

Where:

F_t is the tyre spindle force in ~~newton~~newtons (see paragraph 4.6.1. above),

r_L 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."

Paragraph 5.2.1., amend to read:

5.2.1. General

The rolling resistance F_r , expressed in ~~newton~~newtons, is calculated using the values obtained by testing the tyre to the conditions specified in this Regulation and by subtracting the appropriate parasitic losses F_{pl} , obtained according to paragraph 5.1. above."

Paragraph 6.1., amend to read:

6.1. Rolling resistance coefficient

The rolling resistance coefficient C_r is calculated by dividing the rolling resistance by the load on the tyre:

$$C_r = \frac{F_r}{L_m}$$

Where:

F_r is the rolling resistance, in ~~newton~~newtons,

L_m is the test load, in kN."

Annex 6, Appendix 1, paragraph 2.1., amend to read:

"2.1. Width

For passenger car tyre rims (class C1 tyres), the test rim width shall be the same as the measuring rim determined in ISO 4000-1:~~2010~~**2021**, clause 6.2.2.

For truck and bus tyres (classes C2 and C3), the rim width shall be the same as the measuring rim determined in ISO 4209-1:2001, clause 5.1.3.

In cases where the width is not defined in the above mentioned ISO Standards, the rim width as defined by one of the standards organizations as specified in Appendix 4 to Annex 6 may be used."

Annex 7, paragraph 4.5.1., amend to read:

"4.5.1. Fit the test tyres on rims as per ISO 4209-1:~~2001~~**2001** using conventional mounting methods. Ensure proper bead seating by the use of a suitable lubricant. Excessive use of lubricant should be avoided to prevent slipping of the tyre on the wheel rim."

Annex 8,

Paragraph 2.1.3.1., amend to read:

"2.1.3.1. Standard Reference Test Tyre

For the evaluation of the ice performance of class C1 tyres, the Standard Reference Test Tyre SRTT16 shall be used. The reference tyre shall not be older than 30 months starting from the production week and shall be stored in accordance with ASTM F2493 – ~~2023~~."

Paragraph 2.1.3.2.1., amend to read:

"2.1.3.2.1. Fit each test tyres on an approved rim pursuant to ISO 4000-1:~~2010~~**2021** using conventional mounting methods. Subject to the foregoing, the rim width code shall not differ more than 0.5 from the measuring rim. If a commercialized rim is not available for the test vehicle, it will be acceptable to use a rim whose rim width code differs by 1.0 from the measuring rim width code. Ensure proper bead seating by the use of a suitable lubricant. Excessive use of lubricant should be avoided to prevent slipping of the tyre on the wheel rim."

Annex 9,

Paragraph 2.1.8., amend to read:

"2.1.8. "Central zone" means the area on the tread width defined by the $\frac{3}{4}$ (75%) of the reference tread width (C) symmetrically measured from the centre line (see **Figure 4**)."

Paragraph 2.1.10., amend to read:

"2.1.10. ""Mould parting line" means the border circumference in which mould tread pattern segments connects with mould sidewall plates. If no mould parting line is visible on the tyre, a virtual mould parting line shall be considered as the circumferential line in the equivalent position at the end of the shoulder grooves (see **Figure 1**)."

Paragraph 2.2.1.2.1., amend to read:

"2.2.1.2.1. *Choice of the control measurement points of the central zone*

To control the conformity of the preparation process (see paragraph 2.2.1.2.3.), choose *n* measurement points in the central zone, in the transversal direction (see Figure 32)

..."

Annex 9, Appendix 1, amend to read:

"...

Roughness measurement

Arithmetical mean height of the absolute values of the roughness profile (μm)		Sections			
		1	2	3	4
Trans. Loc.	1 (right)				
	2 (centre)				
	3 (left)				
Average					

"

II. Justification

1. The title of paragraph 6 is changed to *Requirements*, more in line with its content and with UN Regulations No. 30, 75 and 106.
2. In the *Contents*, item 7 is now aligned to the title of paragraph 7.
3. As already done for UN Regulation No. 164, in paragraph 1, the reference to the Consolidated Resolution on the Construction of Vehicles (R.E.3) is simplified to avoid the need of continuous update with new revisions.
4. The reference to ISO standards is updated in many paragraphs.
5. Editorial corrections are introduced to align the wording of measurement units in line with the Guidelines for the preparation and submission of documents to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to its subsidiary bodies.
6. The *snow tyre* definition is now aligned to the one in UN Regulations No. 54 and 75.
7. The updated reference to ASTM standards is provided in paragraph 2.18.
8. In Annex 9, references to two figures were added for clarification.