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**Working Party on Noise and Tyres**

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Item 5 (c) of the provisional agenda

**Tyres: UN Regulation No. 109 (Retreaded tyres for commercial vehicles and their trailers)**

**Proposal for amendments to UN Regulation No. 109**

**Submitted by the experts from the Bureau International Permanent des Associations de Vendeurs et Rechapeurs de Pneumatiques (BIPAVÉR)\***

The text reproduced below has been prepared by the experts from BIPAVÉR in order to align the provisions for retreaded tyres with the proposals of the European Tyre and Rim Technical Organization (ETRTO) for UN Regulations Nos. 54 and 117. The modifications to the existing text of the Regulation are marked in bold for new or strikethrough for deleted characters. For better readability paragraphs with physical/mathematical terms or formulas are deleted and replaced completely.

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\* In accordance with the programme of work of the Inland Transport Committee for 2021 as outlined in proposed programme budget for 2021 (A/75/6 (Sect.20), para 20.51), 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

Paragraph 2.7.3., amend to read:

- "2.7.3. "Radial" or "**radial-ply**" describes a tyre structure in which the ply cords extend to the beads and are laid substantially at 90° to the centreline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt;"

Paragraph 2.8.2., amend to read:

- "2.8.2. "Special use tyre" is a tyre intended for mixed use, both on and off road and/or at restricted speed. **These tyres are primarily designed to initiate and maintain the vehicle in motion in off-road conditions.**

Insert a new paragraph 2.8.4., to read:

- "2.8.4. "Traction tyre" means a tyre in class C2 or C3 bearing the inscription TRACTION and intended to be fitted primarily to the drive axle(s) of a vehicle to maximize force transmission in various circumstances."**

Paragraphs 2.26.-2.26.2., amend to read:

- "2.26. Tyre-size designation" means, except in the case of types of tyre for which the tyre-size designation is shown in the first column of the tables in Annex 5 to this Regulation, a designation showing:
- 2.26.1. The nominal section width (S1). ~~This width must be expressed in mm, except in the case of types of tyre for which the size designation is shown in the first column of the tables in Annex 5 to this Regulation;~~"
- 2.26.2. The nominal aspect ratio, ~~except in the case of certain types of tyre for which the size designation is shown in the first column of the tables in Annex 5 to this Regulation~~ or, depending on the tyre design type, the nominal outer diameter expressed in mm;"

Insert new paragraphs 2.26.3. to 2.26.3.2., to read:

- "2.26.3. An indication of the structure placed in front of the rim diameter marking as follows:**
- 2.26.3.1. on diagonal (bias-ply) tyres, a dash "-" or the letter "D";"**
- 2.26.3.2. on radial-ply tyres, the letter "R";"**

Paragraph 2.47., amend to read:

- "2.47. "~~Standard Reference Test Tyre (SRTT)~~" or "SRTT" means a tyre that is produced, controlled and stored in accordance with the ~~American Society for Testing and Materials (ASTM)~~ standards **of ASTM International:**
- (a) E1136 – 17 for the size P195/75R14 and referred to as "SRTT14",
  - (b) F2872 – 16 for the size 225/75R16C and referred to as "SRTT16C",
  - (c) F2871 – 16 for the size 245/70R19.5 and referred to as "SRTT19.5",
  - (d) F2870 – 16 for the size 315/70R22.5 and referred to as "SRTT22.5",
  - (e) ~~F2493 – 18~~ **F2493 – 19** for the size P225/60R16 and referred to as "SRTT16"."

Paragraph 2.54., amend to read:

- "2.54. "~~Snow grip index ("SG")~~" means the ~~ratio between the snow grip performance of the a candidate tyre relative to and the performance of the standard reference test tyre applicable~~ **SRTT.**"

Insert new paragraphs 2.58. to 2.60., to read:

- “2.58. **"Professional off-road tyre"** is a special use tyre primarily used for service in severe off-road conditions.”
- “2.59. **"Tread depth"** means the depth of the principal grooves.”
- “2.59.1. **"Principal grooves"** means the wide circumferential grooves positioned in the central zone of the tyre tread, which, in the case of passenger and light truck (commercial) tyres, have the treadwear indicators located in the base.”
- “2.60. **"Void to fill ratio"** means the ratio between the area of voids in a reference surface and the area of this reference surface calculated from the mould drawing.”

Paragraph 3.2.13., amend to read:

- “3.2.13. The inscription "ET" or "ML" or "MPT" for special use tyres.<sup>10</sup>

**ET means Extra Tread, ML stands for Mining and Logging, MPT means Multi-Purpose Truck and POR means Professional Off-Road.”**

Insert a new paragraph 3.2.18., to read:

- “3.2.18. The inscription "TRACTION" if the tyre is classified as traction;<sup>11</sup>”**

Add a new footnote 11 to read:

**“<sup>11</sup> Minimum height of marking: refer to dimension C in Annex 3 of UN Regulation No. 109.”**

Paragraph 3.4., amend to read:

- “3.4. Following approval, the markings referred to in paragraph 5.8. and as shown in Annex 2 to this Regulation shall be **clearly legible, indelible and raised above or sunk below the tyre surface** and be affixed in the free space referred to in paragraph 3.3. This marking may be affixed to one sidewall only

Insert a new paragraph 3.4.1. to read:

- “3.4.1. The markings shall be situated in the lower area of the tyre on at least one of its sidewalls, except for the inscriptions mentioned in paragraphs 3.2.1. and 3.2.2.”**

Insert a new paragraph 3.4.2. to read:

- “3.4.2. In the case that the date of manufacture is not moulded, it shall be applied not later than 24 hours after the tyre is removed from the mould.”**

Paragraph 7.2.1., amend to read:

- “7.2.1. For Class C2 and C3 tyres, the minimum snow grip index value, as calculated in the procedure described in Annex 10 and compared with the respective Standard Reference Test Tyre (SRTT) shall be as follows:

Class of tyre	Snow grip index (brake on snow method) <sup>(a)</sup>	Snow grip index (spin traction method) <sup>(b)</sup>	Snow grip index (acceleration method) <sup>(c)</sup>
	Ref. = SRTT16C	Ref. = SRTT14, SRTT16	Ref. = SRTT19.5, SRTT22.5
C2	1.02	1.10	No
C3	No	No	1.25

<sup>(a)</sup> See paragraph 3 of Annex 10 to this Regulation

<sup>(b)</sup> See paragraph 2 of Annex 10 to this Regulation

<sup>(c)</sup> See paragraph 4 of Annex 10 to this Regulation”

*Paragraph 7.1.4.4., amend to read:*

- “7.1.4.4. For retreaded C3 radial tyres ~~with nominal section width exceeding 305 mm for dual mounting (twinning) and a nominal aspect ratio higher than 60~~, an additional sidewall protective rubber layer (ASP) may be applied to a maximum of 8 mm greater than the overall width of the same tyre size description permitted by Regulation No. 54 provided that:
- (a) This rubber layer is applied to one sidewall only;
  - (b) The sidewall concerned is marked with the wording "ASP" and the wording "OUTSIDE", both markings with a minimal height of 8 mm;
  - (c) The maximum allowed speed rating is index J (100 km/h);
  - (d) **In case of a dual mounting (twinning) only one tyre with ASP is allowed and has to be mounted on the outer wheel position.”**

*Insert new paragraphs 7.3. to 7.5., to read:*

- 7.3. In order to be classified as a "traction tyre", a tyre is required to meet at least one of the conditions of paragraph 7.3.1. below.**
- 7.3.1. The tyre shall have a tread pattern with minimum two circumferential ribs, each containing a minimum of 30 block-like elements, separated by grooves and/or sipe elements the depth of which has to be minimum of one half of the tread depth. The use of an alternative option of a physical test will only apply at a later stage following a further amendment to the Regulation including a reference to an appropriate test methods and limit values.**
- 7.4. In order to be classified as a "special use tyre" a tyre shall have a block tread pattern in which the blocks are larger and more widely spaced than for normal tyres and have the following characteristics:**
- For C2 tyres: a tread depth  $\geq$  11 mm and void to fill ratio  $\geq$  35 per cent**
- For C3 tyres: a tread depth  $\geq$  16 mm and void to fill ratio  $\geq$  35 per cent**
- 7.5. In order to be classified as a 'professional off-road tyre', a tyre shall have all of the following characteristics:**
- (a) **For C1 and C2 tyres:**
    - (i) A tread depth  $\geq$  11 mm;
    - (ii) A void-to-fill ratio  $\geq$  35 per cent;
    - (iii) A maximum speed rating of  $\leq$  Q.
  - (b) **For C3 tyres:**
    - (i) A tread depth  $\geq$  16 mm;
    - (ii) A void-to-fill ratio  $\geq$  35 per cent;
    - (iii) A maximum speed rating of  $\leq$  K.”

*Insert a new paragraph 12.3., to read:*

- 12.3. Until 1 September 2024, Contracting Parties applying this Regulation may continue to grant type approvals according to the 02 series of amendments to this Regulation, based on snow performance test described in Annex 7 to this Regulation using SRTT14 as reference tyre. <sup>(a)</sup>**

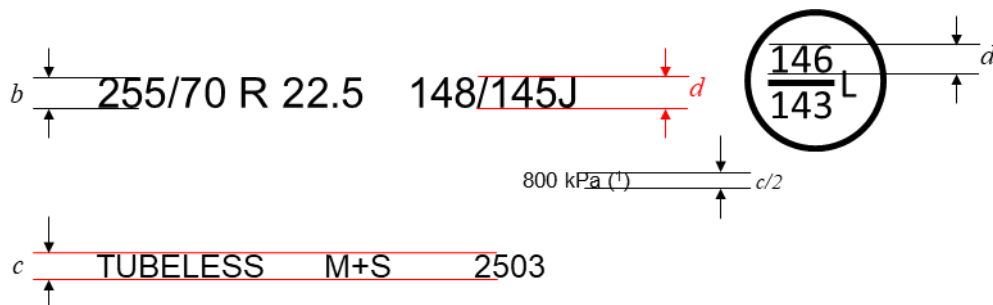
*Add a new footnote (a) to read:*

<sup>(a)</sup> SRTT14 will be available from the supplier until end of October 2021.”

Annex 3,

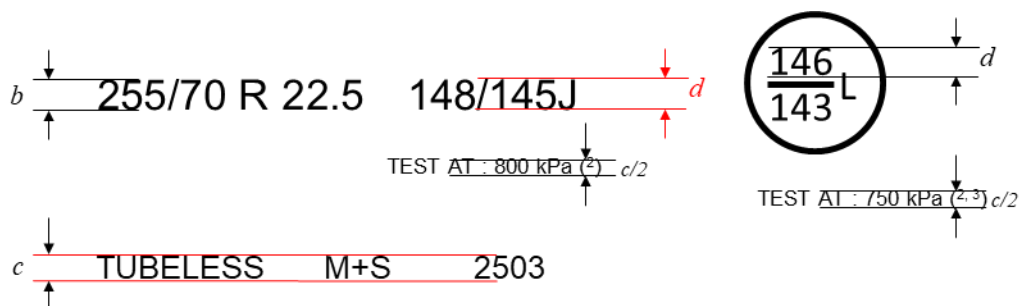
Figure, replace and amend to read:

**"Example 1:**



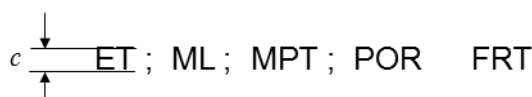
- (1) PSI marking instead of kPa is allowed for tyres first type approved before 1 January 2018. The kPa marking may be preceded by "TEST AT : " or, alternatively, by "TEST INFL : " or the symbol "@".

**Example 2:**



- (2) "TEST AT : " may be replaced by "TEST INFL : " or the symbol "@ " or be omitted.
- (3) The indication of a second inflation pressure for the additional service description is optional. If there is no indication, the same test inflation applies to both load/speed combinations.

**Dimensional requirements for further markings (4):**



- (4) For "ML" and "MPT" being part of the tyre size designation marking the minimum dimension b applies."

Paragraph 1., last indent, amend to read:

"...

Requiring to be inflated to ~~620~~**800** kPa for **both** load/speed endurance tests **in Example 1 and 800 kPa for the load/speed endurance test according to the main load/speed combination and 750 kPa for the test according to the additional load/speed combination in Example 2** for which the PSI symbol is 90."

Insert a new subparagraph 3. (e) to read:

- “(e) **If there are two indications for the test inflation pressure, they must be placed in such a way that it is clear which pressure indication belongs to which load/speed combination.**”

Annex 10,

Paragraph 1.3., amend to read:

- "1.3. "Traction test" means a series of a specified number of spin-traction test runs according to ASTM standard:
- (a) F1805-06 in case SRTT14 is used as reference tyre or
  - (b) F1805-20 in case SRTT16 is used as reference tyre
- of the same tyre repeated within a short time frame."

Paragraphs 2. to 2.2., amend to read:

- "2. Spin traction method for Class C1 and C2 tyres (traction ~~force~~—test per paragraph 6.4. (b) of this Regulation)
- The test procedure of ASTM standard F1805-06 or **F1805-20, as applicable according to paragraph 1.3.**, shall be used to assess snow performance through **the traction performance index (TPI)** ~~spin traction values~~—on medium **pack** ~~packed~~—snow (The snow compaction index measured with a CTI penetrometer<sup>1</sup> shall be between 70 and 80).
- 2.1. The test course surface shall be composed of a medium **pack** ~~packed~~—snow surface, as characterized in table A2.1 of ASTM standard F1805-06 or **ASTM F1805-20, as applicable.**
- 2.2. The tyre load for testing shall be as per option 2 in paragraph 11.9.2. of ASTM standard F1805-06 or **ASTM F1805-20, as applicable. When the SRTT16 is used as reference tyre, it shall be tested with a load of 531 kg at an inflation pressure of 240 kPa (cold).**"

Insert a new paragraph 2.3. to read:

- "2.3. The snow grip index (SG) of a candidate tyre T<sub>n</sub> shall be computed as follows:

$$SG(T_n) = f \cdot \frac{TPI}{100}$$

where

- (a)  $f = 1.000$  when using SRTT14 as reference tyre per ASTM F1805-06, and
- (b)  $f = 0.987$  when using SRTT16 as reference tyre per ASTM F1805-20,

and TPI denotes the traction performance index as defined in ASTM F1805-06 or ASTM F1805-20, as applicable."

Insert a new paragraph 3.1.6. to read:

- "3.1.6. In order to run this test, the Standard Reference Test Tyres (SRTT) as shown in the following table shall be used:

Class C1 tyres	Class C2 tyres
SRTT14 or SRTT16	SRTT16C

"

Paragraph 3.4.1.3., amend to read:

- "3.4.1.3. The snow grip index (SG) of a candidate tyre T<sub>n</sub> shall be computed ~~as the quotient of~~ ~~from~~ the arithmetic mean  $\bar{a}_{T_n}$  of the mfdd of the tyre T<sub>n</sub> and the applicable weighted average  $wa_{SRTT}$  of the SRTT **as shown in the table:**

$$SG(T_n) = \frac{\bar{a}_{T_n}}{wa_{SRTT}}$$

$$SG(T_n) = f \cdot \frac{\bar{a}_{T_n}}{wa_{SRTT}}$$

where  $f$  is given in the following table

Tyre class	Reference tyre	Factor
C1	SRTT14	$f = 1.000$
	SRTT16	$f = 0.980$
C2	SRTT16C	$f = 1.000$

"

Paragraph 3.4.3.1., amend to read:

"3.4.3.1 The snow grip index of the control tyre **C** relative to the SRTT (SG1) is given by

$$SG1 = SG(C) = f \cdot \frac{\bar{a}_C}{wa_{SRTT}}$$

where  $f$  is given in paragraph 3.4.1.3., and snow grip index of the candidate tyre **Tn** relative to the control tyre (SG2) is given by

$$SG2 = \frac{\bar{a}_{Tn}}{wa_C}$$

where  $wa_C$  is the applicable weighted average of the control tyre, shall be established using the procedure in paragraphs 3.1. to 3.4.2. above.

The snow grip index of the candidate tyre relative to the SRTT **SG(Tn)** shall be the product of the two resulting snow grip indices that is given by ~~SG1~~  $\times$  ~~SG2~~

$$SG(Tn) = SG1 \cdot SG2."$$

Annex 7 – Appendix 2, Part 1, Report, amend to read:

"...

- 5. Tyre class: .....
- 6. Category of use: .....
- 7. Snow grip index ~~SG~~ relative to SRTT according to paragraph 6.4.1.1.
- 7.1. Test procedure and SRTT used .....
- 8. Comments (if any): .....

..."

Annex 7 – Appendix 2, Part 2, Test data, amend to read:

"...

- 5. Test results: mean fully developed decelerations (m · s<sup>-2</sup>) / traction coefficient<sup>(3)</sup>

Run number	Specification	SRTT (1st test)	Candidate 1	Candidate 2	SRTT (2nd test)
1					
2					
3					
4					
5					
6					
Mean					

<i>Run number</i>	<i>Specification</i>	<i>SRTT (1st test)</i>	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>SRTT (2nd test)</i>
Standard deviation					
Coefficient of variation	$CV_a \leq 6 \%$				
Coefficient of Validation	$CVal_a(SRTT) \leq 5 \%$				
SRTT weighted average					
<b>Factor <i>f</i></b>					
Snow grip index		1.00			

- (1) for C2 tyres, corresponding to the indication of the inflation pressure marked on the sidewall as required by paragraph ~~4.1.~~ **3.1.** of this Regulation

..."

## II. Justification

This amendment to UN Regulation No. 109 is required in order to ensure that the test procedures for retreaded tyres are aligned with the proposals of ETRTO in TRANS/WP.29/GRBP/2020/13 for UN Regulation No. 54 and in ECE/TRANS/WP.29/GRBP/2020/16 and ECE/TRANS/WP.29/GRBP/2020/17 for UN Regulation No. 117. The modification of paragraph 7.1.4.4. is related to the extended tyre size range that is used in the vehicle original equipment for urban application with the requirement of sidewall protections for the tyres (e.g. 275/70 and 315/60 R 22.5). With the limitation to C3 tyres and the limitation to outside tyre position in dual mounting possible problems in relation to the clearance in the wheel housing are avoided.