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

Proposal for a Supplement to UN Regulation No. 117

Submitted by the experts from France*

The text reproduced below was prepared by the experts from France to amend UN Regulation No. 117. The modifications to the existing text of the 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 2018–2019 (ECE/TRANS/274, para. 123 and ECE/TRANS/2018/21/Add.1, Cluster 3), 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.

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I. Proposal

Insert a new paragraph 2.19.2. to read:

"2.19.2. "Worn Tyre" means a tyre (SRTT, candidate tyre, control tyre,...) that is prepared in accordance with the American Society for Testing and Materials (ASTM) standards F 1046 – 01 (reapproved 2008)."

Paragraphs from 2.19.2.(former) to 2.19.8., renumber into 2.19.3. to 2.19.9.

Paragraph 3.1.1., amend to read:

"3.1.1. The performance characteristics to be assessed for the tyre type; "rolling sound emissions level" **for new tyres** and/or "adhesion performance level **for new or worn tyre state** on wet surfaces" and/or "rolling resistance level" **for new tyres**. Tyre "snow performance level" in cases of "snow tyre for use in severe snow conditions."

Paragraph 5.3.2., amend to read:

"5.3.2. The following suffixes have been already reserved to identify specific regulations on tyre performance parameters:

S to identify additional conformity to the requirements on tyre rolling sound emissions;

W to identify additional conformity to the requirements on tyre adhesion on wet surfaces;

[B] to identify additional conformity to the requirements on worn tyre adhesion on wet surfaces;

R to identify additional conformity to the requirements on tyre rolling resistance.

Taking into account that two stages are defined for rolling sound and rolling resistance specifications in paragraphs 6.1. and 6.3. below, S and R will be followed either by the suffix "1" for compliance to stage 1 or by the suffix "2" for compliance to stage 2."

Paragraph 5.4.3., amend to read:

"5.4.3. The suffix (es), and the identification to the relevant series of amendments, if any, as specified in the communication form. One of the suffixes listed below or any combination of them can be used.

S1	Sound level at stage 1
S2	Sound level at stage 2
W	Wet adhesion level
[B]	Wet adhesion level (in worn state)
R1	Rolling resistance level at stage 1
R2	Rolling resistance level at stage 2

These suffixes shall be placed to the right or below the approval number, if part of the original approval.

If the approval is extended subsequent to UN Regulations Nos. 30 or 54 approvals, the addition sign "+" and the series of amendment to UN Regulation

No. 117 shall be placed in front of the suffix or any combination of suffixes to denote an extension to the approval.

If the approval is extended subsequent to the original approval under UN Regulation No. 117, the addition sign "+" shall be placed between the suffix or any combination of suffixes of the original approval and the suffix or any combination of suffixes added to denote an extension to the approval."

Paragraph 6.2.1., amend to read:

"6.2.1. For Class C1 tyres, tested **either in new or worn state** in accordance with either procedure given in Annex 5, Part (A) to this Regulation, the tyre shall meet the following requirements:

....."

Paragraph 12., amend to read:

12. TRANSITIONAL PROVISIONS

- 12.1. As from the date of entry into force of the 02 series of amendments to this Regulation, Contracting Parties applying this Regulation shall not refuse to grant approval under this Regulation for a type of tyre if the tyre complies with the requirements of the 02 series of amendments, including the stage 1 or stage 2 rolling sound requirements set out in paragraphs 6.1.1. to 6.1.3. of this Regulation, the requirements for wet grip performance set out in paragraph 6.2.1. (**for new state tyres**) of this Regulation, and the stage 1 or stage 2 rolling resistance requirements set out in paragraph 6.3.1. or 6.3.2. of this Regulation.
- 12.2. As from 1 November 2012, Contracting Parties applying this Regulation shall refuse to grant approval if the tyre type to be approved does not meet the requirements of this Regulation as amended by the 02 series of amendments, and shall, in addition, refuse to grant approval if the stage 2 rolling sound requirements set out in paragraphs 6.1.1. to 6.1.3. of this Regulation, the requirements for wet grip performance set out in paragraph 6.2.1. (**for new state tyres**) of this Regulation, and the stage 1 rolling resistance requirements set out in paragraph 6.3.1. of this Regulation are not complied with.
- 12.3. As from 1 November 2014, Contracting Parties applying this Regulation may refuse to allow the sale or entry into service of a tyre which does not meet the requirements of this Regulation as amended by the 02 series, and which does not meet the requirements of this Regulation as amended by the 02 series of amendments including the wet grip performance requirements set out in paragraph 6.2.1. (**for new state tyres**) of this Regulation.
- 12.4. As from 1 November 2016, Contracting Parties applying this Regulation shall refuse to grant approvals if the tyre type to be approved does not meet the requirements of this Regulation as amended by the 02 series of amendments including the stage 2 rolling resistance requirements set out in paragraph 6.3.2. of this Regulation and the wet grip requirements set out in paragraphs 6.2.2. and 6.2.3. of this Regulation.
- 12.5. As from 1 November 2016, any Contracting Party applying this Regulation may refuse to allow the sale or entry into service of a tyre which does not meet the requirements of this Regulation as amended by the 02 series, and which does not meet the stage 2 rolling sound requirements set out in paragraphs 6.1.1. to 6.1.3. of this Regulation.

- 12.6. As from the dates given below, any Contracting Party applying this Regulation may refuse to allow the sale or entry into service of a tyre which does not meet the requirements of this Regulation as amended by the 02 series, and which does not meet the stage 1 rolling resistance requirements set out in paragraph 6.3.1. of this Regulation:

<i>Tyre class</i>	<i>Date</i>
C1, C2	1 November 2014
C3	1 November 2016

- 12.7. As from the dates given below, any Contracting Party applying this Regulation may refuse to allow the sale or entry into service of a tyre which does not meet the requirements of this Regulation as amended by the 02 series, and which does not meet the stage 2 rolling resistance requirements set out in paragraph 6.3.2. of this Regulation and the wet grip requirements set out in paragraphs 6.2.2. and 6.2.3. of this Regulation:

<i>Tyre class</i>	<i>Date</i>
C1 and C2	1 November 2018
C3	1 November 2020

- 12.8. Until 13 February 2019 (60 months after the entry into force of Supplement 4 to the 02 series of amendments to this Regulation) Contracting Parties applying this Regulation may continue to grant type approvals according to the 02 series of amendments to this Regulation, based on the provisions of Annex 4 to this Regulation.

- 12.9. As from the date of entry into force of Supplement [10] of the 02 series of amendments to this Regulation, Contracting Parties applying this Regulation shall not refuse to grant approval under this Regulation for a type of tyre if the tyre complies with the requirements of Supplement [10] to the 02 series of amendments, including the stage 1 or stage 2 rolling sound requirements set out in paragraphs 6.1.1. to 6.1.3. of this Regulation, the requirements for wet grip performance set out in paragraph 6.2.1. (for worn state tyres) of this Regulation, and stage 1 or stage 2 rolling resistance requirements set out in paragraph 6.3.1. or 6.3.2. of this Regulation.**

- [12.10. As from [1 September 2026], Contracting Parties applying this Regulation may refuse to grant approval if the tyre type to be approved does not meet the requirements of this Regulation as amended by Supplement [10] to the 02 series of amendments, and may, in addition, refuse to grant approval if the requirements for wet grip performance set out in paragraph 6.2.1. (for worn state tyres) of this Regulation, are not complied with.]

- [12.11. As from [1 September 2029], Contracting Parties applying this Regulation may refuse to allow the sale or entry into service of a tyre which does not meet the requirements of this Regulation as amended by Supplement [10] to the 02 series of amendments, and which does not meet the requirements of this Regulation as amended by the 02 series of amendments including the wet grip performance requirements set out in paragraph 6.2.1. (for worn state tyres) of this Regulation.]

Annex 1,

Items 6.1. and 6.2., amend to read:

- "6.1. Sound level of the representative tyre size, see paragraph 2.5. 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 km/h ²
- 6.2. Wet adhesion level **in new state** of the representative tyre size, see paragraph 2.5. of this Regulation, as ~~per item 7.~~ **per wet grip index indicated in of** the test report in the Appendix to Annex 5: (G) using the vehicle or trailer method ²"

Insert a new item 6.3. to read:

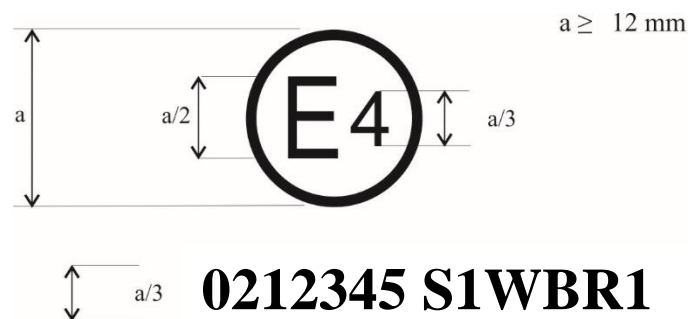
- "**6.3. Wet adhesion level in worn state of the representative tyre size, see paragraph 2. of this Regulation, as per wet grip index indicated in the test report in the Appendix to Annex 5: (G) using the vehicle or trailer method² "**

Items 6.3. (former) and 6.4., renumber into 6.4. and 6.5. and amend to read:

- "**6.3.4.** Rolling Resistance level of the representative tyre size, see paragraph 2.5. of this Regulation, as per item 7. of the test report in Appendix ~~1 3~~ to Annex 6.
- 6.4.5.** Snow grip level of the representative tyre size, see paragraph 2.5. of **this** Regulation ~~No. 117~~, as per item 7. of the test report in the appendix ³ to Annex 7:..... (Snow grip index) using the brake on snow method ², spin traction method ² or acceleration method. ²"

Annex 2, Appendix 1, insert a new example 3 to read:

Example 3



The above approval mark shows that the tyre concerned has been approved in the Netherlands (E 4) pursuant to Regulation No. 117 (marked by S1 (rolling sound at stage 1) W (wet adhesion with tyre in new state) B (wet adhesion with tyre in worn state), and R1 (Rolling resistance at stage 1) under approval number 0212345. This indicates that the approval is for S1WBR1. The first two digits of the approval number (02) indicate that the approval was granted according to the requirements of the 02 series of amendments to this Regulation.

Annex 5, Part (A), paragraph 1.- C1 category tyres,

Insert a new subparagraph 1.6. to read:

- "**1.6. ASTM F 1046-01 (reapproved 2008): Standard Guide for Preparing Artificially Worn Passenger and Light Truck Tires for Testing.**"

Paragraph 3.2.2., amend to read:

"3.2.2. ASTM E 1136 Standard Reference Test Tyre method (b)

By derogation with paragraph 2.4. above, this method uses the reference tyre that has the characteristics indicated in the ASTM E 1136-93 (Reapproved 2003) and referred to as SRTT14.

The average peak braking force coefficient ($\mu_{\text{peak,ave}}$) of the SRTT14 shall be 0.7 ± 0.1 at 65 km/h.

The average peak braking force coefficient ($\mu_{\text{peak,ave}}$) of the SRTT14 shall be corrected for the wetted road surface temperature as follows:

Peak braking force coefficient ($\mu_{\text{peak,ave}}$) = peak braking force coefficient (measured) + temperature correction

Temperature correction = $0.0035 \times (t - 20)$

Where t is the wetted road surface temperature in degrees Celsius.

This method shall never be carried out with a tyre in worn state such as described in § 2.19.2."

Paragraph 4., amend to read:

"4. **Testing methods for measuring wet grip**

For the calculation of the wet grip index (G) of a candidate tyre, the wet grip braking performance of the candidate tyre is compared to the wet grip braking performance of the reference tyre on a vehicle travelling straight ahead on a wet, paved surface. It is measured with one of the following methods:

- (a) Vehicle method consisting of testing a set of tyres mounted on an instrumented passenger car;
- (b) Testing method using a trailer towed by a vehicle or a tyre test vehicle, equipped with the test tyre(s).

When the calculation of the wet grip index (G) involves a candidate tyre in worn state, the wet grip braking performance of the candidate tyre in worn state shall be compared to the wet grip braking performance of the reference tyre in worn state."

Paragraph 4.1.7.2., amend to read:

"4.1.7.2. Principle of the approach

The principle is the use of a control tyre set and two different instrumented passenger cars for the test cycle of a candidate tyre set in comparison with a reference tyre set.

One instrumented passenger car is fitted with the reference tyre set followed by the control tyre set, the other with the control tyre set followed by the candidate tyre set.

When the tests are related to tyres in worn state, both candidate tyre set, reference tyre set and control tyre set shall be tyres in worn state according to 2.19.2.

The specifications listed in paragraphs 4.1.2. to 4.1.4 apply.

....."

Paragraph 4.1.7.4., amend to read:

"4.1.7.4. Replacement of reference tyres and control tyres

When irregular wear or damage results from tests, or when **irregular** wear influences the test results, the use of the tyre shall be discontinued."

Appendix "Test reports examples of wet grip index",

Example 1: "Test report of wet grip index using trailer method", amend to read:

"

Test report number:

Test date:

Tyre state: new or worn (*)

Type of road surface:

Texture depth (mm):

μ peak (SR TT14 E1136) :

or BPN:

Speed (km/h):

Water depth (mm):

(*) strike out what does not apply

..."

Example 2: "Test report of wet grip index using passenger car method", amend to read:

"

Driver:

Test date:

Tyre state: New or Worn (*)

Track:
Texture depth (mm):
BPN:
Water depth (mm):

Passenger car:
Brand:
Model:
Type

Initial speed (km/h):
Final speed (km/h):

(*) strike out what does not apply

..."

II. Justification

Background

1. UN Regulation N° 117 defines the minimum thresholds on both environmental (noise and rolling resistance) and safety (wet adhesion) performances that tyres must pass to be type-approved.
2. Today, performance tests are conducted on new tyres, and while this represents the worst case for both noise and rolling resistance, wet adhesion performance decreases with wear. This decrease (which corresponds to an increase in braking distance) can vary significantly from one tyre to another, and cannot be induced by wet adhesion performance at new state.
3. A threshold at worn state for wet adhesion would improve braking distance, thus impact road safety, while also testing hydroplaning, which is not evaluated in the current test at new state. It would also avoid environmental and economic waste, since many drivers replace their tyres before the minimum legal tread depth limit, in order to try to limit this loss of adhesion.

Proposal

4. To avoid early removal of tyres and its environmental and economic consequences, while also improving road safety, France proposes to amend this Regulation by introducing a wet adhesion requirement for C1 tyres at worn state. The worn state is obtained by buffing the tyres at the minimum tread depth limit following a standardized method. This would ensure that type approval requirements are as representative of the real-use conditions as possible.

5. The modifications introduced in the text of the Regulation accordingly are summarized hereafter:

- Adding a definition for worn tyre (paragraph 2.19.2.).
- Adding a marking symbol (paragraph 5.3.2. and 5.4.3.) and a new example of approval markings (Annex 2, Example 3).
- Adding specific transitional provisions (paragraphs 12.9., 12.10. and 12.11.).
- Adding one item in the template of Communication sheet (Annex 1, item 6.3.) and editorial corrections for some other items (Annex 1, items 6.1., 6.2., former 6.3. and 6.4.).
- Adding a reference to the standard to be used for preparing artificially worn tyres for testing (Annex 5, Part A, paragraph 1.6.).
- Adding of an exclusion of using a worn SRTT 14 for measuring the adhesion characteristic of the track (Annex 5, Part A, paragraph 3.2.2.).
- Adding of a provision on the state of the reference tyre, the control tyre when the measurements are performed with a worn candidate tyre (Annex 5, Part A, paragraph 4.1.7.2.).
- Updating the report templates (Annex 5, Part A, Appendix).
