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**Economic Commission for Europe**

Inland Transport Committee

**World Forum for Harmonization of Vehicle Regulations****Working Party on Noise and Tyres****Seventy-sixth session**

Geneva, 5–7 September 2022

Item 4 (c) of the provisional agenda

**Tyres: Regulation No. 117 (Tyre rolling resistance, rolling noise and wet grip)****Proposal for the 04 series of amendments to UN Regulation No. 117****Submitted by the Informal Working Group on Wet Grip Performance for Tyres in a Worn State\***

The text reproduced below was prepared by the expert from the Informal Working Group on Wet Grip Performance for Tyres in a Worn State (IWG WGWT) with the aim 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.

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\* In accordance with the programme of work of the Inland Transport Committee for 2022 as outlined in proposed programme budget for 2022 (A/76/6 (Sect.20), para 20.76), 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, Annexes, item 9, amend to read:

- "9 ~~Test procedure for measuring~~ **Procedure for determining** the adhesion on wet surfaces of tyres in worn state.....
- Appendix 1 - Worn tyre preparation report example.....
- Appendix 2 - Test reports examples of wet grip index for tyres in worn state ....."

Paragraph 6.4.1., amend to read:

"6.4.1. For class C1 tyres, tested in accordance with either procedure given in Annex 9 to this Regulation, the tyre shall meet the following requirements:

Category of use		Wet grip index (G <sub>B</sub> )
Normal tyre		≥ 0.88
	<b>Tyre with a nominal aspect ratio equal to or less than 40, a section width equal to or higher than 235 mm and suitable for speeds equal to or greater than 300 km/h</b>	<b>≥ 0.80</b>
Snow tyre		<del>≥ 0.80</del> <b>0.88</b>
	"Snow tyre for use in severe snow conditions" <del>and with a speed category symbol ("R" and above, including "H") indicating a maximum permissible speed</del> <b>suitable for speeds greater than 160 km/h</b>	≥ 0.80
	Ice grip tyre	≥ 0.70
	"Snow tyre for use in severe snow conditions" <del>and with a speed category symbol ("Q" or below excluding "H") indicating a maximum permissible speed not greater than suitable for speeds equal to or less than 160 km/h</del>	≥ 0.70
Ice grip tyre	≥ 0.70	
Special use tyre		<del>Not defined</del> <b>≥ 0.80</b>

~~For normal tyres with speed category symbol indicating a maximum permissible speed equal to or greater than 300 km/h and aspect ratio equal to or lower than 40, the limit shall be decreased by 0.08."~~

Paragraph 6.7., amend to read:

"6.7. 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 class C1 tyres: a tread depth ≥ ~~11~~**9** mm and void to fill ratio ≥ ~~35~~**30** per cent

For class C2 tyres: a tread depth ≥ 11 mm and void to fill ratio ≥ 35 per cent

For class C3 tyres: a tread depth ≥ 16 mm and void to fill ratio ≥ 35 per cent"

Add a new paragraph 6.4.2., to read:

**"6.4.2. For class C2 tyres, evaluated in accordance with the procedure given in paragraph 3. of Annex 9 to this Regulation, the tyre shall meet the following requirements:**

Category of use	Wet grip index ( $G_B$ )	
	Other	Traction tyres
Normal tyre	$\geq 0.82$	$\geq 0.74$
Snow tyre	$\geq 0.82$	$\geq 0.74$
	Snow tyre for use in severe snow conditions	$\geq 0.74$
Special use tyre	$\geq 0.74$	$\geq 0.74$

"

Add a new paragraph 6.4.3., to read:

**"6.4.3. For class C3 tyres, evaluated in accordance with the procedure given in paragraph 3. of Annex 9 to this Regulation, the tyre shall meet the following requirements:**

Category of use	Wet grip index ( $G_B$ )	
	Other	Traction tyres
Normal tyre	$\geq 0.66$	$\geq 0.54$
Snow tyre	$\geq 0.54$	$\geq 0.54$
	Snow tyre for use in severe snow conditions	$\geq 0.54$
Special use tyre	$\geq 0.54$	$\geq 0.54$

"

Paragraph 12. and subparagraphs 12.1. to 12.8., amend to read:

"12. Transitional provisions

12.1. As from the official date of entry into force of the ~~03~~ **04** series of amendments, no Contracting Party applying this Regulation shall refuse to grant or refuse to accept type approvals under this Regulation as amended by the ~~03~~ **04** series of amendments.

12.2. **Reserved**

~~Contracting Parties applying this Regulation shall continue to accept type approvals of and to grant extensions of approvals to, the classes C2 and C3 tyres, which are not affected by the changes of the technical requirements concerning the adhesion on wet surfaces of class C1 tyres in worn state introduced by the 03 series of amendments, to the 02 series of amendments to this Regulation.~~

12.3.1. As from 7 July 2024, Contracting Parties applying this Regulation shall not be obliged to accept type approvals of class C1 tyres **issued according to any preceding to the 02-series of amendments, first issued after 7 July 2024.**

12.3.2. **As from 7 July 2024, Contracting Parties applying this Regulation shall not be obliged to accept type approvals of class C2 or C3 tyres issued according to any preceding series of amendments, first issued after 7 July 2024.**

12.4.1. Until ~~76~~ July 2026, Contracting Parties applying this Regulation shall accept type approvals of class C1 tyres ~~to the 02~~ **issued according to the 02 or the 03 series of amendments, first issued before 7 July 2024.**

12.4.2. **Until 6 July 2026, Contracting Parties applying this Regulation shall accept type approvals of class C2 or C3 tyres issued according to the 02 or the 03 series of amendments, first issued before 7 July 2024.**

- 12.5.1. As from 7 July 2026, Contracting Parties applying this Regulation shall not be obliged to accept type approvals of class C1 tyres issued ~~to the 02~~ **issued according to any preceding** series of amendments to this Regulation.
- 12.5.2. **As from 7 July 2026, Contracting Parties applying this Regulation shall not be obliged to accept type approvals of class C2 or C3 tyres issued according to any preceding series of amendments to this Regulation**
- 12.6. Contracting Parties applying this Regulation may grant type approvals according to any preceding series of amendments to this Regulation.
- 12.6.1. Contracting Parties applying this Regulation shall continue to grant extensions of existing approvals to any preceding series of amendments to this Regulation.
- 12.7. Until 1 September 2024, Contracting Parties applying this Regulation may continue to grant type approvals according to the ~~03~~ **04** 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>
- 12.8. Until 1 September 2024, Contracting Parties applying this Regulation may continue to grant type approvals according to the ~~03~~ **04** series of amendments to this Regulation, based on the test procedures for measuring the wet adhesion of tyres in new state as described in Annex 5 of this Regulation, without taking into account the provisions introduced after Supplement 12 to the 02 series of amendments.

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

Add a new paragraph 12.9., to read:

**"12.9. [Until 6 July 2024], Contracting Parties applying this Regulation may continue to grant type approvals according to the 04 series of amendments to this Regulation, based on the test procedures for measuring the wet adhesion of tyres in worn state as described in Annex 9 to this Regulation using buffed SRTT16 in worn state as reference tyre."**

Annex 9,

Title, amend to read

**"Procedure for determining ~~measuring~~ the adhesion on wet surfaces of tyres in worn state"**

Paragraph 2., amend to read

"2. **Test procedure for Tyres-tyres of Class-class C1**  
[...]"

Paragraph 2.3.3., amend to read:

"2.3.3. Atmospheric conditions

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

The wetted surface temperature and the ambient temperature shall be between:

Category of use	Wetted surface temperature	Ambient temperature
Normal <del>tyres</del> <b>tyre</b>	12 °C – 35 °C	12 °C – 40 °C
Snow <del>tyres</del> <b>tyre</b>	5 °C – 35 °C	5 °C – 40 °C
<div style="display: flex; align-items: center;"> <div style="border-right: 1px solid black; padding-right: 5px;">Snow <del>tyres</del><b>tyre</b> for use in severe snow conditions</div> <div style="padding-left: 5px;">5 °C – 20 °C</div> </div>	5 °C – 20 °C	5 °C – 20 °C

Special use tyre	not applicable 5 °C – 35 °C	not applicable 5 °C – 40 °C
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Moreover, the wetted surface temperature shall not vary during the test by more than 10 °C.

The ambient temperature shall remain close to the wetted surface temperature; the difference between the ambient and the wetted surface temperatures shall be less than 10 °C."

Table 2, amend to read:

"Table 2

Category of use	$g_0$ (°C)	$a$	$b$ (°C <sup>-1</sup> )	$c$ (°C <sup>-2</sup> )	$d$ (mm <sup>-1</sup> )
Normal tyre	20	+0.90996	-0.00179	-0.00013	-0.10313
Snow tyre	15	+0.81045	-0.00004	-0.00019	-0.05093
Snow tyre for use in severe snow conditions	10	+0.71094	+0.00172	-0.00025	+0.00127
<b>Special use tyre</b>	<b>15</b>	<b>+0.81045</b>	<b>-0.00004</b>	<b>-0.00019</b>	<b>-0.05093</b>
Special use tyre	not defined				

"

Table 4, amend to read:

"Table 4

Category of use	$g_0$ (°C)	$a$	$b$ (°C <sup>-1</sup> )	$c$ (°C <sup>-2</sup> )	$d$ (mm <sup>-1</sup> )
Normal tyre	20	+0.99655	-0.00124	+0.00041	+0.06876
Snow tyre	15	+0.94572	-0.00032	-0.00020	+0.08047
Snow tyre for use in severe snow conditions	10	+0.89488	+0.00061	-0.00080	+0.09217
<b>Special use tyre</b>	<b>15</b>	<b>+0.94572</b>	<b>-0.00032</b>	<b>-0.00020</b>	<b>+0.08047</b>
Special use tyre	not defined				

"

Add a new paragraph 3., to read

### "3. Evaluation of the adhesion of tyres of classes C2 and C3

#### Wet grip index evaluation of the tyre in worn state

##### Principle

##### Two steps:

- (a) The wet grip index  $G$  of the tyre in new state is evaluated following the provisions specified in Annex 5, Part (B), "Classes C2 and C3 tyres" and its subparagraphs.
- (b) The wet grip index  $G_B$  in worn state of tyres of classes C2 and C3 is evaluated using the following formulae:

$$G_B(C2) = K_{\text{worn}}(C2) \cdot G(C2)$$

$$G_B(C3) = K_{\text{worn}}(C3) \cdot G(C3)$$

**$K_{\text{worn}}$  is the performance drop factor between the wet grip in new state and in worn state:**

**$K_{\text{worn}}(\text{C2}) = 0.87$**

**$K_{\text{worn}}(\text{C3}) = 0.83$ "**

## **II. Justification**

1. For class C1 tyres with a nominal aspect ratio equal to or less than 40, a section width equal to or higher than 235 mm and suitable for speeds equal to or greater than 300 km/h, usually designed to fit high performance cars, the threshold for the wet grip index ( $G_B$ ) is set at 0.80. On high performance cars, a mixed fitment (different tyre size at the front and at the rear) has to be considered. Hydroplaning effect is more pronounced on wider tyres than on normal tyres. The proposed level of wet grip in worn state is based on a similar approach as for normal tyres considering those characteristics. There is a need to gain experience on the test method and future test method improvements (mould SRTT, IWG WGWT test plan for 2023).

2. For all-terrain tyres of class C1 that are also used in a more aggressive and abrasive environment than normal roads and therefore require a specific tread design and compound with possible trade-offs on wet grip, the threshold for the wet grip index ( $G_B$ ) is set at 0.80. The all-terrain cluster as presented in informal document GRBP-75-27, slide 6 was reconsidered by revising the C1 special use tyre category as per paragraph 6.7. and by implementing the pertinent coefficients in the tables of Annex 9. For this reason, we introduce the prescriptions for wet grip in worn state also for special use tyres with a threshold for the wet grip index ( $G_B$ ) at 0.80.

3. For C2 and C3 tyres, the concept presented in informal document GRBP-75-26-Rev.1 was transposed in a new paragraph 3 of Annex 9. The concept of  $k_{\text{worn}}$  factor was introduced to reflect the wet grip drop of performance between tyres in new state and in worn state. The wet grip index  $G_B$  limits are set based on the current wet grip limits in new state.

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