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Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

193rd session
Geneva, 25–28 June 2024
Item 4.9.11 of the provisional agenda
1958 Agreement:
Consideration of draft amendments to existing
UN Regulations submitted by GRBP

Proposal for Supplement 2 to the 03 series of amendments to UN Regulation No. 117 (Tyre rolling resistance, rolling noise and wet grip)

Submitted by the Working Party on Noise and Tyres*

The text reproduced below was adopted by the Working Party on Noise and Tyres (GRBP) at its seventy-ninth session (ECE/TRANS/WP.29/GRBP/77, para. 23). It is based on ECE/TRANS/WP.29/GRBP/2024/9 as amended by GRBP-79-22 and ECE/TRANS/WP.29/GRBP/2024/12 as amended by GRBP-79-49. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their June 2024 sessions.

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* In accordance with the programme of work of the Inland Transport Committee for 2024 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.

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Table of Contents, amend to read:

"[…]

[…]"

Annexes, amend to read:

"[…]

4   Reserved

[…]"

Paragraph 1., footnote 1, amend to read:

"[1]   As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3)"

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

"[2]   Class C1 tyres correspond to "passenger car tyres" in ISO 4000-1:2021.

[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 newtons.

[4]   The rolling resistance is expressed in 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 4000-1:2021.[2]"

Paragraph 2.13., amend to read:

"2.13.   "*Snow tyre*" means a tyre whose tread pattern, tread compound or 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 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 – 19 for the size P195/75R14 and referred to as "SRTT14",

(b)   F2493 – 23 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 – 19 for the size 225/75R16C and referred to as "SRTT16C",

(e)   F2871 – 23 for the size 245/70R19.5 and referred to as "SRTT19.5",

(f)   F2870 – 23 for the size 315/70R22.5 and referred to as "SRTT22.5",

(g)   F3678 – 23 for the size 245/70R19.5 and referred to as "SRTT19.5 siped",

(h)   F3677 – 23 for the size 315/70R22.5 and referred to as "SRTT22.5 siped"."

Paragraph 6, title, amend to read:

"**6.   Requirements**"

Paragraph 6.5.1., amend to read:

"6.5.1.   Snow performance requirements for classes C1, C2 and C3 tyres

The minimum snow grip index value, as calculated in the procedure described in Annex 7 and compared with the respective Standard Reference Test Tyre SRTT shall be as follows:

Class of tyre	Snow grip index (brake on snow method) [a]		Snow grip index (spin traction method) [b]	Snow grip index (acceleration method) [c]
	Ref.s = SRTT14, SRTT16	*Ref. = SRTT16C*	*Ref. = SRTT14, SRTT16*	*Ref.s = SRTT19.5, SRTT22.5, SRTT19.5 siped, SRTT22.5 siped*
C1	1.07	No	1.10	No
C2	No	1.02	1.10	No
C3	No	No	No	1.25

[a]   See paragraph 3. of Annex 7 to this Regulation
[b]   See paragraph 2. of Annex 7 to this Regulation
[c]   See paragraph 4. of Annex 7 to this Regulation "

Paragraph 8.3.2., amend to read:

"8.3.2.   In the case of verification tests with regard to approvals in accordance with paragraph 6.5. 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."

Add a new paragraph 8.3.2.1, to read:

"8.3.2.1.   In the case of verification tests with regard to approvals of tyres of class C3 in accordance with paragraph 6.5.1. of this Regulation, these may be carried out, upon request of the tyre manufacturer, using the same reference tyre (see Annex 7 to this Regulation) as that adopted for the original approval."

Add a new paragraph 8.3.4., to read:

"8.3.4.   In the case of verification tests with regard to approvals in accordance with paragraph 6.1. of this Regulation, these may be carried out, upon request of the tyre manufacturer, using the same temperature correction formula (see Annex 3 to this Regulation) as that adopted for the original approval."

Add new paragraphs 12.12. to 12.20., to read:

"12.12.   Until 6 July 2025, Contracting Parties applying this Regulation shall continue to grant type approvals based on the tyre-rolling sound emissions using only the temperature correction formula specified in Annex 3, paragraph 4.2.1.

12.13.   As from 7 July 2025, Contracting Parties applying this Regulation shall grant type approvals based on the tyre-rolling sound emissions using only the temperature correction formula specified in Annex 3, paragraph 4.2.2.

12.14.   Contracting Parties applying this Regulation shall continue to grant extensions to existing type approvals first granted before 7 July 2025 based on the tyre-rolling sound emissions using the temperature correction formula specified in Annex 3, paragraph 4.2.1. In case a new test has to be performed on a different representative tyre size for an extension to be granted after 6 July 2025, the temperature correction formula specified in Annex 3, paragraph 4.2.2. shall be used.

12.15.   As from 1 September 2028, Contracting Parties applying this Regulation shall not be obliged to accept type approvals issued according to Supplement 2 to the 03 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 to this Regulation using one of the two equivalent Standard Reference Test Tyres SRTT19.5 and SRTT22.5 as tyre reference, first issued after 31 August 2028.

12.16. As from 1 September 2028, Contracting Parties applying this Regulation shall not be obliged to accept type approvals issued according to Supplement 2 to the 03 series of amendments to this Regulation, based on snow performance tests as described in Annex 7 to this Regulation using one of the two equivalent Standard Reference Test Tyres SRTT19.5 and SRTT22.5 as tyre reference, first issued after 31 August 2028.

12.17. Notwithstanding paragraph 12.15., Contracting Parties applying this Regulation shall continue to grant extensions to existing type approvals of class C3 tyres according to the 03 series of amendments to this Regulation first granted before 01 September 2028, based on the test procedures for measuring the wet adhesion of tyres in new state as described in Annex 5 to this Regulation using one of the two equivalent Standard Reference Test Tyres SRTT19.5 and SRTT22.5 as reference tyre. In case a new test has to be performed on a different representative tyre size for an extension to be granted after 01 September 2028, the SRTT19.5 siped or SRTT22.5 siped will be used.

12.18. Notwithstanding paragraph 12.16., Contracting Parties applying this Regulation shall continue to grant extensions to existing type approvals of class C3 tyres according to the 03 series of amendments to this Regulation first granted before 1 September 2028, based on snow performance test described in Annex 7 to this Regulation using either SRTT19.5 or SRTT22.5 as reference tyre. In case a new test has to be performed on a different representative tyre size for an extension to be granted after 1 September 2028, the SRTT19.5 siped or SRTT22.5 siped will be used.

12.19. As from the entry into force of that supplement until 31 August 2028, Contracting Parties applying this Regulation shall accept type approvals issued according to Supplement 2 of the 03 series of amendments to this Regulation, first issued before 1 September 2028, if the track characteristics for measuring wet adhesion of tyre in new state are established using the following reference tyres:

Tyre class	Reference tyres
C2	SRTT16 or SRTT 16C
C3	SRTT16 or SRTT19.5 or SRTT22.5 or SRTT19.5 siped or SRTT22.5 siped

12.20. As from the 1 September 2028, Contracting Parties applying this Regulation shall not be obliged to accept type approval issued according to Supplement 2 to the 03 series of amendments to this Regulation, if the track characteristics for measuring wet adhesion of tyre in new state are not established using the following reference tyres:

Tyre class	Reference tyres
C2	SRTT16C
C3	SRTT19.5 siped or SRTT22.5 siped

"

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 km/h or 80 km/h [2]"

Annex 3,

Paragraph 2.1., amend to read:

"2.1. Test site

The test site shall consist of a central section surrounded by a substantially flat test area. The measuring section shall be level; the test surface shall be dry and clean for all measurements. The test surface shall not be artificially cooled during or prior the testing.

The test track shall be such that the conditions of a free sound field between the sound source and the microphone are attained to within 1 dB(A). These conditions shall be deemed to be met if there is no large sound reflecting objects, such as fences, rocks, bridges or building within 50 m of the centre of the measuring section. The surface of the test track and the dimensions of the test site shall be in accordance with ISO 10844:2021.

A central part of at least 10 m radius shall be free of powdery snow, tall grass, loose soil, cinders or the like. There shall be no obstacle, which could affect the sound field within the vicinity of the microphone and no persons shall stand between the microphone and the sound source. The operator carrying out the measurements and any observers attending the measurements shall position themselves so as not to affect the readings of the measuring instruments."

Paragraph 4.2. and its subparagraphs, amend to read:

"4.2. Temperature correction

4.2.1. Until the date indicated in paragraph 12.12. of this Regulation, for class C1 and class C2 tyres, the rolling sound levels $L_i(\vartheta_i)$ obtained at the test surface temperature ϑ_i (where i denotes the number of the single measurement) shall be normalized to a test surface reference temperature ϑ_{ref} by applying a temperature correction, according to the following formula:

$$L_i(\vartheta_{\text{ref}}) = L_i(\vartheta_i) + K(\vartheta_{\text{ref}} - \vartheta_i)$$

where:

$\vartheta_{\text{ref}} = 20\ °C$,

For class C1 tyres, the coefficient K is:

$- 0.03$ dB(A)/°C when $\vartheta_i > \vartheta_{\text{ref}}$ and

$- 0.06$ dB(A)/°C when $\vartheta_i < \vartheta_{\text{ref}}$.

For class C2 tyres, the coefficient K is -0.02 dB(A)/°C.

4.2.2. From the date indicated in paragraph 12.13., for class C1 and class C2 tyres, the rolling sound levels $L_i(\vartheta_i)$ obtained at the test surface temperature ϑ_i (where i denotes the number of the single measurement) shall be normalized to a test surface reference temperature ϑ_{ref} by applying a temperature correction, according to the following formula:

$$L_i(\vartheta_{\text{ref}}) = L_i(\vartheta_i) - K_1 \cdot \lg\left(\frac{\vartheta_{\text{ref}} + K_2}{\vartheta_i + K_2}\right)$$

where:

$\vartheta_{\text{ref}} = 20\ °C$,

and the coefficients K_1 and K_2 are given in the tables below.

Class C1 tyres	K_1 (°C)	K_2 (°C)
Tyres that are classified as tyre for use in severe snow conditions	1.35	2.29
Other tyres	2.25	0

Class C2 tyres	K_1 (°C)	K_2 (°C)
Tyres that are classified as tyre for use in severe snow conditions	0	0
Other tyres	1.22	0

4.2.3. Notwithstanding the above procedure, the temperature correction may be made only on the final reported tyre rolling sound level L_R, utilizing the arithmetic mean value of the measured temperatures, if the measured test surface temperature does not change more than 5 °C within all measurements necessary for the determination of the sound level of one set of tyres. In this case the regression analysis below shall be based on the uncorrected rolling sound levels $L_i(\vartheta_i)$.

There will be no temperature correction for class C3 tyres."

Annex 4, amend to read:

"**Annex 4**

Reserved"

Annex 5, Part (B),

Paragraph 1.1. and its subparagraphs, amend to read:

"1.1. Track characteristics

The surface shall be a dense asphalt surface with a uniform gradient of not more than two per cent and shall not deviate more than 6 mm when tested with a 3 m straight edge.

The test surface shall have a pavement of uniform age, composition, and wear. The test surface shall be free of loose material or foreign deposits.

The maximum chipping size shall be from 8 mm to 13 mm.

The average macro texture depth measured as specified in ASTM E 965-96 (reapproved 2006) shall be (0.7 ± 0.3) mm.

1.1.1. The surface friction value for the wetted track shall be established by one or other of the following methods according to the class of the candidate tyre and the method (trailer or vehicle).

Tyre class	SRTT	Trailer method μ_{peak} range	Vehicle method BFC range
C2, C3	SRTT16	0.65 – 0.90	-
C2	SRTT16C	0.44 – 0.77	0.36 – 0.69
C3	SRTT19.5, SRTT22.5	0.51 – 0.67	0.35 – 0.61
C3	SRTT19.5 siped, SRTT22.5 siped	0.52 – 0.68	0.36 – 0.62

1.1.1.1.   Standard Reference Test Tyre method using SRTT16

Using the method described in paragraph 4.2. of part (A) of this Annex, perform, in the same area where the average macro texture depth was measured, one braking test of the reference tyre, consisting of at least six (6) valid test runs in the same direction.

Evaluate the braking test as described in paragraphs 4.2.8.1. and 4.2.8.2. of part (A) of this Annex. If the coefficient of variation CV_μ exceeds 4 per cent, dismiss the results and repeat the braking test.

The arithmetic mean ($\overline{\mu_{\text{peak}}}$) of the measured peak braking force coefficients shall be corrected for the effects of temperature as follows:

$$\mu_{\text{peak,corr}} = \overline{\mu_{\text{peak}}} + a \cdot (\vartheta - \vartheta_0)$$

where

ϑ is the wetted track surface temperature in degrees Celsius,

$a = 0.002\ °\text{C}^{-1}$ and $\vartheta_0 = 20\ °\text{C}$.

The temperature corrected average peak braking force coefficient ($\mu_{\text{peak,corr}}$) shall be not less than 0.65 and not greater than 0.90.

The test shall be conducted using the lanes and length of the track to be used for the wet adhesion measurement.

For the trailer method, testing is run in such a way that braking occurs within 10 metres distance of where the surface was characterized.

1.1.1.2.   Standard Reference Test Tyre method using SRTT16C, SRTT19.5, SRTT22.5, SRTT19.5 siped, SRTT22.5 siped;

1.1.1.2.1.   Using the method described in paragraph 2.1. of Part (B) of this Annex, perform, in the same area where the average macro texture depth was measured, one braking test of the reference tyre, consisting of at least eight (8) valid test runs in the same direction in the same test session.

Evaluate the braking test as described in paragraphs 2.1.2.12. and 2.1.2.13. of part (B) of this Annex. If the coefficient of variation CV_μ exceeds 5 per cent, dismiss the results and repeat the braking test.

No temperature correction is applied.

The average peak braking force coefficient ($\overline{\mu_{\text{peak}}}$) shall be within the range reported in the table in paragraph 1.1.1.

The test shall be conducted using the lanes and length of the track to be used for the wet adhesion measurement.

1.1.1.2.2.   Using the method described in paragraph 2.2. of Part (B) of this Annex, perform, in the same area where the average macro texture depth was measured, one braking test of the reference tyre, consisting of at least six (6) valid test runs in the same direction in the same test session.

Evaluate the braking test as described in paragraphs 2.2.2.7.1., 2.2.2.7.2. and 2.2.2.7.4. of part (B) of this Annex. If the coefficient of variation CV_{BFC} exceeds 3 per cent, dismiss the results and repeat the braking test.

No temperature correction is applied.

The braking force coefficient ($\overline{BFC}$) shall be within the range reported in the table in paragraph 1.1.1.

The test shall be conducted using the lanes and length of the track to be used for the wet adhesion measurement."

Paragraph 1.4., amend to read:

"1.4.   In order to cover the range of the tyre sizes fitting the commercial vehicles, the Standard Reference Test Tyres (SRTT) shall be used to measure the relative wet index as shown in the following table:

For class C3 tyres
SRTT19.5, SRTT22.5, SRTT19.5 siped or SRTT22.5 siped
For class C2 tyres
SRTT16C

"

Paragraph 2.1.2.13, amend to read:

"2.1.2.13.   Validation of results

For the reference tyre:

(a)   If the coefficient of variation of the peak braking coefficient CV_μ of the reference tyre, which is calculated by the formula given in 4.2.8.2. of part (A) of this Annex, is higher than five per cent, discard all data and repeat the test for this reference tyre.

(b)   The average peak braking force coefficients ($\overline{\mu_{peak}}$, see paragraph 1.1.1.2.1. of this Annex) as calculated from the initial and from the final braking test of the reference tyre within a test cycle shall be within the range reported in the table in paragraph 1.1.1.

If one or more of the above conditions is not met, the complete test cycle shall be performed again.

For the candidate tyres:

[…]"

Paragraph 2.1.2.14., amend to read:

"2.1.2.14.   The wet grip index (G) shall be calculated as:

Wet grip index $(G) = f \cdot \dfrac{\mu_{peak\ ave(T)}}{\mu_{peak\ ave(R)}}$

where

For class C2 tyres SRTT16C	
f = 1	
For class C3 tyres	
SRTT19.5, SRTT22.5	*SRTT19.5 siped, SRTT22.5 siped*
f = 1	*f = 1.02*

f: correction factor depending on used SRTT

It represents the relative wet grip index for braking performance of the candidate tyre (T) compared to the reference tyre (R)."

Paragraph 2.2.4., amend to read:

"2.2.2.4.   Tyre load

The static load on each axle shall remain the same throughout the test procedure. The static load on each tyre, expressed as a percent of the nominal static load and rounded to the nearest integer, shall lie between 60 per cent and 100 per cent of the SRTT and the candidate tyre's load capacity.

Tyre load on the same axle should not differ by more than 10 per cent.

The use of fitting as per Configurations 2 and 3 shall fulfil the following additional requirements:

Configuration 2: Front axle load > Rear axle load

The rear axle may be indifferently fitted with 2 or 4 tyres

Configuration 3: Rear axle load > Front axle load x 1.8"

Paragraph 2.2.2.7.2., amend to read:

"2.2.2.7.2.   Validation of results

For the reference tyre:

(a)   If the coefficient of variation of "AD" of any two consecutive groups of 3 runs of the reference tyre is higher than 3 per cent, discard all data and repeat the test for all tyres (the candidate tyres and the reference tyre). The coefficient of variation is calculated by the following relation:

$$\frac{\text{standard deviation}}{\text{average}} \times 100$$

(b)   The average braking force coefficients ($\overline{BFC}$, see paragraph 1.1.1.2.2. of this Annex) as calculated from the initial and from the final braking tests of the reference tyre within a test cycle shall be within the range reported in the table in paragraph 1.1.1.

If one or more of the above conditions is not met, the complete test cycle shall be performed again.

For the candidate tyres:

The coefficients of variation are calculated for all the candidate tyres.

$$\frac{\text{standard deviation}}{\text{average}} \times 100$$

If one coefficient of variation is greater than 3 per cent, discard the data for this candidate tyre and repeat the test."

Paragraph 2.2.2.7.5., amend to read:

"2.2.2.7.5.   Calculation of the relative wet grip index of the tyre

The wet grip index represents the relative performance of the candidate tyre compared to the reference tyre. The way to obtain it depends on the test configuration as defined in paragraph 2.2.2.2. of this Annex. The wet grip index *G* of the tyre is calculated as reported into Table 7:

Table 7

| Configuration C1: candidate tyres on both axles	$G = f \cdot \dfrac{BFC(T)}{BFC(R)}$
Configuration C2: candidate tyres on front axle and reference tyres on rear axle	$G = f \cdot \dfrac{BFC(T) \cdot [a+b+h \cdot BFC(R)] - a \cdot BFC(R)}{BFC(R) \cdot [b+h \cdot BFC(T)]}$
Configuration C3: reference tyres on front axle and candidate tyres on rear axle	$G = f \cdot \dfrac{BFC(T) \cdot [-a-b+h \cdot BFC(R)] + b \cdot BFC(R)}{BFC(R) \cdot [-a+h \cdot BFC(T)]}$

where

• For class C2 tyres	
• SRTT16C	
• f = 1	
• For class C3 tyres	
• SRTT19.5, SRTT22.5	• SRTT19.5 siped, SRTT22.5 siped
• f = 1	• f = 1.02

Where (see also Figure 1):

f: correction factor depending on used SRTT

cog: centre of gravity of the loaded vehicle

m: mass (in kilograms) of the loaded vehicle

a: horizontal distance between front axle and centre of gravity of the loaded vehicle (m)

b: horizontal distance between rear axle and centre of gravity of the loaded vehicle

h: vertical distance between ground level and centre of gravity of the loaded vehicle (m).

N.B. When h is not precisely known, these worst case values shall apply: 1.2 for configuration C2, and 1.5 for configuration C3

γ: loaded vehicle acceleration [m·s^{-2}]

g: acceleration due to the gravity [m·s^{-2}]

X_1:   longitudinal (X-direction) reaction of the front tyre on the road

X_2:   longitudinal (X-direction) reaction of the rear tyre on the road

Z_1:   normal (Z-direction) reaction of the front tyre on the road

Z_2:   normal (Z-direction) reaction of the rear tyre on the road

Figure 1
Nomenclature explanation related to grip index of the tyre

"
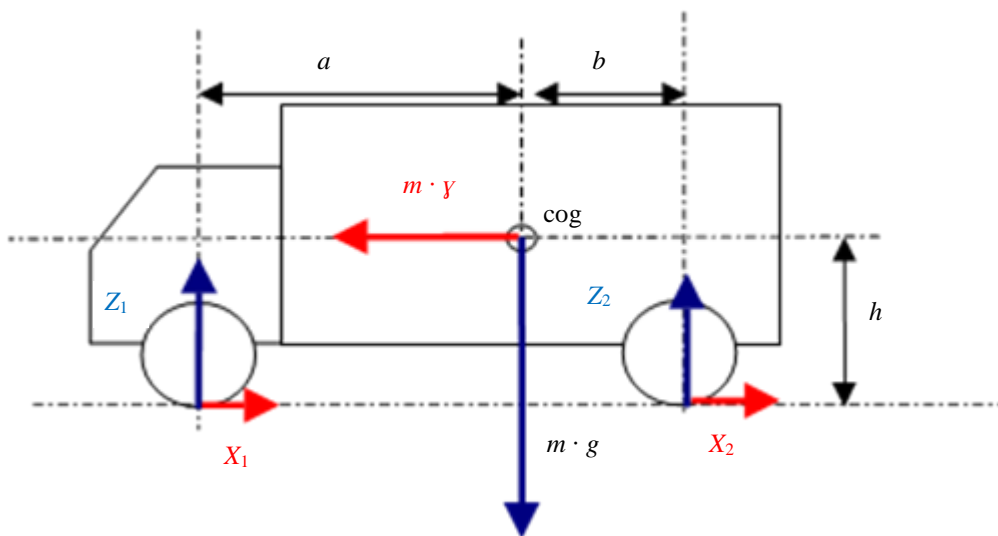
Paragraph 2.2.2.8.4., amend to read:

"2.2.2.8.4. The wet grip index of the candidate tyre compared to the reference tyre is deduced by multiplying the relative efficiencies calculated above:

(Wet Grip Index 1 · Wet Grip Index 2)

"

Annex 5, Appendix, amend to read:

"Test reports examples of wet grip index for tyres in new state

Example 1: Test report of wet grip index for tyres in new state using trailer or tyre test vehicle method

Test report number:		Test date:	

Track:			Minimum:	Maximum:
Texture depth (mm):		Wetted surface temp. (°C):		
$\mu_{peak,corr}$ [(4)]:		Ambient temp (°C):		
Water depth (mm):				

Speed (km/h):	

No.		*1*	*2*	*3*	*4*	*5*
Brand						
Pattern/trade description		SRTT…				SRTT…
Size						
Service description						
Reference (test) inflation pressure[(1)] (kPa)						
Tyre identification						
M+S marking (Y/N)						
3PMSF marking (Y/N)						
Rim						
Load (kg)						
Pressure (kPa)						
μ_{peak}	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
$\overline{\mu_{peak}}$						
Standard deviation, σ_μ						
$CV_\mu \leq 4\%$ [(2)]						
$CVal(\mu_{peak}) \leq 5\%$ [(3)]		✕	✕	✕	✕	✕

$\mu_{peak,corr}(R)$		✕	✕	✕	✕
$\mu_{peak,adj}(R)$	✕	✕	✕	✕	✕
f		✕	✕	✕	✕
Wet grip index	✕	✕	✕	✕	✕
Wetted surface temp. (°C)					
Ambient temp. (°C)					
Remarks					

[1] for classes C2 and C3 tyres, corresponding to the indication of the inflation pressure marked on the sidewall as required by paragraph 4.1. of this Regulation

[2] For classes C2 and C3 tyres, the limit is 5 %.

[3] For classes C2 and C3 tyres, $CVal(\mu_{peak})$ is not defined nor applied.

[4] For classes C2 and C3 tyres, no temperature correction is applied when paragraph 1.1.1.2. is applied.

Example 2: Test report of wet grip index for tyres in new state using vehicle method

Test report number:		Test date:	

			Minimum:	Maximum:		Vehicle	
Track:						Brand:	
Texture depth (mm):		Wetted surface temp. (°C):				Model:	
$BFC_{ave,corr,1}$[5]: or BFC_{ave} or $\mu_{peak,corr}$[4]:		Ambient temp (°C):					
$BFC_{ave,corr,2}$[5]:						Type:	
$CVal(BFC_{ave,corr})$:						Year of registration:	
Water depth (mm):						Maximum axle load:	Front Rear

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

No.		1		2		3		4		5	
Brand											
Pattern/trade description		SRTT…								SRTT…	
Size											
Service description											
Reference (test) inflation pressure[1] (kPa)											
Tyre identification											
M+S marking (Y/N)											
3PMSF marking (Y/N)											
Rim											
Front axle pressure (kPa)		left: right:		left: right:		left: right:		left: right:		left: right:	
Rear axle pressure (kPa)		left: right:		left: right:		left: right:		left: right:		left: right:	
Front axle load (kg)		left: right:		left: right:		left: right:		left: right:		left: right:	
Rear axle load (kg)		left: right:		left: right:		left: right:		left: right:		left: right:	
		Braking distance (m)	BFC_i	*Braking distance (m)*	BFC_i	*Braking distance (m)*	BFC_i	*Braking distance (m)*	BFC_i	*Braking distance (m)*	BFC_i
Measurement	1										
	2										
	3										
	4										
	5										
	6										

	7								
	8								
	9								
	10								
$\overline{BFC_{ave}}$									
Standard deviation, σ_{BFC}									
$CV_{BFC} \leq 4\%$ [2]									
$CVal(BFC_{ave}) \leq 5\%$ [3]	✕		✕		✕		✕		
$BFC_{ave,corr}(R)$			✕		✕		✕		✕
$BFC_{adj}(R)$	✕		✕		✕		✕		
f			✕		✕		✕		✕
Wet grip index	✕						✕		
Wetted surface temp. (°C)									
Ambient temp. (°C)									
Remarks									

[1] for classes C2 and C3 tyres, corresponding to the indication of the inflation pressure marked on the sidewall as required by paragraph 4.1. of this Regulation.

[2] For classes C2 and C3 tyres, the limit is 3 %.

[3] For classes C2 and C3 tyres, $CVal(BFC_{ave})$ is not defined nor applied.

[4] For classes C2 and C3 tyres, depending on whether paragraph 1.1.1.1 or 1.1.1.2. applies.

[5] For classes C2 and C3 tyres, $BFC_{ave,corr}$ is not defined nor applied."

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 4000-1:2021,

(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."
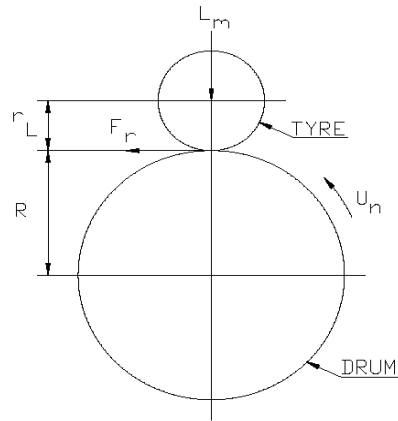
Paragraph 4.5., amend to read:

"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 8855:2011.

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 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 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 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 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 4000-1:2021, 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 2., amend to read:

"2.   Spin traction method for classes C1 and C2 tyres (traction force test per paragraph 6.5. (b) of this Regulation)."

Paragraph 4.5.1., amend to read:

"4.5.1.   Fit the test tyres on rims as per ISO 4209-1:2001 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."

Paragraph 4.8.4., amend to read:

"4.8.4.   Calculation of the relative snow grip index of the tyre

The snow grip index represents the relative performance of the candidate tyre compared to the reference tyre.

$$SG(\text{Tn}) = f \cdot \frac{\overline{AA_{\text{Tn}}}}{wa_{\text{SRTT}}}$$

where $\overline{AA_{Tn}}$ is the arithmetic mean of the average accelerations of the n-th candidate tyre

and *f* is given in the following table

Reference tyre	Factor
SRTT19.5, SRTT22.5	$f = 1.000$
SRTT19.5 siped	$f = 1.570$
SRTT22.5 siped	$f = 1.680$

"

Paragraph 4.9.2., amend to read:

"4.9.2.   Principle of the approach

The principle lies upon the use of a control tyre and 2 different vehicles for the assessment of a candidate tyre in comparison with a reference tyre.

One vehicle can fit the reference tyre and the control tyre, the other the control tyre and the candidate tyre. All conditions are in conformity with paragraph 4.7. above.

The first assessment is a comparison between the control tyre C and the reference tyre. The result (snow grip index SG1) is the relative efficiency of the control tyre compared to the reference tyre.

$$SG1 = f \cdot \frac{\overline{AA_C}}{wa_{SRTT}}$$

The second assessment is a comparison between the candidate tyre Tn and the control tyre C. The result (snow grip index SG2) is the relative efficiency of the candidate tyre compared to the control tyre.

$$SG2 = \frac{\overline{AA_{Tn}}}{\overline{AA_C}}$$

The second assessment is done on the same track as the first one. The air temperature must be in the range of ±5 °C of the temperature of the first assessment. The control tyre set is the same set as the set used for the first assessment.

The snow grip index SG of the candidate tyre compared to the reference tyre is deduced by multiplying the relative efficiencies calculated above:

$$SG = SG1 \cdot SG2$$

"

Annex 7, Appendix 3, Part 5, amend to read:

"5.   Test results: average accelerations (m · s⁻²)

Run number	Specification	SRTT (1st test)	Candidate 1	Candidate 2	Candidate 3	SRTT (2nd test)
1						
2						
3						
4						
5						
6						
Mean						
Standard deviation						
Slip ratio (per cent)						
Coefficient of variation	$CV_{AA} \leq 6\ \%$					
Coefficient of Validation	$CVal_{AA}$(SRTT) $\leq 6\ \%$					

SRTT weighted average			⊠	⊠	⊠	⊠
f			⊠	⊠	⊠	⊠
Snow grip index		1.00				⊠

(1) corresponding to the indication of the inflation pressure marked on the sidewall as required by paragraph 4.1. of this Regulation

(2) refer to single load"

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 – 23."

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 4000-1:2021 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."

Paragraph 2.4.5.1.2., amend to read:

"2.4.5.1.2.   The control tyre shall pass the ice grip index threshold defined in paragraph 6.5.2. of this Regulation."

Annex 9,

Paragraph 2.1.8., amend to read:

"2.1.8.   "*Central zone*" means the area on the tread width defined by the ¾ (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 3)

[…]"

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					

"

_____