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Economic Commission for Europe**Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Noise and Tyres****Seventieth session**

Geneva, 11-13 September 2019

Item 6 (d) of the provisional agenda

Tyres: UN Regulation No. 117 (Tyre rolling resistance, rolling noise and wet grip)**Proposal for an amendment to complement the content of working document ECE/TRANS/WP.29/GRVA/2018/5****Submitted by the experts from the European Tyre and Rim Technical Organisation***

The text reproduced below was prepared by the experts from the European Tyre and Rim Technical Organisation (ETRTO) 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.

GE.19-10378(E)



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I. Proposal

Paragraph 2.1., amend to read:

- “2.1. “*Type of tyre*” means; tyres which do not differ in such essential characteristics as:
- (a) The manufacturer's name;
 - (b) The tyre class (see paragraph 2.4. below);
 - (c) The tyre structure;
 - (d) The category of use: normal tyre, snow tyre and special use tyre;
 - (e) **Whether tyre for use in severe snow conditions or not;**~~For Class C1 tyres:~~
 - ~~(i) In case of tyres submitted for approval of rolling sound emission levels, whether normal or reinforced (or extra load);~~
 - ~~(ii) In case of tyres submitted for approval of performance adhesion on wet surfaces, whether normal tyres or snow tyres with a speed category of Q or below excluding H (≤ 160 km/h) or speed category R and above including H (> 160 km/h);~~
 - (f) For Classes C2 and C3 tyres, **whether traction tyre or not;**
 - ~~(i) In case of tyres submitted for approval of rolling sound emission levels at stage 1, whether M+S marked or not;~~
 - ~~(ii) In case of tyres submitted for approval of rolling sound emission levels at stage 2, whether traction tyre or not;~~
 - (g) The tread pattern (see paragraph 3.2.1. of this Regulation).”

Paragraph 2.18., amend to read:

- “2.18. “*Standard Reference Test Tyre (SRTT)*” means a tyre that is produced, controlled and stored in accordance with the American Society for Testing and Materials (ASTM) standards
- (a) ~~E1136-93 (2003)~~ **E1136 – 17** for the size P195/75R14 **and referred to as “SRTT14”**,
 - (b) ~~F2872 (2014)~~ **F2872 – 16** for the size 225/75R16C **and referred to as “SRTT16C”**,
 - (c) ~~F2871 (2014)~~ **F2871 – 16** for the size 245/70R19.5 **and referred to as “SRTT19.5”**,
 - (d) ~~F2870 (2014)~~ **F2870 – 16** for the size 315/70R22.5 **and referred to as “SRTT22.5”**,
 - (e) **F2493 – 18 for the size P225/60R16 and referred to as “SRTT16”.**”

Paragraph 2.19.1., amend to read:

- “2.19.1. “*Adhesion on wet surfaces*” means the relative braking performance, on a wet surface, of a test vehicle equipped with the candidate tyre in comparison to that of the same test vehicle equipped with a ~~reference tyre~~ **Standard Reference Test Tyre (SRTT)**.”

Paragraph 2.20.1., amend to read:

“2.20.1. **“Rolling resistance F_r ” means the loss of energy (or energy consumed) per unit of distance traveled.**”³”

Paragraph 2.20.3., amend to read:

“2.20.3. **“New test tyre” means a tyre which has not been previously used in a rolling deflected test that raises its temperature above which elevates the tyre’s temperature to higher than that generated in rolling resistance tests, and which has not previously been exposed to a temperature above 40 °C.**”^{5,6}”

Paragraph 2.20.5., amend to read:

“2.20.5. **“Capped inflation” means the process of inflating the tyre to the required cold inflation pressure and allowing the inflation pressure to build up, as the tyre is warmed up while running.**”

Paragraph 2.20.8., amend to read:

“2.20.8. **“Inertia” or “moment of inertia” means the ratio of the torque applied to a rotating body, such as a tyre assembly or machine drum, to the rotational acceleration of this body.**”⁸”

Paragraph 2.20.9., amend to read and delete footnote 9 related to this paragraph:

“2.20.9. **“Measurement ~~reproducibility/repeatability~~ σ_m ” means the measurement precision under conditions where independent test results are obtained with the same method and procedure on identical test items in the same laboratory by the same operator using the same equipment within short intervals of time.**”

Paragraphs 3.1.2. to 3.1.10., amend to read:

3.1.2. Manufacturer’s name **and address**;

3.1.3. **If applicable, name** Name and address of applicant ~~applicant~~ **manufacturer’s representative**;

3.1.4. ~~Address(es) of manufacturing plant(s)~~ **Tyre class (Class C1, C2 or C3) (see paragraph 2.6. of this Regulation)**;

3.1.5. **Category of use (normal, snow, or special)**;

3.1.5.1. **Whether tyre for use in severe snow conditions or not**;

3.1.5.2. **For Class C2 and C3 tyres, whether traction tyre or not**;

3.1.6. **Tyre structure**;

3.1.7. ~~Brand name(s)/trademark(s), trade description(s)/commercial name(s)~~;

3.1.6. ~~Tyre class (Class C1, C2 or C3) (see paragraph 2.4. of this Regulation)~~;

3.1.6.1. ~~Section width range for Class C1 tyres (see paragraph 6.1.1. of this Regulation)~~;

~~Note: This information is required only for approval with regard to rolling sound emission level.~~

3.1.7. ~~————~~ Tyre structure;

3.1.8. ~~————~~ For Class C1 tyres, state whether:

- (a) ~~————~~ Reinforced (or extra load) in case of approval with regard to rolling sound emission level;
- (b) ~~————~~ Speed category symbol "Q" or below (excluding "H") or "R" and above (including "H") in case of tyres *for use in severe snow conditions* for approval with regard to adhesion on wet surfaces;

~~————~~ For Classes C2 and C3 tyres, state whether traction tyre or not;:

- (a) ~~————~~ M+S marked in case of approval with regard to rolling sound emission level at stage 1;
- (b) ~~————~~ Traction in case of approval with regard to rolling sound emission level at stage 2.

3.1.9. ~~————~~ Category of use (normal, snow, or special);

3.1.8.10. A list of tyre size designations covered by this application **and specifying for each brand name/trademark and/or each trade description/commercial name the applicable tyre size designations and service descriptions, adding in case of Class C1 tyres whether "reinforced" (or "extra load") or not.**"

Paragraph 3.4., amend to read:

"3.4. With regard to the application, testing may be confined to a **representative tyre size of the type of tyre worst case selection**, at the discretion of the Type Approval Authority ~~or designated Technical Service.~~"

Paragraph 6.2., amend to read:

"6.2. The wet grip performance will be based on a procedure that compares either peak brake force coefficient ("pbfc") or mean fully developed deceleration ("mfdd") against values achieved by a ~~standard reference test tyre~~ **Standard Reference Test Tyre (SRTT)**. The relative performance shall be indicated by a wet grip index (G)."

Paragraph 6.4., amend to read:

"6.4. In order to be classified as a "snow tyre for use in severe snow conditions" the tyre shall meet the performance requirements of paragraph 6.4.1. below. The tyre shall meet these requirements based on a test method of Annex 7 by which:

- (a) The mean fully developed deceleration ("mfdd") in a braking test,
- (b) Or alternatively an average traction force in a traction test,
- (c) Or alternatively the average acceleration in an acceleration test

of the candidate tyre is compared to that of a ~~standard reference tyre~~ **Standard Reference Test Tyre (SRTT)**.

The relative performance shall be indicated by a snow **grip** index."

Paragraph 6.4.1.1., amend to read:

"6.4.1.1. Class 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. = C1—SRTT14 SRTT14	Ref. = C2—SRTT16C	Ref. = C1—SRTT14 SRTT14	Ref.s = C3N—SRTT19.5 C3W—SRTT22.5 SRTT19.5, SRTT22.5
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”

Insert a new paragraph 12.9 to read:

"12.9. Until 3 months after the date of entry into force of Supplement [11] to the 02 series of amendments to this Regulation, Contracting Parties applying this Regulation can continue to grant type approvals according to the 02 series of amendments to this Regulation, without taking into account the provisions of Supplement [11]."

Annex 1,

Item 3., amend to read:

“... ”

3. "Tyre class" and "category of use" of the type of tyre:

Items 3.1. and 3.2., renumber to 4.1. and 4.2.

Insert new items 4. and 5. to read:

"4. "Category of use" of the type of tyre:"

4.1.3.1. Snow tyre for use in severe snow conditions (Yes/No)²

4.2.3.2. Traction tyre (Yes/No)²

5. Tyre structure:"

Items 4. to 14.2., renumber as 6. to 16.2., respectively.

Items 8.1. to 8.4. (new), amend to read:

~~8.1.6.1.~~ Sound level of the representative tyre size, see paragraph **2.7. 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/h²

~~8.2.6.2.~~ Wet adhesion level of the representative tyre size, see paragraph **2.7. 2.5.** of this Regulation, as per item 7. of the test report in the appendix to Annex 5: (G) using the vehicle or trailer method²

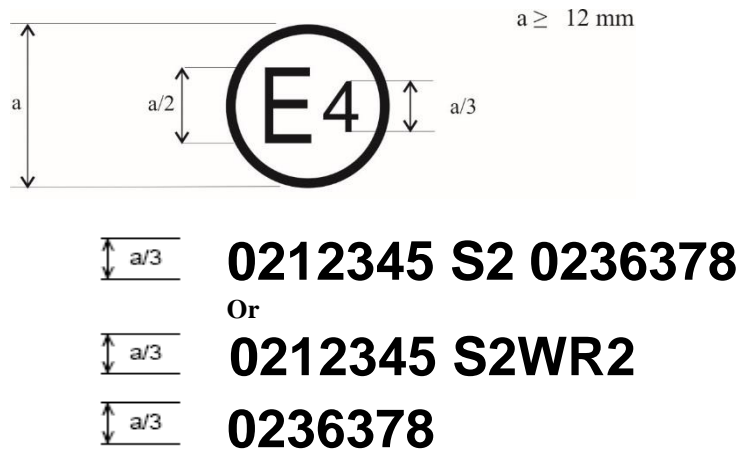
~~8.3. 6.3.~~ Rolling resistance level of the representative tyre size, see paragraph **2.7. 2.5.** of this Regulation, as per item 7. of the test report in Appendix 1 to Annex 6.....

8.4.6.4. Snow grip level of the representative tyre size, see paragraph ~~2.7.2.5.~~ of Regulation No. 117, as per item 7. of the test report in the appendix¹³ to Annex 7:..... (Snow grip index) using the brake on snow method², spin traction method² or acceleration method.²”

Item 16.2. (new), amend to read:

~~“16.2.14.2.~~ A list of tyre size designations: Specify for each brand name/trademark and/or each trade description/Commercial name the list of tyre size designations **and service descriptions**, adding in case of Class C1 tyres ~~the mark whether~~ "reinforced" (or "extra load") **or not** ~~or the speed symbol of snow tyres or in the case of tyres of Classes C2 and C3, the mark "traction", if so required by paragraph 3.1. of this Regulation.”~~

Annex 2, Appendix 2, example 2, figure, amend to read:



Annex 3,

Paragraph 1.1., amend to read:

“1.1. Acoustic measurements

The sound level meter or the equivalent measuring system, including the windscreen recommended by the manufacturer shall meet or exceed the requirements of Type 1 instruments in accordance with IEC ~~61672-1:2013~~~~60651:1979/A1:1993, second edition.~~”

Paragraph 1.1.1., amend to read:

“1.1.1. Calibration

At the beginning and at the end of every measurement session, the entire measurement system shall be checked by means of a sound calibrator that fulfils the requirements for sound calibrators of at least precision Class 1 according to IEC ~~60942:2003~~~~60942:1988.~~ Without any further adjustment the difference between the readings of two consecutive checks shall be less than or equal to 0.5 dB(A). If this value is exceeded, the results of the measurements obtained after the previous satisfactory check shall be discarded.”

Annex 3, paragraphs 4.2 to 4.5., amend to read and delete paragraph 4.5.:

“4.2.4.3. Temperature correction

For Class C1 and Class C2 tyres, the measured rolling sound levels L_i shall be normalized to a test surface reference temperature ϑ_{ref} by applying a temperature correction, utilizing the temperature ϑ at the time of the respective sound recording and according to the following formula:

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

where:

ϑ = the measured test surface temperature,

$\vartheta_{\text{ref}} = 20\text{ }^\circ\text{C}$,

For Class C1 tyres, the coefficient K is:

– 0.03 dB(A)/ $^\circ\text{C}$ when $\vartheta > \vartheta_{\text{ref}}$ and

– 0.06 dB(A)/ $^\circ\text{C}$ when $\vartheta < \vartheta_{\text{ref}}$.

For Class C2 tyres, the coefficient K is $-0.02\text{ dB(A)/}^\circ\text{C}$

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 $5\text{ }^\circ\text{C}$ 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 $L_i(\vartheta)$.

There will be no temperature correction for Class C3 tyres.

4.3.4.2.

Regression analysis of rolling sound measurements

The tyre-road rolling sound level $L_R(\vartheta_{\text{ref}})$ in dB(A) is determined by a regression analysis according to:

$$L_R(\vartheta_{\text{ref}}) = \bar{L} - a \cdot \bar{\tau}$$

where:

\bar{L} is the mean value of the temperature-corrected rolling sound levels $L_i(\vartheta_{\text{ref}})$, measured in dB(A):

$$\bar{L} = \frac{1}{n} \sum_{i=1}^n L_i(\vartheta_{\text{ref}})$$

n is the measurement number ($n \geq 16$),

$\bar{\tau}$ is the mean value of logarithms of speeds V_i :

$$\bar{\tau} = \frac{1}{n} \sum_{i=1}^n \tau_i \quad \text{with} \quad \tau_i = \log_{10} \left(\frac{V_i}{V_{\text{ref}}} \right)$$

a is the slope of the regression line in dB(A):

$$a = \frac{\sum_{i=1}^n [(\tau_i - \bar{\tau})(L_i(\vartheta_{\text{ref}}) - \bar{L})]}{\sum_{i=1}^n (\tau_i - \bar{\tau})^2}$$

4.4.

In order to take account of any measuring instrument inaccuracies, the temperature corrected tyre rolling sound level $L_R(\vartheta_{\text{ref}})$ in dB(A) shall be reduced by 1 dB(A) and then rounded down to the nearest lower whole value to obtain the final result.”

Annex 3 - Appendix I, amend to read:

“...
 Part 1 – Report
 ...

2. Name and address of ~~applicant~~**manufacturer**:

...

4. ~~Manufacturer and brand~~**Brand name and** trade description:

...

6. Category of use:

6.1. Tyre for use in severe snow conditions (Yes/No)¹

6.2. Traction tyre (Yes/No)¹

7. Sound level according to paragraphs 4.4. ~~and 4.5.~~ of Annex 3: dB(A)
 at reference speed of 70/80 km/h¹

...

Part 2 – Test data
 ...

...

4.3. Reference (**test**) inflation pressure²: kPa

...

5. Valid test results:

Run No.	Test speed km/h	Direction of run	Sound level left ^{1a} measured dB(A)	Sound level right ^{1a} measured dB(A)	Air temp. °C	Track temp. °C	Sound level left ^{1a} temp. corrected ^b dB(A)	Sound level right ^{1a} temp. corrected ^b dB(A)	Comments
1									
2									
3									
4									
5									
6									
7									
8									

^{1a} Relative to the vehicle.

^b Omit, if regression according to paragraph 4.3 of Annex 3 is made on the uncorrected rolling sound level values.

5.1. Regression line slope:

5.2. Sound level ~~after temperature correction~~ according to paragraph 4.3. of Annex 3:
 dB(A)”

Annex 3 - Appendix I, add a new footnote 2:

“² for 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”

Annex 5, part A,

Paragraphs 1.4 and 1.5., delete:

"1.4. ~~ASTM E 1136 93 (Reapproved 2003), Standard Specification for a Radial Standard Reference Test Tyre P195/75R14.~~

1.5. ~~ASTM F 2493 08, Standard Specification for a Radial Standard Reference Test Tyre P225/60R16."~~

Paragraph 2.4., amend to read:

"2.4. "Reference tyre(s) (R)" means a tyre or a tyre set ~~that has the characteristics indicated in the ASTM F 2493 08 and referred to as the~~ of Standard Reference Test Tyres **SRTT16**."

Paragraphs 2.12. and 2.13., delete:

"2.12. ~~"SRTT14" means the ASTM E 1136 93 (Reapproved 2003), Standard Specification for a Radial Standard Reference Test Tyre P195/75R14.~~

2.13. ~~"SRTT16" means the ASTM F 2493 08, Standard Specification for a Radial Standard Reference Test Tyre P225/60R16."~~

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~~ **This** method uses the ~~reference tyre that has the characteristics indicated in the ASTM E 1136 93 (Reapproved 2003) and referred to as~~ **Standard Reference Test Tyre SRTT14**.

~~The average~~ **Perform at least six (6) valid measurements of the** peak braking force coefficient ($\mu_{\text{peak,ave}}$) ~~of~~ **with the SRTT14 using the trailer towed by a vehicle or a tyre test vehicle test procedure as specified in clause 4.2. shall be 0.7 +/- 0.1 (at 65 km/h and 180 kPa).**

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

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

~~Temperature correction = 0.0035 · (t - 20)~~

$$\mu_{\text{peak,corr}} = \mu_{\text{peak,ave}} + 0.0035 \cdot (t - 20)$$

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

The temperature corrected average peak braking force coefficient ($\mu_{\text{peak,corr}}$) shall be 0.7 ± 0.1."

Paragraph 4.1.6.2., first sentence, amend to read:

“ The AD coefficient of variation CV_{AD} is calculated as follows:

~~(Standard deviation / Average) x 100~~

$$CV_{AD} = 100\% \cdot \frac{\sigma_{AD}}{AD}$$

where

$\sigma_{AD} = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (AD_i - \overline{AD})^2}$ denotes the corrected sample standard deviation and

\overline{AD} the arithmetic mean of the Average Decelerations (AD_i) of N test runs.”

Paragraph 4.1.7.3., amend to read:

"4.1.7.3. Storage and preservation

It is necessary that all the tyres of a control tyre set have been stored in the same conditions. As soon as the control tyre set has been tested in comparison with the reference tyre, the specific storage conditions defined in ASTM E 1136-93 (Reapproved 2003) E1136 – 17 shall be applied."

Paragraph 4.2.8.2., first sentence, amend to read:

“ The μ_{peak} coefficient of variation CV_{μ} is calculated as follows:

(Standard deviation / Average) x 100

$$CV_{\mu} = 100\% \cdot \frac{\sigma_{\mu}}{\mu_{\text{peak}}}$$

where

$\sigma_{\mu} = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (\mu_{\text{peak},i} - \overline{\mu_{\text{peak}}})^2}$ denotes the corrected sample standard deviation and

$\overline{\mu_{\text{peak}}}$ the arithmetic mean of the peak braking force coefficients ($\mu_{\text{peak},i}$) of N test runs.”

Annex 5, part B,

Paragraph 1.1.1., amend to read:

"1.1.1. Standard Reference Test Tyre (SRTT) method

This method uses the Standard Reference Test Tyre SRTT14.

The average Perform at least six (6) valid measurements of the peak braking force coefficients ($\mu_{\text{peak,ave}}$) of with the ASTM E1136-93 (reapproved 2003) reference tyre Standard Reference Test Tyre SRTT14 (Test method using a—the trailer or a—special purpose tyre test evaluation vehicle test procedure as specified in clause 2.1) shall be 0.7 ± 0.1 (at 65 km/h and 180 kPa).

The **average ($\mu_{\text{peak,ave}}$) of the measured peak braking force coefficients values** shall be corrected for the effects of temperature as follows:

$$pbfc = pbfc (\text{measured}) + 0.0035 \cdot (t - 20)$$

$$\mu_{\text{peak,corr}} = \mu_{\text{peak,ave}} + 0.0035 \cdot (t - 20)$$

where " t " is the wetted track surface temperature in degrees Celsius.

The temperature corrected average peak braking force coefficient ($\mu_{\text{peak,corr}}$) shall be 0.7 ± 0.1 .

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

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

Paragraph 1.4., amend to read:

"1.4. In order to cover the range of the tyre sizes fitting the commercial vehicles, ~~three the~~ Standard Reference Testing Tyres (SRTT) sizes shall be used to measure the relative wet index:

(a) ~~SRTT 315/70R22.5 LI=154/150, ASTM F2870~~

(b) ~~SRTT 245/70R19.5 LI=136/134, ASTM F2871~~

(c) ~~SRTT 225/75 R 16 C LI=116/114, ASTM F2872~~

The ~~three standard reference testing tyre sizes~~ shall be used to measure the relative wet index as shown in the following table:

For C3 tyres	
Narrow family S _{Nominal} < 285 mm	Wide family S _{Nominal} ≥ 285 mm
SRTT 245/70R19.5 LI=136/134 SRTT19.5	SRTT 315/70R22.5 LI=154/150 SRTT22.5
For C2 tyres	
SRTT 225/75 R 16 C LI=116/114 SRTT16C	
S _{Nominal} = Tyre nominal section width	

"

Paragraph 2.1.2.1., amend to read:

"... P_r = Inflation pressure **corresponding to the the indication of the inflation pressure** marked on the sidewall **as required by paragraph 4.1. of this Regulation**. If P_r is not marked on the sidewall refer to the specified pressure in applicable tyre standards manuals corresponding to maximum load capacity for single applications. ..."

Paragraph 2.1.2.12., amend to read:

"... ~~Analogic~~**Analogue** signals should be filtered to remove noise. ..."

Paragraph 2.1.2.13., amend to read:

"... For the reference tyre:

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**, "~~standard deviation/average x 100~~" of the reference tyre is higher than five per cent, discard all data and repeat the test for this reference tyre.

For the candidate tyres:

The coefficients of variation CV_{μ} (standard deviation/average $\times 100$) are calculated for all the candidate tyres **according to the formula in 4.2.8.2. of part (A) of this Annex**. If one coefficient of variation is greater than five per cent, discard the data for this candidate tyre and repeat the test. ...”

Paragraph 2.2.2.3., amend to read:

“... P_r = Inflation pressure **corresponding to the indication of the inflation pressure** marked on the sidewall **as required by paragraph 4.1. of this Regulation**. ~~If P_r is not marked on the sidewall refer to the specified pressure in applicable tyre standards manuals corresponding to maximum load capacity for single applications.~~

...

P_r = Inflation pressure **corresponding to the indication of the inflation pressure** marked on the sidewall **as required by paragraph 4.1. of this Regulation**.

~~If P_r is not marked on the sidewall refer to the specified pressure in applicable tyre standard manuals corresponding to maximum load capacity for single applications.~~

Check the tyre pressure just prior to testing at ambient temperature.”

Paragraph 2.2.2.8.1., amend to read:

“... All conditions are in conformity with paragraphs ~~2.2.1.2.~~ **2.2.1.** to 2.2.2.5. above.”

Annex 5 – Appendix, Example 1, amend to read:

“... ”

No.	1	2	3	4	5	6	7	8	9	10
Size										
Service description										
Reference (test) inflation pressure⁽¹⁾ (kPa)										
Tyre identification										
...										
Wet Grip Index										
Surface temp. (°C)										
...										

“...
⁽¹⁾ **for 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**”

Annex 5 – Appendix, Example 2, amend to read:

“... ”

No.	1	2	3	4	5
Brand name	Uniroyal	TYRE B	TYRE C	TYRE D	Uniroyal
Pattern/Trade description	ASTM F 2493 SRTT16	PATTERN B	PATTERN C	PATTERN D	ASTM F 2493 SRTT16
Size	P225/60R16	SIZE B	SIZE C	SIZE D	P225/60R16
Service description	97S	LI/SS	LI/SS	LI/SS	97S
Reference (test) inflation pressure ⁽¹⁾ (kPa)					
Tyre identification	XXXXXXXXXX	YYYYYYYYYY	ZZZZZZZZZ	NNNNNNNNN	XXXXXXXXXX

...
(1) for 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”

Annex 6,

Paragraph 2.2., amend to read:

“2.2. Measuring rim (~~see Appendix 2~~)

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,
- (b) For Class 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 2.4.3., delete.

Paragraph 3.1, amend to read:

“3.1. General

The test consists of a measurement of rolling resistance in which the tyre is inflated **to the required cold inflation pressure** and the inflation pressure allowed to build up, i.e., "capped ~~air~~-inflation".”

Paragraph 3.2, amend to read:

“3.2. Test speeds

The **rolling resistance coefficient** value shall be obtained at the appropriate drum speed specified in Table 1.”

Table 1, amend to read:

"Table 1

Test Speeds (in km/h)

Tyre Class	C1	C2 and C3	C3
Load index	All	LI ≤ 121	LI > 121
Speed symbol	All	All	J (100 km/h) and lower or tyres not marked with speed symbol and higher

<i>Tyre Class</i>	<i>C1</i>	<i>C2 and C3</i>	<i>C3</i>
Speed Test speed (km/h)	80	80	60
			80

Table 2, amend to read:

"Table 2

Test loads and inflation pressures

<i>Tyre Class</i>	<i>C1^(a)</i>		<i>C2, C3</i>
	<i>Standard load</i>	<i>Reinforced or extra load</i>	
Load % of maximum load capacity as indicated by the load capacity index	80	80	85 ^(b) (% of refer to single load application)
Inflation pressure kPa	210	250	Test inflation pressure corresponding to the indication of the inflation pressure marked on the sidewall as required by paragraph 4.1. of this Regulation. Corresponding to maximum load capacity for single application^(c)

Note: The inflation pressure shall be capped with the accuracy specified in paragraph 4. of Appendix 1 to this annex.

^(a) For those passenger car tyres belonging to categories which are not shown in ISO 4000 1:2010, the inflation pressure shall be the inflation pressure recommended by the tyre manufacturer, corresponding to the maximum tyre load capacity, reduced by 30 kPa.

^(b) As a percentage of single load, or 85 per cent of maximum load capacity for single application specified in applicable tyre standards manuals if not marked on tyre.

^(c) Inflation pressure marked on sidewall, or if not marked on sidewall, as specified in applicable tyre standards manuals corresponding to maximum load capacity for single application.

Paragraph 4.6.2., amend to read:

“4.6.2. Deceleration method

The deceleration method follows the procedure below:

- (a) Remove the tyre from the test surface **while running at a speed greater than test speed;**
- (b) Record the deceleration of the test drum $\Delta\omega_{D0}/\Delta t$ and that of the unloaded tyre $\Delta\omega_{T0}/\Delta t$ or record the deceleration of the test drum j_{D0} and that of the unloaded tyre j_{T0} in exact or approximate form in accordance with paragraph 3.5. above.

The speed range for measurement includes the test speed and does not exceed 10 km/h above and 10 km/h below the test speed.”

Paragraph 5.1.5., amend to read:

“5.1.5. Deceleration method

Calculate the parasitic losses F_{pl} , in newton.

$$F_{pl} = \frac{I_D}{R} \left(\frac{\Delta\omega_{D0}}{\Delta t_0} \right) + \frac{I_T}{R_r} \left(\frac{\Delta\omega_{T0}}{\Delta t_0} \right)$$

where: ...

$\Delta\omega_{D0}$ is the test drum angular speed **increment, drum** without tyre, in radians per second,

$\Delta\omega_{T0}$ is the tyre angular speed **increment**, unloaded tyre, in radian per second. ...”

Paragraph 5.2.1., amend to read:

“5.2.1. General

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

Paragraph 6.4., amend to read:

“6.4. Measurement result

Where n measurements are greater than 1, if required by paragraph 4.6. above, the measurement result shall be the average of the C_r values obtained for the n measurements, after the corrections described in paragraphs 6.2. and 6.3. above have been made. **Following this method, final C_r results shall be expressed in N/kN and rounded to the first decimal place according to ISO 80000-1:2009, B.3, rule B.**”

Paragraph 6.5., amend to read:

“6.5. **Measurement Repeatability**

6.5.1. The measurement repeatability σ_m shall be estimated by measuring the rolling resistance coefficient n times (where $n \geq 3$), on a single tyre using the test procedure as described in paragraph 4. of this Annex, as follows:

$$\sigma_m = \sqrt{\frac{1}{n-1} \sum_{j=1}^n (C_{r,j} - \bar{C}_r)^2}$$

where:

$C_{r,j}$ ($C_{r,i}$) denotes the rolling resistance coefficient measured in measurement j (i)

$\bar{C}_r = \frac{1}{n} \sum_{i=1}^n C_{r,i}$ denotes the arithmetic mean of the rolling resistance coefficients $C_{r,i}$.

6.5.2. The laboratory shall ensure that, ~~based on a minimum of three measurements, the machine maintains~~ the following values of **the measurement repeatability** σ_m , ~~as measured on a single tyre~~ **are maintained for the machine:**

$$\sigma_m \leq 0.075 \text{ N/kN} \quad \text{for tyres of Classes C1 and C2}$$

$$\sigma_m \leq 0.06 \text{ N/kN} \quad \text{for tyres of Class C3}$$

If the above requirement for **the measurement repeatability** σ_m is not met, the following formula shall be applied to determine the minimum number of measurements n (rounded to the immediate superior integer value) that are required by the machine to qualify for conformance with this Regulation.

$$n = \left(\frac{\sigma_m}{x}\right)^2$$

where:

$$x = 0.075 \text{ N/kN} \quad \text{for tyres of Classes C1 and C2}$$

$$x = 0.06 \text{ N/kN} \quad \text{for tyres of Class C3}$$

If a tyre needs to be measured several times, the tyre/wheel assembly shall be removed from the machine between the successive measurements.

~~If the removal/refitting operation duration is less than 10 minutes, the warm-up durations indicated in paragraph 4.3. above may be reduced to:~~

- ~~(a) — 10 minutes for tyres of Class C1;~~
- ~~(b) — 20 minutes for tyres of Class C2;~~
- ~~(c) — 30 minutes for tyres of Class C3.”~~

Annex 6 - Appendix 1,

Paragraph 1, amend to read:

“1. Purpose

The limits specified in this ~~annex~~**appendix** are necessary, **but may not be sufficient**, in order to achieve suitable levels of repeatable test results, which can also be correlated among various test laboratories. ~~These tolerances are not meant to represent a complete set of engineering specifications for test equipment; rather, they should serve as guidelines for achieving reliable test results.”~~

Paragraph 2.2, amend to read:

“2.2. Run-out

It is recommended that the run-out shall meet the following criteria:

(i) for C1 tyres, C2 tyres and for C3 tyres with LI ≤ 121:

- (a) Maximum radial run-out: 0.5 mm,
- (b) Maximum lateral run-out: 0.5 mm;”

(ii) for C3 tyres with LI ≥ 122:

- (a) Maximum radial run-out: 2.0 mm,**
- (b) Maximum lateral run-out: 2.0 mm.”**

Paragraph 3.1., amend to read:

“3.1. Load application

The direction of tyre loading application shall be kept normal to the test surface and shall pass through the wheel centre within

- (a) 1 mrad for the force ~~method and deceleration methods~~;
- (b) 5 mrad for the torque, **power** and ~~power deceleration~~ methods.”

Paragraph 4.(a), amend to read:

“(a) Tyre loading:

- (i) For **C1 tyres, C2 tyres and for C3 tyres with $LI \leq 121$** : ± 20 N or ± 0.5 per cent, whichever is greater;
- (ii) For **C3 tyres with $LI \geq 122$** : ± 45 N or ± 0.5 per cent whichever is greater;”

Paragraph 5., amend to read:

“... ”

Parameter	C1 tyres, C2 tyres and C3 tyres with Load Index $LI \leq 121$	C3 tyres with Load Index $LI \geq 122$
Tyre load	± 10 N or ± 0.5 % ^(a)	± 30 N or ± 0.5 % ^(a)

“... ”

Paragraph 7., amend to read:

“7. Test surface roughness

The roughness, measured laterally, of the **new** smooth steel drum surface shall have a maximum centreline average height value of $6.3 \mu\text{m}$. **This value should be reconfirmed in case visible damage should occur. ...**”

Annex 6 - Appendix 2, amend to read:

“Annex 6 - Appendix 2

~~Measuring rim width~~

1. ~~Class C1 tyres~~

~~The measuring rim width R_m is equal to the product of the nominal section width S_N and the coefficient K_2 :~~

$$R_m = K_2 \times S_N$$

~~rounded to the nearest standardized rim, where K_2 is the rim/section width ratio coefficient. For tyres mounted on 5° drop centre rims with a nominal diameter expressed by a two figure code:~~

$$K_2 = 0.7 \text{ for nominal aspect ratios } 95 \text{ to } 75$$

$$K_2 = 0.75 \text{ for nominal aspect ratios } 70 \text{ to } 60$$

$$K_2 = 0.8 \text{ for nominal aspect ratios } 55 \text{ and } 50$$

$$K_2 = 0.85 \text{ for nominal aspect ratio } 45$$

$K_2 = 0.9$ for nominal aspect ratios 40 to 30

$K_2 = 0.92$ for nominal aspect ratios 20 and 25

2. Class C2 and C3 tyres

The measuring rim width R_m is equal to the product of the nominal section width S_N , and the coefficient K_4 :

$R_m = K_4 \times S_N$ rounded to the nearest standardized rim width.

Table 1
Coefficients for determining measuring rim width

Tyre structure code	Type of rim	Nominal aspect ratio H/S	Measuring rim/section ratio K_4
B, D, R	5° tapered	100 to 75	0.70
		70 and 65	0.75
		60	0.75
		55	0.80
		50	0.80
		45	0.85
		40	0.90
	15° tapered (drop centre)	90 to 65	0.75
		60	0.80
		55	0.80
		50	0.80
		45	0.85
		40	0.85

Note: — Other factors may be established for new tyre concepts (structures).

(omitted)”

Annex 6 - Appendix 3, amend to read:

“... ”

Part 1: Report

...

2. Name and address of applicant ~~manufacturer~~:

...

4. ~~Manufacturer and brand~~ Brand name ~~and~~ trade description:

...

6. Category of use:

6.1. Tyre for use in severe snow conditions (Yes/No)²

Part 2: Test data

...

3.3. Reference (test) inflation pressure⁽¹⁾: kPa”

Annex 6 - Appendix 3, add a footnote (1):

“(1) for 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 as indicated on the sidewall.”

Annex 7,

Paragraph 3.4.1.1., amend to read:

“3.4.1.1. For each tyre and each braking test, the **arithmetic mean \bar{a}** and **corrected sample standard deviation σ_a** of the mfdd shall be computed and reported.

The coefficient of variation CV_a of a tyre braking test shall be computed as:

$$CV_a = 100\% \cdot \frac{\sigma_a}{\bar{a}}$$

with

$$\sigma_a = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (a_i - \bar{a})^2}$$

$$CV(\text{tyre}) = \frac{\text{Std.dev}(\text{tyre})}{\text{Mean}(\text{tyre})} \text{ „}$$

Paragraph 3.4.1.2., amend to read:

“3.4.1.2 Weighted averages wa_{SRTT} of two successive tests of the SRTT shall be computed taking into account the number of candidate tyres in between:

In the case of the order of testing R1 – T – R2, the weighted average of the SRTT to be used in the comparison of the performance of the candidate tyre shall be taken to be:

$$wa_{SRTT} = \frac{1}{2}(\bar{a}_{R1} + \bar{a}_{R2})$$

$$wa(SRTT) = (R_1 + R_2)/2$$

Where:

\bar{a}_{Rn} is the arithmetic mean of the mfdd for the n-th test of the SRTT.

R_1 is the mean fully developed deceleration for the first test of the SRTT and R_2 is the mean mfdd for the second test of the SRTT.

In the case of the order of testing R1 – T1 – T2 – R2, the weighted averages wa_{SRTT} (wa) of the SRTT to be used in the comparison of the performance of the candidate tyre shall be taken to be:

$$wa_{SRTT} = \frac{2}{3}\bar{a}_{R1} + \frac{1}{3}\bar{a}_{R2} \quad wa(SRTT) = 2/3 R_1 + 1/3 R_2 \text{ for comparison with the candidate tyre T1; and:}$$

$$wa_{SRTT} = \frac{1}{3}\bar{a}_{R1} + \frac{2}{3}\bar{a}_{R2} \quad wa(SRTT) = 1/3 R_1 + 2/3 R_2 \text{ for comparison with the candidate tyre T2.”}$$

Paragraph 3.4.1.3., amend to read:

“3.4.1.3. The snow grip index (SG) ~~in per cent~~ of a candidate tyre **Tn** shall be computed as **the quotient of the arithmetic mean $\overline{a_{Tn}}$ of the mfdd of the tyre Tn and the applicable weighted average wa_{SRTT} of the SRTT:**

$$SG(Tn) = \frac{\overline{a_{Tn}}}{wa_{SRTT}}$$

~~Snow Grip Index (candidate) = $\frac{\text{Mean (candidate)}}{wa (SRTT)}$ ”~~

Paragraph 3.4.2., amend to read:

“3.4.2. Statistical validations

The sets of repeats of measured or computed mfdd for each tyre should be examined for normality, drift, eventual outliers.

The consistency of the **arithmetic means \overline{a} and ~~standard deviations corrected sample standard deviations σ_a~~** of successive braking tests of SRTT should be examined.

~~The means of two successive SRTT braking tests~~ **In addition and in order to take in account possible test evolution, the coefficient of validation $CVal_a(SRTT)$ is calculated on the basis of the average values of any two consecutive groups of the minimum 6 runs of the Standard Reference Test Tyre according to**

$$CVal_a(SRTT) = 100\% \times \left| \frac{\overline{a_{R2}} - \overline{a_{R1}}}{\overline{a_{R1}}} \right|$$

The coefficient of validation $CVal_a(SRTT)$ shall not differ by more than 5 per cent.

The coefficient of variation CV_a , **as defined in paragraph 3.1.1. of this annex**, of any braking test shall be less than 6 per cent.

If those conditions are not met, tests shall be performed again after re-grooming the test course.”

Paragraph 4.1., amend to read:

“4.1. ~~According to the definition of C3 tyres reported into paragraph 2.4.3. above, the additional classification for the purpose of this test method only applies:~~

- ~~(a) C3 Narrow (C3N), when the C3 tyre nominal section width is lower than 285 mm~~
- ~~(b) C3Wide (C3W), when the C3 tyre nominal section width is greater or equal to 285 mm(omitted)”~~

Paragraph 4.2., amend to read:

“4.2. Methods for measuring snow grip index

Snow performance is based on a test method by which the average acceleration in an acceleration test, of a candidate tyre is compared to that of a standard reference tyre.

The relative performance shall be indicated by a snow grip index (SG).

When tested in accordance with the acceleration test in paragraph 4.7. below, the average acceleration of a candidate snow tyre shall be at least 1.25 compared to one of the two equivalent SRTTs—~~ASTM F 2870~~**Standard Reference Test Tyres SRTT19.5 and ASTM F 2871 SRTT22.5.**”

Paragraph 4.7., amend to read:

“4.7. Acceleration on snow test procedure for snow grip index of **Class C3**~~Classes C3N and C3W~~”

Paragraph 4.7.5.4., amend to read:

“4.7.5.4. For every candidate tyre and the standard reference tyre, the acceleration test runs shall be repeated a minimum of 6 times and the coefficients of variation CV_{AA} (~~standard deviation/average*100~~) ~~calculated for minimum 6 valid runs on the distance~~ shall be lower than or equal to 6 per cent. **CV_{AA} shall be calculated for minimum 6 valid runs according to**

$$CV_{AA} = 100\% \cdot \frac{\sigma_{AA}}{\overline{AA}}$$

where

$\sigma_{AA} = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (AA_i - \overline{AA})^2}$ denotes the corrected sample standard deviation and

\overline{AA} the arithmetic mean of the Average Accelerations (AA_i) of N test runs.”

Paragraph 4.8.1., amend to read:

“4.8.1. Calculation of the average acceleration AA

Each time the measurement is repeated, the average acceleration AA (~~m·s⁻²~~) ($\text{m} \cdot \text{s}^{-2}$) is calculated by

$$AA = \frac{S_f^2 - S_i^2}{2D}$$

Where D (m) is the distance covered between the initial speed S_i (~~m·s⁻¹~~) ($\text{m} \cdot \text{s}^{-1}$) and the final speed S_f (~~m·s⁻¹~~) ($\text{m} \cdot \text{s}^{-1}$).”

Paragraphs 4.8.2. and 4.8.3., amend to read:

“4.8.2. Validation of results

For the candidate tyres:

The coefficient of variation CV_{AA} of the average acceleration is calculated **according to the formula in 4.7.5.4. of this Annex** for all the candidate tyres. If one coefficient of variation is greater than 6 per cent, discard the data for this candidate tyre and repeat the test.

~~$$\text{coefficient of variation} = \frac{\text{stdev}}{\text{average}} \times 100$$~~

For the reference tyre:

If the coefficient of variation CV_{AA} of the average acceleration “ AA ” **calculated according to the formula in 4.7.5.4. of this Annex** for each group of min 6 runs of the reference tyre is higher than 6 per cent, discard all data and repeat the test for all tyres (the candidate tyres and the reference tyre).

In addition and in order to take in account possible test evolution, the coefficient of validation $CVal_{AA}(SRTT)$ is calculated on the basis of the average values of any two consecutive groups of **minimum** 6 runs of the reference tyre **according to**

$$CVal_{AA}(SRTT) = 100\% \times \left| \frac{\overline{AA_2} - \overline{AA_1}}{\overline{AA_1}} \right|$$

If the coefficient of validation is greater than 6 per cent, discard the data for all the candidate tyres and repeat the test.

~~$$\text{coefficient of validation} = \left| \frac{\text{Average2} - \text{Average1}}{\text{Average1}} \right| \times 100$$~~

4.8.3. Calculation of the "average AA" **weighted averages**

~~If R_1 is the average of the "AA" values in the first test of the reference tyre, R_2 is the average of the "AA" values in the second test of the reference tyre, the following operations are performed, **Weighted averages w_{SRTT} of the average accelerations of two successive tests of the SRTT are calculated according to Table 1:**~~

Table 1

<i>If the number of sets of candidate tyres between two successive runs of the reference tyre is:</i>	<i>and the set of candidate tyres to be qualified is:</i>	<i>then "R_a" w_{SRTT} is calculated by applying the following:</i>
1 R – T1 – R	T1	$w_{SRTT} = \frac{1}{2}(\overline{AA_{R1}} + \overline{AA_{R2}})$ $R_a = 1/2 (R_1 + R_2)$
2 R – T1 – T2 – R	T1 T2	$w_{SRTT} = \frac{2}{3}\overline{AA_{R1}} + \frac{1}{3}\overline{AA_{R2}}$ $R_a = 2/3 R_1 + 1/3 R_2$ $w_{SRTT} = \frac{1}{3}\overline{AA_{R1}} + \frac{2}{3}\overline{AA_{R2}}$ $R_a = 1/3 R_1 + 2/3 R_2$
3 R – T1 – T2 – T3 – R	T1 T2 T3	$w_{SRTT} = \frac{3}{4}\overline{AA_{R1}} + \frac{1}{4}\overline{AA_{R2}}$ $R_a = 3/4 R_1 + 1/4 R_2$ $w_{SRTT} = \frac{1}{2}(\overline{AA_{R1}} + \overline{AA_{R2}})$ $R_a = 1/2 (R_1 + R_2)$ $w_{SRTT} = \frac{1}{4}\overline{AA_{R1}} + \frac{3}{4}\overline{AA_{R2}}$ $R_a = 1/4 R_1 + 3/4 R_2$

where $\overline{AA_{Rn}}$ is the arithmetic mean of the average accelerations in the n-th test of the Standard Reference Test Tyre "T_a" (a = 1, 2, ...) is the average of the AA values for a test of a candidate tyre."

Paragraph 4.8.4., delete.

Paragraph 4.8.5., renumber as 4.8.4. and amend to read:

“**4.8.4.4.8.5.** 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.

$$SG(T_n) = \frac{\overline{AA}_{T_n}}{wa_{SRTT}}$$

where \overline{AA}_{T_n} is the arithmetic mean of the average accelerations of the n-th candidate tyre

~~$$\text{Snow Grip Index} = \frac{AFC(T)}{AFC(R)}$$~~

Paragraph 4.8.6., renumber as 4.8.5.

Annex 7 - Appendix 2, amend to read:

“ ...

Part 1 - Report

...

2. Name and address of ~~applicant~~**manufacturer**:

...

4. ~~Manufacturer and brand~~**Brand name and** trade description:

...

7. Snow **grip** index relative to SRTT according to paragraph 6.4.1.1.

...

Part 2 - Test data

...

4. Test tyre details **and data**:

4.1. ~~Tyre size designation and service description~~:

4.2. ~~Tyre brand and trade description~~:

4.3. ~~Test tyre data~~:

	<i>SRTT (1st test)</i>	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>SRTT (2nd test)</i>
Brand name				
Trade description/ commercial name				
Tyre dimensions size designation				
Service description				
Test rim width code				
Reference (test) inflation pressure⁽¹⁾ (kPa)				
Tyre loads F/R (kg)				

	<i>SRTT</i> (1st test)	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>SRTT</i> (2nd test)
Tyre loads Load index F/R (percent % of load associated to LI⁽²⁾)				
Tyre pressure F/R (kPa)				

5. Test results: mean fully developed decelerations ($\frac{m}{s^2} \cdot s^{-2}$) / traction coefficient^{†(3)}

<i>Run number</i>	<i>Specification</i>	<i>SRTT</i> (1st test)	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>SRTT</i> (2nd test)
1					
2					
3					
4					
5					
6					
Mean					
Std-Standard deviation					
CV (%) Coefficient of variation	< 6 % $CV_a \leq 6 \%$				
Coefficient of Validation SRTT	(SRTT) < 5 % $CV_{a(SRTT)} \leq 5 \%$				
SRTT weighted average					
Snow grip index		100 1.00			

”

Annex 7 - Appendix 2, add a footnote (1) and (2) and renumber the former footnote (1) to (3):

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

(2) **for C2 tyres, refer to single load**

†(3) Strike out what does not apply.”

Annex 7 - Appendix 3, amend to read:

“... ”

Part 1 - Report

...

2. Name and address of applicant ~~manufacturer~~:

...

4. ~~Manufacturer and brand~~ **Brand name** or ~~brand~~ trade description:

...

Part 2 - Test data

...

4. Test tyre details **and data**:

4.1. ~~Tyre size designation and service description~~:

4.2. ~~Tyre brand and trade description~~:

4.3. ~~Test tyre data~~:

	<i>SRTT (1st test)</i>	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>Candidate 3</i>	<i>SRTT (2nd test)</i>
Brand name					
Trade description/ commercial name					
Tyre dimensions size designation					
Service description					
Test rim width code					
Reference (test) inflation pressure⁽¹⁾ (kPa)					
Tyre loads F/R (kg)					
Tyre loads Load index F/R (per cent% of load associated to LI⁽²⁾)					
Tyre pressure F/R (kPa)					

5. Test results: average accelerations (m/s^2 ~~m~~ • s^{-2})

<i>Run number</i>	<i>Specification</i>	<i>SRTT (1st test)</i>	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>Candidate 3</i>	<i>SRTT (2nd test)</i>
1						
2						
3						
4						
5						
6						

<i>Run number</i>	<i>Specification</i>	<i>SRTT (1st test)</i>	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>Candidate 3</i>	<i>SRTT (2nd test)</i>
Mean						
Std Standard deviation						
Slip ratio (per cent)						
Coefficient of variation	≤ 6 per cent $CV_{AA} \leq 6 \%$					
Coefficient of Validation SRTT	(SRTT) ≤ 6 per cent $CVal_{AA}(SRTT) \leq 6 \%$					
SRTT weighted average						
Snow grip index		1.00				

...”

Annex 7 - Appendix 3, add footnotes (1) and (2):

“(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”

II. Justification

1. The amendments to the Standard Reference Test Tyre (SRTT) denominations are needed to align this UN Regulation with the latest approved versions of such standard specifications, because it is practically impossible to procure an earlier version (as it is not produced anymore). Keeping the year reference ensures that the UN Regulation keeps control of the version/performances.
2. The amendments to paragraph 6.4.1.1. and to Annex 7 are proposed to remove the discrimination between the two Class C3 tyres that may create some problems of fitment with specific vehicles, given the fact that in any case coefficients and performances are equivalent for the purpose of this UN Regulation.
3. The amendments to Table 1 of Annex 6 are proposed to make clearer that there are no C3 tyres in the scope of this UN Regulation "not marked with speed symbol".
4. It is proposed to align Annex 6 with the most recent amendments made to standard ISO 28580 (published as ISO 28580:2018) with the aim to clarify the procedure further, e.g. by using more appropriate language and expressions.
5. In the current version of UN Regulation No. 117, the term "standard deviation" is used on several occasions without being defined properly. When looking up "standard deviation"

in a dictionary one finds several differing definitions for the calculation of this property. This may bear the possibility that the standard deviation is calculated not according to the generally accepted formula for estimating the standard deviation of a distribution based on a limited number of samples and lead to a situation where tests get accepted that should not be accepted using the generally accepted formula. Therefore, it is proposed to introduce the appropriate definitions for the standard deviation where applicable.

6. The amendments to Appendix 1 of Annex 3, to paragraphs 2.1.2.1 and 2.2.2.3 of Annex 5, part B, to Examples 1 and 2 of the Appendix to Annex 5 and to Table 2 of Annex 6 are proposed to make clearer that, in case of C2 and C3 tyres, the “Reference (test) pressure” and the value “Pr” correspond to the indication of the inflation pressure which is always marked on the sidewall as required by paragraph 4.1. of this Regulation.

7. The term 'reproducibility' changed to 'repeatability', because the definition refers to test repeatability. Text is aligned to ISO 5725.

8. Test report forms are revised to reflect changes introduced by supplement 9 and better specification to items to be reported.

9. According to the provisions of Article 1, paragraph 2 (e) and paragraph 4 and of Article 12 of the 1958 Agreement, it is proposed to include the date on which the new proposed supplement of UN Regulation No. 117 will apply. The proposal allows to address the gap between the effective date of entry into force and the date of notification of the adoption of the supplement to the Contracting Parties, period of time during which the type approval cannot be granted against the newly supplement in force. Furthermore, such transitional provisions are particularly needed as this proposal includes a revision of the application and test report forms, which requires some lead time for the tire industry to adapt.

10. The current description of the evaluation of the rolling sound emission test is not entirely conclusive (the form of the test report does not correspond to the description in the Annex 3). Furthermore, even for the case when the surface temperature does not change by more than 5 °C, many Technical Services use the procedure prescribed in caswe of higher surface temperature changes and correct the results of the individual test runs before aligning to the reference speed. Therefore, it is proposed to change the description of the evaluation of the rolling sound emission test so that it is in line with the sample test form and reflects the currently widely adopted practice, while allowing for the reverse order of evaluation steps in case the surface temperature does not chonage by more than 5 °C.

11. The figure in Annex 2, Appendix 2 was unintentionally changed during one of the previous amendments of UN Regulation No. 117. It is proposed to restore the figure in its original form.

12. References to certain paragraphs need to be updated due to renumbering in the Regulation.
