United Nations ECE/TRANS/WP.29/GRRF/2011/29

Economic and Social Council

Distr.: General
1 July 2011

Original: English
English and French only

Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

Working Party on Brakes and Running Gear

Seventy-first session
Geneva, 13–15 September 2011
Item 6(d) of the provisional agenda
Tyres – Regulation No. 117 (Tyres - Rolling resistance, rolling noise and wet grip)

Proposal for amendment to the 02 series of amendments to Regulation No. 117 (Tyres - Rolling resistance, rolling noise and wet grip)

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) in order to add specific performance requirements for C2 snow Tyres. 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 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Paragraph 2.16., amend to read:

"2.16. "*Standard reference test tyre*" (SRTT) means a tyre that is produced, controlled and stored in accordance with the ASTM (American Society for Testing and Materials) standards

(a) E1136-93 (2003) **for the** ~~(~~size P195/75R14~~)~~.

(b) **F2872 (2011) for the size 225/75 R 16 C**."

Paragraph 2.17., amend to read:

"2.17. Wet Grip **or Snow Grip** measurements – Specific definitions"

Paragraph 2.17.3., amend to read:

"2.17.3. "*Control tyre*" means a normal production tyre that is used to establish the wet grip **or snow grip** performance of tyre sizes unable to be fitted to the same vehicle as the standard reference test tyre – see paragraph 2.2.2.~~16~~**15**. of Annex 5 **and paragraph 3.4.3. of Annex 7** to this Regulation."

Insert a newparagraph 2.17.5., to read:

"**2.17.5.** **"*Snow grip index ("SG")*" means the ratio between the performance of the candidate tyre and the performance of the standard reference test tyre.**"

Paragraphs 2.17.5. (former) to 2.17.7., renumber as paragraphs 2.17.6. to 2.17.8.

Paragraph 6.4.1.1., amend to read:

"6.4.1.1. Class C1 and C2 tyres

The minimum snow index value, as calculated in the procedure described in Annex 7 and compared with the SRTT shall be as follows:

Class of tyre	*Snow grip index (brake on snow method)* [(a)]		*Snow grip index (spin traction method)*[(b)]
	Ref. = C1 – SRTT 14	***Ref. = C2 – SRTT 16C***	***Ref. = C1 – SRTT 14***
C1	1.07	**No**	1.10
C2	~~N/A~~ **No**	**1.02**	1.10

[(a)] See paragraph 3 of Annex 7 to this Regulation

[(b)] See paragraph 2 of Annex 7 to this Regulation"

Annex 5

Paragraph 2.2.2.15.1., amend to read:

"2.2.2.15.1. The wet grip index of the control tyre relative to the SRTT (G1) and of the candidate tyre relative to the control tyre (G2) shall be established using the procedure in paragraphs 2.2.2.1 to 2.2.2.~~15~~**14**."

Paragraph 2.2.2.15.5., amend to read:

"2.2.2.15.5. The SRTT and control tyres shall be discarded if there is irregular wear or damage or when the performance appears to have **been** deteriorated."

Annex 7, paragraph 3, amend to read:

"3. Braking on snow method for Class C1 **and C2** tyres"

Annex 7, paragraph 3.1.1., amend to read (footnote 1 remains unchanged):

"3.1.1. Test course

The braking tests shall be done on a flat test surface of sufficient length and width, with a maximum 2 per cent gradient, covered with packed snow.

The snow surface shall be composed of a hard packed snow base at least 3 cm thick and a surface layer of medium packed and prepared snow about 2 cm thick.

~~Both~~ **The** air temperature, measured about one meter above the ground, **shall be between -2 °C and -15 °C;** ~~and~~ **the** snow temperature, measured at a depth of about one centimetre, shall be between ~~-2~~ **-4** °C and -15 °C.

It is recommended to avoid direct sunlight, large variations of sunlight or humidity, as well as wind.

The snow compaction index measured with a CTI penetrometer [1] shall be between 75 and 85.

[1] See appendix of ASTM standard F1805-06 for details."

Annex 7, paragraph 3.1.2., amend to read:

"3.1.2. Vehicle

The test shall be conducted with a standard production ~~passenger car~~ **vehicle** in good running order and equipped with an ABS system.

The vehicle used shall be such that the loads on each wheel are appropriate to the tyres being tested. Several different tyre sizes can be tested on the same vehicle."

Annex 7, paragraph 3.1.3., amend to read and to amend numbering:

"3.1.3. Tyres

The tyres should be "broken-in" prior to testing to remove spew, compound nodules or flashes resulting from the moulding process. ~~Tyres shall be trimmed and broken in prior to testing by driving at least 100 km on dry pavement.~~ The tyre surface in contact with snow shall be cleaned before performing a test.

Tyres shall be conditioned at the outdoor ambient temperature at least two hours before their mounting for tests. Tyre pressures shall then be adjusted to the values specified for the test.

In case a vehicle cannot accommodate both the reference and candidate tyres, a third tyre ("control" tyre) may be used as an intermediate. First test control vs. reference on another vehicle, then test candidate vs. control on the vehicle."

Annex 7, paragraph 3.1.4., amend to read:

"3.1.4 Load and pressure**:"**

Annex 7, insert new paragraphs 3.1.4.1. and 3.1.4.2., to read:

"3.1.4.1. For C1 tyres, the vehicle load shall be such that the resulting loads on the tyres are between 60 per cent and 90 per cent of the load corresponding to the tyre load index.

The cold inflation pressure shall be 240 kPa.

3.1.4.2. For C2 tyres, the vehicle load shall be such that the resulting loads on the tyres are between 60 per cent and 100 per cent of the load corresponding to the tyre load index.

The static tyre load on the same axle should not differ by more than 10 per cent.

The inflation pressure is calculated to run at constant deflection:

For a vertical load higher or equal to 75 per cent of the load capacity of the tyre, a constant deflection is applied, hence the test inflation pressure "Pt" shall be calculated as follows:

$$P_t = P_r\left(\frac{Q_t}{Q_r}\right)^{1.25}$$

Qr is the maximum load associated to the load capacity index of the tyre written on the sidewall

Pr is the reference pressure corresponding to the maximum load capacity Qr

Qt is the static test load of the tyre

For a vertical load lower than 75 per cent of the load capacity of the tyre, a constant inflation pressure is applied, hence the test inflation pressure Pt shall be calculated as follows:

$$P_t = P_r(0.75)^{1.25} = (0.7)P_r$$

Pr is the reference pressure corresponding to the maximum load capacity Qr

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

Annex 7, paragraph 3.4.1.3., amend to read:

"3.4.1.3. The snow ~~performance~~ **grip** index **(SG)** in per cent of a candidate tyre shall be computed as:

$$Snow\ Grip\ Index\ (candidate) = \frac{Mean\ (candidate)}{wa\ (SRTT)}$$ "

Annex 7, insert new paragraphs 3.4.3. to 3.4.3.5., to read:

"**3.4.3.** **In the case where the candidate tyres cannot be fitted to the same vehicle as the SRTT, for example, due to tyre size, inability to achieve required loading and so on, comparison shall be made using intermediate tyres, hereinafter referred to as "control tyres", and two different vehicles. One vehicle shall be capable of being fitted with the SRTT and the control tyre and the other vehicle shall be capable of being fitted with the control tyre and the candidate tyre.**

3.4.3.1. **The snow grip index of the control tyre relative to the SRTT (SG1) and of the candidate tyre relative to the control tyre (SG2) shall be established using the procedure in paragraphs 3.1. to 3.4.2.**

The snow grip index of the candidate tyre relative to the SRTT shall be the product of the two resulting snow grip indices that is SG1 x SG2.

3.4.3.2. **The ambient conditions shall be comparable. All tests shall be completed within the same day.**

3.4.3.3. **The same set of control tyres shall be used for comparison with the SRTT and with the candidate tyre and shall be fitted in the same wheel positions.**

3.4.3.4. **Control tyres that have been used for testing shall subsequently be stored under the same conditions as required for the SRTT.**

3.4.3.5. **The SRTT and control tyres shall be discarded if there is irregular wear or damage or when the performance appears to have been deteriorated.**"

Annex 7, Appendix 2

The title, amend to read:

"**Test Reports and Test Data** for C1 and C2 tyres**"**

Paragraph 2.1., amend the table to read:

"

	At start of tests	*At end of tests*	*specification*
weather			
ambient temperature			-2 °C to -15 °C
snow temperature			~~2~~ **4** °C to -15 °C
CTI index			75 to 85
other			

"

Paragraph 4.3., amend the table to read:

"

	SRTT (1st test)	*Candidate*	*Candidate*	*SRTT (2nd test)*
Tyre dimensions				
Test rim width code				
Tyre loads F/R (kg)				
Load index F/R (per cent)				
Tyre pressure **F/R**(kPa)				

"

II. Justification

1. The 02 series of amendments to Regulation No. 117 introduced the following main changes compared to the 01 series of amendment:

(a) New testing procedures and requirements for tyre rolling resistance;

(b) Lower noise limit values; and

(c) New, more robust, definitions for snow tyres, special use tyres and traction tyres for which additional allowances in respect of the rolling resistance and noise requirements mentioned above will be granted.

2. Both the reduction of rolling resistance and rolling noise present challenges to tyre manufacturers, and there are some categories for which the standard proposed limits would not be technically feasible. Therefore additional allowances have been added to the limit values for these tyres. However, to ensure that the allowances are only given to the tyre categories where there is a justified need, the definitions are linked to specific design or performance requirements.

3. This document proposes amendments to Regulation No. 117-02 adding specific performance requirements for Snow Tyres in Class C2.

4. In addition to the spin traction method for Class C1 and C2 tyres according to the test procedure of ASTM standard F1805-06, a second performance test procedure is proposed in paragraph 3 of Annex 7 for Class C2 tyres using a new reference tyre belonging to this class of tyres. It is based on a braking-on-snow test procedure.

5. This test method is in line with the logic of the existing test for C1 tyres. The reasons to add this second method for Class C2 tyres are the following:

(a) In order to use an appropriate vehicle for braking of C2 tyres, a dedicated C2 reference testing tyre needs to be introduced. This C2 SRTT 16C ensures coverage of the required load capacity and avoids fitting problems and so, stabilizes the test quality.

(b) Increase in flexibility: many available vehicles on the market can be used by all testing parties.

(c) It is not necessary to invest in a special traction vehicle (ASTM) for the different test companies.

(d) Cost reason: the spin traction evaluation is more expensive than a braking evaluation for the above reasons.

(e) Timing reason: lots of available test tracks leads to a long possible snow testing season.

6. In order to qualify as a snow tyre a tyre must achieve a performance which is at least 2 per cent better than a standard reference C2 tyre in the braking-on-snow test.

7. Tyres meeting this performance can be marked with an 'alpine' symbol.

8. Paragraph 2.16.: to add the new reference tyres in Class.

9. Paragraph 2.17. : to add specific definitions for the snow grip tests.

10. Paragraph 6.4.: to add the specific requirements for a tyre of Class C2 to be classified in the category of use "snow tyre" when using the braking-on snow method.

11. Annex 5 paragraphs 2.2.2.1.15.1. and 5. are editorial corrections.