

7 December 2017

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## **Agreement**

### **Concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations\***

(Revision 3, including the amendments which entered into force on 14 September 2017)

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#### **Addendum 108 – UN Regulation No. 109**

#### **Revision 1 – Amendment 2**

Supplement 8 to the original version of the Regulation – Date of entry into force: 10 October 2017

#### **Uniform provisions concerning the approval for the production of retreaded pneumatic tyres for commercial vehicles and their trailers**

This document is meant purely as documentation tool. The authentic and legal binding texts is: - ECE/TRANS/WP.29/2017/9 (1622735).



**UNITED NATIONS**

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\* Former titles of the Agreement:

Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958 (original version); Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, done at Geneva on 5 October 1995 (Revision 2).

Paragraph 3.2.14.1., amend to read:

"3.2.14.1. This marking is optional in the case of tyres fitted on 5° drop centre rims, suitable for single and dual fitment, having a load index in single fitment equal to or less than 121 and intended for the equipment of motor vehicles."

Paragraph 3.2.14.2., amend to read:

"3.2.14.2. This marking is mandatory in the case of tyres fitted on 5° drop centre rims, suitable for single fitment only, having a load index equal to or greater than 122 and intended for the equipment of motor vehicles."

Paragraph 3.2.15., amend to read:

"3.2.15. The suffix "CP" following the rim diameter marking referred to in paragraph 2.21.3. and, if applicable, after the tyre to rim configuration symbol referred to in paragraph 2.21.4. This marking is mandatory in the case of tyres fitted on 5° drop centre rims, having a load index in single fitment equal to or less than 121 and specifically designed for the equipment of motor caravans."

Annex 3, amend the table to read:

"

	<i>Minimum heights of markings (mm)</i>
b	6
c	4
d	6

"

Annex 7

Paragraph 2.1., amend to read:

"2.1. Mount the tyre and wheel assembly on the test axle and press it against the outer face of a smooth surfaced power-driven test drum 1.70 m ± 1 per cent diameter having a surface at least as wide as the tyre tread."

Paragraph 2.2., amend to read:

"2.2. Apply to the test axle a series of test loads equal to a percentage of the load indicated in Annex 4 to this Regulation, corresponding to the load index indicated on the tyre, and in accordance with the test programme below. Where the tyre has load indices for operation in both single and twin or dual formation the load corresponding to the load index for single operation shall be used for the test."

Paragraph 2.2.1., amend to read:

"2.2.1. In the case of tyres with a speed capacity greater than 150 km/h (speed symbol "Q" and above, plus "H") the test procedure shall be as given in paragraph 3. of this annex."

Paragraph 3., amend to read:

"3. Load/speed test programme for tyres having a speed capability greater than 150 km/h (speed symbol "Q" and above, plus "H")."

Paragraph 3.1.1., amend to read:

"3.1.1. All tyres having a load index in single fitment equal to or less than 121;"

Paragraph 3.1.2., amend to read:

"3.1.2. Tyres having a load index in single fitment equal to or greater than 122 and having the additional marking "C" or "LT" referred to in paragraph 3.2.14. of this Regulation."

Annex 7, Appendix 1, amend to read:

## "Endurance-test programme

Load index	Speed symbol	Test-drum speed [km.h <sup>-1</sup> ]		Load placed on the wheel as a percentage of the load corresponding to the load index		
		Radial-ply	Diagonal (bias ply) and bias belted	7 h.	16 h.	24 h.
122 or more	F	32	32	66%	84%	101%
	G	40	32			
	J	48	40			
	K	56	48			
	L	64	-			
	M	72	-			
121 or less	F	32	32	70%	88%	106%
	G	40	40			
	J	48	48			
	K	56	56			
	L	64	56	4 h.	6 h.	114%
				75%	97%	
	M	80	64	75%	97%	114%
	N	88	-	75%	97%	114%
P	96	-	75%	97%	114%	

Notes:

(1) "Special-use" tyres (see paragraph 2.3.2. of this Regulation) shall be tested at a speed equal to 85 per cent of the speed prescribed for equivalent normal tyres.

(2) Tyres having a load index equal to or greater than 122, a speed symbol "N" or "P" and the additional markings "C" or "LT" included in the tyre size designation (referred to in paragraph 3.2.14. of this Regulation), shall be tested with the same programme as specified in the above table for tyres having a load index equal to or less than 121.

"

*Annex 10*

*Paragraph 1.3.*, amend to read:

"1.3.           *"Traction test"* means a series of a specified number of spin-traction test runs according to ASTM standard F1805-06 of the same tyre repeated within a short time frame."

*Paragraph 3.1.4.2.*, replace last paragraph of by a new paragraph 3.1.5. to read:

"3.1.5.           Instrumentation

The vehicle shall be fitted with calibrated sensors suitable for measurements in winter. There shall be a data acquisition system to store measurements.

The accuracy of measurement sensors and systems shall be such that the relative uncertainty of the measured or computed mean fully developed decelerations is less than 1 per cent."

*Paragraph 3.2.1.*, amend to read:

"3.2.1.           For every candidate tyre and the standard reference tyre, ABS-braking test runs shall be repeated a minimum of 6 times."

*Paragraph 3.4.1.2.*, amend to read:

"3.4.1.2.       Weighted averages of two successive tests of the SRTT shall be computed taking into account the number of candidate tyres in between:

..."

*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 means and standard-deviations of successive braking tests of SRTT should be examined.

The means of two successive SRTT braking tests shall not differ by more than five per cent.

The coefficient of variation of any braking test shall be less than six per cent.

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

*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 and ASTM F 2871."

*Paragraph 4.4.1.*, amend to read:

"4.4.1. Test course

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

*Paragraph 4.7.2.1.*, amend to read:

"4.7.2.1. The test shall be conducted with a standard two axle commercial vehicle in good running order with:

- (a) Low rear axle weight and an engine powerful enough to maintain the average percentage of slip during the test as required in paragraphs 4.7.5.1. and 4.7.5.2.1. below;
- (b) A manual gearbox (automatic gearbox with manual shift allowed) having a gear ratio covering the speed range of at least 19 km/h between 4 km/h and 30 km/h;
- (c) Differential lock on driven axle is recommended to improve repeatability;
- (d) A standard commercial system controlling/limiting the slip of the driving axle during acceleration (Traction Control, ASR, TCS, etc.)."

*Paragraph 4.7.2.1.1.*, amend to read:

"4.7.2.1.1. In the particular case where a standard commercial vehicle equipped with a traction control system is not available, a vehicle without Traction Control/ASR/TCS is permitted provided the vehicle is fitted with a system to display the percentage slip as stated in paragraph 4.3.4. and a mandatory differential lock on the driven axle used in accordance with operating procedure. If a differential lock is available it shall be used; if the differential lock, however, is not available, the average slip ratio should be measured on the left and right driven wheel."

*Paragraph 4.7.4.2.*, amend to read:

"4.7.4.2. The driven tyres inflation pressure shall be 70 per cent of the one written on the sidewall. The steer tyres are inflated at nominal sidewall pressure.

If the pressure is not marked on the sidewall, refer to the specified pressure in applicable tyre standards manuals corresponding to maximum load capacity."

*Paragraph 4.7.5.1.*, amend to read:

"4.7.5.1. Mount first the set of reference tyres on the vehicle and when on the testing area.

Drive the vehicle at a constant speed between 4 km/h and 11 km/h and the gear ratio capable of covering the speed range of at least 19 km/h for the complete test programme (e.g. R-T1-T2-T3-R).

The recommended gear ratio selected is 3rd or 4th gear and shall give a minimum 10 per cent average slip ratio in the measured range of speed."

*Paragraph 4.7.5.2.1.*, amend to read:

"4.7.5.2.1. In the particular case of paragraph 4.7.2.1.1. of this annex where a standard commercial vehicle equipped with a Traction Control system is not available, the driver shall manually maintain the average slip ratio between 10 and 40 per cent (Controlled Slip procedure in place of the Full Slip) within the prescribed range of speeds. If a differential lock is not available, the averaged slip ratio

difference between the left and right driven wheel shall not be higher than 8 per cent for each run. All the tyres and runs in the test session are performed with Controlled Slip procedure."

*Paragraph 4.7.5.3.*, amend to read:

"4.7.5.3. Measure the distance between the initial speed and the final speed."

*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 (standard deviation/average\*100) calculated for minimum six valid runs on the distance shall be lower than or equal to 6 per cent."

*Paragraph 4.7.5.5.*, amend to read:

"4.7.5.5. In case of Traction Control System equipped vehicle, the Average Slip ratio shall be in the range from 10 per cent to 40 per cent (calculated as per paragraph 4.3.4. of this annex)."

*Paragraph 4.8.2.*, amend to read:

"4.8.2. Validation of results

For the candidate tyres:

The coefficient of variation of the average acceleration is calculated 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.

..."

*Paragraph 4.8.3.*, amend to read:

"4.8.3. Calculation of the "average AA"

If R1 is the average of the "AA" values in the first test of the reference tyre, R2 is the average of the "AA" values in the second test of the reference tyre, the following operations are performed, according to Table 1:

..."

*Paragraph 4.8.6.*, amend to read:

"4.8.6. Calculation of the Slip Ratio

The Slip Ratio can be calculated as the average of Slip ratio as mentioned in paragraph 4.3.4. of this annex or by comparing the average distance referred to in paragraph 4.7.5.3. of this annex of the minimum six runs to the distance of a run done without slip (very low acceleration).

$$\text{Slip Ratio \%} = \left[ \frac{\text{Averagedistance} - \text{No slip distance}}{\text{No slip distance}} \right] \times 100$$

No slip distance means the wheel distance calculated on a run done with a constant speed or a continuous low acceleration."

*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 and the reference tyre. The result (Snow grip index 1) is the relative efficiency of the control tyre compared to the reference tyre.

The second assessment is a comparison between the candidate tyre and the control tyre. The result (Snow grip index 2) is the relative efficiency of the candidate tyre compared to the control tyre."

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