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Item 7(f) of the provisional agenda

Tyres – Regulation No. 109**Proposal for amendment to Regulation No. 109 (Retreaded
tyres for commercial vehicles and their trailers)****Submitted by the experts from the European Tyre and Rim Technical
Organisation***

The text reproduced below was prepared by the expert from the European Tyre and Rim Technical Organisation (ETRTO) in order to amend the Annex 7 (based on the documents ECE/TRANS/WP.29/GRRF/2015/39 and GRRF-80-16 prepared by the expert from the Slovakia) and Annex 10 of the Regulation 109. 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 2016–2017 (ECE/TRANS/254, para. 159 and ECE/TRANS/2016/28/Add.1, cluster 3.1), 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.

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I. Proposal

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 ~~capacity~~ 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 ~~capacity~~ 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 ~~capacity~~ index in single fitment equal to or less than 121 and specifically designed for the equipment of motor caravans."

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. ~~In certain cases a 2.00 m ± 1 per cent diameter drum may be used.~~"

Annex 7, 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 ~~capacity~~ 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."

Annex 7, 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 ~~category~~ symbol "Q" and above, plus "H") the test procedure shall be as given in paragraph 3. of this annex."

Annex 7, paragraph 3., amend to read:

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

Annex 7, paragraphs 3.1.1., amend to read:

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

Annex 7, paragraph 3.1.2., amend to read:

"3.1.2. tyres having a load ~~capacity~~ index in single fitment equal to or greater than 122 and having the additional marking "C" or "LT" referred to in paragraph 3.2.~~13~~**14**. of this Regulation."

Annex 7, Appendix 1, amend to read:

"Endurance-test programme

Load index	Speed symbol	Test-drum speed [min ⁺ km.h ⁻¹]		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	100 32	100 32	66%	84%	101%
	G	125 40	100 32			
	J	150 48	125 40			
	K	175 56	150 48			
	L	200 64	-			
121 or less	M	225 72	-	70%	88%	106%
	F	100 32	100 32			
	G	125 40	125 40			
	J	150 48	150 48	4 h.	6 h.	114%
	K	175 56	175 56			
	L	200 64	175 56	75%	97%	114%
	M	250 80	200 64	75%	97%	114%
N	275 88	-	75%	97%	114%	
P	300 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 capacity index equal to or greater than ~~121~~ 122, a speed category symbol "N" or "P" and the additional markings "C" or "LT" included in the tyre size designation (referred to in paragraph ~~3.2.13.~~ 3.2.14. of this Regulation), shall be tested with the same programme as specified in the above table for tyres having a load capacity 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 (~~American Standard Test Method~~) standard F1805-06 of the same tyre repeated within a short time frame."

Annex 10, 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."

Annex 10, 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 ~~six~~ 6 times."

Paragraph 3.4.1.2., amend to read:

"3.4.1.2. Weighted averages ~~(wa)~~ 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~~**grip** index ~~(SG)~~

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 ~~two~~**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 ~~two-axes~~ standard ~~model~~**2 axle** commercial vehicle in good running ~~conditions~~**equipped** with:

(a) Low rear axle weight and ~~enough~~**an engine** powerful ~~engine~~**enough** to ~~ensure~~**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 ~~at the~~**the speed range of at least** 19 km/h ~~range~~ between 4 **km/h** and 30 km/h;

(c) ~~Blocking differential~~ **Differential lock** on driven axle is recommended ~~as increasing~~**to improve** repeatability;

(d) A standard commercial system controlling/limiting the slip of the driving axle ~~when accelerating~~ ~~(called~~ **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 ~~it is not possible to find~~ a standard commercial vehicle equipped with a traction control system **is not available**, a vehicle without Traction Control/ASR/TCS is ~~allowed~~ **permitted provided the vehicle is fitted with a mandatory system to display of the percentage slip as stated in paragraph 4.3.4. and a mandatory blocking differential lock on the driven axle to be used in practice the accordance with operating procedure of paragraph 4.7.5.2.1. below**. **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 ~~an initial~~ 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** Gear ratio selected is ~~third~~ **3rd** or ~~fourth~~ **4th** and shall give a minimum ~~13-10~~ 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. ~~above of this annex where it is not possible to find~~ a standard commercial vehicle ~~having the~~ **equipped with** a Traction Control system **is not available**, the driver ~~maintain~~ **shall** manually **maintain** the averaged **average** slip ratio ~~range of 20 per cent~~ **between 10 and 40** per cent (Controlled Slip procedure in place of the Full Slip) ~~in~~ **within** the ~~same~~ **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 ~~and the time~~ 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 6 valid runs on the distance ~~and the time should~~ **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~~ **Average Slip** ratio shall be in the range from ~~13~~**10** per cent to 40 per cent (calculated as per ~~in~~ paragraph 4.3.4. ~~above 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 ~~six~~**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 ~~below~~:

..."

Paragraph 4.8.6., amend to read:

"4.8.6. Calculation of the ~~slip ratio~~ **Slip Ratio**

The slip ratio can be calculated as the average of Slip ratio as mentioned in paragraph 4.3.4. ~~above of this annex~~ or by comparing the average distance referred to in paragraph 4.7.5.3. ~~above of this annex~~ of the ~~min~~ **minimum** 6 runs to the distance of a run done without slip (very low acceleration)

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

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~~ **grip index** 2) is the relative efficiency of the candidate tyre compared to the control tyre.

..."

II. Justification

1. In annex 7, it is proposed to change measurement units for drum speed from min^{-1} to km.h^{-1} to align the requirements with other tyre regulations.
 2. It is also proposed to amend:
 - (a) incorrect wording "speed category symbol" to "speed symbol" (as defined in para. 2.33 of this Regulation);
 - (b) incorrect wording "load capacity index" to "load index" (as defined in para. 2.32 of this Regulation);
 - (c) incorrect reference to para. 3.2.13. of the Regulation in Annex 7, Appendix 1;
 - (d) and an incorrect boundary value of load index in Annex 7, Appendix 1;
 - (e) to delete in paragraph 2.1. in Annex 7, the possibility to use the 2.0 m drum diameter to perform the endurance test.
 3. In Annex 10, it is proposed to align the text with the one of Annex 7 of the Regulation No. 117 resulting from the adoption of Supplement 5 to the 02 series of amendments of this Regulation.
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