

**Economic and Social Council**Distr.: General
4 December 2017

Original: English

Economic Commission for Europe**Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Brakes and Running Gear****Eighty-sixth session**

Geneva, 12-16 February 2018

Item 7(e) of the provisional agenda

Tyres: Regulation No. 106**Proposal for amendments to Regulation No. 106 (Tyres for agricultural vehicles and their trailers)****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) amending UN Regulation No. 106. 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 2014–2018 (ECE/TRANS/240, para. 105 and ECE/TRANS/2014/26, 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.

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I. Proposal

Add a new paragraph 2.18.12.1. to read:

"2.18.12.1. The letters "IND" may be replaced by the letters "SS" or "NHS" after the nominal rim diameter marking in case of tyres for construction applications as identified in Annex 5 table 10"

Add a new paragraph 2.46. to read:

"2.46. NHS (not for highway service) means a tyre primarily designed for use outside of public roads, but suitable for temporary/incidental use on public roads."

Paragraph 2.29.1., amend to read:

"...as defined in paragraphs 2.26. and 2.27.

Paragraph 2.33.2. shall be deleted.

Paragraph 2.34.1., amend to read:

"...(see paragraphs 2.30. and 2.33.)..."

Paragraph 2.43. amend the reference to read:

"..ISO 18805"

Paragraph 3.1.7. amend to read:

"3.1.7. The inscription "DEEP" (or "R-2" or 'LS-3' or 'HF-3' or 'HF-4') in the case of a special tread tyre;"

Add a new paragraph 3.1.7.1., to read:

"3.1.7.1. "DEEP" and "R-2" identify special tread tyres for tractor drive wheels."

Paragraph 3.1.9. amend to read:

"3.1.9. The inscriptions 'LS-1', 'LS-2', 'LS-3' or 'LS-4' in the case of **log-skidder** tyres for forestry machines.."

*Paragraph 3.1.9.1. modify to read: 'LS-3' identifies special tread **log-skidder** tyres."*

Add a new paragraph 3.1.13. to read:

"3.1.13. The inscription 'R-3' for tractor drive wheel tyres with shallow tread as identified in Annex 5, table 2".

Renumber paragraph 3.1.13. as 3.1.14.

Add new paragraphs 3.1.15. and 3.15.1. to read:

"3.1.15. The inscriptions 'HF-1', 'HF-2', 'HF-3', or 'HF-4' in the case of high-flotation tyres for tractor drive wheels or forestry machines listed in Annex 5 Table 7"

"3.1.15.1. "HF-3" and "HF-4" identify special tread tyres"

Paragraph 3.2. amend to read, also adding commas:

"3.2. Tyres submitted for approval shall bear, on one sidewall only, the following **markings.**"

Paragraph 3.2.2. amend to read:

"3.2.2. A free space sufficiently large to accommodate an approval mark as shown in Annex 2 to this Regulation."

Paragraph 5.4. amend to read

"5.4. There shall be affixed conspicuously to every tyre conforming to a type of tyre approved under this Regulation, in the space referred to in paragraph 3.2.2. above, and in addition to the markings prescribed in paragraph 3.1. and 3.2. ~~and 3.3~~ above, an international approval mark consisting of: ..."

Paragraph 6.1.2., amend to read:

"6.1.2. However, for the types of tyre for which the size designation is given in the first column of the tables in Annex 5, the theoretical rim width **code** (A1)⁴ and the nominal section width (S1) are given opposite the tyre size designation in those tables."

Paragraph 6.2.1., amend to read:

"...

d is the conventional number denoting the nominal rim diameter expressed in mm (see paragraph 2.19.);

...

All as shown on the sidewall of the tyre in the tyre-size designation in conformity with the requirements of paragraph 2.18."

Annex 3,

Part D, "These markings define a tyre for forestry machines (LS):", amend to read:

"These markings define a tyre for forestry machines:"

Part D, (b) second appearance, amend to read:

"(b) The inscription "LS-*n*" (or "HF-*n*" in the case of high-flotation tyres) is placed after the size designation, where *n* is the number pertaining to the appropriate classification code as defined in Annex 10 (e.g. "LS-2" in the example above)

Annex 4, amend in the table the value in kg corresponding to LI 275 to read: "121 500"

Annex 5, Table 1, add under the heading "Overall diameter (D) (mm)" a new column identified by "(*)" and add the relevant values, together with a new entry

Table 1

Agricultural steering wheels – Normal and low section sizes

Tyre size designation	Theoretical rim width code (A1)	Nominal width (s1) (mm)	Overall diameter (D) (mm)		Nominal rim diameter (d) (mm)
				(*)	
4.00-12	3	112	535	526	305
4.00-15	3	112	610	602	381
4.00-19	3	112	712	704	483
5.00-15	4	140	655	649	381
5.50-16	4	150	710	694	406
6.00-14	5	169	688	669	356
6.00-16	4.5	165	735	720	406
6.00-19	4.5	165	814	796	483

6.50-16	4.5	175	760	739	406
6.50-20	4.5	175	865	841	508
7.50-16	5.5	205	805	782	406
7.50-18	5.5	205	860	833	457
7.50-20	5.5	205	915	883	508
8.00-16	5.5	211	813	813	406
9.00-16	6	234	855	827	406
11.00-16	10	315	965	935	406
11.00-24	10	315	1170	1138	610
<i>Low section</i>					
11L-15	8	280	815	783	381
11L-16	8	279	840	808	406
11.5/80-15.3	9	290	845		389
14L-16.1	11	360	985	950	409
14.5/75-16.1	11	373	940	904	409
16.5L-16.1	14	419	1072	1031	409

Annex 5, Table 1, add at the bottom new footnotes to read:

- "³ Overall diameters (D) in column (*) apply to tyres for industrial service (construction applications) marked with classification code 'F-3' – see paragraph 3.1.8 of this Regulation. These tyres may be marked with the suffix 'IND' instead of "Front"
- "⁴ For diagonal tyres marked on the tyre sidewall with classification code "F-1" (see paragraph 3.1.8. of this regulation), the overall diameter (D) is to be increased by 12 mm"

Annex 5, Table 2, add to the heading of the column "Overall diameter (D) (mm) – Diagonal" an asterisk "(*)" and at the bottom of the table the note

- " (*) For Diagonal tyres marked on the tyre sidewall with classification code "R-3" (see paragraph 3.1.14. of this regulation) the overall diameter (D) is to be reduced by 24 mm"

Annex 5, Table 2, insert the following entries

Tyre size designation	Theoretical rim width code (A1)	Nominal section width (S1) (mm)		Overall diameter (D) (mm)		Nominal rim diameter (d) (mm)
		Radial	Diagonal	Radial	Diagonal	
7.00-16	6		183		742	406
7.00-18	6		183		792	457
7.50-16	5.5	205		805		406
7.50-18	5.5	205	205	880	860	457
13.6-46	12		345		1768	1168
35.5L-32	31		902		1981	813

Annex 5, Table 2, amend note 1 to read:

- "¹ **The Tyre size designation may be supplemented by a rim contour prefix: ex: VA35.5L-32 instead of 35.5L-32 "**

Annex 5, Table 5, insert the value **950** in column (*) for tyre size designation **8.25 - 20 IMP**

Annex 5, Table 5 (3 of 3), note 3 shall read: "...3.1.9.2..."

Annex 5, Table 6 (1 of 3), delete notes 1 and 2 as only part of notes already shown on Table 6 (3 of 3)

Annex 5, Table 6, insert the value **1162** in column (*) for tyre size designation **21.5L-16.1 IMP**:

Annex 5, Table 6, amend note 1 and note 3 to read:

- "¹ The suffix "IMP" may be replaced by the wording "IMPLEMENT". **In case of tyres marked with classification code 'I-3' on the tyre sidewall the suffix 'IND' may be used in place of 'IMP'.**"
- "³ Overall diameters (D) in column (*) apply to tyres marked with classification code "I-3" – see paragraph 3.1.9.2 of this Regulation"

Annex 5, Table 7, insert the following entries:

Tyre size designation ⁵	Theoretical rim width code (A1)	Nominal section width (S1) (mm)	Overall diameter (D) (mm)	Nominal rim diameter (d) (mm)
...
35x16-17.5	10.5	406	914	445
40x19-19.5	15	495	1003	495
54x37.00-25	32	940	1397	635
57x31.00-26	26	775	1473	660
73x44.00-32	36	1 118	1 880	813
73x50.00-32	44	1 270	1 880	813
76x50.00-32	44	1270	1956	813

Annex 5, Table 7, modify note 1 and note 3 to read:

- "¹ These Tyres may be classified in categories of use "Tractor Drive Wheels" øf, "Implement" or, **in the case of tyres with nominal rim diameters of 635 mm and above, also "Forestry Machines"**"
- "³ Tyres of radial structure are identified by means of the letter "R" in place of " - " (e.g. 11x4.00R4). **The Tyre size designation may be supplemented by a rim contour prefix (eg: VA73x44.00-32 instead of 73x44.00-32) "**

Annex 5, Table 7, add a new footnote 5 to read

- "5 In case of Tyre Size designations not included in this table (e.g. 27x10.00 – 16):**
- (a) **the first number (e.g. 27) represents the overall diameter (D) expressed by code i. For tyres with rim diameters of 508 mm and above, add 1 before converting to mm;**
- (b) **the second number (e.g. 10.00) represents the nominal section width (S1) expressed by code; and**
- (c) **the third number (e.g. 16) represents the nominal rim diameter (d) expressed by code- see point 2.19; To convert dimensions expressed in code to mm multiply by 25.4 and round to the nearest mm; The theoretical rim width code (A1) is taken to equal to the nominal section width (S1) expressed by code multiplied by the factor 0.8 rounded to the nearest 0.5 step."**

Annex 5, Table 8, amend title of table to read:

"Log-Skidder Tyres for Forestry Machines – Code-Designated Sizes"

Annex 5, Table 8, insert the following entries:

<i>Tyre size designation⁵</i>	<i>Theoretical rim width code (A1)</i>	<i>Nominal section width (S1) (mm)</i>	<i>Overall diameter (D) (mm)</i>	<i>Nominal rim diameter (d) (mm)</i>
...
16.9-30 LS	15	429	1511	762
18.4-26 LS	16	467	1476	660
18.4-30 LS	16	467	1577	762
18.4-34 LS	16	467	1679	864
....				

Annex 5, Table 8, modify note 1 to read:

- "1. Log-Skidder Tyres are identified by suffix "LS-1", "LS-2", "LS-3", or "LS-4" placed after the size designation (e.g. 30.5L-32 LS-2)"

Annex 5, Table 8, insert a new footnote 3 to read:

- "3 The Tyre size designation may be supplemented by a rim contour prefix (eg: DH35.5L-32 LS instead of 35.5L-32 LS)"

Annex 5, Table 9, insert the following entries

<i>Tyre size designation</i>	<i>Theoretical rim width code (A1)</i>	<i>Nominal section width (S1) (mm)</i>		<i>Overall diameter (D) (mm)</i>		<i>Nominal rim diameter (d) (mm)</i>
		<i>Radial</i>	<i>Diagonal</i>	<i>Radial</i>	<i>Diagonal</i>	
10.5/80-18	9	274	274	885	885	457
12.5/80-18	9	308	308	965	965	457
12.5-18	11	325	325	990	990	457
12.5-20	11	325	325	1040	1040	508
14.5-20	11	355	355	1095	1095	508
21L-28	18		533		1479	711

Annex 5, insert new Table 10 and the relevant notes to read:

"Table 10

Tyres for construction applications (skid-steers / mini-loaders)

<i>Tyre size designation</i>	<i>Theoretical rim width code (A1)</i>	<i>Nominal section width (S1) (mm)</i>	<i>Overall diameter (D) (mm)</i>	<i>Nominal rim diameter (d) (mm)</i>
7.00-15	5.50	201	762	381
8.25-15	6.00	231	848	381
5.70-12	4.50	146	570	305
5.70-15	4.50	146	647	381
23x8.50-12	7.00	213	574	305
23x8.50-14	7.00	218	584	356
23x10.50-12	8.50	264	579	305
25x8.50-14	7.00	218	635	356
26x12.00-12	10.50	307	648	305

9.00–20	7.00	259	1038	508
10.00–20	7.50	278	1075	508
11.00–20	8.00	293	1104	508
10–16.5	8.25	264	773	419
12–16.5	9.75	307	831	419
14–17.5	10.50	349	921	445
15–19.5	11.75	389	1019	495
15–22.5	11.75	389	1095	572
18–19.5	14	457	1096	495
18–22.5	14	457	1172	572

Notes:

Tyres of radial structure are identified by means of the letter "R" in place of "-" (e.g. 12R16.5)

Suffixes IND or 'NHS' or 'SS' identify tyres for skid-steers / mini-loaders (see paragraph 2.18.12.1)

Appendix 1, amend to read:

" ~~(see paragraphs 2.2. and 4.1.)~~

Annex 7, amend to read:

" ~~...~~(See paragraphs 2.30-33. and 2.31-34. of this Regulation)..."

Annex 7, Part A, amend to read:

" ~~...~~(see paragraph 2.20.23 of this Regulation)"

Annex 7, Part A, add to the right of the column with heading (1) in the table "*Variation of load carrying capacity (per cent)*" a new column with the heading (2) as follows and add the relevant note (2)

<i>Speed (km/h)</i>	(2)
10	+ 56
15	+ 44
20	+ 33
25	+ 22
30	+ 11
35	+ 6
40	[0]
45	-
50	-
55	-
60	-
65	-
70	-

"...

- (2) **These percentages apply only in case of diagonal tyres listed in Annex 5, Table 2 'Drive wheel tyres for agricultural tractors - Normal section sizes' with nominal section width (S1) 211 mm and above (i.e. section width code 8.3 and above) marked with speed symbol "A8"**

Annex 7, Part B, amend to read:

"Applicable to tyres classified with category of use "Tractor steering wheels" and marked "Front" or "F-1" or "F-2" **or F-3** (see paragraph 2.21-24. of this Regulation)

Variation of load carrying capacity (per cent) (see paragraphs 2.30-33. ~~and 2.31.~~ of this Regulation)"

Annex 7, Part C, amend to read:

"Applicable to tyres classified with categories of use: "Implement" and marked "IMP" or "IMPLEMENT" (see paragraph 2.22-25. of this Regulation)
Variation of load carrying capacity (per cent) (see paragraphs 2.30-33. and 2.31-34. of this Regulation)"

Annex 7, Part D, amend to read:

"Applicable to tyres classified with categories of use: "Forestry machines" (see paragraph 2.41-44. of this Regulation)
Variation of load carrying capacity (per cent) for tyres marked with speed category symbols A6 and A8) (see paragraphs 2.33. and 2.34. of this Regulation)"

Annex 7, Part E, amend to read:

"Part E: Tyres for construction applications (industrial tractors or skid-steers / mini-loaders)

Applicable to tyres classified with categories of use: "Construction Applications" (see paragraph 2.42-45.) and marked "IND" or "R-4" or "SS" or "NHS" (see paragraph 2.22-25. and 2.18.12.1 of this Regulation)
Variation of load carrying capacity (per cent) (see paragraph 2.33. of this Regulation)

Annex 7, Part E, insert to the table a new column A2 and the heading A8 to read:

Speed (km/h)	Speed Category Symbol		
	A2	A8	
		Constant load	Cyclic applications (+)
5	+ 11	+ 45	+ 67 (1)
10	[0]	+ 25	+ 50 (2)
15	- 21	+ 13	+ 34
20	- 24	+ 9	+ 23
25	- 28	+ 6	+ 11
30	- 32	+ 4	+ 7
35	-33	+ 2	+ 3
40	-34	[0]	[0]
45	- 35	- 4	- 4
50	- 37	- 9	- 9

Note: speed category symbol A2 applies to tyres marked with suffix "SS" or "NHS"

Annex 10, the Table, add the following entries:

Code	Nomenclature
...	
HF-1	High-flotation tyres: shallow tread
HF-2	High-flotation tyres: regular tread
HF-3	High-flotation tyres: deep tread
HF-4	High-flotation tyres: extra deep tread
...	

II. Justification

1. This document consolidates previous documents ECE/TRANS/WP.29/GRRF/2017/19 and informal document GRRF-84-17 taking into account the request for addition of tyre sizes and tyre classification codes common in the United States of America and standardised by the Tire and Rim Association Inc., but needed to be added to UN Regulation No. 106 in order to permit their type approval in order to conform to Regulation EU 167/2013 for tyres to be exported to Europe. It includes addition/modifications of some paragraphs to the main text of the Regulation as well as the addition of some tyre size designations to Annex 5 and Annex 7
2. Some references were modified to conform to the renumbering approved with Supplement 15.
 - (a) ISO 4251-4 was replaced by the new standard ISO 18805;
 - (b) Paragraph 2.33.2 is deleted since new tables for IF and VF were added to Annex 7.
3. Paras 3.2., 3.2.2. and 5.4. are modified because "*Tyres submitted for approval*" until not approved cannot bear an approval mark, and the "*only*" as it is written can be misunderstood. Para. 3.2.2. was aligned to the wording in other UN Regulations. Reference to para. 3.3 in paragraph 5.4. is deleted because paragraph 3.3 does not refer to specific markings.
4. Para 6.1.2. is amended to align the wording to the headers in Annex 5 and to correct the reference to the footnote.
5. Para 6.2.1. is amended to restore the proper references after renumberings that occurred within the last Supplements.
6. The amendment of Annex 5, Table 5 is needed to add the value for the Overall diameter (D) in column (*) that applies to tyres marked with classification code "I-3".
7. The amendment of Annex 5, Table 6, Note 1 is necessary because most of the tyre sizes listed in such table, especially those identified by the "classification code I-3" (i.e. Traction tread) are currently available in both versions: 'implement' to be used on agricultural machinery and 'IND' to be used on construction application vehicles. The two types of tyres have the same type of size designation and the same dimensions. Therefore some manufacturers identify those tyres with the suffix 'IND' rather than with the suffix 'IMP' thus applying the variation of load capacity with speed as published in Annex 7 Part E. The reason for this proposal is to avoid a duplication of tables with a new table only replacing the suffix IMP with the suffix IND.
8. The addition of the footnote to Annex 5, Table 7 is the answer to the request by GRRF to ETRTO ("...to introduce the appropriate formulae in the Regulation instead of continuously updating Annex 5." - ref. paragraph 36 of ECE/TRANS/WP.29/GRRF/83) as done for UN Regulation No. 54.
9. References in Annex 7 are amended to restore the correctness after renumbering that occurred with the introduction of three new paragraphs in Supplement 15 approved during the 172nd session of WP.29.
10. The amendment of Annex 7, Part A is proposed to be in conformity with Tire and Rim Association Inc. specifications for code designated diagonal tyres with speed symbol A8. TRA is the only standardization body listing tractor drive wheel code designated tyres in diagonal construction, as those listed in Annex 5 - Table 2, with speed symbol A8, but for historical reasons they did assign a specific set of bonus loads with the speed that differ from the ones adopted for other types of tyres for tractor drive wheels marked with speed symbol A8.