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Global Registry

Created on 18 November 2004, pursuant to Article 6 of the Agreement concerning the establishing of global technical regulations for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles (ECE/TRANS/132 and Corr.1) done at Geneva on 25 June 1998

Addendum 16: Global technical regulation No. 16

Global technical regulation on tyres

Established in the Global Registry on 13 November 2014

Proposal and report pursuant to Article 6, paragraph 6.2.7. of the Agreement

- Authorization to develop global technical regulation No. 16 concerning tyres of light vehicles (ECE/TRANS/WP.29/AC.3/15)
- Final report on Phase I on the development of a global technical regulation No. 16 concerning uniform provisions for pneumatic radial tyres for passengers and light truck commercial vehicles (ECE/TRANS/WP.29/2013/122 as amended by WP.29-164-04), adopted by AC.3 at its forty-second session (ECE/TRANS/WP.29/1112, paras. 105 and 106)



UNITED NATIONS

Authorization to develop global technical regulation No. 16 (Tyres)

I. Objective of the proposal

1. Tyres are the point of contact between the vehicle and the road, so they have a major impact on road safety, road noise, energy consumption and hence emissions. For this reason they are subject to various technical requirements in many countries.
2. These requirements address similar concerns. Tyres should provide optimum performance at all technically possible speeds; their performance should be consistent and verified by a high-speed endurance test. Correct behaviour in the event of under-inflation and good grip on wet surfaces are other essential safety features. Certain additional parameters are less universally required yet merit consideration from the standpoint of global harmonization.
3. In addition, the conditions of geometric compatibility between a vehicle and its tyres, either on first use or when the tyre is changed, ensure standardization of the definition and measurement of the main dimensional parameters and enable the relevant specifications to be indicated on the sidewall of the tyre. Conformity with regulations may also be indicated on the sidewall.
4. It is both feasible and desirable to ensure global harmonization of the different regulations listed below.
5. The objective of this proposal is:
 - (a) To establish a set of tests according to parameters that the Contracting Parties judge essential for road safety and environmental protection;
 - (b) To define a uniform set of globally standardized markings.

II. Description of the proposed global technical regulation

6. As indicated below, certain regulations are considered to be universal requirements, whereas others are less universal, and the proposed regulation should reflect this.
7. The proposed regulation has three modules:
 - (a) A core module containing the minimum requirements enforced by all the Contracting Parties. It would include:
 - Prescribed markings
 - Dimension codes
 - High-speed safety test
 - Endurance test, including for under-inflated tyres
 - Wet grip test
 - (b) Two optional modules, at the discretion of each Contracting Party:
 - (i) Optional module 1
 - Perforation energy test
 - Loosening test

- (ii) Optional module 2
 - Road noise regulations

8. The core module should be subscribed to by all Contracting Parties. Each Contracting Party would be free to apply either or both optional modules, or neither.

III. International regulations and norms in force

- 9. Regulations annexed to the 1958 Agreement
 - (a) Regulation No. 30.
 - (b) Regulation No. 117, amended.
- 10. Directives of the European Union (relating to paragraph 9.)
 - (a) Directive 92/23/EEC.
 - (b) Directive 2001/43/EC.
- 11. United States of America
 - (a) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.109: New Pneumatic Tires.
 - (b) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.110: Tire Selection and Rims.
 - (c) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.119: New Pneumatic Tires for Vehicles other than Passenger Cars.
 - (d) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.202: Tire Selection and Rims for Motor Vehicles other than Passenger Cars.
 - (e) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.138: Tire Pressure Monitoring Systems.
 - (f) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.139: New Pneumatic Tires for Light Vehicles.
 - (g) SAE J918c Passenger Car Tire Performance Requirements and Test Procedures.
 - (h) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 569: regrooved Tires.
 - (i) U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 574: Tire Identification and Record Keeping.
- 12. International norms
 - (a) ISO 4000-1. Passenger car tyres and rims (metric series).
 - (b) ISO 10191. Passenger car tyres - Verifying tyre capabilities – Laboratory test methods.
 - (c) ISO 16992. Passenger car tyres - Spare Unit Substitutive Equipment (SUSE).
 - (d) ISO 17269. Passenger car tyres - Methods for measuring rolling circumference - Loaded new tyres.

- (e) ISO 23671. Passenger car tyres - Method for measuring relative wet grip performance - Loaded new tyres.
- (f) ISO 18164. Passenger car, truck, bus and motorcycle tyres - Methods of measuring rolling resistance.

Final report on Phase I on the development of global technical regulation No. 16 concerning uniform provisions for pneumatic radial tyres for passengers and light truck commercial vehicles

A. Background

1. The Executive Committee of the 1958 Agreement (AC.3) authorized at its eighteenth session the development of a global technical regulation (gtr) on tyres (ECE/TRANS/WP.29/1056, para. 111). The authorization ([ECE/TRANS/WP.29/AC.3/15](http://www2.unece.org/wiki/pages/viewpage.action?pageId=2523589)) was transmitted to the Working Party on Brakes and Running Gear (GRRF) for the development of the gtr. An informal working group (IWG) for the development of the gtr, chaired by Mr. I. Yarnold, was established under GRRF. All the information on the informal working group, its sessions and related documents is available at: www2.unece.org/wiki/pages/viewpage.action?pageId=2523589.

B. Introduction

2. The gtr was developed by the GRRF informal working group (the tyre gtr working group).

3. A formal proposal for the establishment of a tyre gtr was proposed to AC.3 by the technical sponsor, France. At the 140th session of the World Forum for Harmonization of Vehicle Regulations (WP.29) on 14 November 2006, the French proposal was approved as a gtr project by AC.3. That proposal is contained in document ECE/TRANS/WP.29/2006/139.

4. Subsequently, three unofficial meetings were held between December 2004 and November 2006 and another 14 meetings were scheduled in conjunction with the GRRF or WP.29 meetings. A further two interim meetings were held in Brussels in July 2007 and July 2009.

5. In 2009, at the request of the informal working group, AC.3 agreed that the gtr should be developed in two phases: the initial phase on harmonizing requirements for passenger car tyres only, and a second harmonization phase on requirements for light trucks tyres, which carry a C (Commercial) or LT (Light Truck) designation. In the interim, the existing requirements for C or LT tyres (albeit non-harmonized) are included in the first stage of the gtr for completeness. The current document reflects that decision and contains only harmonized requirements for PC tyres, with the LT/C requirements still to be harmonized.

6. This report is in response to paragraph 5. of TRANS/WP.29/882 – Guidelines Regarding Proposing and Developing of Global Technical Regulations. It describes the work done to complete the first phase of the gtr for tyres.

C. Development of the gtr

7. Tests or requirements for radial passenger car tyres required extensive harmonization. These newly harmonized tests or requirements are:

- (a) High speed test;
- (b) Physical dimensions test;

(c) Required markings.

8. Several other test requirements for radial passenger car tyres are applied at a national or regional basis and these were not considered suitable for harmonization. These tests were simply included as direct copies in the gtr for tyres. In particular, harmonization is not proposed for:

- (a) Endurance test;
- (b) Low pressure endurance test;
- (c) Bead unseating test;
- (d) Strength test;
- (e) Rolling sound emission test;
- (f) Wet grip test;
- (g) Run flat test.

9. Harmonizing the high speed test posed a significant challenge in that the two existing tests were quite different from each other and based on different principles. One was designed to ensure that a tyre would perform adequately at speeds well above a national speed limit, but the test requirements were not related to any speed symbol indicated on the tyre itself. The other required that a tyre pass a test at its highest rated speed. Taking into account the long experience of the Federal Motor Vehicle Safety Standards (FMVSS) in the United States of America and in countries applying Regulation No. 30 annexed to the 1958 Agreement, and the huge amount of test results corresponding to these two testing procedures, it was decided to base harmonization on a combination of the two existing test procedures rather than develop a wholly new harmonized test procedure. The harmonization work was based on a determination of which test was more onerous for tyres of different speed symbols, and using the best test procedure.

10. At the first meeting of the informal working group in September 2006, three different scenarios for the high speed test harmonization were discussed. One of the options considered was to use the FMVSS 139 high speed test for tyres with a speed rating equivalent to the symbol of "S" and below (less than or equal to 180 km/h), and the Regulation No. 30 test for speed symbols above "S" (greater than 180 km/h). At that meeting there was general consensus by the Contracting Parties that this proposal could be considered as a starting point, but it would require significant work in order to demonstrate the validity of the proposal.

11. The tyre industry presented a theoretical method to determine, for each speed symbol, the test which is the most severe and to validate that the equivalence point (the speed symbol for which both tests are equally severe) between the two tests is reached at a specific speed symbol. The following year, the tyre industry gathered data to demonstrate this concept. Six tyre manufacturers supplied data, and 704 tyres were tested using both tests. All the tyres were tested above and beyond the normal high speed test requirements, and the number of steps that each tyre was able to withstand above the regulatory limit was counted. The ratio of the number of Steps Above the Limit (SAL) for the FMVSS 139 test, divided by the number of steps above the limit for the Regulation No. 30 test was used to evaluate the data. It was determined that the FMVSS 139 high speed test was more severe for tyres with speed symbol of S and below (less than or equal to 180 km/h). The Regulation No. 30 high speed test was more severe for tyres with speed symbols of T (190 km/h) and above.

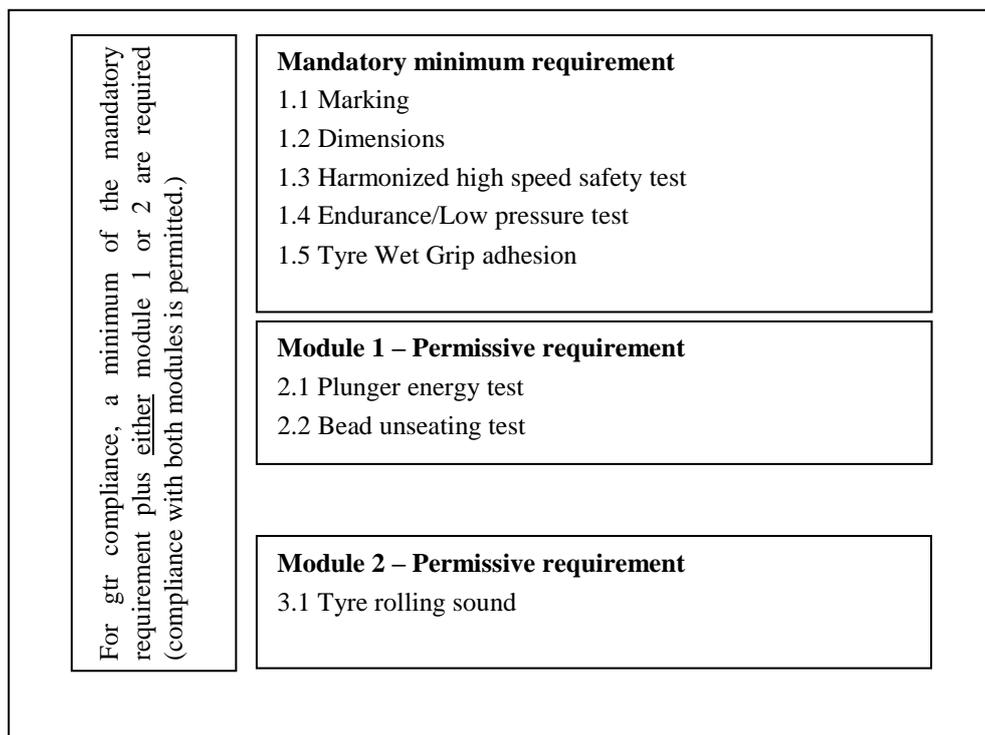
12. To validate this concept further, work was undertaken on a smaller sample of tyres to determine the temperature increase during the different tests. In all cases, it was

demonstrated that for T rated tyres and above, greater energy input was required (as determined by the increase in the contained air temperature) during the Regulation No. 30 test than from the FMVSS 139 test. This data was also independently confirmed by one of the Contracting Parties. Since the increase in temperature of a tyre should be directly related to the amount of energy supplied during the test, a higher internal tyre temperature at the end of a test indicates a higher degree of severity. At the September 2008 meeting, it was agreed to use the Regulation No. 30 test for tyres with speed symbols of T (190 km/h) and above, and to use the FMVSS 139 high speed test for all lower speed symbols (180 km/h and below).

13. The physical dimensions test was less difficult to harmonize from a technical point of view, because of the elementary simplicity of determining the outside diameter and width of a tyre in its inflated state to ensure interchangeability between tyres marked with the same size designation. A small but not insignificant gain has been achieved by harmonizing the measuring of the tyre's width at four points around the circumference.

14. Following an inventory of different tests for passenger car tyres existing in the world, it appeared that some of these tests might be harmonized on a worldwide level, while some of them may have a more regional application. Thus the technical sponsor of the tyre gtr proposed to organize the different tests into three modules.

15. The modular structure, reproduced in the following chart (from ECE/TRANS/WP.29/2006/139), was provided to AC.3 as the formal request of authorisation to develop the gtr, and agreed upon the Contracting Parties to the 1998 Agreement.



16. The informal working group developing the gtr pursued the modular approach and a wider appreciation among Contracting Parties of the application of modules emerged. This prompted proposals for a less prescriptive approach to some of the individual elements included in the mandatory module. The informal working group considered alternatives to deliver the requirements of Contracting Parties while retaining the original modular

approach but could not find a sufficiently robust solution. As a result, the group proposes a revised structure centred upon a "General Module" plus Options 1 and 2:

<i>Passenger car tyres</i>		
	<i>Test name</i>	<i>Paragraph(s)</i>
General module	Marking and tread wear indicators	3.2., 3.3. and 3.4.
	Physical dimensions	3.5.
	High speed test	3.11.
	Endurance test	3.9.
	Low pressure test	3.10.
	Wet grip test	3.12.
	Run flat test	3.13.
Option 1	Strength test	3.6.
	Bead unseating test	3.7.
Option 2	Rolling sound emissions	3.8.

17. In this version of the gtr for tyres, the harmonized requirements apply only to tyres for passenger cars. The module concept applicable to LT/C tyres is below:

<i>LT/C tyres</i>	<i>C type tyres</i>	<i>LT type tyres</i>
<i>Test name</i>	<i>Paragraphs related to Regulation No. 54</i>	<i>Paragraphs related to FMVSS 139</i>
Marking and tread wear indicators	3.2., 3.3. and 3.4.	3.2., 3.3. and 3.4.
Physical dimensions	3.21.	3.20.
High speed test	3.16.	3.19.
Endurance test	3.16.	3.17.
Low pressure test	None	3.18.
Wet grip test	None	None
Run flat test	None	None
Strength test	None	3.14.
Bead unseating test	None	3.15.
Rolling sound emissions	3.8.	None

18. Some required markings may be eliminated as they have become unnecessary over the years, (i.e. Radial and Tubeless). Over 90 per cent of passenger car tyres and LT/C tyres sold worldwide are of radial and tubeless construction and continuing this marking is unnecessary. An additional change was made in the way the Tyre Identification Number (TIN) will be used in combination with other markings.

19. The Tyre Identification Number (TIN) format is based on the National Highway Traffic Safety Administration (NHTSA) of the United States of America. The NHTSA plans to change the 2-digit plant codes to 3-digits. A symbol, the number "1" for example, will be reserved to precede all current 2-digit codes, and be used exclusively for existing plant codes. The "1" would only be used as the prefix for existing 2-digit codes, and would not be used as the leading digit for any new 3-digit codes. NHTSA will continue to assign

global plant codes and the necessary information to ensure such a code is contained in the gtr.

20. The aim of the tyre gtr is to introduce the universal worldwide harmonized requirements on tyres included in the scope of the gtr. In accordance with the provisions of the 1998 Agreement, once the gtr is adopted, those Contracting Parties voting in favour of its adoption will begin transposing those requirements into their national legislation. In the interest of moving rapidly towards creating a "Global tyre" approach the informal working group suggests that Contracting Parties transpose the gtr requirements in a flexible way to permit tyres complying with the full requirements access to as many markets as possible.

21. Consideration was given to harmonizing the approval markings (both type approval and self-certification markings) and discussions on this issue were raised in WP.29 and AC.3 meetings. It was concluded that, currently, it is not possible to adopt a harmonized approval marking since the compliance assessment procedures are not yet harmonized worldwide, so this gtr contains no administrative provisions on approval markings. In the absence of a harmonized marking, the Contracting Parties retain the option to assign markings to tyres, especially markings for a "Global tyre", and these can be introduced within their national / regional compliance assessment systems.

22. It is anticipated that the Contracting Parties to the 1958 Agreement will incorporate the provisions of the gtr into the Regulations within that legal framework. This will include applying suitable tyre marking and so help provide for market recognition between the Contracting Parties. This development might encourage wider recognition of harmonized markings and thus further the move towards a single global marking where tyres meet the full requirements established by this gtr.

23. The technical content of the gtr has been presented to GRRF both at its seventy-third and seventy-fourth sessions, respectively in September 2012, February 2013, and its seventy-seventh and seventy-eighth sessions, respectively in June and September 2014.

D. Future work

24. The work that remains to be done includes the design of harmonized tests for LT/C

- (a) Physical dimensions;
- (b) Markings;
- (c) High speed test;
- (d) Endurance test.

25. In addition, some modifications will be required to the gtr for tyres so that it remains aligned with other Regulations annexed to the 1958 Agreement that are currently undergoing major amendments, such as Regulation No. 117, including its 02 series of amendments, Regulation No. 30 and Regulation No. 54. These amendments include the addition of tests for rolling resistance (C1, C2 and C3), wet grip for C2 and C3 tyres, and a test for snow tyres (C1, C2 and C3) used in severe winter conditions with the 3 peak mountain snowflake marking.

26. The informal working group has established in September 2010 a schedule for the development and completion of this gtr. The draft gtr, including Phase II, should be presented to GRRF at its eighty session, in September 2015 and, in the absence of any major disagreement, the final draft including Phase II could be approved at the eighty-three GRRF session in February 2017. After GRRF's adoption, the final report will be prepared and sent together with the approved gtr to AC.3 and WP.29 in June 2017 for probable approval in November 2017.

E. Conclusion

27. Following the preliminary review, the informal working group requests the approval of AC.3 for the continuation of this work toward a gtr for radial pneumatic tyres for passenger and light truck (commercial) vehicles based on the proposal of document ECE/TRANS/WP.29/AC.3/15.
