

Proposal to develop and preliminary report on the development of a global technical regulation concerning uniform provisions for pneumatic radial tyres for passenger and light truck (commercial) vehicles

A. Proposal to develop a global technical regulation on 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:
 - To establish a set of tests according to parameters that the Contracting Parties judge essential for road safety and environmental protection;
 - To define a uniform set of globally standardized markings.

II. Description of the proposed 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 parts:
 - A core module containing the minimum requirements enforced by all the Contracting Parties. It would include:
 - Prescribed markings
 - Physical dimensions
 - High-speed safety test
 - Endurance test, including for under-inflated tyres
 - Wet grip test
 - Two optional modules, at the discretion of each Contracting Party
 - Optional module 1
 - Plunger energy test
 - Bead unseating test

Optional module 2
Rolling sound emission test

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
- UN Regulation No. 30
 - UN Regulation No. 54
 - UN Regulation No. 117, amended
10. Directives of the European Union (relating to C.1)
- Directive 92/23/EEC
 - Directive 2001/43/EC
11. United States of America
- U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.109: New Pneumatic Tires
 - U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.110: Tire Selection and Rims
 - U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.119: New Pneumatic Tires for Vehicles other than Passenger Cars
 - U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.202: Tire Selection and Rims for Motor Vehicles other than Passenger Cars
 - U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.138: Tire Pressure Monitoring Systems
 - U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 571.139: New Pneumatic Tires for Light Vehicles
 - SAE J918c Passenger Car Tire Performance Requirements and Test Procedures
 - U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 569: regrooved Tires
 - U.S. Code of Federal Regulations (CFR) Title 49: Transportation; Part 574: Tire Identification and Record Keeping
12. International norms
- ISO 4000-1 Passenger car tyres and rims (metric series)
 - ISO 10191 Passenger car tyres - Verifying tyre capabilities - Laboratory test methods
 - ISO 16992 Passenger car tyres - Spare unit substitutive equipment (SUSE)
 - ISO 17269 Passenger car tyres - Methods for measuring rolling circumference - Loaded new tyres
 - ISO 23671 Passenger car tyres - Method for measuring relative wet grip performance - Loaded new tyres
 - ISO 18164 Passenger car, truck, bus and motorcycle tyres - Methods of measuring rolling resistance

B. Preliminary report on the development of a global technical regulation on tyres

A. Introduction

1. This gtr was developed by the GRRF informal working group (the Tyre gtr working group).
2. The work on this gtr began informally in December of 2004 with a meeting in Paris. As required by the 1998 Agreement, a formal proposal for the establishment of a tyre gtr was proposed to the Executive Committee (AC.3) by the technical sponsor, France. At the 140th session of 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.
3. Subsequent to that approval, the informal tyre gtr working group met on numerous occasions. In addition to 3 unofficial meetings held between December 2004 and November 2006, another 13 meetings were scheduled in conjunction with the GRRF or WP.29 meetings and a further two interim meetings were held in Brussels in July 2007 and July 2009.
4. In 2009 at the request of the informal working group, AC.3 approved the gtr should be developed in 2 phases; the initial phase being dedicated to harmonising requirements for passenger car tyres only, and requirements for light trucks tyres, which carry a C or LT designation, to be harmonised before the end of 2014 as a second step. In the interim the existing requirements for C or LT tyres (albeit non-harmonised) are included in the first stage of the gtr for completeness. The current document reflects that decision and contains only harmonised requirements for PC tyres, with the LT/C requirements remaining to be harmonised.
5. This preliminary report is in response to paragraph 5. of TRANS/WP.29/882 – Guidelines Regarding Proposing and Developing of Global Technical Regulations. It was prepared after a thoughtful review and describes the work done to complete the first phase of the gtr for tyres.

B. DEVELOPMENT OF THE GTR

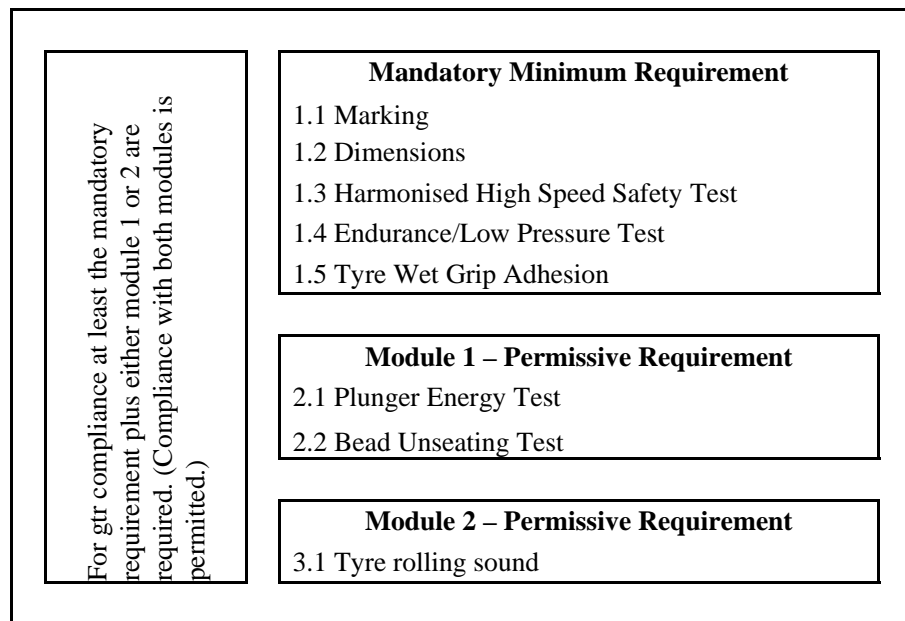
6. Tests or requirements for radial passenger car tyres required extensive harmonisation during the course of the informal working group's mandate. These newly harmonised tests or requirements are:
 - (a) High speed test
 - (b) Physical dimensions test
 - (c) Required markings
7. Several other test requirements for radial passenger car tyres are applied at a national or regional basis and these were not considered suitable for harmonisation. These tests were simply included as direct copies in the gtr for tyres. In particular, harmonisation 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

8. 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 FMVSS standards in the USA and in countries applying UN Regulation 30, and the huge amount of test results corresponding to these two testing procedures, it was decided to base harmonisation on a combination of the two existing test procedures rather than develop a wholly new harmonised test procedure. The harmonisation work was based on a determination of which test was more onerous for tyres of different speed symbols, and using the best test procedure.
9. At the meeting of the ad hoc working group in September 2006, 3 different scenarios for the high speed test harmonisation 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 UN Regulation No. 30 test for speed symbols above "S" (greater than 180 km/h). At that meeting there was a general consensus by the Contracting Parties that this proposal could be considered as a starting point, but it would require significant further work in order to demonstrate the validity of the proposal.
10. 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. Over the following year the tyre industry gathered data to demonstrate this concept. Six tyre manufacturers supplied data, and in total, 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 were 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 UN Regulation No. 30 test was used to evaluate the data. Based on this extensive set of 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 UN Regulation No. 30 high speed test was more severe for tyres with speed symbols of T (190 km/h) and above.
11. 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 UN 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 meeting in September 2008, it was agreed to use the UN 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).

12. The physical dimensions test was less difficult to harmonise 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.
13. After the inventory of different tests for passenger car tyres existing in the world had been made, it appeared that some of these tests might be harmonised on a worldwide level, while some of them appeared to have a more regional application. In order to take this situation into account, the technical sponsor of the tyre gtr proposed to organize the different tests into three modules:



This modular structure was described in the document ECE/TRANS/WP.29/2006/139 that was provided to AC.3 as the formal request of authorisation to develop the gtr, and accepted by the contracting parties.

14. The informal working group developing the gtr pursued the modular approach. As the group continued to develop the modular approach so 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 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 two options (Options 1 & 2). These are described in the table.

Passenger Car Tyres

	Test Name	Paragraph(s)
	Marking and treadwear indicators	3.2., 3.3. and 3.4.
	Physical dimensions	3.5.
Mandatory	High speed test	3.11.
Module	Endurance test	3.9.
	Low pressure test	3.10.
	Wet grip test	3.12.
	Run Flat test	3.13.
	Strength test	3.6.
Option 1	Bead unseating test	3.7.
Option 2	Rolling sound emissions	3.8.

15. In this initial version of the gtr for tyres, the harmonised requirements apply only to tyres for passenger cars. The module concept does not apply to LT/C tyres and the following table lists the tests applicable to these tyres.

<i>LT/C Tyres</i>	<i>C type tyres</i>	<i>LT type tyres</i>
Test Name	Paragraphs related to UN Regulation No. 54	Paragraphs related to FMVSS 139
Marking and treadwear indicators	3.2. and 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

16. In the case of required markings, it was possible to eliminate some that had become unnecessary over the years, such as the words Radial and Tubeless. Indeed over 90% of passenger car tyres and LT/C tyres sold worldwide are radial and tubeless construction and so continuing to mark tyres is unnecessary. In addition, a change was made in the way the Tyre Identification Number (TIN) will be used in combination with other markings.

17. The Tyre Identification Number (TIN) format is based on USA NHTSA's plan to change the currently assigned 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 not be used as the leading digit for any new 3-digit codes. USA NHTSA will continue to assign global plant codes and the necessary information to obtain such a code is contained with the gtr.
18. The aim of the tyre gtr is to introduce the universal worldwide harmonised requirements to tyres included into 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 start the process of transposing those requirements into their national legislation. In the interests of moving rapidly towards creating a "Global tyre" approach the informal 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.
19. Consideration was given to harmonise the approval markings (both type approval and self-certification markings) and discussions on this issue was elevated to WP.29 and AC.3 meetings. It was concluded as not possible currently to adopt a harmonised approval marking since the compliance assessment procedures are not yet harmonised worldwide. So this gtr contains no administrative provisions on approval markings. In the absence of a harmonised 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.
20. It is anticipated the contracting parties to the 1958 Agreement will incorporate the gtr provisions into 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 harmonised markings and thus further the move towards a single global marking where tyres meet the full requirements established by this gtr.
21. The technical content of the gtr will be presented to GRRF at its seventy-third session in September 2012.

C. Future work

22. The work that remains to be done includes the design of harmonised tests for LT/C
 - Physical dimensions
 - Markings
 - High speed test
 - Endurance test
23. In addition, some modifications will be required to the gtr for tyres in order that it remains aligned with other UN Regulations that are currently undergoing major amendments, such as Regulation No. 117.02, 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.

24. The informal group has established a schedule for the development and completion of this gtr. The draft gtr including Phase II should be presented to GRRF at its seventy-fifth session in September 2013 and, in the absence of any major disagreement, the final draft could be approved at the seventy-seventh GRRF session in September 2014. After GRRF's adoption, the final report will be prepared and sent together with the approved gtr to AC.3 and WP.29 in November 2014 for probable approval in March 2015.

D. Conclusion

25. Following the preliminary review, France, as Technical Sponsor, requests the approval of AC.3 for the continuation of this work toward a global technical regulation for radial pneumatic tyres for passenger and light truck (commercial) vehicles based on the proposal document TRANS/WP.29/AC.3/15.
-