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GTR on tyres – Rationale and justification: New proposal from MM Gauvin (Sponsor) and Yarnold (Chair)

I. STATEMENT OF TECHNICAL RATIONALE AND JUSTIFICATION

A. INTRODUCTION

1. The objective of this proposal is to establish a global technical regulation (gtr) for new radial pneumatic tyres equipping passenger cars and light vehicles up to 4536 kg (10,000 pounds) under the 1998 Agreement. The official bases of this harmonised set of requirements are the Regulations 30, and 54 and 117 annexed to the 1958 Agreement, as well as the FMVSS 139 requirements established in the USA under the direction of the National Highway Traffic Safety Administration (NHTSA). Regulations from GSO (Gulf States Organization), India and China, although not officially registered in the compendium of regulations for the tyre gtr, were also analyzed and requirements from them were considered in this gtr insofar as they were not already covered by one of the regulations from UN ECE and USA. In addition, parts of FMVSS 109 and 119 were copied directly into this gtr, since they are applicable to certain tyres for light vehicles (LT).

2. Many countries throughout the world have already introduced regulations concerning pneumatic tyres. Many of the existing regulations are based on the four primary ones mentioned above. However, many differences in test conditions and regulatory marking requirements require tyre manufacturers to produce almost identical products but with market specific variations to meet local market requirements – including slight variations on sidewall marking provisions.

3. This first version of the gtr for tyres harmonises the requirements for passenger car tyres. Work is ongoing to define the technical specification for the harmonisation of tyres with the designations LT or C which are primarily fitted on light commercial vehicles.

B. BACKGROUND OF TYRE REGULATIONS

4. Radial pneumatic tyres for passenger cars and light vehicles are increasingly becoming worldwide products, expected to be used anywhere in the world when mounted as original equipment on new vehicles which are themselves marketed on a global basis. This globalisation creates significant opportunities for manufacturers to deliver better and more cost efficient products but also requires harmonisation of the technical provisions at a global level to avoid increasing manufacturing costs.

5. Although testing requirements for different regulations used around the world are often substantially similar, slight variations in test procedures oblige tyre manufacturers to test the same object for the same performance characteristic under slightly different conditions, without any significant improvement in the final product..

6. Marking requirements are also variable around the world, and the same tyre may need several different approval marks to be marketed in a truly worldwide fashion. Any harmonisation of such markings should continue to be a priority, as it would clarify the administrative identity of the tyre and facilitate the management of production moulds.

C. PROCEDURAL BACKGROUND AND DEVELOPMENT OF THE GLOBAL TECHNICAL REGULATION

7. This gtr was developed by the GRRF informal working group (the Tyre gtr working group).

8. 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 ECE/TRANS/WP.29/2006/139.

9. 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 10 meetings were scheduled in conjunction with the GRRF meetings and a further two interim meetings were held in Brussels in July 2007 and July 2009.

10. 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.

11. 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

12. Several other test requirements for radial passenger car tyres existed only in one of the existing regulations and needed no harmonisation. These tests were simply included as direct copies in the gtr for tyres. In particular, no harmonisation was required for:

    (a) Endurance test
    (b) Low pressure endurance test
    (c) Bead unseating test
    (d) Strength test
    (e) Rolling sound emission test
    (f) [Rolling resistance test]

(g) Wet grip test
(h) Run flat test

13. 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 capacity index 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 tests 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 indices, and using the best test procedure.

14. 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 FVMSS 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 30 test for speeds 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.
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 ECE R30 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 rating of S and below (less than or equal to 180 km/h). The UN ECE R30 high speed test was more severe for tyres with speed symbols of T (190 km/h) and above.
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 ECE Regulation 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 ECE R30 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).

15. 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.

16. 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:

Radial Passenger Car Tyres		
	Test Name	Paragraphs
Mandatory Module	Marking and treadwear indicators	3.2. and 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.
Module 1	Strength test	3.6.
	Bead unseating test	3.7.
Module 2	Rolling sound emissions	3.8.

This modular structure was described in the document which was provided to AC3 as a support for the request of authorization to develop the gtr, and accepted by AC3.

17. In this initial version of the gtr for tyres, which only contains harmonised requirements for passenger car tyres, the module concept does not apply to LT/C tyres (see table below).

Radial LT/C Tyres	C type tyres	LT type tyres
Test Name	Paragraphs related to UN ECE Reg. 54	Paragraphs related to FMVSS 139
Marking and treadwear indicators	3.2. and 3.3. and 3.4.	3.2. and 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. In the case of required markings, it was possible to eliminate some markings 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. Also, a 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 US 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. US NHTSA will continue to assign global plant codes and the necessary information to obtain such a code is contained with the gtr.

20. Some considerations were given to harmonise approval markings (both type approval and self certification markings) and discussions on this issue also took place in WP29 meetings. Eventually it was not possible to adopt an harmonised approval marking. So this gtr, like the previous ones existing in the global registry, contains no administrative provisions on approval markings.

D. TECHNICAL AND ECONOMIC FEASIBILITY

21. The tyre gtr has been developed by drawing on the experience of many stakeholders, including regulatory authorities, type approval authorities, tyre and vehicle manufacturers and technical consultants. The gtr has been built upon the experience of many organizations and individuals with expertise in the area of tyres for passenger cars and light trucks or light commercial vehicles.

22. The tyre gtr has been designed to update and improve upon existing regulations, and the requirements are based on existing concepts in different Contracting Parties' present regulations.

23. Since this gtr is based on existing requirements and some harmonised tests, no economic or technical feasibility study was deemed necessary. When transposing this gtr into national legislation, contracting parties are invited to consider the economic feasibility of the gtr in the context of their country.

E. ANTICIPATED BENEFITS

24. The principal economic benefit of this regulation will be a reduction in the variety of tests for the same or substantially similar requirements.

25. Depending on how different Contracting Parties implement this gtr, there may be benefits due to the way the approval markings are treated. Tyre mould design and fabrication might be rationalized,with associated reductions in production costs.

26. Safety benefits resulting from the transposition of the gtr in the national legislations depend of the previous level of the national regulations. In the case of USA and of the countries which apply the 1958 Agreement regulations on tyres, the safety benefits will be marginal.

F. POTENTIAL COST EFFECTIVENESS

27. It is not possible to assess, at this moment, the total costs linked to the gtr. On one hand, there are more tests in the gtr than in the existing national or international regulations, on the other hand the harmonisation of the regulation will reduce the global cost of type approval in the variety of countries which will apply the gtr through that administration procedure.

28. Safety benefits are anticipated, but it is not yet possible to assess them in terms of reduction of number of accidents and victims. So the potential cost effectiveness cannot be evaluated.