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**ECONOMIC COMMISSION FOR EUROPE**

INLAND TRANSPORT COMMITTEE

World Forum for Harmonization of Vehicle Regulations

Working Party on Brakes and Running Gear

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Item 8(e) of the provisional agenda

TYRES

Regulation No. 124  
(Replacement wheels)

Proposal for draft amendments to Regulation No. 124

Submitted by the expert from Germany \*/

The text reproduced below was prepared by the expert from Germany to extend the range of the scope, to facilitate the application by wheel manufacturer of light alloy wheels and to avoid misunderstandings at the required wheel tests. It is based on a document without a symbol (informal document No. GRRF-63-02), distributed during the sixty-third session of the Working Party on Brakes and Running Gear (see report ECE/TRANS/WP.29/GRRF/63, para. 41). The modifications to the existing text of the Regulation are marked in **bold** characters.

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\*/ In accordance with the programme of work of the Inland Transport Committee for 2006-2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance performance of vehicles. The present document is submitted in conformity with that mandate.

A. PROPOSAL

Paragraph 1., amend to read (footnote including 1/) :

"1. This Regulation covers new replacement wheels designed for vehicles of categories M<sub>1</sub>, M<sub>1</sub>G, N<sub>1</sub>, O<sub>1</sub> and O<sub>2</sub> 1/.

It does not apply...

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1/ Categories M, N, and O as defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.1/Amend.2)."

Insert a new paragraph 2.1.5., to read:

"2.1.5. **"PCD"**, means the pitch circle diameter of bolt holes."

Insert a new paragraph 2.2.8., to read:

"2.2.8. **"Styling"**, the wheel's exterior appearance."

Insert a new paragraph 2.12., to read:

"2.12. **"Wheel family"**, are in case of light alloy, wheels of the same type; however, with different inset values, PCD and centre bore."

Paragraph 3.1.2.9., amend to read:

"3.1.2.9. maximum load capacity **at rolling circumference;**"

Paragraph 5.1.5., amend to read:

"5.1.5. **part number of the wheel / rim, wheel type (optional).**"

Paragraph 6.5.2.1., insert a new subparagraph (e), to read:

"(e) **Alternating torque test according to Annex 9 of this Regulation (however, only if the technical service considers it necessary due to the number and thickness of spokes).**"

Paragraph 6.5.2.2., subparagraph (e), amend to read:

"(e) Alternating torque test **according to Annex 9 of this Regulation (however, only if the technical service considers it necessary due to the construction design and number of fixings).**"

Paragraph 6.5.3.1., insert a new subparagraph (e), to read:

- "(e) Alternating torque test **according to Annex 9 of this Regulation (however, only if the technical service considers it necessary due to the number and thickness of spokes).**"

Paragraph 6.5.3.2., subparagraph (e), amend to read:

- "(e) Alternating torque test **according to Annex 9 of this Regulation (however, only if the technical service considers it necessary due to the construction design and number of fixings).**"

Paragraph 6.6., amend to read:

"6.6. Where a wheel manufacturer submits an application for type approval **for a wheel family, it is not necessary to carry out tests for each wheel version.** Worst case selection ... "

Annex 1, item 2.7., amend to read:

"2.7. **Maximum wheel load and respective theoretical rolling circumference .....** "

Annex 2, add at the end of the text a new sentence, to read:

**"The marking shall be at a position selected by the manufacturer. It shall be easily visible and clearly legible after the tyre has been mounted to the wheel and the wheel is fitted to the car."**

Annex 3, amend the last sentence, to read:

**"The marking shall be at a position selected by the manufacturer. It shall be easily visible and clearly legible after the tyre has been mounted to the wheel."**

Annex 4, paragraphs (c) to (e), amend to read:

- "(c) Check of the **material** characteristics ( $R_{p0,2}$ ,  $R_m$  and A) of **specimen taken from critical zones (such as the spoke, for example) as well as the inner and the outer rim flange. The take-off points and position of the samples must be depicted in the drawing.**
- (d) Analysis of the defects and of the new material structure.
- (e) Analysis of the metallurgic defects and **structure taken from the transition zone of the wheel disc and rim or from the fracture zone, if applicable.**"

Annex 5, paragraph 1.1., amend to read:

"1.1. Sample preparation

A surface treated sample, taken from the production, shall be damaged by cross engraving (**DIN EN ISO 2409**) and stone impact (**DIN EN ISO 20567-1**) to represent ..."

Annex 6, paragraph 4., amend to read:

"4. Test schedule for **wheel families**

**Wheels of a wheel type with the same number of wheel attachment holes, same styling, different PCD and/or different inset values can be grouped at the same or at a lower value of test bending moment taking into account the test schedule to follow. Wheels with the largest centre hole diameter shall be included in the test. A negative test can be compensated by two positive tests. A retest with another negative test result necessitates the request for modified test samples.**

Necessary tests: ..."

Annex 8,

Paragraph 1., amend to read:

"1. Test description

**The fracture behaviour of the wheel striking an object at the outer rim flange shall be checked at critical positions. For proof of adequate fracture behaviour, an impact test according to ISO 7141 (2005-07-04) shall be carried out."**

Paragraph 4., amend to read:

"4. Tests schedule for **wheel families**

Wheels to be tested	Impact test
smallest pitch circle diameter	one for each impact position
largest pitch circle diameter	one for each impact position
deviation of inset value up to -15 mm	--
<b>more than -15 mm and larger than +2 mm</b>	one for each impact position

"

Insert a new paragraph 5., to read:

**"5. Failure criteria**

**The wheel will not pass the test if one of the following criteria applies:**

- (a) visible incipient crack in a zone of the wheel disc of wheel assembly;**
- (b) the centre member separates from the rim;**
- (c) total loss of pressure within one minute.**

**The wheel is not considered to have failed the test by deformation of the wheel assembly or by fractures in the area of a rim section struck by the face plate of the striker."**

Annex 8 – Appendix, should be deleted.

Annex 10,

Paragraph 1.2., amend to read:

"1.2. Vehicle characteristics

**Those vehicle characteristics should be listed that distinctly describe the vehicle type and version for which the wheel will be used. Thereby, depending on the restriction of the range of application of various markets with respect to certain vehicle versions and variants, various specification characteristics are possible.**

**Absolutely required are the data of:**

- (a) vehicle manufacturer;**
- (b) vehicle type;**
- (c) vehicle approval number;**
- (d) engine performance (also possible range of performance).**

**Other specification characteristics / restrictions may also be used."**

Paragraph 1.5., amend to read:

"1.5. Example of possible structures of the application and fitting information table

Wheel characteristics (mandatory fields in **bold** characters)

<b>Approval Number</b>				
<b>Wheel Type</b>				
<b>Size</b>	<b>Fixing holes / pcd (mm)</b>		<b>Inset (mm)</b>	<b>Max. wheel load (N)</b>
<b>6 Jx15 H2</b>				
Wheel marking (Variant/Version)	centering marking	<b>Centering (mm)</b>	date of manufacture (week/year)	<b>at circumference (mm)</b>

Vehicles' characteristics as well as additional conditions and advice

**Vehicle manufacturer:**

.....

**Fitting parts**

e.g. special bolts delivered by the wheel manufacturer M14x1.5, conical angle 60°, length of piston skirt xx mm

<b>Vehicle Type</b>		.....		
<b>Approval No.</b>		.....		
<b>Performance ( kW from – to)</b>	<b>Vehicle Model name</b>	<b>Permissible tyre size front and rear axle</b>	<b>Additional conditions and advice</b>	
			A01)A02)A03) E01)	

**Conditions and Advice**

- A01)** e.g. kind of balancing weights and their place of fitting
- A02)** e.g. kind of possible valves
- A03)** e.g. for using manufacturer's replacement wheels only the standard fitting parts are allowed
- E01)** e.g. not allowed on 4x4 vehicles. "

**B. JUSTIFICATION**

- Ad paragraph 1.: The range of application of the regulation will be extended to vehicles of category N<sub>1</sub>, that as a rule are identical in construction with regard to (the technical equipment of) vehicles of category M<sub>1</sub>.
- Ad paragraph 2.1.5.: The definition has been incorporated into the regulation without explanations; this will lead to different interpretations when translated into national languages. Therefore, a clear statement becomes necessary.
- Ad paragraph 2.2.8.: It makes sense to list only those wheels that do not vary optically under one approval number, in as much as in the following requirements of the regulation this is being done. Serves clarification purposes.
- Ad paragraph 2.12.: In Annex 6 the definition is being used for the possible pooling of tests. The definition serves the avoidance of errors during the establishment of families. Here, the definition of the wheel family is listed.
- Ad paragraph 3.1.2.9.: The maximum allowable wheel load is to be viewed as function of the used tyre's tread circumference.

- Ad paragraph 5.1.5.: For a single wheel version a statement concerning the type is being considered as sufficient. This usually is the case with identical and identical replacement wheels.
- Ad paragraph 6.5.2.1.: Generally, an alternating torque test becomes necessary, if due to the low number or thickness of spokes the technical service questions the wheel strength at torque loads forced by acceleration and braking operations.
- Ad paragraph 6.5.2.2.: Generally, an alternating torque test becomes necessary, if due to the low number or size of screws the technical service questions the wheel strength at torque loads forced by acceleration and braking operations.
- Ad paragraph 6.5.3.1.: Generally, an alternating torque test becomes necessary, if due to the low number or thickness of spokes the technical service questions the wheel strength at torque loads forced by acceleration and braking operations.
- Ad paragraph 6.5.3.2.: Generally, an alternating torque test becomes necessary, if due to the low number or size of screws the technical service questions the wheel strength at torque loads forced by acceleration and braking operations.
- Ad paragraph 6.6.: This redrafting becomes necessary since prior to this a new type classification was established. The worst case selection is possible for wheel versions within a wheel family.

#### Annex 1

- Ad paragraph 2.7.: A statement of the maximum allowable wheel load only makes sense in connection with the allowable tyre-tread circumference of the largest tyre equipment described in the range of application. This serves as calculation base for the bending moment determined during the impact test.

- Annex 2 The approval number serves as a means of identification of the wheel mounted to the vehicle in traffic. For this reason, it must be legible without demounting the wheel.

- Annex 3 The manufacturer defines the marking of the wheel (drawing). However, it must be carried out in such a manner that it is clearly legible and visible after the tyres have been mounted.

- Annex 4 The sample taking should be performed in areas of the wheel that are extremely strained. The wheel flange is rather uncritical due to the large thickness of material. At the intersection area of spoke and rim samples of the required dimensions can only be taken from certain design species. In the case of light alloy wheels, spokes and rim flange are considered a good sample taking area. The sample taking locations should be listed so as to be able to use the results – e.g. within the scope of a conformity of production test. The same applies to micrographs.

- Annex 5 Correction of standards listed for cross engraving and stone impact.

Annex 6

Ad paragraph 4.: A decisive factor for the worst case selection procedure is that the wheels belong to one wheel family, i.e. stem from one mould. This is being explained here once again. However, the table displayed here contains among different inset values also the possibility to test wheels with different pitch circles with a simplified procedure, which does make sense for wheel families.

Annex 8

Ad paragraph 1.: The impact test is performed according to the international standard ISO 7141 (Datum) and thus, is laid down in writing. – Therefore, additional explanations regarding the procedure can be omitted.

Ad paragraph 4.: The table contained some errors which were corrected: With different inset values an enlargement of the inset value is being considered as critical since the flange will become thinner. Insofar, another sample must be tested.

Ad paragraph 5.: Since the appendix to Annex 8 has been deleted, the failure criteria are being listed here, again.

Annex 10

Ad paragraph 1.2.: Decisive for a safe identification of vehicles that are appropriate for the wheels are those characteristics that are known to the individual vehicle keeper or ones that he can get to know – either by means of documents or from data on the vehicle itself. These characteristics can vary depending on existing stipulations of the individual markets (countries). Within the scope of the approval procedure, the vehicle manufacturer describes the variants and versions being part of the vehicle licensure. However, the VIN does not always contain the data required to enable a safe identification of a certain vehicle variant / version.

Aside from this, not all vehicle manufacturers provide a key to the deciphering of the WMI. VDS and year of construction that are contained in the VIN.

As a rule, a safe means is the identification by the vehicle manufacturer, the approval number that was allocated to the vehicle in its particular market area, the vehicle type as well as engine performance.

Additionally, however, further characteristics can be required: e.g. data on the attachment (attachment bores and pitch circle) of series wheels.

The presentation, as the attached sample proves, has been considered as expedient within the European Union, since a distinct identification is possible. Other markets, however, can require different characteristics, which will have to be agreed upon in individual cases by the respective approval authorities.

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