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Item 6 (c) of the provisional agenda
Tyres: UN Regulation No. 117 (Tyre Rolling Resistance, Rolling Noise and Wet Grip)

Proposal for a Supplement to the 04 series of amendments to UN Regulation No. 117

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). The modifications to the existing text of the UN 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 2024 as outlined in proposed programme budget for 2024 (A/78/6 (Sect.20), para 20.6), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Paragraph 1.1., amend to read:

"1.1. This Regulation applies to new pneumatic tyres * of classes C1, C2 and C3 in new state with regard to their sound emissions, **and** rolling resistance**,** and ~~to adhesion performance on wet surfaces (wet adhesion)~~ **in new** and ~~for class C1 tyres in~~ worn state with regard to adhesion performance on wet surfaces (wet adhesion). It also applies to C1 tyres in new state with regards to their ~~tyre~~ abrasion as defined in paragraph 1.3. of this UN Regulation. It does not, however, apply to:"

Paragraph 1.3., amend to read:

"1.3. In the case of class C1 tyres, except ice grip tyres and tyres having a nominal rim diameter code ≤ 13, approval shall be supplemented with information on the abrasion level according to paragraphs 5.7**.** to ~~5.9~~ **5.10.** of this Regulation."

Annex 10,

Introduction, amend to read:

" Introduction

For the calculation of the tyre abrasion index of a candidate tyre, the abrasion level of the candidate tyre is compared to the abrasion level of a standard reference test tyre. It is measured with one of the ~~followings~~ **following** test methods:

(a) vehicle test method on public open roads;

(b) indoor drum test method."

Paragraph 1.2., amend to read:

"1.2. Definitions

In addition to relevant definitions ~~set at point 2~~ **set out in paragraph 2.** of this Regulation the following apply."

Paragraph 1.2.7., amend to read:

"1.2.7. *"Hybrid electric vehicle (HEV)"* is a ~~Hybrid~~ **hybrid** vehicle where one of the propulsion energy converters is an electric machine."

Paragraph 1.2.10., amend to read:

"1.2.10. *"Off-vehicle charging hybrid electric vehicle (OVC-HEV)"* is a ~~Hybrid~~ **hybrid** electric vehicle that can be charged from an external source."

Paragraph 1.3., table, second row, replace "ALC" by "ALCT".

Paragraph 1.3., table, rows "ARC" and "ARR", delete.

Paragraph 1.4. and its sub-paragraphs 1.4.1., 1.4.3., 1.4.4., 1.4.5., 1.4.6., 1.4.7., headings, delete the full stop "." at the end.

Paragraph 1.4.4., amend to read:

"1.4.4. …

The distance ran by the tyre shall equal the GNSS reported distance plus the distance ran without a GNSS signal, ~~unless the latter is estimated by the GNSS system.,~~ unless this distance is estimated by the GNSS itself.

…"

Paragraph 1.4.7., amend to read:

"1.4.7. … A continuous measurement device recording the temperature is acceptable as well provided **that** it fulfils the measurement accuracy described above.

Initial and final ~~measurement~~ **measurements** shall be done using a calibrated thermometer."

Paragraph 1.4.8., amend to read:

"1.4.8. Instruments for tyre and wheel assembly mass measurement

The weight scale shall be able to measure the tyre **and wheel assembly** mass with an accuracy of ± 2 g."

Paragraph 1.6., heading, amend to read:

"1.6. Vehicle **and circuit** requirements"

Paragraph 1.6.2.2. (e), amend to read:

"1.6.2.2. …

(e) In addition, the toe IN/OUT **angle** in absolute value shall be lower than or equal to the values used in the ~~test~~ **candidate** vehicles for the front axle."

Paragraph 1.6.6., amend to read:

"1.6.6. In case no vehicle respecting conditions described in paragraph 1.6.2., 1.6.3., 1.6.4. or 1.6.5., the following process shall be used:

(a) Measurement with at least 4 different vehicles (if 4 vehicles available or all the available vehicles if less than 4) able to fit the candidate tyres must ~~demonstrated~~ **demonstrate** that the settings limits cannot be achieved. The vehicles shall be ~~aged of~~ less than two ~~years,~~ **years old** and made by 4 different carmakers.

(b) Select vehicles (both reference and candidate vehicles) respecting following criteria:

(i) Front Toe **IN/OUT angle** shall respect the previously given tolerances (0° +/- tolerance);

(ii) Front camber angle shall not differ by more than 0.5° between Reference and Candidate vehicle. Reference vehicle shall have a Front Camber lower than or equal to the respective value of the candidate vehicle, in absolute value;

(iii) Rear camber angle shall not differ by more than 0.6° between reference and candidate vehicle. Reference vehicle shall have a rear camber lower than or equal to the respective value of the candidate vehicle, in absolute value;

(iv) Rear Toe **IN/OUT** angle shall not differ by more than 0.1° between reference and candidate vehicle. Reference vehicle shall have a rear toe lower than or equal to the respective value of the candidate vehicle, in absolute value;

(v) In addition, the following ~~limit~~ **limits** shall be respected for candidate vehicles with loaded condition as described in paragraph ~~1.5.3.~~ **1.5.4.**:

a. Toe IN/OUT angle per wheel on the front axle set to 0 ± 0.1 degrees;

b. Camber angle on the front axle set between -1.7 degrees and 0 degree;

c. Toe IN/OUT angle per wheel on the rear axle set between 0.05 degree and 0.3 degrees;

d. Camber angle on the rear axle set between -2.7 ~~degree~~ **degrees** and 0.3 degrees.

(vi) In addition, the following ~~limit~~ **limits** shall be respected for reference vehicles with loaded condition as described in paragraph ~~1.5.3.~~ **1.5.4.**:

a. Toe IN/OUT angle per wheel on the front axle set to 0 ± 0.05 degrees;

b. Camber angle on the front axle set between -1.7 degrees and 0 degree;

c. Toe IN/OUT angle per wheel on the rear axle set between 0.05 degree and 0.3 degrees;

d. Camber angle on the rear axle set between -2.7 ~~degree~~ **degrees** and 0.3 degrees."

Paragraph 1.6.7., amend to read:

"1.6.7. Vehicle acceptable propulsion energy ~~convertor~~ **converter**

All the propulsion energy ~~convertor~~ **converter** types are allowed, as long as they are homogeneous in the convoy. The convoy shall consist of vehicles that belong in the same vehicle type in terms of the vehicles' electrification grade (i.e. ICE or NOVC-HEV or OVC-HEV or PEV)."

Paragraph 1.6.12., amend to read:

"1.6.12. …

Load distribution between front and rear ~~axle~~ **axles** shall be as following:

…"

Paragraph 1.6.16.1., amend to read:

"1.6.16.1. …

The offsets of the regression lines of the reference tyre abrasion ~~rate~~ level to the average test temperature during the test are calculated by means of the following equations:

…

Where:

…

$\overline{ALRT}$ is the average abrasion level of the n reference ~~tyres~~ **tyre tests** at three temperatures in mg/kg/t;

…"

Paragraph 1.7.1., first sentence, amend to read:

"1.7.1. **When testing tyres** ~~Tyres tested~~ against SRTT17S according to table in paragraph 1.2.25. of this Annex ~~shall respect~~**,** the following weather and climate conditions **shall be respected**:

…"

Paragraph 1.7.2., amend to read:

"1.7.2. **When testing tyres** ~~Tyres tested~~ against SRTT17W according to table in paragraph 1.2.25. of this Annex ~~shall respect~~**,** the following weather and climate conditions **shall be respected**:"

Paragraph 1.7.3.2., last sentence, amend to read:

"1.7.3.2. … Both time-based and distance-base**d** average for temperature are acceptable."

Paragraph 1.8., amend to read:

"1.8. Standard Reference Test Tyre requirements

Reference tyres SRTT17S and SRTT17W shall be stored in condition recommended in F3676-23 and F3675-23 respectively.

SRTT17S shall be used for evaluating candidate tyres of category of use normal and ~~for tyres of category of use snow or special use not classified as tyres for use in severe snow condition and~~ for tyres of category of use "special use" not ~~declared~~ **marked** "M+S".

SRTT17W shall be used for evaluating candidate tyres of category of use snow tyres ~~or~~ and special use tyres ~~declared as~~ **marked** "M+S", either or not classified as tyres for severe snow conditions."

Paragraph 1.11.3. (b), amend to read:

"1.11.3. …

(b) Propulsion energy converters (e.g. ~~Pure~~ **pure** internal combustion engine vehicle~~"~~ (ICE), NOVC-HEVCs only, OVC-HEVs only, or PEVs only) in the same convoy. For hybrid vehicles, the provisions described in paragraph 1.6.7. of this Annex shall apply.

…"

Paragraph 1.11.7., amend to read:

"1.11.7. …

During each shift, a continuous evaluation of speed, lateral, and longitudinal acceleration**s** shall be carried out. …"

Paragraph 1.11.8. (b), amend to read:

"1.11.8. …

(b) Accelerations: lateral and longitudinal acceleration**s** shall respect maximum and standard deviation values as calculated in paragraph 1.11.7. of this Annex and shall ~~the~~ respect **the** specifications defined in paragraph 1.6.13.3. of this Annex;

…"

Paragraph 1.11.8. (f), amend to read:

"1.11.8. …

(f) For candidate tyres ~~for use in severe snow conditions~~ **of category of use snow tyres and special use tyres marked "M+S", either or not classified as tyres for severe snow conditions**, the **abrasion level** of the SRTT17W normalized at 10 °C ($ALRT_{10}$) shall be in the range defined in paragraph 1.6.16. of this Annex;

…"

Paragraph 1.11.9., amend to read:

"1.11.9. …

(c) The abrasion level of reference tyre at 20°C **or 10°C as applicable** is within the ranges specified in paragraph 1.6.16. of this Annex;

…

Accidental deviation(s) are acceptable if representing less than 20 per cent of circuit distance or less than 100 km (whichever is lower) under the condition that the reference tyre abrasion level at 20°C **or 10°C as applicable** stays in authorized limits and acceleration standard deviations are respected.

…"

Paragraph 1.11.11. (a), amend to read:

"1.11.11. …

(a) If a tyre used during the test on the reference vehicle or one of the candidate vehicles is damaged by a reparable puncture and if the tyre can be repaired without running without pressure, the added repair mass shall be recorded and taken into account in the final calculation. The use of a spare tyre is permitted for a maximum distance of one loop **or maximum** 7.5 per cent of the test **distance**. The mileage ran with the spare tyre shall be recorded and taken into account for the tyre abrasion level;

…"

Paragraph 1.11.13.2., amend the equation to read:

"1.11.13.2. …

$$\boldsymbol{ALRT_{20}} = ALRT + S_S \cdot (20 - \overline{T})$$

…"

Paragraph 1.11.13.3., amend the equation to read:

"1.11.13.3. …

$$\boldsymbol{ALRT_{10}} = ALRT + S_W \cdot \left(10 - \overline{T}\right)$$

…"

Paragraph 1.12.1. (e), amend to read:

"1.12.1. …

(e) Start and end date**s** of the test."

Paragraph 1.12.2. (d), delete (since it is identical to item (c)).

Paragraph 1.12.2., subparagraphs (e) to (w), renumber as (d) to (v), respectively.

Paragraph 1.12.2. (o) (former), renumber and amend to read:

"1.12.2. …

(n) Abrasion level in mg/km/t normalized at 20 ºC **or 10 ºC as applicable**

…"

Paragraph 1.12.3. (d), delete (since it is identical to item (c)).

Paragraph 1.12.3., subparagraphs (e) to (t), renumber as (d) to (s), respectively.

Paragraph 1.12.4. (c), amend to read:

"1.12.1. …

(c) The final result tyre abrasion index AICT as described in paragraph ~~11.~~ **1.11.** of this Annex."

Paragraph 2.2.2., amend to read:

"2.2.2. "Mass loss" means amount of the mass lost due to tyre abrasion ~~Note 1 to entry:~~ It is expressed in grams."

Paragraph 2.2.3.2.1., amend to read:

"2.2.3.2.1. …

Normal reference tyre (225/45R17 94 XL ASTM F3676 - 23) shall be used for testing candidate tyres ~~not for severe snow condition, means~~ **of category of use** normal, ~~snow~~ and **for tyres of category of use** special ~~tyres not bearing~~ **not marked** M+S ~~nor 3PMSF marks~~.

Winter reference tyre (225/45R17 94 XL ASTM F3675 - 23) shall be used for testing candidate tyres ~~for severe snow conditions (marked with 3PMSF symbol) and special use tyres bearing the marking M+S or 3PMSF~~ **of category of use snow tyres and special use tyres, marked "M+S", either or not classified as tyres for severe snow conditions.**"

Paragraph 2.2.4., amend to read:

"2.2.4. "Mean profile depth" is used for the characterization of the surface roughness in macroscale and is described in ~~ISO13473-1~~ **ISO 13473-1**."

Paragraph 2.2.10., amend to read:

"2.2.10. "Loaded radius" means the distance from the tyre axis to the drum outer surface under steady-state conditions at 0 speed and 0 camber as well while the test load and inflation pressure is applied at room temperature and refer to the thermal conditioning of paragraph ~~2.5.2.~~ **2.6.2. of this Annex.**"

Paragraph 2.4.2.3., amend to read:

"2.4.2.3. …

The abrasion level of the SRTT17W reference tyre for all types of surface shall be in the range between 35 mg/km/t and 165 mg/km/t. The abrasion level shall be calculated according to the method in paragraph 2.8. of this Annex. In case of ~~sand paper~~ **sandpaper** used for surface it shall be replaced as specified in Appendix 5.

…"

Paragraph 2.4.4.2. (a), amend to read:

"2.4.4.2. …

(a) Blow-in type: In case of only one nozzle, centre of the nozzle shall be positioned in symmetrical plane. The distance between nozzles and centre of contact patch shall be ~~at less/lower~~ **less** than 35 cm ~~from centre of contact patch~~.

…"

Paragraph 2.4.4.2. (b), amend to read:

"2.4.4.2. …

(b) Dispersion type: The tester shall be ~~is~~ covered with the enclosure coverings. Powder shall be evenly dispersed within the enclosure. The nozzle/nozzles shall be placed parallel to the Y axis and symmetrically distributed respective to the X axis."

Paragraph 2.5.3., table 1, footnote a, amend to read:

" … ~~ISO 4000-1:2015~~ **ISO 4000-1:2024** …"

Paragraph 2.5.4. (a), amend to read:

"2.5.4. …

(a) Longitudinal force and lateral force shall be computed from the values shown in Appendix 3 of this Annex. Speed shall be in accordance with that shown in ~~Appendix 4~~ **Appendix 3** of this Annex;

…"

Paragraph 2.6.4., amend to read:

"2.6.4. …

The average ambient temperature for reference and candidate tyres during testing shall not differ by more than ~~2 °~~ **2 °C**."

Paragraph 2.6.6.1., amend to read:

"2.6.6.1. Input Condition

Both reference tyre and candidate tyre shall be tested according to input condition of ~~Appendix 4~~ **Appendix 3** of this Annex. The ~~Appendix 4~~ **Appendix 3** test condition of 250 km is defined as one test cycle, and the test cycle shall be repeated 20 times until 5000 km is reached."

Paragraph 2.7., amend to read:

"2.7. Validation

~~When~~ **After** a tyre has been subjected to the test ~~method~~ **procedure** specified in paragraph ~~2.5.~~ **2.6.** of this Annex using a test rim and a valve that undergo no permanent deformation and allow no loss of air, there shall be no visual evidence of tread, sidewall, ply, cord, inner liner, belt or bead separation, chunking, open splices, cracking, broken cords, or rubber adhesion.

…"

Paragraph 2.8., amend to read:

"2.8. …

The abrasion index (AICT) shall be calculated according to the following equation:

AICT = ArT/ArR

~~Where~~ **Where:**

ArT ~~Normalized abrasion rate~~**Abrasion level** (mg/km/t) of candidate tyre,

ArT = MlT (g)/DT(km)/Fz,T(t) x 1000 (mg/kg)

ArR ~~Normalized abrasion rate~~**Abrasion level** (mg/km/t) of reference tyre,

ArR = MlR (g)/DR(km)/Fz,R(t) x 1000 (mg/kg)

DT Testing mileage of candidate tyre (km)

…"

Paragraph 2.9.1., amend to read:

"2.9.1. The test report shall include the following information:

(a) Test machine identification;

(b) Drum ~~circumference~~ **diameter** (m);

(c) Test cycle (2 positions /1 position);

(d) 3rd body (~~Mineral~~ **Talc** / ~~Clay~~ **Silica**);

(e) MPD of test surface (mm): Beginning of test / End of test;

…"

Paragraph 2.9.1., insert a new item (o) to read:

"2.9.1. …

(o) M+S marking (Y/N);

…"

Paragraph 2.9.1., subparagraphs (o) (former) to (y), renumber as (p) to (z), respectively.

Annex 10 – Appendix 3, amend to read:

" …

Fz is the test load defined in ~~2.2.8~~ **paragraphs 2.2.7.** and 2.5.2. **of this Annex**.

…"

Annex 10 – Appendix 5, amend to read:

" …

Sandpaper surface shall be replaced when it does not meet the specifications described in ~~2.3.2.3.~~ **paragraph 2.4.2.3. of this Annex**;

…"

Annex 10 – Appendix 6, table, insert a new row to read:

" …

…		
3PMSF marking (Y/N)		
M+S marking (Y/N)		
Rim width		
…		

"

II. Justification

1. Paragraph 1. “Scope” is amended to reflect that adhesion performance on wet surfaces (wet adhesion) is required not only for C1 tyres, but also for C2 and C3 tyres.

2. In paragraph 1.3., the correct reference to “5.10.” is indicated as adopted at the seventy-ninth session of GRBP (paragraph 29 of ECE/TRANS/WP.29/GRBP/77). It was unintentionally omitted in document ECE/TRANS/WP.29/2024/65.

3. In Annex 10, in the table of paragraph 1.3., the defined symbols “ARC” and “ARR” pertain to Annex 10, paragraph 2, “Test method (b) using indoor drum” instead of the vehicle test method. These quantities are calculated in Annex 10, paragraph 2.8. as “ArT” and “ArR” being the abrasion levels in mg/km/t.

4. Paragraphs 1.8. and 1.11.8. (f) are corrected according to the table in paragraph 1.2.25. of Annex 10, prescribing that:

- if a candidate tyre is not marked M+S (including a special use tyre), then it has to be evaluated against SRTT17S,
- if a candidate tyre is marked M+S (including a special use tyre), then it has to be evaluated against SRTT17W ; a M+S candidate tyre can further be classified as 3PMSF.

5. Paragraph 2.2.3.2.1. is corrected similarly.

6. In paragraph 2.5.3., the latest International Standard ISO 4000-1:2024 (published in March 2024) is referred to.