Transmitted by the expert
from the Russian Federation

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Proposal for draft amendments to Regulation No. 117 (Tyre rolling noise, wet grip adhesion and rolling resistance)

The text reproduced below was prepared by the experts from the Russian Federation. This proposal concerns barely existing method of tyre rolling resistance determining in regards to modification of symbols of deceleration only. The amended text is shown in bold characters; in the formulae it is shown in a square framework.

I. Proposal

Annex 6., Test procedure for measuring rolling resistance

Paragraph 3.5. a*dd the new item a) and replace the lettering of older items*, to read:

"3.5. Duration and speed.

When the deceleration method is selected, the following requirements apply:

a) The deceleration j shall be determined in exact dω/dt or approximate Δω/Δt form, where ω is angular velocity, t – time

b) For duration Δt, the time increments shall not exceed 0.5 s;

c) Any variation of the test drum speed shall not exceed 1 km/h within one time increment."

Paragraph 4.6.2., *add the new words at the end of item b)*, to read:

"4.6.2. Deceleration method

The deceleration method follows the procedure below:

a) Remove the tyre from the test surface;

b) Record the deceleration of the test drum $\mathbf{j_{D0}}$ and that of the unloaded tyre $\mathbf{j_{T0}}$ **in exact or approximate form in accordance with paragraph 3.5.** 3"

Paragraph 5.1.5., *replace the symbols of deceleration in formula and corresponding wordings,* to read:

"5.1.5. Deceleration method

Calculate the parasitic losses F_{pl}, in newton.

$$F_{pl} = \frac{I_D}{R}\boxed{j_{D0}} + \frac{I_T}{R_r}\boxed{j_{T0}}$$

where:

I_D is the test drum inertia in rotation, in kilogram meter squared;

R is the test drum surface radius, in meter;

j_{D0} is the deceleration of the test drum, without tyre, in radians per second squared;

I_T is the spindle, tyre and wheel inertia in rotation, in kilogram meter squared;

R_r is the tyre rolling radius, in metre;

j_{T0} is the deceleration of unloaded tyre, in radians per second squared."

Paragraph 5.2.5, *replace the symbols of deceleration in formula and corresponding wordings*, to read:

"5.2.5. Deceleration method

The rolling resistance F_r, in newton, is calculated using the equation:

$$Fr = \frac{I_D}{R}\boxed{j_V} + \frac{RI_T}{R_r^2}\boxed{j_V} - F_{pl}$$

where:
I_D is the test drum inertia in rotation, in kilogram metre squared;
R is the test drum surface radius, in meter;
F_{pl} represents the parasitic losses as calculated in paragraph 5.1.5.;
j_V is the deceleration of the test drum, in radians per second squared,
I_T is the spindle, tyre and wheel inertia in rotation, in kilogram metre squared;
R_r is the tyre rolling radius, in metre."

II. **Justification**

The deceleration in similar methods of rolling resistance determining plays an important role. But the formulae 5.1.5 and 5.2.5 in Regulation No. 117, Annex 6 direct only approximate form of deceleration $\Delta\omega/\Delta t$, where $\Delta\omega$ and Δt are increments of angular speed and time consequently. These formulae had been carried over from old standards: ISO 8767 (1992) and ISO 9948 (1992) of the last century and thus could not allow usage of the exact form: $d\omega/dt$.

Therefore, it is proposed that Regulation No. 117-02 should allow wider application of engineering knowledge especially in their simplest form.