

## Proposal for Supplement to the 03 series of Amendments to Regulation No. 51

The proposed amendments are marked in bold for new or strikethrough for deleted characters.

*Paragraph 2, « Definitions » amend to read as follows:*

### 2.24. Table of symbols

<i>Symbol</i>	<i>Unit</i>	<i>Paragraph</i>	<i>Explanation</i>
[...]			
<b>RTD<sub>TT COP → TTA</sub></b>	<b>dB</b>	<b>Annex 6 §4.</b>	<b>Difference between COP test track and Type approval test track. Correction on COP to be applied on L<sub>TR</sub></b>
<b>L<sub>Urban_TT_Corrected</sub></b>	<b>dB</b>	<b>Annex 6 §4.</b>	<b>Reported tyre sound pressure level on COP Test track; value to be reported and used for calculations to the first decimal place</b>
<b>L<sub>TR</sub></b>	<b>dB</b>	<b>Annex 6 §4.</b>	<b>Reported tyre sound pressure level contribution on COP test track during urban operation; value to be reported mathematically rounded to the nearest integer</b>
<b>L<sub>PT</sub></b>	<b>dB</b>	<b>Annex 6 §4.</b>	<b>Reported powertrain sound pressure level contribution during urban operation; value to be reported mathematically rounded to the nearest integer</b>
<b>L<sub>TR_TT_corrected</sub></b>	<b>dB</b>	<b>Annex 6 §4.</b>	<b>Reported correction tyre sound pressure level contribution on TA test track during urban operation; value to be reported mathematically rounded to the nearest integer</b>
<b>T<sub>COP</sub>, T<sub>TA</sub></b>	<b>°C</b>	<b>Annex 6 §4</b>	<b>Air temperature during test on COP, TA tests tracks</b>
<b>C</b>	<b>dB/°C</b>	<b>Annex 6 §4</b>	<b>Temperature correction factor of the sound pressure level</b>

*Annex 6, « Checks on conformity of production » amend to read as follows:*

### 2. Testing procedure

The test site and measuring instruments shall be those as described in Annex 3.

2.1. The vehicle(s) under test shall be subjected to the test for measurement of sound of vehicle in motion as described in paragraph 3.1. of Annex 3.

For vehicles of category M<sub>1</sub>, N<sub>1</sub> and M<sub>2</sub> ≤ 3,500 kg technically permissible maximum laden mass,

- the same mode, gear(s)/gear ratio(s), gear weighting factor k and partial power factor k<sub>P</sub> as determined during the type approval process.

- the test mass  $m_t$  of the vehicle shall be between  $0.9m_{ro} \leq m_t \leq 1.2m_{ro}$ .

If the COP tests are not carried out in the same condition than type approval (same test track and under similar environmental conditions), results are subjected to corrections to take into account non-negligible differences in sound performance related to these conditions. Correction shall be done according to paragraph 4 of this annex.

#### 4. Test track and environmental corrections

##### 4.1. Test track comparison

In order to compare tests tracks, following steps shall be done:

- 1) Selection of test track to be compared,
- 2) Selection of representative sets of tyres and representative vehicle(s) type to be used for comparison in both test tracks,
- 3) Tyre sound level testing according to ISO 362-3 Annex B (including temperature correction)

Calculation of Reference Tyre Deviation (RTD) between the two tests tracks.  $RTD_{TT_{COP} \rightarrow TT_{TA}}$  is a correction factor from COP Test Track ( $TT_{COP}$ ) to Type Approval Test Track ( $TT_{TA}$ ). This deviation is the average of tyre deviations of all tyre sets.

##### 4.2. Test track and environmental correction

Test track alignment on COP results shall be done according to the following formula:

$$L_{urban\_TT\_Corrected} = 10 \times \text{LOG}_{10}(10^{0,1 \times L_{TR\_TT\_Corrected}} + 10^{0,1 \times L_{PT}})$$

With:

$$L_{TR} = 10 \times \text{LOG}_{10}(x\% \times 10^{\left(\frac{L_{CRS\ REP}}{10}\right)}) \text{ with } x = [90]\%$$
$$L_{PT} = 10 \times \text{LOG}_{10}(10^{0,1 \times L_{Urban}} - 10^{0,1 \times L_{TR}})$$
$$L_{TR\_TT\_corrected} = L_{TR} + RTD_{TT_{COP} \rightarrow TT_{TA}}$$

Test track and environmental correction on COP results shall be done according to the following formula:

$$L_{urban\_Corrected} = L_{urban\_TT\_Corrected} + C \times (T_{TA} - T_{COP})$$

with  $C = [X] \text{ dB} / ^\circ\text{C}$

The prerequisite for applying the above formula is that the respective comparative measurements are carried out under the same driving conditions with regard to  $V_{AA}$ ,  $V_{BB}$ ,  $n_{AA}$ ,  $n_{BB}$  and the  $a_{wot}$  accelerations. The permissible deviation in relation to the speed, the engine speed and the acceleration is  $\pm 1 \text{ km/h}$ ;  $\pm 50 \text{ rpm}$  and  $\pm 0.05 \text{ m/s}^2$  of the non-rounded reported values.

If vehicle speed, engine speed or acceleration values outside the aforementioned tolerance range occur during the respective comparison runs due to deviating temperature, air pressure or humidity values, the above-mentioned correction formula cannot be applied.

## **II. Justification**

This proposal aims to take into account non-negligible differences in sound performance when COP tests are not carried out in the same condition than type approval (test track and similar environmental conditions). In that case, this proposal introduces conditions and procedures to be followed for test tracks comparison (COP and Type approval) and for corrections to be applied on L urban.

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