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|  | United Nations | ECE/TRANS/WP.29/2023/2 |
| _unlogo | **Economic and Social Council** | Distr.: General13 December 2022Original: English |

**Economic Commission for Europe**

Inland Transport Committee

**World Forum for Harmonization of Vehicle Regulations**

**189th session**

Geneva, 7-9 March 2023

Item 4.6.1 of the provisional agenda

**1958 Agreement:
Consideration of draft amendments to existing
UN Regulations submitted by GRBP**

 **Proposal for Supplement 8 to the 03 series of amendments to UN Regulation No. 51**

 **Submitted by the Working Party on Noise and Tyres**[[1]](#footnote-2)\*

The text reproduced below was adopted by the Working Party on Noise and Tyres (GRBP) at its seventy-sixth session (ECE/TRANS/WP.29/GRBP/74, paras. 3 and 6). It is based on ECE/TRANS/WP.29/GRBP/2022/16 as amended by informal document GRBP-76-09 and ECE/TRANS/WP.29/GRBP/2022/13. It also includes further minor corrections as contained in ECE/TRANS/WP.29/GRBP/2023/12. The proposal is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their March 2023 sessions.

*Paragraph 2.24.,* amend to read:

"2.24 Table of symbols

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| … | … | … | … | … |
| Lcrs (i) | dB(A) | Annex 3 | 3.1.3.4.1.2. | vehicle sound pressure level at constant speed test for gear i; value to be reported and used for calculations to the first decimal place |
| Lcrs (i + 1) | dB(A) | Annex 3 | 3.1.3.4.1.2. | vehicle sound pressure level at constant speed test for gear (i + 1); value to be reported and used for calculations to the first decimal place |
| Lcrs rep | dB(A) | Annex 3 | 3.1.3.4.1.2. | reported vehicle sound pressure level at constant speed test; value to be reported and used for calculations to the first decimal place |
| Lwot (i) | dB(A) | Annex 3 | 3.1.3.4.1.2. | vehicle sound pressure level at wide-open-throttle test for gear i; value to be reported and used for calculations to the first decimal place |
| Lwot (i + 1) | dB(A) | Annex 3 | 3.1.3.4.1.2. | vehicle sound pressure level at wide-open-throttle test for gear (i + 1); value to be reported and used for calculations to the first decimal place |
| Lwot rep | dB(A) | Annex 3 | 3.1.3.4.1.2. | reported vehicle sound pressure level at wide-open-throttle; value to be reported and used for calculations to the first decimal place |
| Lurban | dB(A) | Annex 3 | 3.1.3.4.1.2. | reported vehicle sound pressure level representing urban operation; value to be reported mathematically rounded to the nearest integer |
| … | … | … | … | … |

*"*

*Paragraph 11,* add new subparagraphs 11.14. and 11.15., to read:

"11.14. Supplement 8 does not apply to existing type approvals, originally granted prior to the date of entry into force of Supplement 7.

11.15. From the entry into force of Supplement 8, ISO 10844:2021 shall be accepted for all approvals granted under this Regulation. Until five years from the entry into force of Supplement 8, ISO 10844:2014 shall be accepted for all approvals granted under this Regulation."

*Annex 3,*

*Paragraph 2.1.1.,* amend to read:

"2.1.1. Test site outdoor

 The surface of the test track and the dimensions of the test site shall be in accordance with ISO 10844:2021."

*Paragraph 3.1.2.1.1.,* amend to read:

"3.1.2.1.1. Power to mass ratio index (PMR)

 PMR is defined as follows:

 PMR = (Pn / mro) \* 1000 kg/kW, where Pn is measured in kW and defined according to paragraph 2.8. of the main body and mro is measured in kg and defined according to paragraph 2.4. of the main body.

 The PMR with no dimension is used for the calculation of acceleration."

*Paragraph 3.1.2.1.3.,* amend to read:

"3.1.2.1.3. Partial power factor kP

 The partial power factor kP (see paragraph 3.1.3.4.1.2.) is used for the weighted combination of the test results of the acceleration test and the constant speed test for vehicles of category M1 and N1 and M2 < 3,500 kg technically permissible maximum laden mass

 In cases other than a single gear test, awot ref shall be used instead of awot test (see paragraph 3.1.3.4.1.2.)."

 *Paragraph* *3.1.3.4.1.2.,* amend to read:

"3.1.3.4.1.2. […]

 The final result is calculated by combining Lwot rep and Lcrs rep. The equation is:

 Lurban = Lwot rep – kP \* (Lwot rep – Lcrs rep)

 The weighting factor kP gives the part power factor for urban driving. In cases other than a single gear test, kP is calculated by:

 kP = 1 – (aurban / awot ref)

 If only one gear was specified for the test, kP is given by:

 kP = 1 – (aurban / awot test)

 In cases where awot test is less than aurban:

 kP = 0

In cases where the PMR of the vehicle is lower than 25 the final result Lurban is the result of the acceleration test:

 Lurban = Lwot rep

 In cases where Lwot,rep is less than Lcrs,rep:

kP=1

In cases where Lwot,rep is less than Lcrs,rep the final result Lurban is the result of the cruise test:

Lurban= Lcrs,rep"

*Annex 3, Appendix 1,*

*Figure 4a,* amend to read:

"Figure 4a

**Flowchart for vehicles tested according to paragraph 3.1.2.1. of Annex 3 to this Regulation – Lurban computation**

Determine PMR for test vehicle 3.1.2.1.1.

Determine target acceleration aurban (3.1.2.1.2.3.) and reference acceleration awot ref (3.1.2.1.2.4.)

Select test method (3.1.2.1.4.)

locked gears (3.1.2.1.4.1.) See Figures 4b, 4c and 4d

non-locked gears (3.1.2.1.4.2.) See Figure 4e

Acceleration test (3.1.2.1.5.)

Constant speed test (3.1.2.1.6.)

Calculation of gear weighting factor k if 2-gear test (3.1.2.1.4.1.)

Calculate *L* wot rep and *L* crs rep (3.1.3.4.1.2.)

Calculate *kP* (3.1.3.4.1.2.)

Calculate *L*urban (3.1.3.4.1.2.)

"

*Figure 4b,* amend to read:

"Figure 4b

**Flowchart for vehicles tested according to paragraph 3.1.2.1. of Annex 3 to this Regulation -
Gear selection using locked gear PART 1**

Select Gear

Is acceleration stable according to 2.26.2.?

Calculate test acceleration according to 3.1.2.1.2.1.

Select Pre-acceleration and entry speed

Yess

No

Is acceleration within *awot\_ref* tolerance band?

Yess

No

Is acceleration less than or equal 2,0 m/s2? and engine speed less than *nMAX* prior to BB'?

Use gear and compute *k*P according to 3.1.3.4.1.2.

Compute *Lwot\_rep*using results of valid runs

No

Select gears to obtain gear *i* with stable acceleration above

*awot\_ref* and gear *i*+1 with stable acceleration below *awot\_ref*

See Case 2 in Figure 4c

See Case 1 in Figure 4c

Yess

Testing locked gears according to 3.1.2.1.4.1.

"

*Figure 4c*, amend to read:

"Figure 4c

**Flowchart for vehicles tested according to paragraph 3.1.2.1. of Annex 3 to this Regulation –
Gear selection using locked gear PART 2**

Yess

No

Is acceleration of gear *i* less than or equal 2.0 m/s2? and engine speed less than *nMAX* prior to BB’?

Use both gears *i* and *i*+1, (*i*+2, *i*+3, or*…*) and compute *kP* according to 3.1.3.4.1.2.and *k* by 3.1.2.1.4.1.

Compute *Lwot\_rep*using results of valid runs

Case 1:

Two gears, gear *i* with stable acceleration above *awot\_ref* and gear *i*+1 with stable acceleration below *awot\_ref*

Case 2:

One gear with stable acceleration above 2.0 m/**s**2 or engine speed greater than *nMAX* prior to BB'

Determine first gear *i* + n (n=1, 2…) with stable acceleration less than or equal to 2.0 m/s2 and engine speed less than nMAX prior to BB'

Is acceleration of gear *i* +n more than *aurban*?

Yess

Use gear i+n (n=1, 2, …) and compute *kP* according to 3.1.3.4.1.2.

No

Use both gears *i* with acceleration higher than 2.0 m/s2 and *i*+1, (*i*+2, *i*+3, or*…*) with acceleration less than *aurban*

Is engine speed of gear *i* more than *nMAX* prior to BB’?

See Case 3 in Figure 4d

No

Yess

"

*Figure 4d*, amend to read:

"Figure 4d

**Flowchart for vehicles tested according to paragraph 3.1.2.1. of Annex 3 to this Regulation –
Gear selection using locked gear PART 3**

Yess

No

Yes

Use gear i+n (n=1, 2, ...) with test speed 50km/h and compute *kP* according to 3.1.3.4.1.2.

Reduce test speed *vtest* by 2.5 km/h with gear *i*

Use both gears i and i+n (n=1, 2, ...) with new test speed for gear i and 50km/h for gear i+n and compute *kP* according to 3.1.3.4.1.2.

Is engine speed of gear *i* less than nMAX prior to BB’?

No

Case 3:

 No gear with acceleration more than *aurban* and engine speed less than *nMAX* prior to BB’

Is test speed *vtest* =40 km/h?

"

*Figure 4e*, amend to read:

"Figure 4e

**Flowchart for vehicles tested according to paragraph 3.1.2.1. of Annex 3 to this Regulation Gear Selection using non-locked gears**

Yess

No

Compute *Lwot\_rep*using results of valid runs

Calculate test acceleration according to 3.1.2.1.2.2. Pre-acceleration is not allowed

Compute *kP*according to 3.1.3.4.1.2.

Can measures be taken to control downshifts?

Is acceleration stable? i.e. there is no delay.

Calculate test acceleration according to 3.1.2.1.2.2.

Select Pre-acceleration and entry speed

No

Yess

If possible, control downshift to obtain acceleration less than or equal to 2.0 m/s2 or *awot\_ref*, whichever is lower. If not possible, run higher than 2.0 m/s2 is valid.

Testing unlocked gears according to 3.1.2.1.4.2.

Select entry speed

No

See flowchart 4f.

engine speed greater than *nMAX* prior to BB'

Yes

"

*Figure 4f*, amend to read:

"Figure 4f

**Flowchart for vehicles tested according to paragraph 3.1.2.1.4.2. of Annex 3 to this Regulation – Gear Selection using non-locked gears**

**Possibility 2**

Test according to 3.1.2.1.4.2. with specified engine load

**Possibility 1**

Yess

No

Yes

Not valid test condition.

Reduce test speed *vtest* by 2.5 km/h

Test according to 3.1.2.1.4.2. with new test speed

Is engine speed less than *nMAX* prior to BB’?

No

Engine speed exceed *nMAX* prior to BB’

Is test speed *vtest* 40 = km/h?

Reduce engine load (by using partial load) such that *nBB’* is between 95 % *nMAX* and *nMAX*

Yess

"

*Annex 3, Appendix 2,*

*Paragraph 2.,* amend to read:

"2. General (see the flowcharts in this Appendix 2, Figure 7a to Figure 7c)

This Appendix provides correction for temperature and test track dependent on the tyre category and purpose.

For the correction, tyre rolling sound reference values are needed. Tyre rolling sound measurements shall be carried out according to the test procedure of Appendix 3 to Annex 3 of this regulation."

*Paragraph 3.3.4.,* amend to read:

**"**3.3.4 For each gear, run and vehicle side extract the power train component LPT,wot,j from the reported acceleration test Lwot,j, by calculation.

In case that LTR,wot,j,ϑwot is greater than Lwot,j**:**

(a)the power train component LPT,wot,j is determined by

(b) the tyre component LTR,wot,j,ϑ\_ref is determined by

"

*Annex 3, Appendix 3, paragraph 5.1.4.1.,* amend to read:

"5.1.4.1. Date of track certification to ISO 10844: 2014/2021\*: …………………………."

*\* Delete what does not apply according to the transitional provisions in this Regulation.*

*Annex 9, Appendix 4,*

*Formula 3.2.4.4.2. No.2,* amend to read:

*Formula 3.4. No.2,* amend to read:

1. \* In accordance with the programme of work of the Inland Transport Committee for 2023 as outlined in proposed programme budget for 2023 (A/77/6 (Sect. 20), table 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. [↑](#footnote-ref-2)