Proposal (DRAFT)

The following amendments are intended to introduce EVs and HEVs into Annex 7 as agreed during the 82nd session of GRBP in Geneva:

*Paragraph 2.24.*, amend to read:

"2.24. Table of Symbols

…

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| nanchor,κ | 1/min | Annex 7 | 3.1. | reported vehicle engine speed for gear ratio i from Annex 3 |
| vanchor,κ | km/h | Annex 7 | 3.1. | reported vehicle test speed for gear ratio i at BB’ from Annex 3; value to be reported and used for calculations to the first decimal place |
| **aanchor,κ** | **m/s²** | **Annex 7** | **3.1.** | **reported vehicle acceleration for gear ratio i from Annex 3; value to be reported and used for calculations to the first decimal place** |
|  | **dB(A)** | **Annex 7**  | **3.3.** | **sound pressure level calculated for a gear ratio i and for a speed (engine or vehicle) to reflect the estimated linear sound level increase regarding the engine speed (ICEs) or the vehicle speed (EVs)** |
| **ΔLASEP, j** | **dB** | **Annex 7** | **3.4.**  | **estimated delta sound pressure level for ASEP to reflect the relation of the measured performance versus performance at the anchor point; value to be used for calculations to the first decimal place** |
| Lκj | dB(A) | Annex 7 | ~~3.4.~~**3.5.**   | sound pressure level measured for a gear κ and at a test point j; value to be reported and used for calculations to the first decimal place |

…"

*Add new paragraph 2.29.,* to read

**"2.29. "*Active Sound Source*" means a physical part installed on the vehicle**

1. **which is powered and/or controlled externally, and**
2. **whose [main] purpose is – at least in part – to emit sound to the exterior of the vehicle."**

*Add new paragraph 2.30.,* to read

**"2.30. "*Enhanced Exterior Sound (EES)*" means any sound**

1. **generated by one or more Active Sound Sources, and**
2. **whose sound emission is not subject to another UN Regulation."**

*Add new paragraph 2.31.,* to read

**"2.31. "*Vehicle Master Control Switch*" means the device by which the vehicle’s on-board electronics system is brought, from being switched off, as in the case where a vehicle is parked without the driver being present, to normal operation mode (i.e. the vehicle status is "ready to drive").[[1]](#footnote-2)"**

***Paragraph 6.2., amend 6.2. to read:***

**"6.2. Specification regarding sound levels**

 **If the vehicle has different modes which affect sound emissions, the vehicle shall comply with the requirements of this Regulation in all modes.”**

*Paragraph 6.2.3.,* amend to read:

"6.2.3. Additional ~~s~~**S**ound ~~e~~**E**mission ~~p~~**P**rovisions **(ASEP)**

The Requirements of Annex 7~~Additional Sound Emission Provisions (~~ASEP~~)~~ apply ~~only~~ to vehicles of categories M1 and N1 ~~equipped with an internal combustion engine~~.

Vehicles are deemed to fulfil the requirements of Annex 7~~,~~ if the vehicle manufacturer provides technical documents to the type approval authority showing~~,~~ that the difference between maximum and minimum engine speed of ~~the~~ vehicles at BB' for any test condition inside the ASEP control range (as defined in paragraph 2.3. of Annex 7 ~~to~~ **of** this Regulation ~~(~~including Annex 3 conditions) does not exceed 0.15 x S. This article is intended especially for non-lockable transmissions with variable gear ratios (CVT).

Vehicles are exempted from ASEP if one of the following conditions is fulfilled:

(a) For vehicles of category N1, if the engine capacity does not exceed 660 ccm and the power-to-mass ratio PMR calculated by using the technically permissible maximum laden mass does not exceed 35.

(b) For vehicles of category N1, if the payload is at least 850 kg and the power-to-mass ratio calculated by using the technically permissible maximum laden mass does not exceed 40.

(c) For vehicles of category N1 or M1 derived from N1, if the technically permissible maximum laden mass is greater than 2.5 tons and the R-point height is greater than 850 mm from the ground and the power- to-mass ratio calculated by using the technically permissible maximum laden mass does not exceed 40.

The sound emission of the vehicle under typical on-road driving conditions, which are different from those under which the type-approval test set out in Annex 3 and Annex 7 was carried out, shall not deviate from the test result in a significant manner.**[[2]](#footnote-3)**

Any ~~electric sound enhancement system~~~~for the purpose of~~ ~~the exterior sound emission~~ **system generating EES** shall be operational during the type-approval test."

*Add new paragraph 6.2.3.3. and sub paragraphs, to read:*

**"6.2.3.3. Specifications for EVs and HEVs regarding the emission of EES**

**6.2.3.3.1. Upon start-up of the vehicle by the Vehicle Master Control Switch, no EES shall be emitted by the vehicle.**

**6.2.3.3.2. Activating the emission of an EES shall always require an intentional action from the driver (such as changing a mode or operating a switch). [Any automatic activation of the emission of an EES is prohibited (an automatic deactivation is allowed).] An automated vehicle shall not be able to activate an EES when controlled under the responsibility of the ADS.**

 **[The effect of this intentional action shall be to activate the emission of an EES with the only effect to activate the EES.]**

**6.2.3.3.3. The driver shall be able to stop the emission of all EES [at any time and] as easily as it was activated.**

 **[Alternative wording:**

 **The driver shall be able to deactivate the EES in the same manner as it was activated.]**

**6.2.3.3.4. No EES shall be emitted at vehicle speeds below 20 km/h and at standstill.**

**~~[All sound in the range of 20km/h and below, incl standstill, shall fulfill the specifications of UN-Regulation 138]~~**

**6.2.3.3.5. No EES shall be emitted at vehicle speeds above 80 km/h."**

*Paragraph 6.2.3.3. (former), renumber:*

"6.2.3.**4.** In applying for type approval, the manufacturer…"

*Add three new paragraphs 11.18., 11.19. and 11.20.,* to read:

**"11.18. Supplement** [**11**] **does not apply to existing UN type approvals and their extensions, granted prior to the date of entry into force of Supplement** [**11**].

**11.19. As from the official date of entry into force of Supplement [11] to the 03 series of amendments to this Regulation, no Contracting Party applying this UN Regulation shall refuse to grant or refuse to accept UN type approvals according to Supplement [11] to the 03 series of amendments to this UN Regulation.**

**11.20. Until [12-18-24] months after the date of entry into force of the Supplement [11] to the 03 series of amendments to this UN Regulation, Contracting Parties applying this UN Regulation can continue to grant extensions to existing UN type approvals to the 03 series of amendments to this UN Regulation, granted prior to the date of entry into force of Supplement** [**11**], **without taking into account the provisions of Paragraph 6.2.3.3. of Supplement [11] "**

*Annex 1 – Appendix 1, add a new paragraph 1.1.10.* to read:

**"1.1.10 System(s) generating EES, Make and Type:**  **"**

*Annex 1 – Appendix 2, add new paragraph 7.2.* to read:

**"7.2. Details of any system(s) generating EES (e.g., number and position of actuators)**  **"**

*Annex 3, paragraph 2.2.3.3.,* amend to read:

"2.2.3.3. ~~Active Sound~~ Systems **generating EES**

 Any **system generating EES**, **subject to paragraph 6.2.3. and Annex 7 of this Regulation,** ~~either for noise control, or sound enhancement~~, shall operate as foreseen by the vehicle manufacturer and not be interfered with during the measurements."

*Annex 7, add a new paragraph 1.1.,* to read:

**"1.1. Tests performed in pure electric mode shall be analysed with Analysis method 1 described in Paragraph 3 of this annex (Slope assessment method)."**

*Annex 7, paragraph 2.3.,* amend to read:

"2.3. Control ~~r~~**R**ange

 The ASEP requirements apply to every gear ratio κ that leads to test results within the control range as defined below.

**The control range is specified as:**

|  |  |  |
| --- | --- | --- |
|  | **For tests in pure electric mode** | **For all other tests** |
| **Vehicle speed vAA\_ASEP** | **vAA ≥ 20 km/h** | **vAA ≥ 20 km/h** |
| **Vehicle acceleration aWOT\_ASEP** | **aWOT ≤ 5.0 m/s2** | **aWOT ≤ 5.0 m/s2** |
| **Engine speed nBB\_ASEP** | **not applicable** | **nBB ≤ 2.0 \* PMR-0.222 \* S or nBB ≤ 0.9 \* S, whichever is the lowest** |
| **Vehicle speed vBB\_ASEP for vehicles tested in Annex 3 with** |
|  | * **locked gear**
 | **vBB ≤ 80 km/h** | **If the vehicle, in the lowest valid gear does not achieve the maximum engine speed nBB\_ASEP below 70 km/h, increase the vehicle speed in that gear to reach the maximum engine speed nBB\_ASEP, but not beyond 80 km/h.****For any other gear, the maximum vehicle speed is 70 km/h.**  |
|  | * **non locked gears**
 | **vBB ≤ 80 km/h** | **For vehicles tested in non-locked transmission conditions the maximum vehicle speed is 80 km/h.** |
| **Gear selection** | **only if applicable, e.g. for hybrid electric vehicles:****gears κ ≤ gear i as determined in Annex 3** | **gears κ ≤ gear i as determined in Annex 3** |
| **Transmission condition for vehicles tested in Annex 3 with** |
|  | * **locked gear**
 | **Geari, geari-1,…** | **Geari, geari-1,…** |
|  | * **non locked gears**
 | **Non locked gears** | **Non locked gears** |

~~Vehicle speed V~~~~AA\_ASEP~~~~: v~~~~AA~~ ~~≥ 20 km/h~~

~~Vehicle acceleration a~~~~WOT\_ASEP~~~~: a~~~~WOT~~ ~~≤ 5.0 m/s~~~~2~~

~~Engine speed n~~~~BB\_ASEP:~~ ~~n~~~~BB~~ ~~≤ 2.0 \* PMR~~~~-0.222~~ ~~\* S or~~

 ~~n~~~~BB~~ ~~≤ 0.9 \* S, whichever is the lowest~~

 **For tests in pure electric mode,** **the manufacturer shall take measures to achieve an acceleration aWOT\_ASEP within the acceleration control range.**

**Table 1 in Appendix 1 to Annex 3 provides examples of valid measures to enable a test condition within the above specified acceleration boundaries. Any measure used by a manufacturer for the above-mentioned purposes shall be documented in the test report.**

~~Vehicle speed V~~~~BB\_ASEP~~~~:~~

~~If the vehicle, in the lowest valid gear does not achieve the maximum engine speed n~~~~BB\_ASEP~~~~below 70 km/h, increase the vehicle speed in that gear to reach the maximum engine speed n~~~~BB\_ASEP~~~~, but not beyond 80 km/h.~~

~~For any other gear, the maximum vehicle speed is 70 km/h.~~

~~For vehicles tested in non-locked transmission conditions~~**~~,~~** ~~the maximum vehicle speed is 80 km/h.~~

~~Gears κ ≤ gear i as determined in Annex 3~~

~~Transmission conditions:~~

|  |  |
| --- | --- |
| *~~Annex 3 gear selection~~* | *~~Annex 7 gear selection~~* |
| ~~Locked~~ | ~~Gear~~~~i~~~~, gear~~~~i-1~~~~,…~~ |
| ~~Non-locked~~ | ~~Non-locked~~ |

"

*Annex 7, paragraph 3.1.,* amend to read:

"3.1. Determination of the anchor point

The anchor point is the same for each gear ratio κ falling under the control range according to paragraph 2.3. The parameters for the anchor point are taken from the acceleration test of Annex 3 as follows:

In the case the test has been carried out with two gear ratios:

Lanchor isthe higher sound pressure level of Lwot,(i) of left and right side of gear ratio i;

nanchor is the average of nBB,wot of the 4 runs of gear ratio i reported from Annex 3;

In the case the test has been carried out in a single gear:

Lanchor isthe higher sound pressure level of Lwot of left and right side of gear ratio selected for the test;

 nanchor is the average of nBB,wot of the 4 runs of gear ratio selected for the test reported from Annex 3;

**For test in pure electric mode:**

**Lanchor isthe higher sound pressure level of Lwot of left and right sides of gear ratio selected for the test;**

**vanchor is the average of vBB,wot of the 4 runs of gear ratio selected for the test reported from Annex 3, but limited to 60 km/h for further calculation;**

**aanchor is the measured acceleration and is not limited to 2.0 m/s² as required in paragraph 3.1.2.1.4.3. of Annex 3 for the determination of the kp‑factor, and is the average of awot,test reported from Annex 3, as defined in paragraph 3.1.2.1.2. of Annex 3.”**

*Annex 7, paragraph 3.2.2.,* amend to read:

"3.2.2. Slope of the regression line for each gear ratio κ

The slopeκ of a particular gear for the further calculation is the derived result of the calculation in paragraph 3.2.1. rounded to the first decimal place, but not higher than 5 dB(A)/1,000 min-1.

In case of non-locked conditions, if Slopeκ  < 0, the selected transmission setup is not valid. In that case the Lurban-Assessment as specified in paragraph 4. shall be applied.

**For tests in pure electric mode, Slope**κ **shall be set to a constant value of 0,25 dB/(km/h) for further calculation.**"

*Annex 7, paragraph 3.3.,* amend to read:

"3.3. Calculation of the linear sound level increase expected for each measurement

The sound level LASEP,κj for measurement point j and gear ratio κ shall be calculated using the engine speeds measured for each measurement point, using the slope specified in paragraph 3.2. above to the specific anchor point for each gear ratio.

For nBB\_κ,j ≤ nanchor:

For nBB\_κ,j > nanchor:

Where Y= 1 **dB(A) /1,000 min-1**

**For tests in pure electric mode:**

**The sound level LASEP,κj for measurement point j and gear ratio κ shall be calculated using the vehicle speeds measured for each measurement point, using the constant slope specified in paragraph 3.2.2. above to the specific anchor point [for each gear ratio].**

**For vBB\_κ,j ≤ vanchor:**

**For vBB\_κ,j > vanchor:**

**Where Y= 0,05 dB/(km/h)**"

*Annex 7, add new paragraph 3.4.,* to read:

"**3.4. Calculation of the sound level increase regarding performance**

**For tests in pure electric mode, the sound level ΔLASEPj shall be calculated:**

**For all other tests the sound level ΔLASEPj is set to 0 dB.**"

*Annex 7,* *paragraph 3.4. (former),* renumber:

"3.~~4~~**5**. Additional Samples"

*Annex 7, paragraph 3.5. (former),* renumber and amend to read:

"3.~~5~~**6**. Specifications

Every individual sound measurement shall be evaluated.

The sound level of every specified measurement point shall not exceed the limits given below:

Lκj **- ΔLASEP,**j ≤ LASEP,κ.j + x

With:

~~x = 3 dB(A)~~ **~~+~~** ~~limit value[[3]](#footnote-4) - L~~~~urban~~ ~~for vehicle tested with non-locked transmission conditions~~

x = 2 dB~~(A)~~ + **(**limit value³ - Lurban), ~~of Annex 3 for all other vehicles~~

**and only for vehicles**

* **tested with non-locked transmission conditions given by multiple gear ratios or**
* **[having multiple electric propulsion sources or]**
* **[(EV only) having an Lcrs\_rep greater than Lwot\_rep of Annex 3]:**

 **x = 3 dB + (limit value[[4]](#footnote-5) - Lurban)**

If **at any point** the measured sound level ~~at a point~~ exceeds the limit, two additional measurements at the same point shall be carried out to verify the measurement uncertainty. The vehicle is still in compliance with ASEP, if the average of the three valid measurements at this specific point fulfils the specification.

Justifications

1. ….
1. **as already defined in UN Regulation No. 141, No. 171 and others.** [↑](#footnote-ref-2)
2. **See recommendations provided by informal document GRB-68-03 in its latest version as guidance for technical interpretation. The document can be found in https://unece.org/documents-reference-only-0.** [↑](#footnote-ref-3)
3. As applicable for the approved type of vehicle [↑](#footnote-ref-4)
4. As applicable for the approved type of vehicle [↑](#footnote-ref-5)