

(OICA) MANAGEMENT OF NOISE EMISSIONS ACCORDING TO UN-R51-03 AT LOW SPEEDS VS. AVAS COMPLIANT TO UN-R138

SOUND LIMITS
MINIMUM SOUND
ASEP
TYRE ROAD NOISE
GREY ZONES

MAIN MESSAGES FROM THE PRESENTATION(S)

- AVAS (Acoustic Vehicle Alerting System) systems fail RD-ASEP (Real Driving-Additional Sound Emission Provisions) especially at lower speeds. -> needs Clarification
- With implementation of AVAS several grey zones in UN Regulation No.138 are detected.

Approach for Clarifications in UN-R138-01

- The AVAS operation range is expanded on the basis of the NHTSA model based on UN-R138-01 minimum sound levels to allow manufacturer a matching with existing regulations.
- In the presentation, a curve for the minimum/maximum level according to the speed and the tyres impact on vehicle's noise is proposed.
 - Minimum sound is defined up to 40 km/h. Maximum sound no longer constant, but ramped-up from > 0 km/h to 40 km/h and cannot become louder beyond 40 km/h.
 - Maximum sound is applicable to any driving condition up to 3 m/s² acceleration, not only to constant speed.
- Vehicles which are equipped with an AVAS fully compliant to these provisions are exempted from RD-ASEP.
- Sound enhancement systems which are operational beyond that speed range are subject to UN-R51 RD-ASEP.

Reflection of AVAS and Sound Enhancement Systems into RD-ASEP

- The AVAS max sound ramp-up principle can be established in RD-ASEP by creating a transient between UN-R138 to UN-R51-04 RDASEP
- The suggested parameter for Electric Vehicles set the power train and its dynamic in a way, that tyre rolling sound remains always the dominant source

SUMMARY

Conflicts between UN-R138 (AVAS Systems) and Draft of amendment to UN-R51 RD-ASEP

- According to draft of amendment to UN-R51, vehicles will have to comply to RD-ASEP when their sound systems operate outside the specification range of UN-R138.
- **AVAS systems fail RD-ASEP especially at lower speeds.**
- It is necessary to create a handshake between UN-R138 and UN-R51 RD-ASEP

Grey Zone in UN-R138-01

- 6.2. Acoustics characteristics :
 - "...Operation of an AVAS is permitted at vehicle speeds outside the specification range. ..."
This provision was primarily made to
 - Enable compatibility to USA FMVSS141
 - Allow fade-out of sound instead of a sudden shut-off to avoid driver and pedestrian irritations
- 6.2.7. Specifications on maximum sound level for AVAS
 - "... tested under the conditions of Annex 3 paragraph 3.3.2., ..."
Annex 3 paragraph 3.3.2. specifies constant speed test only. No specifications are given for sound emission accelerated condition.
 - "...shall not emit an overall sound level of more than 75 dB(A), if driving in forward direction.³"
³ *The maximum overall sound pressure level of 75 dB(A) measured at a distance of 2 m is corresponding to the overall sound pressure level of 66 dB(A) measured at a distance of 7.5 m. The limit value of 66 dB(A) at a*

distance of 7.5 m is the lowest permitted maximum value in Regulations established under the 1958 Agreement."

Refers to UN-R63 for mopeds, which provides two limits for vehicles with maximum design speed below and above 25 km/h. (66 and 71 dB(A))

Approach for Clarifications in UN-R138-01

For clarity, the following modifications to UN-R138-01 could be considered

- **The AVAS operation range is expanded on the basis of the NHTSA model based on UN-R138-01 minimum sound levels to allow manufacturer a matching with existing regulations.**
- Minimum sound is defined up to 40 km/h.
- Maximum sound no longer constant, but ramped-up from > 0 km/h to 40 km/h and cannot become louder beyond 40 km/h.
- Maximum sound is applicable to any driving condition up to 3 m/s² acceleration, not only to constant speed.
- **Vehicles which are equipped with an AVAS fully compliant to these provisions are exempted from RD-ASEP.**
- **Sound enhancement systems which are operational beyond that speed range are subject to UN-R51-03 RD-ASEP.**

Reflection of AVAS and Sound Enhancement Systems into RD-ASEP

- **The AVAS max sound ramp-up principle can be established in RD-ASEP by creating a transient between UN-R138 to UN-R51 RD-ASEP**
- The ramp-up function is only applicable to vehicles equipped with AVAS devices which exceed the UN-R138-01 application range.
- In addition, the parameter table should be modified for electric vehicles (parameters in the presentation)
- EVs should be MANDATED to take measures to restrict the maximum acceleration during the test to 3 m/s².
- **The suggested parameter for EVs set the power train and its dynamic in a way, that tyre rolling sound remains always the dominant source**

ADDITIONAL POINTS FROM DISCUSSIONS IN THE UN TF-VS

- As reminder:
 - Because of a new/young device/regulation, when UN-R138 has been created, the target was to allow flexibility and transient to US Standard FMVSS141. In EU/UN regulation, to regulate only the minimum values for other road user's protection, the speed range for type-approval has been limited to 20km/h vs. 30 in the US. And no compatibility with minimum levels in the US.
 - Discussions of the cut-off of the sound have to be continued because at that time the fade-out was not defined.
 - The maximum value was defined only to avoid eventual abuse.
- With the implementation of AVAS on more and more vehicles, several grey zones are detected.
- It is a good time to go more in detail and review this regulation with feedback/examples we have with vehicles equipped with AVAS, in keeping the EU/UN regulation compatible with the US Standard if possible.
- The group TF-VS supports the need to work on UN-R138 from the experience of last years

REFERENCES

- [TFVS-04-12](#) (OICA): Management of Noise emissions according to UN-R51-03 at low speeds vs. AVAS compliant to UN-R138