

Draft Report of
5th meeting of the Informal Working Group
on
Quiet Road Transport Vehicles for a Global Technical Regulation
10th to 12th December 2013
JASIC Offices
Tokyo, Japan

1. Opening remarks by Mr. Kubota (Jassic)

In his opening remarks, Mr. Kubota points out the importance of this groups work to come to a result with global acceptance for legislators as well as for industry

2. Introduction of participants and organizations

National bodies:

EU COM, Japan (NTSEL, MLIT & JASIC), France (UTAC), Germany (BMVBS), Spain (LCOE), US (NHTSA), Taiwan (VSCC), Korea (KATRI)

Associations/Researchers/Others:

NFB (US National Federation of the Blind), OICA (Porsche, Ford, Volvo Car&Trucks, JAMA, Scania), ISO, CLEPA (Brigade), IMMA(Yamaha), ETRTO(Michelin), Nagasaki University,

3. Adoption of the [agenda](#)

The final agenda was adopted incl. last changes introduced by the Chair, the Co-Chair and the secretariat

4. Report from the last meetings

Since the last official meeting in Washington, two TF meetings were held in absence of the Chairman. EU COM explained that the main tasks of these meetings were to determine options and to clean up the text. Nothing was deleted from the version after last official meeting. However, comments and clarification (after ISO review) where added and the text was rearranged in order to add clarity.

The timing for the final rule in the US has changed from January 2014 to March 2015. Transitional periods will start from that time onwards. US informed the group the work schedule of the IWG as included in the ToR needed to be revised as the mandate

for the completion of a draft report was extended by AC3 to Nov 2015 (was Nov 2014). Latest by Feb 2015 a draft report must be presented to GRB for approval in order to prepare a working document for WP29 in Nov 2015 in time.

The GRB Chairman clarified that if the work of the group is completed in time as scheduled, the QRTV content can seamlessly be included in the EU legislation. EU COM added that so far, Annex 9 of R51 is in brackets, allowing discussion in GRB to continue. First revision to R51 be completed, leaving all open issues excluded that are still under discussion. This may result in introducing R51.03 without AVAS. EU wants to include AVAS in exterior Noise legislation in Europe, therefore COM must possibly request this for R51.

5. Presentation [Development, Features and Next for Acoustic vehicle alerting system Regulation of Taiwan](#)

Taiwan intends to apply the GTR for QRTV in the long-term. Until then, RE3 is a potential base for national legislation. OEMs will have to provide evidence, that the included recommendations are fulfilled. This shall be applicable for both HEV and BEV. Also Taiwan is interested in signing the 58 agreement and to apply R51 from 2015 on.

6. Presentation [Frequency shift testing \(Korea\)](#)

The background of the study that was presented was to compare and evaluate indoor versus outdoor testing. Also the need for maximum level of AVAS was looked at. Three different ICE vehicles were tested, both on a chassis dynamometer and on outdoor facilities. It was concluded that both testing location delivered similar results so that testing can be carried outdoor. One advantage of outdoor testing is the easier availability of testing facilities as there is no limitation for the vehicle length. Also the standardization of indoor test facilities would have to be determined. As these tests were done on ICE vehicles, the transferability of the gathered results to electric vehicles remains to be proven.

Also Korea supports the request from France to set a maximum value for the emission from AVAS.

ISO mentioned some basic findings and the specific concerns on outdoor testing (pitch shifting) have been presented at previous meetings and invites Korea to participate in future ISO work.

7. Presentation [Detection distances of various sounds](#), OICA

In addition to the findings already presented during the last TF meeting in Brussels,

a more detailed analysis of the study on detection distances as function of various sounds was shown. All analyzed sounds are suitable to meet the basic NHTSA requirements for detection distance (1.8sec in front of pedestrian @ 10 km/h), however only three of them were designed in line with the NPRM requirements for number and quality of the 1/3 octave bands (8 bands with individual SPLs). 1 of them actually fulfills the requirements, while the other two miss to fulfill SPL requirements in at least one 1/3 octave bands. This may be a consequence of sound propagation of a sounder fitted to a vehicle being unstable and depending on so far unknown factors. Subsequently it is likely that sound emitted from the speaker must be produced to include a certain safety margin so to be sure that the signal measured according to ISO 16254 does fulfill all criteria. This of course risks resulting in a higher overall SPL. Emissions of all three sounds are higher than the emission from an ICE that had also been included in the study.

Actual detection distances are between 8 and 29 meters with sound levels between 39.8 dB(A) and 63,7 dB(A) at the moment of detection and between 52.9 dB(A) and 72 dB(A) in front of the pedestrian.

Further analysis reveals that a sufficiently high level of detectability can be reached with signal emitted from only two bands, either according to proposed specification from Japan (2 bands, one above 1 kHz, one below 800Hz, each SPL >43 dB(A)) or to the proposal from VDA (2 bands, one below 1.6 kHz, individual SPL level for each band) .The detectability does not improve with the number of bands. Also there is no clear relation between the overall SPL from the all 1/3 octave forming the individual sound and the distance at which a vehicle can be detected. Even a lower overall SPL (and less energy) produced from less 1/3 octave bands may result in a better detectability.

Analysis of data from ICE vehicles show that the typical sound emission according to ISO16254 is about 60 dB(A) in average (2m / 10 km/h) with sedan type vehicles typically emitting between 55 and 60 dB(A). As sedan are sufficiently detectable in normal urban, it can be concluded that a SPL below 60 dB (A) should be adequate for detectability.

In summary it can be concluded that the frequency range from 160Hz to 5000Hz is a good range and any frequency is suitable for detectability. It can be discussed to blank some bands around 1000Hz, but there is no real need for it. If the sound levels are selected with care, there is no risk to jeopardize traffic noise reduction aims. Two bands are sufficient as requirement; the vehicle will add “natural additional sound” in many cases. An overall sound level per test condition should be specified as well. It is suggested to invite all parties that have generated data, to merge their data together. The whole database should be re-analyzed to determine, re-assess or validate the given proposals for sound levels again.

8. Presentation [Relationship between Acceleration Impression and Frequency Shifting of Vehicle Sound](#) - K.Yamauchi, Nagasaki University

This presentation shows the results of a study that was designed to review the relation between various pitch shifting scenarios and the acceleration perceived.

The overall conclusion from the study is that for elderly people, no significant difference in reaction is expected. There is a big variety of suitable pitch shifting modes so that the requirements for pitching should not be too tight.

9. Changes to the draft GTR document

The basis for the discussion was [Draft GTR after 2nd TF meeting.](#) All changes made during this meeting are reflected in document '[Draft GTR incl. changes made during 5th meeting](#)'

A discussion on the format of the GTR was lead in terms of the proposed split of the technical requirements into a section with mandatory requirements and a section with optional requirements, called 'REQUIREMENTS FOR NATIONAL ADOPTION BY CONTRACTING PARTIES ' that was introduced during the 2nd TF meeting. The US stated that the content of a GTR can be modified in order to fit national requirements, including different measures for the time being until it is proven which methods work and which don't.

- [Discussion on Backing alarm](#): It was discueesed if requirements for a signal during backing can be excluded in the case where the vehicle is fitted with another kind of backing alarm. Japan made clear that requirements from the GTR for backing shall not influence other existing legal or national requirements.
- [Requirements for SPLs](#): requirements for the SPL for various driving conditions are moved from the main text into the annexed table.
- [Deactivation](#): A requirement for prompt activation/deactivation of the signal at defined conditions would prohibit a fade out. This is not preferred by most participants. It requires a test method to prove its proper functioning. The environmental aspect of sound emissions at speeds outside of the mandated range would be covered by other regulation. Instead the minimum range of AVAS being activated should be mandated. Fading of the signal at conditions not included in that range should remain undefined and therefore left to the OEM to decide if more than the mandated signal is produced.
- [Stationary sound](#): The signal that is emitted when the vehicle is in stationary condition was discussed. Stationary is seen as a condition where the vehicle is not

parked but where it is likely that a movement will start soon. The start of emission can either be related to after 'Activation of starting system', thus a specified period after a certain event or before 'Ready to move', thus before an event still to be determined. Anyway a clear definition for both 'Activation of Starting system' and 'Ready to move' must be included in the text.

- Commencing motion sound is seen as a useful feature, but should not be strictly described.
- Pause Switch: Certain or all use conditions of AVAS may be in conflict with national legislation of EU member states. A temporary or permanent pause switch shall therefore generally be regulated on national basis. COM has the mandate to change Annex 9 depending on the final content of the GTR.
- Test procedures: Technically both Outdoor and Indoor testing is possible. But out of aspects of practicability, Indoor testing is the preferred route due to the lack of background noises.
US so far only foresee outdoor testing. However with the self-certification system, it is the responsibility of the OEM to ensure that requirements would be fulfilled during outdoor testing.
Japan again mentions the concern of missing indoor test lab specifications.

10. Next meetings

Jan 27 – 28:	3 rd TF meeting, Monday & Tuesday of week of GRB 59
April 7-9:	4 th TF meeting, Washington or Baltimore
May 13-15:	6 th meeting: NHTSA, Washington DC
Week of GRB 60:	5 th TF
Q3/Q4 2014:	7 th meeting (after GRB 60), Europe