Transmitted by the expert from France

Informal document **GRB-62-20**
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Proposal to correct ECE/TRANS/WP.29/GRB/2015/7 - (Russian Federation) Proposal for Supplement 5 to Regulation No. 28 (Audible warning devices)

The text reproduced below was prepared by the experts from the FRANCE. The text reproduced below modifies the text drafted. The modifications to the existing text of the Regulation are shown in bold for new characters.

I. Proposal

6.2. Measuring instruments

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When no general statement or conclusion can be made about conformance of the sound level meter model to the full specifications of IEC 61672-1:2014, the apparatus used for measuring the sound pressure level shall be a sound level meter or equivalent measurement system meeting the requirements of Class 1 instruments as described in IEC 61672-3:2014.

When measurements of the sound pressures in the one-third mid-band frequencies 2,000, 2,500 and 3,150 Hz are carried out for one-third octaves, the instrumentation shall meet all requirements of IEC 61260-1-2014, class 1.~~The spectrum of the sound emitted shall be measured according to the Fourier transform of the acoustic signal. Alternatively, one-third octave filters conforming to the specifications of IEC "61260-1:2014 Electroacoustics - Octave-band and fractional-octave-band filter" may be used: in this case,~~ ~~t~~The sound pressure level in the mid-band frequency 2,500 Hz shall be determined by adding the quadratic means of the sound pressures in the one-third mid-band frequencies 2,000, 2,500 and 3,150 Hz. ~~In every case, only the Fourier transform method shall be regarded as a reference method."~~

When measurements the rated frequency (or frequencies), the digital sound recording system shall have at least a 16 bit quantization. The average auto power spectrum shall be determined, using a Hanning window and at least 66.6% overlap averages.

6.2.3. Compliance with requirements

~~Compliance of the acoustic measurement instrumentation shall be verified~~ **Compliance of the sound calibrator with the requirements of IEC 60942:2003 and compliance of the instrumentation system with the requirements of IEC 61672-3:2014** by the existence of a valid certificate of compliance.

6.3.1. The warning device should, preferably, be tested in an anechoic chamber. Alternatively, it may be tested in a semi-anechoic chamber or in an open space. In this case, precautions shall be taken to avoid reflections from the ground within the measuring area (for instance by erecting a set of absorbing screens).

~~Compliance with the spherical divergence to a limit of 1 dB within a hemisphere of not less than 5 m radius, up to the maximum frequency to be measured, especially in the measuring direction and at the height of the apparatus and the microphone, shall be checked.~~

The test facility shall meet requirements of ISO 26101:2012 with the following qualification criteria and measurement requirements appropriate to this test method. For qualifying the hemi acoustic space, the following evaluation shall be conducted:

- **Sound source location shall be placed in position of the audible warning device to be tested;**
- **Sound source shall provide a broadband input for measurement;**
- **Evaluation shall be conducted in one-third-octave bands;**
- **Microphone locations for evaluation shall be on a line from the source location to position of the microphone used for measurement. This is commonly referred to as the microphone transverse;**
- **A minimum of 10 points shall be used for evaluation on the microphone transverse line;**
- **The one-third-octave bands used to establish hemi-anechoic qualification shall be defined to cover the spectral range of interest.**
- **The test facility shall have a cut-off frequency, as defined in ISO 26101:2012, lower than the lowest frequency of interest. The lowest frequency of interest is the frequency below which there is no signal content**

relevant to the measurement of sound emission for the audible warning device.

6.3.2. ~~The device to be tested and the microphone shall be placed at the same height. This height shall 1.20 ± 0.05 m~~. The axis of maximum sensitivity of the microphone shall coincide with the direction of the maximum sound level of the device.

6.3.3. The warning device shall be mounted rigidly, by means of the equipment indicated by the manufacturer, on a support ~~whose mass is at least ten times that of the warning device under test and not less than 30 kg. In addition, arrangements must be made to ensure~~ **ensuring** that reflections on the sides of the support and its own vibrations have no appreciable effect on the measuring results.

II. JUSTIFICATION

1. Measuring instruments
   a. The tests of IEC 61672-3 cover only a limited subset of the specifications in IEC 61672-1 for which the scope is large (temperature range, frequency requirements up to 20 kHz, EMC tests, …). It is economically impossible to verify the whole IEC 61672-1 standard requirements one each item of an computerized data acquisition systems model. Until now, it seems that no IEC 61672-1 conformity has been given to computerized data acquisition systems on the market and the users cannot prove the instrumentation conformity required by the test code.
   b. For measurements of the sound pressures in the one-third mid-band frequencies 2,000, 2,500 and 3,150 Hz, France experts recommend IEC 61260-1-2014's method as a reference method instead of Fourier transform method.
   c. For measurements of the rated frequency (or frequencies), France experts recommend as specification as defined in Proposal for a new Regulation concerning the approval of quiet road transport vehicles (QRTV).
2. Compliance with requirements: Periodical compliance checking of the instrumentation system shall be referred to IEC 61672-3. 2014.
3. For specification of anechoic chamber, France experts recommend ISO 26101:2012 as defined in Proposal for a new Regulation concerning the approval of quiet road transport vehicles (QRTV).
4. In an anechoic environment (microphone transverse), only the distance between the device and microphone is important, not the height.
5. A support whose mass is at least ten times that of the warning device under test and not less than 30 kg do not ensure that there are no appreciable effect on the measuring results.