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**Road vehicles - Performance requirements and test methods
for hands-free communication and voice interaction**

道路车辆 免提通话和语音交互性能要求及试验方法

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1 Scope

This document specifies the requirements for hands-free communication and speech interaction performance of road vehicles, and describes the corresponding test methods.

This document is applicable to M1 and N1 vehicles equipped with car speaker hands-free communication terminals, car emergency call terminals, and car speech interaction terminals.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ITU-T G.122-1993, Influence of national systems on stability and talker echo in international connections ITU-T P.51, Simulation mouth ITU-T P.57, Simulation ear s ITU-T P.58, Head and torso simulator for telephonometry, HATS ITU-T P.79-2007, Calculation of loudness ratings for telephone sets ITU-T P.501-2020, Test signals for use in telephonometry ITU-T P.502-2000, Objective test methods for speech communication systems using complex test signals ITU-T P.863-2018, Perceptual objective listening quality assessment ITU-T P.863.1-2019, Application guide for recommendation P.863 ETSI EG202 396-3-2018, Speech and multimedia Transmission Quality (STQ);

Speech Quality performance in the presence of background noise; Part 3.

[Source: ITU-T P 1100-2019, 3.2.6]

3.21 Diffuse field equalization; DF

An equalization of the transmission characteristics in the receiving direction of HATS, so that the sound waves incident directly in front of HATS under diffusion field conditions have a flat frequency characteristic.

NOTE. Equalization is performed for HATS, expressed as the ratio of the average sound pressure of the undisturbed diffusion field at the HATS reference point within the 1/3 octave

sub-band (i.e., the average sound pressure of the undisturbed diffusion field at the HATS reference point without placing HATS) to the average sound pressure at the ear ear-drum reference point after placing HATS.

[Source. ITU-T P 1100-2019, 3.2.4]

3.22 Maximum setting of the volume

When the volume in the receiving direction is adjustable, avoid overloading the sound system and introducing non-linear relationships in the echo path, and maximize the volume of the receiving direction loudness rating.

3.23 Nominal setting of the volume

To ensure that the loudness rating of the receiving direction meets the volume requirements of this document (when the receiving volume is adjustable), or the default volume of the vehicle terminal (when the receiving volume is not adjustable).

3.24 Sending loudness rating; SLR

The loudness loss between the user's mouth and the electrical interface on the network end.

NOTE. The loudness loss here is defined as the weighted average of the ratio of the driving sound pressure to the measured voltage.

[Source. ITU-T P 1100-2019, 3.2.20]

3.25 Receiving loudness rating; RLR

The loudness loss between the network electrical interface and the listening user's ear.

NOTE. The loudness loss here is defined as the weighted average of the ratio of the driving electromotive force to the measured sound pressure.

[Source. ITU-T P 1100-2019, 3.2.19]

3.26 Junction loudness rating; JLR

It refers to the loudness loss between the network electrical interface and the short- does not exceed 110 ms.

4.1.2 Delay in the case of using SRWT

Tested according to 7.2.1, the delay of the driver's seat shall meet the following requirements.

- When using narrowband speech, $Trtd$ shall be less than 120 ms; when using wideband

speech, Trtd shall be less than 130 ms;

- The Trtdimp introduced by hands-free signal processing does not exceed 110 ms.

4.2.1 Sending loudness rating

The sending loudness rating (SLR) of the driver's seat shall be tested according to 7.2.2.1
The SLR at the point of interconnection (POI) shall be within the range of 9 dB~17 dB.

4.2.2 Receiving loudness rating

The receiving loudness rating (RLR) of the driver's seat shall be tested according to 7.2.2.2.

If the volume in the receiving direction cannot be adjusted, the RLR at the POI shall be within the range of -2 dB~6 dB.

If the volume in the receiving direction can be adjusted, it shall meet the following requirements.

- At least one volume setting RLR meets the above requirements;
- The nominal setting of the volume RLR shall be at least 15 dB greater than the maximum setting of the volume (if the volume is adjustable) RLR;
- At least one volume setting shall ensure a signal-to-noise ratio (S/N) of at least 6 dB in any possible communication and noise environment.

4.2.3 Linearity of sending loudness rating

Tested according to 7.2.2.3, the SLR of the driver's seat shall meet the following requirements.

- When the signal level of the sending direction is relative to the nominal level by - 3 dB, the deviation between the SLR and the SLR measured using the nominal value shall not exceed -0.5 dB;

4.4.1 Sending speech quality

Tested according to 7.2.4.1, the sending speech quality shall meet the following requirements.

- When using narrowband speech, the average listening opinion score (MOSLQO) shall be at least 3.0;
- When using wideband speech, MOSLQO shall be at least 3.6.

4.4.2 Receiving speech quality

Tested according to 7.2.4.2, the receiving speech quality shall meet the following