NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB/T 37153-2018

Acoustic vehicle alerting system of electric vehicles running at low speed

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1 Scope

This Standard specifies requirements and test methods for vehicle speed range, sound level limit, frequency requirements, sound type, and pause switch of acoustic vehicle alerting system of electric vehicles running at low speed (hereinafter referred to as "acoustic-alerting system").

This Standard is applicable to pure electric vehicles of the Category-M1 and N1 categories, hybrid electric vehicles with pure electric driving modes, and fuel cell electric vehicles.

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.

GB 1495, Permissible noise limit emitted by power-driven vehicles

GB/T 3241-2010, Electroacoustics - Octave-band and fractional-octave-band filters

GB/T 3785.1-2010, Electroacoustics - Sound level meters - Part 1.

Specifications

GB/T 12534, Motor vehicles - General rules of road test method

GB/T 15173-2010, Electroacoustics - Sound calibrators

GB/T 19596, Terminology of electric vehicles

GB 50800-2012, Technical code for anechoic and semi-anechoic rooms

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 19596 as well

as the followings apply.

3.1 acoustic vehicle alerting system; AVAS

a system for issuing a prompt sound to effectively transmit information to other road users when the noise value emitted by the vehicle is below a certain value

3.2 acoustic vehicle alerting system of electric vehicle running at low

speed a prompt sound from the vehicle's acoustic-alerting system when the speed of the electric vehicle is lower than a certain value

3.6 rear plane of the vehicle

a vertical plane tangent to the trailing edge of the vehicle

3.7 sound pressure level; SPL

the base 10 logarithm of the ratio of the square root sound pressure to the reference sound pressure multiplied by 20

3.8 weighted sound level

sound level measured by a weighted network filter

4.1 Working speed range

The working speed range of the acoustic-alerting system shall be at least greater than 0km/h and less than or equal to 20km/h.

4.2.1 The noise of the electric vehicle measured by the measurement method

specified in 5.6.2 shall be on each 1/3 octave included in it. At least two of the 1/3 octaves are not less than the sound levels specified in Table 1, and at the same time meet the requirements for the total sound level in Table 1.

4.2.2 Vehicles equipped with the acoustic-alerting system shall not emit more

than 75dB(A) of noise at the most when driving.

4.3.1 Frequency range

The sound of a vehicle equipped with the acoustic-alerting system shall contain at least two 1/3 octaves as specified in Table 1, and at least one 1/3 octave below 1600 Hz (including 1600). The minimum sound level of these two 1/3 octaves shall not be lower than the corresponding sound level limit specified in

Table 1.

4.5.1 For vehicles equipped with the acoustic-alerting system, the manufacturer

can choose whether to configure the pause switch.

4.5.2 The pause switch shall be placed in a position where the driver can see, touch and operate under normal driving conditions.

4.5.3 When the pause switch is activated, there shall be a clear signal device

(acoustic, optical, electrical or other device) release signal to alert the driver that the acoustic-alerting system running at low speed has been suspended.

5.1.1 Meteorological measuring equipment

Meteorological measuring instruments are mainly used to monitor environmental conditions during the test. The accuracy shall meet the following requirements.

5.2 Weather condition

During the test, meteorological conditions shall meet the following requirements.

5.3.1.1 Outdoor test conditions

Outdoor test sites and pavements shall comply with the requirements of GB 1495.

5.3.1.2 Microphone position

The microphone placement position is shown in P and P' in Figures 1 and 2.Its distance to the CC' line is 2.0m +/- 0.05m, and 1.2m +/- 0.02m upward on the ground surface. The reference direction shall be horizontal and point vertically to the CC' line of the vehicle's operation.

5.3.2.1 Indoor semi-anechoic or muffling test conditions

This clause specifies the conditions on the road that simulate the operation of all systems during the test, or only the conditions applicable to the acoustic-alerting system operating mode.

5.4 Vehicle status

The vehicle test mass is the curb weight +75kg.

5.5.1 Measurement method of background noise A-weighted sound level

When measuring background noise, measure at least 10s continuously. When calculating

the background noise by using a 10s sound obtained from the measurement, make sure that the sound is typical background noise and does not contain any transient interference.

5.5.2 Correction method of vehicle A-weighted sound level measurement

The noise outside the vehicle shall be corrected according to the difference between the maximum and minimum values of the background noise at the time of measurement. Ltest correction = Ltest - Lcorrection.

5.6.2.2.1 Constant speed test when the vehicle moving forward

When testing in the outdoor field shown in Figure 6, the path of the vehicle centerline shall be as close as possible to the CC' line throughout the test. The front plane of the vehicle shall pass through the AA' line at the beginning of the test. The rear plane of the vehicle shall pass through the BB' line at the end of the test, as shown in Figure 1.The vehicle shall maintain a constant test speed throughout the operation.

5.6.2.2.2 Simulated constant speed test under vehicle static state

When the vehicle is being tested indoors or outdoors, the front plane of the vehicle shall be placed on the PP' line as shown in Figure 4 of 5.3.2.2.By providing an external signal to simulate the test vehicle speed, the vehicle shall maintain a constant simulated test vehicle speed of at least 5s.

5.6.2.3.1 Reverse test during driving

When the vehicle is tested in the outdoor field shown in Figure 6, the path of the vehicle centerline shall be as close as possible to the CC' line throughout the test. The rear plane of the vehicle shall pass through the AA' line at the beginning of the test. The front plane of the vehicle shall pass through the BB' line at the end of the test, as shown in Figure 2.The vehicle shall maintain a constant test speed throughout the operation.

5.6.3 Measurement data and recorded values

Under each test condition, at least 4 measurements shall be taken on both sides of the vehicle.

5.7.1 Analytical equipment requirements

Digital sound recording system shall be at least 16-bit accurate. Sampling rate, range, and dynamic range are suitable for signals that require testing.

The frequency of the test results shall have sufficient accuracy. The setting of the analytical equipment shall be determined by the automobile manufacturer and the testing agency.