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**Coast-by methods for measurement of tyre-to-road sound
emission**

(English Translation)

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1 Scope

This document describes a method for measuring the noise of tyres installed on a test vehicle under coasting conditions. Coasting refers to a state of motion where the tyres are in free-rolling motion without power, which is typically achieved by placing the transmission in neutral or an equivalent position and simultaneously shutting off the engine and all auxiliary systems that do not affect safe driving.

This document applies to passenger car tyres and truck tyres. It does not apply to measuring tyre noise under normal driving conditions or measuring traffic noise and its hazard level at a given location under normal driving conditions.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. In terms of dated references, only the version with the specified date applies to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 6326 Tyre - Vocabulary

ISO 10844 Acoustics - Specification of Test Tracks for Measuring Noise Emitted by Road Vehicles and Their Tyres

NOTE: GB/T 22157-2018 Acoustics - Specification of Test Tracks for Measuring Noise Emitted by Road Vehicles and Their Tyres (ISO 10844.2014, IDT)

ISO/IEC Guide 98-3 Uncertainty of Measurement - Part 3. Guide to the Expression of Uncertainty in Measurement (GUM.1995)

NOTE: GB/T 27418-2017 Guide to the Evaluation and Expression of Uncertainty in Measurement (ISO/IEC Guide 98-3.2008, MOD)

IEC 60942 Electroacoustics - Sound Calibrators

NOTE: GB/T 15173-2010 Electroacoustics - Sound Calibrators (IEC 60942.2003, IDT)

IEC 61672-1 Electroacoustic - Sound Level Meters - Part 1. Specifications

NOTE: GB/T 3785.1-2023 Electroacoustics - Sound Level Meters - Part 1. Specifications (IEC 61672-1.2013, IDT)

IEC 61672-3 Electroacoustic - Sound Level Meters - Part 3. Periodic Test

NOTE: GB/T 3785.3-2018 Electroacoustics - Sound Level Meters - Part 3. Periodic Tests (IEC 61672-3.2013, IDT)

3 Terms and Definitions

The terms and definitions defined in GB/T 6326 are applicable to this document.

4 Tyre Classification

C1 tyres. passenger car tyres.

C2 tyres. tyres for mini and light trucks with a single tyre load index of 121 or less and a velocity rating of N or higher.

C3 tyres. tyres for mini and light trucks with a single tyre load index of 121 or less and a

velocity rating of M or lower, or tyres for mini and light trucks, and truck tyres with a single tyre load index of 122 or higher.

5 General Rules

This document applies to the measurement of tyre noise of test vehicles under coasting conditions.

The test results are objective quantities of tyre noise measured under specified test conditions.

6 Test Site

The test site shall be a semi-free sound field formed by a continuous horizontal area. The test road surface (including pores) shall be dry and clean throughout the measurement process. The test site, test area and road surface shall conform to the requirements of ISO 10844, as shown in Figure 1. There shall be no large sound reflecting objects or sound sources within the radius

R50 shown in Figure 1. The test road surface shall be periodically validated, and the validation methods are given in Appendix C.

Figure 1 -- Test Site and Road Surface

7.1 Acoustic Measuring Instruments

The sound level meter or equivalent measuring system, including the windproof cover recommended by the microphone manufacturer, shall meet the minimum requirements for Type

1 equipment in IEC 61672-1 or IEC 61672-3.

Measurements shall be performed using "A" frequency weighting characteristics and "F" time weighting characteristics.

At the start of the measurement, the sound level meter shall be calibrated and recorded using a standard sound source (for example, a piston generator) in accordance with the instrument manufacturer's instructions. At the end of the test, the sound level meter shall be calibrated and recorded again. The sound calibrator shall meet the requirements for Type 1 equipment in IEC

60942.

During measurement, if the sound level meter readings obtained from a series of measurement calibrations differ by more than 0.5 dB, the tests during that period shall be considered invalid.

Any deviation shall be recorded in the test report.

The sound level meter shall be submitted for inspection in accordance with the requirements of

IEC 61672-1 and IEC 61672-3, and the metrological calibration cycle shall not exceed 2 years.

The sound calibrator shall be submitted for inspection in accordance with the requirements of

IEC 60942, and the metrological calibration cycle shall not exceed 1 year.

The microphones shall be equipped with a windproof cover, and the use of the windproof cover shall meet the requirements of the microphone manufacturer.

When it cannot be confirmed whether the sound level meter model conforms to all specifications of IEC 61672-1, the sound level meter or equivalent measurement system used for measurement shall conform to the requirements for Type 1 equipment in IEC 61672-3.

NOTE: the tests in IEC 61672-3 only cover a finite subset of the specifications in IEC 61672-1, which has a relatively wide scope (temperature range, frequency requirements up to 20 kHz, etc.). From an economic perspective, it is not feasible to verify every item of a computerized data acquisition system model against the requirements of IEC 61672-1.

Currently, no commercially available computer-based data acquisition system fully meets all the requirements of IEC 61672-1. Furthermore, this does not mean that the user needs to prove that these systems meet the equipment requirements in accordance with the test requirements.

7.2 Microphones

Two microphones shall be used in the test, one on each side of the vehicle. There shall be no reflective objects affecting the sound field near the microphones, and no person or object shall be left between the microphones and the sound source. Test personnel shall be in a location that does not interfere with the acoustic testing, and in particular, they shall not be positioned within the test area.

The microphones shall be positioned $7.5\text{ m} \pm 0.05\text{ m}$ from the centerline of driving of the test vehicle and $1.2\text{ m} \pm 0.02\text{ m}$ above the ground. In addition, it shall be determined by the sound level meter manufacturer's requirements based on the actual position of the test vehicle when it passes through the centerline of driving as shown in Figure 1.