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Wind buffeting measurement method for motor vehicle

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Foreword

This document has been drafted in accordance with the provisions of GB/T 1.1—2020 Directives for Standardization—Part 1: Rules for the Structure and Drafting of Standardizing Documents 国家标准委.

Attention is drawn to the possibility that some elements of this document may be the subject of patent rights. The issuing body of this document shall not be held responsible for identifying any or all such patent rights.

This document was proposed and is under the jurisdiction of the National Technical Committee on Automotive Standardization of China (SAC/TC 114).

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Wind buffeting measurement method for motor vehicle

1 Scope

This document specifies the measurement methods for interior wind buffeting noise of motor vehicles during driving with windows open, including the road measurement method and the aeroacoustic wind tunnel measurement method.

The road measurement method in this document applies to Category M and Category N vehicles.

The aeroacoustic wind tunnel measurement method in this document applies to Category N₁ vehicles, as well as Category M vehicles with a mass of below 3,500 kg.

2 Normative References

The contents of the following documents constitute indispensable provisions of this document through normative reference in the text. For dated reference documents, only the version corresponding to the specified date shall apply to this document; for undated reference documents, the latest version (including all amendments) shall apply to this document.

GB/T 2900.86-2009 Electrotechnical terminology - Acoustics and electroacoustics

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

GB/T 3730.2 Road vehicles - Mass - Vocabulary and codes

GB/T 3785.1 Electroacoustics - Sound level meters - Part 1: Specifications

GB/T 6882 Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for anechoic and semi-anechoic chambers

GB/T 12534 General rules for automotive road test methods

GB/T 14198 General specification for microphones

GB/T 15089 Classification of motor vehicles and their trailers

GB/T 15173 Electroacoustics - Sound calibrators

GB/T 18697 Acoustics - Measurement methods for interior noise of motor vehicles

GB/T 23466 Selection guide for hearing protectors

GB/T 35227 Specifications for surface meteorological observations - Wind direction and wind speed

QC/T 1183-2023 Automotive aerodynamic terminology and definitions

3 Terms and Definitions

The terms and definitions specified in QC/T 1183-2023 and the following apply to this document.

3.1 wind buffeting noise

The low-frequency noise generated inside a vehicle when the vehicle windows or sunroofs are open during vehicle operation.

Note: Referred to as wind buffeting for short.

[Source: Terms and Definitions for Vehicle Noise, Vibration and Harshness (NVH), 3.2.20]

3.2 sound pressure level

The logarithm of the ratio of a given sound pressure to the reference sound pressure.

Note 1: The sound pressure level expressed in decibels (dB) is 20 times the common logarithm of the aforesaid ratio. Unless otherwise specified, the reference sound pressure in air is 20 μPa , and the reference sound pressure in other media is 1 μPa .

Note 2: Unless otherwise specified, sound pressure shall all be expressed by root-mean-square (RMS) value.

[Source: Terms and Definitions for Vehicle Noise, Vibration and Harshness (NVH), 3.1.50]

3.3 sound pressure level of wind buffeting

The unweighted overall sound pressure level calculated from the 5 Hz to 25 Hz frequency components in the auto-power spectrum of interior vehicle wind buffeting noise.

Note: Unit in decibels (dB).

3.4 peak sound pressure level of wind buffeting

The maximum sound pressure level within the 5 Hz to 25 Hz frequency band in the auto-power spectrum of interior vehicle wind buffeting noise at a frequency resolution of 1 Hz under a specific wind buffeting measurement condition.

Note: Referred to as wind buffeting peak for short, unit in decibels (dB).

3.5 window opening ratio

The ratio of the sliding travel of vehicle window glass in the open direction to its total slidable travel.

Note: Expressed as a percentage.

3.6 characteristic speed of wind buffeting

The vehicle speed corresponding to the first occurrence of the interior wind buffeting sound pressure level reaching 100 dB under a specific wind buffeting measurement condition.

Note: Unit in kilometers per hour (km/h).

3.7 maximum speed of wind buffeting

The vehicle speed corresponding to the maximum value of the interior wind buffeting sound pressure level under a specific wind buffeting measurement condition.

Note: Unit in kilometers per hour (km/h).

3.8 wind buffeting peak frequency

The frequency at which the wind buffeting peak appears under a specific wind buffeting measurement condition.

Note: Unit in hertz (Hz).

3.9 wind tunnel test section

The effective test area between a wind tunnel nozzle and collector that meets the flow field and sound field requirements, and where test vehicles can be placed.

Note: Referred to as test section for short.

3.10 low-frequency flutter

A sound field resonance phenomenon caused by the interaction between the jet flow from a wind tunnel nozzle and the wind tunnel structure.

Note: Low-frequency flutter will affect the flow field and sound field quality of the test section as well as the wind buffeting measurement results of the test vehicle.