International

ISO 13472-2

Acoustics — Measurement of sound absorption properties of road surfaces in situ —

Part 2: Spot method for reflective surfaces

Acoustique — Mesurage in situ des propriétés d'absorption acoustique des revêtements de chaussées —

Partie 2: Méthode ponctuelle pour les surfaces réfléchissantes

Second edition
2025-05

Reference number
ISO 13472-2:2025(en)

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Published in Switzerland

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This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This second edition cancels and replaces the first edition (ISO 13472-2:2010), which has been technically revised.

The main changes are as follows:

— mandatory choice of the transfer function formulation and quality requirements for the coherence function;

— an alternative microphone arrangement and application of alternating transfer functions are presented to cancel the distortion due to destructive interference at the microphone positions.

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This method provides a means to evaluate the sound absorption characteristics of a road surface without damaging the surface. The field of application is limited to low absorption surfaces such as those in accordance with ISO 10844[2] and similar surfaces. Due to air leakage the method is not reliable if the measured sound absorption coefficient exceeds 0,15. Surfaces with a sound absorption coefficient of 0,10 or below are considered reflective.

The method in this document is based on propagation of the test signal from the source to the road surface and back to the receiver through an impedance tube with a diameter of 80 mm to 100 mm. The tube covers an area of approximately 0,005 m^2 to 0,008 m^2 and a frequency range, in one-third octave bands, from 250 Hz to 1 600 Hz for a 100 mm diameter, or from 250 Hz to 2 000 Hz, for an 80 mm diameter tube. It uses the test procedure and signal processing described in ISO 10534-2, but because of the defined frequency range of application, the dimensions of the system are not freely adjustable.

The essential part in the ISO 10534-2 procedure is the determination of the transfer function between two microphones at different distances from the sample at the end of the tube. In this case of a reflecting sample at specific frequencies destructive interferences (nodes) will occur at the microphone positions jeopardizing the correct determination of the transfer function between the microphone pair.

Therefore in this document the ISO 10534-2 procedure is extended with a preference for transfer function H calculated as the ratio of the auto spectrum S_{22} at the lowest microphone position and the cross spectrum S_{21} and requirements on the resolution, the sample frequency and the block length in the FFT analysis added with a requirement on the average narrow band coherence within a one-third octave band. Recommendations for improvement of the accuracy by alternative microphone arrangement, variation in transfer function and type of random noise are presented in Annex C.

This method is complementary to the extended surface method (ISO 13472-1[3]) that covers an area of approximately 3 m^2 and a frequency range, in one-third octave bands, from 250 Hz to 4 000 Hz.

Both methods should give similar results in the valid frequency range, but their fields of application and therefore their accuracy will differ strongly. The method described in ISO 13472-1 has limited accuracy at small sound absorption values and is therefore unfit to check compliance of surfaces with the requirements in ISO 10844 or similar regulations, while the method described in this standard fails at higher sound absorption values.

Within their ranges of applicability the methods are applicable also to acoustic materials other than road surfaces.

The measurement results by this method are comparable with the results of the impedance tube method, performed on bore cores taken from the surface such as ISO 10534-1, ISO 10534-2 and ASTM E 1050-19[5].

The measurement results obtained with this method are in general not comparable with the results of the reverberation room method (ISO 354[1]), because the method described in this International Standard uses a plane progressive wave at normal incidence, while the reverberation room method uses a diffuse sound field.