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

**Part 1:
Extended surface method**

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

Partie 1: Méthode de la surface étendue



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

	Page
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Summary of the method	3
4.1 General principle	3
4.2 Signal separation techniques	4
4.3 Test method	6
5 Test system	7
5.1 Components of the test system	7
5.2 Sound source	7
5.3 Test signal	7
6 Data processing	7
6.1 Calibration	7
6.2 Sampling frequency	7
6.3 Recovery of the overall impulse response	7
6.4 Temporal separation of the signals	8
7 Positioning of the equipment	8
7.1 Maximum sampled area	8
7.2 Positioning of the measuring equipment	8
7.3 Reflecting objects	9
7.4 Background noise	9
7.5 Safety considerations	9
8 Road surface and meteorological conditions	9
8.1 Condition of the road surface	9
8.2 Wind	9
8.3 Temperature	9
9 Measurement procedure	10
10 Measurement uncertainty	10
11 Test report	11

Annexes

A Radius of the maximum sampled area	12
B Reference measurement and correction procedure.....	13
C Physical principle of the measurement	14
D Measurement using an MLS test signal.....	16
E Example of a test report.....	18
F Sound absorption coefficient at non-normal incidence	21

G Correction of small time shifts in the direct impulse response between the free-field measurement and the reflected measurement	23
Bibliography	26

This document is a preview generated by EVS

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 13472 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13472-1 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

ISO 13472 consists of the following parts, under the general title *Acoustics — Measurement of sound absorption properties of road surfaces in situ*:

— *Part 1: Extended surface method*

Other parts are in preparation.

Annexes A and B form a normative part of this part of ISO 13472. Annexes C, D, E, F and G are for information only.

Introduction

This part of ISO 13472 describes a test method for measuring, *in situ*, the sound absorption coefficient of road surfaces as a function of frequency under normal incidence.

This method provides a means of evaluating the sound absorption characteristics of a road surface without damaging the surface. It is intended to be used during road construction, road maintenance and other traffic noise studies. It may also be used to qualify the absorption characteristics of road surfaces used for vehicle and tyre testing. However, the standard uncertainty is limited to 0,05.

This method in this part of ISO 13472 is based on free-field propagation of the test signal from the source to the road surface and back to the receiver and covers an area of approximately 3 m² and a frequency range, in one-third-octave bands, from 250 Hz to 4 kHz.

To complement this method, a spot method (will be part 2) is under development. This method is based on the transmission of the test signal from the source to the road surface and back to the receiver inside a tube and covers an area of approximately 0,1 m² and a frequency range, in one-third-octave bands, from 315 Hz to 2 kHz.

Both methods should give the same results in the frequency range from 315 Hz to 2 kHz.

They are both applicable also to acoustic materials other than road surfaces.

The measurement results of this method are comparable with the results of impedance tube methods, performed on bore cores taken from the surface (e.g. ISO 10534-1 and ISO 10534-2).

The measurement results of this method are in general not comparable with the results of the reverberation room method (ISO 354), because the method described in this part of ISO 13472 uses a directional sound field, while the reverberation room method assumes a diffuse sound field.

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

Part 1:

Extended surface method

1 Scope

This part of ISO 13472 describes a test method for measuring *in situ* the sound absorption coefficient of road surfaces as a function of frequency in the range from 250 Hz to 4 kHz.

Normal incidence is assumed. However, the test method can be applied at oblique incidence although with some limitations (see annex F). The test method is intended for the following applications:

- determination of the sound absorption properties of test tracks according to ISO 10844, with limitations, and other similar standards;
- determination of the sound absorption properties of road surfaces in actual use;
- comparison of sound absorption design specifications of road surfaces with actual performance data of the surface after completion of the construction work.

The complex reflection factor can also be determined by this method.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 13472. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 13472 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 10534-1, *Acoustics — Determination of sound absorption coefficient and impedance in impedance tubes — Part 1: Method using standing wave ratio*

ISO 10534-2, *Acoustics — Determination of sound absorption coefficient and impedance in impedance tubes — Part 2: Transfer-function method*

IEC 60651, *Electroacoustics — Sound level meters*

IEC 61260, *Electroacoustics — Octave and fractional-octave-band filters*

GUM:1993, *Guide to the expression of uncertainty in measurement*. BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML

3 Terms and definitions

For the purposes of this part of ISO 13472, the following terms and definitions apply.