

## **Acoustics - Determination of sound absorption coefficient and impedance in impedances tubes - Part 2: Transfer-function method**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 10534-2:2002 sisaldab Euroopa standardi EN ISO 10534-2:2001 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 16.01.2002 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 10534-2:2002 consists of the English text of the European standard EN ISO 10534-2:2001.</p> <p>This document is endorsed on 16.01.2002 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b></p> <p>This test method covers the use of an impedance tube, two microphone locations and a digital frequency analysis system for determination of the sound absorption coefficient of sound absorbers for normal sound incidence.</p>	<p><b>Scope:</b></p> <p>This test method covers the use of an impedance tube, two microphone locations and a digital frequency analysis system for determination of the sound absorption coefficient of sound absorbers for normal sound incidence.</p>
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**Võtmesõnad:** acoustic absorption, acoustic measurement, acoustic testing, acoustics, building acoustics, determination, sound absorption, sound absorption coefficient, transmission

English version

Acoustics

Determination of sound absorption coefficient and  
impedance in impedance tubes

Part 2: Transfer-function method

(ISO 10534-2 : 1998)

Acoustique – Détermination du facteur  
d'absorption acoustique et de l'impé-  
dance acoustique à l'aide du tube  
d'impédance – Partie 2: Méthode de  
la fonction de transfert  
(ISO 10534-2 : 1998)

Akustik – Bestimmung des Schallab-  
sorptionsgrades und der Impedanz in  
Impedanzrohren – Teil 2: Verfahren  
mit Übertragungsfunktion  
(ISO 10534-2 : 1998)

This European Standard was approved by CEN on 2001-05-13.

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**CEN**

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## Foreword

International Standard

ISO 10534-2 : 1998 Acoustics – Determination of sound absorption coefficient and impedance in impedance tubes – Part 2: Transfer-function method,

which was prepared by ISO/TC 43 'Acoustics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 126 'Acoustic properties of building products and of buildings', the Secretariat of which is held by AFNOR, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by December 2001 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

## Endorsement notice

The text of the International Standard ISO 10534-2 : 1998 was approved by CEN as a European Standard without any modification.

## Contents

Page

1	Scope .....	3
2	Definitions and symbols .....	3
3	Principle.....	5
4	Test equipment.....	5
5	Preliminary test and measurements.....	9
6	Test specimen mounting .....	10
7	Test procedure .....	11
8	Precision.....	15
9	Test report .....	16

## Annexes

A	Preliminary measurements .....	17
B	Procedure for the one-microphone technique .....	22
C	Pressure-release termination of test sample.....	23
D	Theoretical background .....	24
E	Error sources .....	26
F	Determination of diffuse sound absorption coefficient $\alpha_{st}$ of locally reacting absorbers from the results of this part of ISO 10534 .....	28
G	Bibliography .....	28

## 1 Scope

This test method covers the use of an impedance tube, two microphone locations and a digital frequency analysis system for the determination of the sound absorption coefficient of sound absorbers for normal sound incidence. It can also be applied for the determination of the acoustical surface impedance or surface admittance of sound absorbing materials. Since the impedance ratios of a sound absorptive material are related to its physical properties, such as airflow resistance, porosity, elasticity and density, measurements described in this test method are useful in basic research and product development.

The test method is similar to the test method specified in ISO 10534-1 in that it uses an impedance tube with a sound source connected to one end and the test sample mounted in the tube at the other end. However, the measurement technique is different. In this test method, plane waves are generated in a tube by a noise source, and the decomposition of the interference field is achieved by the measurement of acoustic pressures at two fixed locations using wall-mounted microphones or an in-tube traversing microphone, and subsequent calculation of the complex acoustic transfer function, the normal incidence absorption and the impedance ratios of the acoustic material. The test method is intended to provide an alternative, and generally much faster, measurement technique than that of ISO 10534-1.

Compared with the measurement of the sound absorption in a reverberation room according to the method specified in ISO 354, there are some characteristic differences. The reverberation room method will (under ideal conditions) determine the sound absorption coefficient for diffuse sound incidence, and the method can be used for testing of materials with pronounced structures in the lateral and normal directions. However, the reverberation room method requires test specimens which are rather large, so it is not convenient for research and development work, where only small samples of the absorber are available. The impedance tube method is limited to parametric studies at normal incidence but requires samples of the test object which are of the same size as the cross-section of the impedance tube. For materials that are locally reacting, diffuse incidence sound absorption coefficients can be estimated from measurement results obtained by the impedance tube method. For transformation of the test results from the impedance tube method (normal incidence) to diffuse sound incidence, see annex F.

## 2 Definitions and symbols

For the purposes of this part of ISO 10534 the following definitions apply.

### 2.1

#### **sound absorption coefficient at normal incidence**

$\alpha$

ratio of sound power entering the surface of the test object (without return) to the incident sound power for a plane wave at normal incidence