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**Acoustics - Measurement of the reverberation time of rooms with reference to other acoustical parameters**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 3382:2000 sisaldab Euroopa standardi EN ISO 3382:2000 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 08.08.2000 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 3382:2000 consists of the English text of the European standard EN ISO 3382:2000.</p> <p>This document is endorsed on 08.08.2000 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> This standard specifies methods for the measurement of reverberation time in rooms.</p>	<p><b>Scope:</b> This standard specifies methods for the measurement of reverberation time in rooms.</p>
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**Võtmesõnad:** acoustic measurements, acoustic tests, acoustical reverberation, acoustics, auditoria, determination, public buildings, reverberation, tests

ICS 91.120.20

English version

Acoustics

Measurement of the reverberation time of rooms with  
reference to other acoustical parameters

(ISO 3382 : 1997)

Acoustique – Mesurage de la durée de  
réverbération des salles en référence à  
d'autres paramètres acoustiques  
(ISO 3382 : 1997)

Akustik – Messung der Nachhallzeit  
von Räumen mit Hinweis auf andere  
akustische Parameter  
(ISO 3382 : 1997)

This European Standard was approved by CEN on 1999-12-10.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of 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.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

## Foreword

International Standard

ISO 3382 : 1997 Acoustics – Measurement of the reverberation time of rooms with reference to other acoustical parameters,

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 August 2000 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 3382 : 1997 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

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## Introduction

The reverberation time of a room used to be regarded as the predominant indicator of its acoustical properties. Whilst reverberation time continues to be regarded as a significant parameter, there is reasonable agreement that other types of measurements such as relative sound pressure levels, early/late energy ratios, lateral energy fractions, interaural cross correlation functions and background noise levels are needed for a more complete evaluation of acoustical quality of rooms. This International Standard continues to specify room acoustic quality by reverberation time alone, but introduces two other levels of complexity in room acoustics measurement.

Annex A presents measures based on squared impulse responses: a further measure of reverberation (early decay time) and measures of relative sound levels, early/late energy fractions and lateral energy fractions in auditoria. Within these categories there is still work to be done in determining which measures are the most suitable to standardize on but, since they are all derivable from impulse responses, it is appropriate to introduce the impulse response as the basis for standard measurements. Annex B introduces binaural measurements and the head and torso simulators (dummy heads) required to make the measurements in auditoria.

Reverberation time measurements are important in the field of noise control in rooms as well as for the assessment of rooms for speech and music; this International Standard also applies to measurements in these enclosures. However, it does not apply to laboratory measurements in test facilities or reverberation rooms. Laboratory measurements require other specifications of averaging single measurements at prescribed source and microphone positions. This International Standard establishes a method for obtaining reverberation times from impulse responses and from interrupted noise. In the annexes, the concepts and details of measurement procedures for some of the newer measures are introduced, but these annexes do not constitute a part of the formal specifications of this standard. The intention is to make it possible to compare reverberation time measurements with higher certainty, and to promote the use of and consensus in measurement of the newer measures.

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## 1 Scope

This International Standard specifies methods for the measurement of reverberation time in rooms. It is not restricted to auditoria or concert halls; it is also applicable to rooms intended for speech and music or where noise protection is a consideration. It describes the measurement procedure, the apparatus needed, the coverage required, and the method of evaluating the data and presenting the test report. Furthermore, it is intended for application of modern digital measuring techniques and for evaluation of room acoustical parameters derived from impulse responses.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3741:1988, *Acoustics — Determination of sound power levels of noise sources — Precision methods for broad-band sources in reverberation room.*

ISO 5725-2:1994, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method.*

IEC 268-1:1985, *Sound system equipment — Part 1: General.*

IEC 651:1979, *Sound level meters.*

IEC 1260:1995, *Electroacoustics — Octave-band filters and fractional-octave-band filters.*

ITU Recommendation P.58:1994, *Head and torso simulator for telephony.*

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

### 3.1 decay curve:

Decay of sound pressure level as a function of time at one point of the room after the source of sound has ceased.

NOTE 1 This decay may be either measured after the actual cut-off of a continuous sound source in the room or derived from the reverse-time integrated squared impulse response of the room.

NOTE 2 The decay directly obtained after non-continuous excitation of a room (e.g. by recording a gunshot with a level recorder) is not recommended for accurate evaluation of the reverberation time. This method should only be used for survey purposes.

### 3.2 interrupted noise method:

Method of obtaining decay curves by direct recording of the decay of sound pressure level after exciting a room with broadband or band limited noise.