

AKUSTIKA. HELIISOLATSIOONI MÕÕTMINE HOONETES
JA HOONEOSADEL. OSA 2: LÖÖGIHELI ISOLATSIOON

Acoustics - Field measurement of sound insulation in
buildings and of building elements - Part 2: Impact
sound insulation (ISO 16283-2:2018)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 16283-2:2018 sisaldab Euroopa standardi EN ISO 16283-2:2018 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 16283-2:2018 consists of the English text of the European standard EN ISO 16283-2:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 08.08.2018.	Date of Availability of the European standard is 08.08.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 91.060.30, 91.120.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Acoustics - Field measurement of sound insulation in
buildings and of building elements - Part 2: Impact sound
insulation (ISO 16283-2:2018)

Acoustique - Mesurage in situ de l'isolation acoustique
des bâtiments et des éléments de construction - Partie
2: Isolation des bruits d'impacts (ISO 16283-2:2018)

Akustik - Messung der Schalldämmung in Gebäuden
und von Bauteilen am Bau - Teil 2: Trittschalldämmung
(ISO 16283-2:2018)

This European Standard was approved by CEN on 9 June 2018.

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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN ISO 16283-2:2018) has been prepared by Technical Committee ISO/TC 43 "Acoustics" in collaboration with Technical Committee CEN/TC 126 "Acoustic properties of building elements and of buildings" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2019, and conflicting national standards shall be withdrawn at the latest by February 2019.

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

This document supersedes EN ISO 16283-2:2015.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 16283-2:2018 has been approved by CEN as EN ISO 16283-2:2018 without any modification.

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Instrumentation	5
4.1 General	5
4.2 Calibration	5
4.3 Verification	5
5 Frequency range	6
5.1 Tapping machine as the impact source	6
5.2 Rubber ball as the impact source	6
6 General	6
7 Default procedure for sound pressure level measurement	7
7.1 General	7
7.2 Generation of sound field	7
7.2.1 General	7
7.2.2 Impact source positions for the tapping machine as impact source	7
7.2.3 Impact source positions for the rubber ball as impact source	8
7.3 Fixed microphone positions for the tapping machine or rubber ball as impact source	8
7.3.1 General	8
7.3.2 Number of measurements	8
7.3.3 Tapping machine operated at more than one position	8
7.3.4 Rubber ball operated at more than one position	9
7.4 Mechanized continuously moving microphone for the tapping machine as impact source	9
7.4.1 General	9
7.4.2 Number of measurements	10
7.4.3 Tapping machine operated at more than one position	10
7.5 Manually scanned microphone for the tapping machine as impact source	10
7.5.1 General	10
7.5.2 Number of measurements	10
7.5.3 Tapping machine operated at more than one position	10
7.5.4 Circle	10
7.5.5 Helix	10
7.5.6 Cylindrical-type	11
7.5.7 Three semicircles	11
7.6 Minimum distances for microphone positions	12
7.7 Averaging times for the tapping machine as impact source	12
7.7.1 Fixed microphone positions	12
7.7.2 Mechanized continuously moving microphone	13
7.7.3 Manually scanned microphone	13
7.8 Calculation of energy-average sound pressure levels	13
7.8.1 Fixed microphone positions for the tapping machine as impact source	13
7.8.2 Mechanized continuously moving microphone and manually scanned microphone for the tapping machine as impact source	13
7.8.3 Fixed microphone positions for the rubber ball as impact source	14
8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source	14
8.1 General	14
8.2 Generation of sound field	14
8.2.1 General	14

8.2.2	Impact source positions	14
8.3	Microphone positions	14
8.4	Averaging time	15
8.5	Calculation of low-frequency energy-average impact sound pressure levels	15
9	Background noise (default and low-frequency procedure)	16
9.1	General	16
9.2	Correction to the signal level for background noise	17
10	Reverberation time in the receiving room (default and low-frequency procedure)	18
10.1	General	18
10.2	Generation of sound field	18
10.3	Default procedure	18
10.4	Low-frequency procedure	18
10.5	Interrupted noise method	19
10.6	Integrated impulse response method	19
11	Conversion to octave bands	19
12	Expression of results	20
13	Uncertainty	20
14	Test report	20
Annex A	(normative) Impact sources	22
Annex B	(normative) Requirements for loudspeakers used for reverberation time measurements	28
Annex C	(informative) Forms for the expression of results	29
Annex D	(informative) Additional guidance	33
Annex E	(informative) Horizontal measurements — Examples of suitable impact source and microphone positions	37
Annex F	(informative) Vertical measurements — Examples of suitable impact source and microphone positions	41
Bibliography	44

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

This second edition cancels and replaces the first edition (ISO 16283-2:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

- amended text in [7.3.2](#) so that the choice of microphone positions applies to any impact source.

A list of all parts in the ISO 16283 series can be found on the ISO website.

Introduction

ISO 16283 (all parts) describes procedures for field measurements of sound insulation in buildings. Airborne, impact and façade sound insulation are described in ISO 16283-1, this document (ISO 16283-2) and ISO 16283-3, respectively.

Field sound insulation measurements that were described previously in ISO 140-4¹⁾, ISO 140-5²⁾, and ISO 140-7³⁾ were a) primarily intended for measurements where the sound field could be considered to be diffuse, and b) not explicit as to whether operators could be present in the rooms during the measurement. ISO 16283 (all parts) differs from ISO 140-4, ISO 140-5, and ISO 140-7 in that:

- a) it applies to rooms in which the sound field may or may not approximate to a diffuse field;
- b) it clarifies how operators can measure the sound field using a hand-held microphone or sound level meter;
- c) it includes additional guidance that was previously contained in ISO 140-14⁴⁾.

NOTE Survey test methods for field measurements of airborne and impact sound insulation are dealt with in ISO 10052.

Two impact sources are described: the tapping machine and the rubber ball. These impact sources do not exactly replicate all possible types of real impacts on floors or stairs in buildings.

The tapping machine can be used to assess a variety of light, hard impacts such as footsteps from walkers wearing hard-heeled footwear or dropped objects. A single number quantity can be calculated using the rating procedures in ISO 717-2. This single number quantity links the measured impact sound insulation using the tapping machine to subjective assessment of general impacts in dwellings that occur on floors or stairs in a building. The tapping machine is also well-suited to the prediction of impact sound insulation using ISO 12354-2. These two aspects facilitate the specification of impact sound insulation in national building requirements using only measurements with the tapping machine as an impact source.

The rubber ball can be used to assess heavy, soft impacts such as from walkers in bare feet or children jumping, as well as quantifying absolute values that can be related to human disturbance in terms of a Fast time-weighted maximum sound pressure level. Calculation procedures for a single number quantity do not currently exist in an International Standard.

1) Withdrawn.

2) Withdrawn.

3) Withdrawn.

4) Withdrawn.

Acoustics — Field measurement of sound insulation in buildings and of building elements —

Part 2: Impact sound insulation

1 Scope

This document specifies procedures to determine the impact sound insulation using sound pressure measurements with an impact source operating on a floor or stairs in a building. These procedures are intended for room volumes in the range from 10 m³ to 250 m³ in the frequency range from 50 Hz to 5 000 Hz. The test results can be used to quantify, assess and compare the impact sound insulation in unfurnished or furnished rooms where the sound field can approximate to a diffuse field.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3382-2, *Acoustics — Measurement of room acoustic parameters — Part 2: Reverberation time in ordinary rooms*

ISO 12999-1, *Acoustics — Determination and application of measurement uncertainties in building acoustics — Part 1: Sound insulation*

ISO 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 18233, *Acoustics — Application of new measurement methods in building and room acoustics*

IEC 60942, *Electroacoustics — Sound calibrators*

IEC 61183, *Electroacoustics — Random-incidence and diffuse-field calibration of sound level meters*

IEC 61260 (all parts), *Electroacoustics — Octave-band and fractional-octave-band filters*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>