

SLOVENSKI STANDARD oSIST prEN ISO 16283-2:2017

01-november-2017

Akustika - Terenska merjenja zvočne izolirnosti v stavbah in zvočne izolirnosti stavbnih elementov - 2. del: Izolirnost pred udarnim zvokom (ISO/DIS 16283-2:2017)

Acoustics - Field measurement of sound insulation in buildings and of building elements -Part 2: Impact sound insulation (ISO/DIS 16283-2:2017)

Akustik - Messung der Schalldämmung in Gebäuden und von Bauteilen am Bau - Teil 2: Trittschalldämmung (ISO/DIS 16283-2:2017)

SIST EN 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/DIS 16283-2:2017)

Ta slovenski standard je istoveten z: prEN ISO 16283-2

<u>ICS:</u>

17.140.01	Akustična merjenja in blaženje hrupa na splošno	Acoustic measurements and noise abatement in general
91.120.20	Akustika v stavbah. Zvočna izolacija	Acoustics in building. Sound insulation

oSIST prEN ISO 16283-2:2017

en

oSIST prEN ISO 16283-2:2017

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 16283-2:2018 https://standards.iteh.ai/catalog/standards/sist/cace4e42-6d16-453c-81f2-2bc2bce32e99/sist-en-iso-16283-2-2018

DRAFT INTERNATIONAL STANDARD ISO/DIS 16283-2

ISO/TC **43**/SC **2**

Voting begins on: **2017-08-28**

Secretariat: **DIN**

Voting terminates on: 2017-11-19

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

Part 2: Impact sound insulation

Acoustique — Mesurage in situ de l'isolation acoustique des bâtiments et des éléments de construction — Partie 2: Isolation des bruits d'impacts

ICS: 91.120.20; 91.060.30 iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN ISO 16283-2:2018</u> https://standards.iteh.ai/catalog/standards/sist/cace4e42-6d16-453c-81f2-2bc2bce32e99/sist-en-iso-16283-2-2018

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION. This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING



Reference number ISO/DIS 16283-2:2017(E)

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN ISO 16283-2:2018</u>

https://standards.iteh.ai/catalog/standards/sist/cace4e42-6d16-453c-81f2-2bc2bce32e99/sist-en-iso-16283-2-2018



© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office Ch. de Blandonnet 8 • CP 401 CH-1214 Vernier, Geneva, Switzerland Tel. +41 22 749 01 11 Fax +41 22 749 09 47 copyright@iso.org www.iso.org

Contents

Introduction v 1 Scope 1 2 Normative references 1 3 Terms and definitions 2 4 Instrumentation 5 5 Frequency range 6 6 General 6 7 Default procedure for sound pressure level measurement 8 8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source 14 9 Background noise (default and low-frequency procedure) 16 10 Reverberation time in the receiving room (default and low-frequency procedure) 17 11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Forms for the expression of results 27 Annex C (informative) Additional guidance 31 Annex C (informative) Additional guidance 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39	Forew	ord	iv
1 Scope 1 2 Normative references 1 3 Terms and definitions 2 4 Instrumentation 5 5 Frequency range 6 6 General 6 7 Default procedure for sound pressure level measurement 8 8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source 14 9 Background noise (default and low-frequency procedure) 16 10 Reverberation time in the receiving room (default and low-frequency procedure) 17 11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Forms for the expression of results 27 Annex C (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39	Introd	uction	v
2 Normative references 1 3 Terms and definitions 2 4 Instrumentation 5 5 Frequency range 6 6 General 6 7 Default procedure for sound pressure level measurement 8 8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source 14 9 Background noise (default and low-frequency procedure) 16 10 Reverberation time in the receiving room (default and low-frequency procedure) 17 11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex C (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography </th <th>1</th> <th>Scope</th> <th>1</th>	1	Scope	1
3 Terms and definitions. 2 4 Instrumentation 5 5 Frequency range 6 6 General 6 7 Default procedure for sound pressure level measurement 8 8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source 14 9 Background noise (default and low-frequency procedure) 16 10 Reverberation time in the receiving room (default and low-frequency procedure) 17 11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Forms for the expression of results 26 Annex C (informative) Forms for the expression of results 27 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	2	Normative references	1
4 Instrumentation 5 5 Frequency range 6 6 General 6 7 Default procedure for sound pressure level measurement 8 8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source 14 9 Background noise (default and low-frequency procedure) 16 10 Reverberation time in the receiving room (default and low-frequency procedure) 17 11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	3	Terms and definitions	2
5 Frequency range 6 6 General 6 7 Default procedure for sound pressure level measurement 8 8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source 14 9 Background noise (default and low-frequency procedure) 16 10 Reverberation time in the receiving room (default and low-frequency procedure) 17 11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	4	Instrumentation	5
6 General	5	Frequency range	6
7 Default procedure for sound pressure level measurement.	6	General	6
8 Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source 14 9 Background noise (default and low-frequency procedure)	7	Default procedure for sound pressure level measurement	8
9 Background noise (default and low-frequency procedure) 16 10 Reverberation time in the receiving room (default and low-frequency procedure) 17 11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	8	Low-frequency procedure for sound pressure level measurement for the tapping machine as impact source	14
10 Reverberation time in the receiving room (default and low-frequency procedure)	9	Background noise (default and low-frequency procedure)	16
11 Conversion to octave bands 19 12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 20%/sit-en-iso-16283-2-2018 21 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements – Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements – Examples of suitable impact source and microphone positions 39 Bibliography 42	10	Reverberation time in the receiving room (default and low-frequency procedure)	17
12 Expression of results 19 13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 20 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	11	Conversion to octave bands	19
13 Uncertainty 19 14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	12	Expression of results	19
14 Test report 20 Annex A (normative) Impact sources 21 Annex B (normative) Requirements for loudspeakers used for reverberation time measurements 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	13	- Uncertainty	19
Annex A (normative) Impact sources 21 Annex B (normative) Requirements for loudspeakers used for reverberation time 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	14	Test report	20
Annex B (normative) Requirements for loudspeakers used for reverberation time 26 Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	Annex	A (normative) Impact sources.99/sist-en-iso-16283-2-2018	21
Annex C (informative) Forms for the expression of results 27 Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	Annex	B (normative) Requirements for loudspeakers used for reverberation time measurements	26
Annex D (informative) Additional guidance 31 Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions 35 Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	Annex	C (informative) Forms for the expression of results	27
Annex E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography	Annex	D (informative) Additional guidance	31
Annex F (informative) Vertical measurements — Examples of suitable impact source and microphone positions 39 Bibliography 42	Annex	E (informative) Horizontal measurements — Examples of suitable impact source and microphone positions	35
Bibliography	Annex	F (informative) Vertical measurements — Examples of suitable impact source and microphone positions	39
	Bibliog	graphy	42

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. 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. 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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*. 2bc2bcc32c99/sist-en-iso-16283-2-2018

This second edition of ISO 16283-2 cancels and replaces ISO 16283-2:2015, which has been technically revised.

The main change compared to the previous edition is as follows:

— Amended text in 7.3.2 so that the choice of microphone positions applies to any impact source.

ISO 16283 consists of the following parts, under the general title *Acoustics* — *Field measurement of sound insulation in buildings and of building elements*:

- Part 1: Airborne sound insulation
- Part 2: Impact sound insulation
- Part 3: Façade sound insulation

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, ISO 16283-2 and ISO 16283-3, respectively.

Field sound insulation measurements that were described previously in ISO 140-4, ISO 140-5, and ISO 140-7 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 might, or might 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 and c) it includes additional guidance that was previously contained in ISO 140-14.

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 16283-2:2018 https://standards.iteh.ai/catalog/standards/sist/cace4e42-6d16-453c-81f2-2bc2bce32e99/sist-en-iso-16283-2-2018 oSIST prEN ISO 16283-2:2017

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN ISO 16283-2:2018</u> https://standards.iteh.ai/catalog/standards/sist/cace4e42-6d16-453c-81f2-2bc2bce32e99/sist-en-iso-16283-2-2018

Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 2: Impact sound insulation

1 Scope

This part of ISO 16283 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 might, or might not approximate to a diffuse field.

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 15712-2. 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. At present, calculation procedures for a single number quantity do not currently exist in an ISO Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable to its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 717-2, Acoustics — Rating of sound insulation in buildings and of building elements — Part 2: Impact sound insulation

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 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, 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

3.1

energy-average impact sound pressure level in a room

Li

ten times the common logarithm of the ratio of the space and time average of the squared sound pressure to the square of the reference sound pressure where the impact source is the tapping machine and the space average is taken over the central zone of the room where nearfield radiation from the room boundaries has negligible influence

Note 1 to entry: L_i is expressed in decibels.

3.2

corner impact sound pressure level in a room

 $L_{i,Corner}$

ten times the common logarithm of the ratio of the highest time average squared sound pressure from the set of corner measurements to the square of the reference sound pressure for the low-frequency range (50 Hz, 63 Hz, and 80 Hz one-third octave bands) where the impact source is the tapping machine

Note 1 to entry: *L*_{i,Corner} is expressed in decibels.

3.3

low-frequency energy-average impact sound pressure level in a room

 $L_{i,LF}$

ten times the common logarithm of the ratio of the space and time average of the squared sound pressure to the square of the reference sound pressure in the low-frequency range (50 Hz, 63 Hz, and 80 Hz one-third octave bands) where the impact source is the tapping machine and the space average is a weighted average that is calculated using the room corners where the sound pressure levels are highest and the central zone of the room where nearfield radiation from the room boundaries has negligible influence

Note 1 to entry: $L_{i,LF}$ is expressed in decibels.

Note 2 to entry: *L*_{i,LF} is an estimate of the energy-average sound pressure level for the entire room volume.

3.4

energy-average maximum impact sound pressure level in a room

$L_{i,Fmax}$

ten times the common logarithm of the ratio of the space average of the squared maximum sound pressure with Fast time weighting to the square of the reference sound pressure where the impact source is the rubber ball and the space average is taken over the central zone of the room where nearfield radiation from the room boundaries has negligible influence

Note 1 to entry: $L_{i,Fmax}$ is expressed in decibels.

3.5

reverberation time

Т

time required for the sound pressure level in a room to decrease by 60 dB after the sound source has stopped

Note 1 to entry: *T* is expressed in seconds.

3.6

background noise level

measured sound pressure level in the receiving room from all sources except the impact source

3.7

fixed microphone

microphone that is fixed in space by using a device such as a tripod so that it is stationary

3.8

mechanized continuously moving microphone

microphone that is mechanically moved with approximately constant angular speed in a circle, or is mechanically swept along a circular path where the angle of rotation about a fixed axis is between 270° and 360°

3.9

manually scanned microphone

microphone attached to a hand-held sound level meter or an extension rod that is moved by a human operator along a prescribed path and a prescribed path a

3.10

manually held microphone standards iteh ai

microphone attached to a hand-held sound level meter or a rod that is hand-held at a fixed position by a human operator at a distance at least an arm's length from the trunk of the operator's body

3.11 https://standards.iteh.ai/catalog/standards/sist/cace4e42-6d16-453c-81f2-

partition 2bc2bce32e99/sist-en-iso-16283-2-2018

total surface of the floor or stair which is excited by the impact source

Note 1 to entry: For two rooms which are staggered vertically or horizontally, the total surface of the separating partition is not visible from both sides of the partition; hence it is necessary to define the partition as the total surface.

3.12

common partition

part of the floor or stair that is common to both the room in which the impact source is used and the receiving room

3.13

standardized impact sound pressure level

L'_{nT}

impact sound pressure level, L_i , reduced by a correction term which is given in decibels, being ten times the common logarithm of the ratio of the measured reverberation time, T, to the reference reverberation time, T_0 , which is calculated using Formula (1) when the impact source is the tapping machine:

$$L'_{nT} = L_i - 10 \lg \frac{T}{T_0}$$
 (1)

where

- *T* is the reverberation time in the receiving room;
- T_0 is the reference reverberation time; for dwellings, $T_0 = 0.5$ s.

Note 1 to entry: L'_{nT} is expressed in decibels.

Note 2 to entry: The impact sound pressure level is referenced to a reverberation time of 0,5 s because in dwellings with furniture the reverberation time has been found to be reasonably independent of volume and frequency and to be approximately equal to 0,5 s.

Note 3 to entry: L'_{nT} provides a straightforward link to the subjective impression of impact sound insulation.

3.14

normalized impact sound pressure level

Ľ'n

impact sound pressure level, L_i , increased by a correction term which is given in decibels, being ten times the common logarithm of the ratio between the measured equivalent absorption area, A, of the receiving room and the reference equivalent absorption area, A_0 , which is calculated using Formula (2) when the impact source is the tapping machine:

$$L'_{n} = L_{i} + 10 \lg \frac{A}{A_{0}}$$
 (2)

where

- *A* is the equivalent absorption area in the receiving room;
- A_0 is the reference equivalent absorption area; for dwellings, $A_0 = 10 \text{ m}^2$.
- Note 1 to entry: L'_n is expressed in decibels. catalog/standards/sist/cace4e42-6d16-453c-81f2-2bc2bce32e99/sist-en-iso-16283-2-2018

3.15

standardized maximum impact sound pressure level

L'_{i,Fmax,V,T}

maximum impact sound pressure level, $L_{i,Fmax}$, increased by a correction term for room volume and reduced by a correction term for reverberation time and Fast time weighting which is calculated using Formulae (3), (4) and (5) when the impact source is the rubber ball:

$$L'_{i,Fmax,V,T} = L_{i,Fmax} + 10 \lg \frac{V}{V_0} - 10 \lg \left[\frac{1 - C_0^{-1}}{1 - C^{-1}} \left(\frac{C^{(1 - C)^{-1}} - C^{-(1 - C^{-1})^{-1}}}{C_0^{(1 - C_0)^{-1}} - C_0^{-(1 - C_0^{-1})^{-1}}} \right) \right]$$
(3)

$$C_0 = \frac{T_0}{1.7275} \tag{4}$$

$$C = \frac{T}{1.7275}$$
(5)

where

T is the reverberation time in the receiving room;

- T_0 is the reference reverberation time; for dwellings, $T_0 = 0.5$ s;
- *V* is the receiving room volume, in cubic metres;
- V_0 is the reference receiving room volume; for dwellings, $V_0 = 50$ m³.

Note 1 to entry: $L'_{i \text{ Fmax } VT}$ is expressed in decibels.

Note 2 to entry: Background information can be found in Reference [15].

3.16 equivalent absorption area

Α

hypothetical area of a totally absorbing surface without diffraction effects which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration and is calculated using Sabine's formula in Formula (6):

$$A = \frac{0.16V}{T} \tag{6}$$

where

- *V* is the receiving room volume, in cubic metres;
- *T* is the reverberation time in the receiving room.

Note 1 to entry: *A* is expressed in square metres.

4 Instrumentation SIST EN ISO 16283-2:2018

https://standards.iteh.ai/catalog/standards/sist/cace4e42-6d16-453c-81f2-

4.1 General 2bc2bce32e99/sist-en-iso-16283-2-2018

The instruments for measuring sound pressure levels, including microphone(s) as well as cable(s), windscreen(s), recording devices and other accessories, if used, shall meet the requirements for a class 0 or 1 instrument in accordance with IEC 61672-1 for random incidence application.

Filters shall meet the requirements for a class 0 or 1 instrument in accordance with IEC 61260.

The reverberation time measurement equipment shall comply with the requirements defined in ISO 3382-2.

The impact sources shall meet the requirements given in Annex A.

4.2 Calibration

At the beginning and at the end of every measurement session and at least at the beginning and the end of each measurement day, the entire sound pressure level measuring system shall be checked at one or more frequencies by means of a sound calibrator meeting the requirements for a class 0 or 1 instrument in accordance with IEC 60942. Each time the calibrator is used, the sound pressure level measured with the calibrator should be noted in the field documentation of the operator. Without any further adjustment, the difference between the readings of two consecutive checks shall be less or equal to 0,5 dB. If this value is exceeded, the results of measurements obtained after the previous satisfactory check shall be discarded.

4.3 Verification

Compliance of the sound pressure level measuring instrument, the filters and the sound calibrator with the relevant requirements shall be verified by the existence of a valid certificate of compliance. If applicable, random incidence response of the microphone shall be verified by a procedure from IEC 61183. All compliance testing shall be conducted by a laboratory being accredited or otherwise nationally authorized to perform the relevant tests and calibrations and ensuring metrological traceability to the appropriate measurement standards.

NOTE Unless national regulations dictate otherwise, it is recommended that the sound calibrator be calibrated at intervals not exceeding one year, the compliance of the instrumentation system with the requirements of IEC 61672–1 should be verified at intervals not exceeding two years, and the compliance of the filter set with the requirements of IEC 61260 should be verified at intervals not exceeding two years.

5 Frequency range

5.1 Tapping machine as the impact source

All quantities shall be measured using one-third octave band filters having at least the following centre frequencies, in hertz:

100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1 000, 1 250, 1 600, 2 000, 2 500, 3 150

If additional information in the low-frequency range is required, use one-third octave band filters with the following centre frequencies, in hertz:

50, 63, 80

If additional information in the high-frequency range is required, use one-third octave band filters with the following centre frequencies, in hertz:

4 000, 5 000

<u>SIST EN ISO 16283-2:2018</u>

NOTE Measurement of additional information in the low- and high-frequency ranges is optional.

5.2 Rubber ball as the impact source

All quantities shall be measured using one-third octave or octave band filters.

One-third octave band filters shall have at least the following centre frequencies, in hertz:

50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630

6 General

Determination of the impact sound insulation in accordance to this part of ISO 16283 requires that one room is chosen as the receiving room into which sound is radiated due to an impact source operating on a partition. The room or space in which the impact source is operated is referred to as the source room.

The measurements that are required include the sound pressure levels in the receiving room with the impact source operating, the background noise levels in the receiving room when the impact source is switched off and the reverberation times in the receiving room.

Two impact sources are described: the tapping machine and the rubber ball.

Two measurement procedures are described that shall be used for the sound pressure level, the reverberation time and the background noise; a default procedure and an additional low-frequency procedure.

For the sound pressure level and the background noise, the default procedure requires measurements to be taken in the central zone of a room at positions away from the room boundaries. With the tapping

machine as the impact source, the default procedure for all frequencies is to obtain the energy-average sound pressure level using a fixed microphone or a manually-held microphone moved from one position to another, an array of fixed microphones, a mechanized continuously moving microphone or a manually scanned microphone. With the rubber ball as the impact source, the default procedure for all frequencies is to obtain the energy-average sound pressure level using a fixed microphone or a manually-held microphone moved from one position to another or an array of fixed microphone.

For the sound pressure level and the background noise with the tapping machine as the impact source, the low-frequency procedure shall be used for the 50 Hz, 63 Hz, and 80 Hz one-third octave bands in the receiving room when its volume is smaller than 25 m³ (calculated to the nearest cubic metre). This procedure should be carried out in addition to the default procedure and requires additional measurements of the sound pressure level in the corners of the receiving room using either a fixed microphone or a manually-held microphone.

NOTE 1 The low-frequency procedure is necessary in small rooms due to large spatial variations in the sound pressure level of the modal sound field. In these situations, corner measurements are used to improve the repeatability, reproducibility and relevance to room occupants.

NOTE 2 The low-frequency procedure is not used with the rubber ball because no link has yet been shown between any combination of measurements from the corners and central zone of a room for the maximum Fast time-weighted sound pressure level and the maximum Fast time-weighted sound pressure level that is spatially averaged over the entire room volume.

NOTE 3 If necessary to avoid hearing damage, hearing protection is worn by the operator when measuring the sound pressure level in the source room and, if necessary, when measuring reverberation times in the receiving room. When measuring sound pressure levels in the receiving room that will not cause hearing damage it is advisable to remove any hearing protection so that the operator is aware of short external noise events that could invalidate the measurement as well as helping the operator to minimize self-generated noise.

For the reverberation time, the low-frequency procedure shall be used for the 50 Hz, 63 Hz, and 80 Hz one-third octave bands in the receiving room when its volume is smaller than 25 m³ (calculated to the nearest cubic metre).

If using methods of signal processing for reverberation times described in ISO 18233, the measurements shall be carried out using fixed microphones and shall not use a mechanized continuously-moving microphone, manually-held microphone or a manually-scanned microphone.

The sound fields in typical rooms will rarely approximate to a diffuse sound field over the entire frequency range from 50 Hz to 5000 Hz. The default and low-frequency procedures allow for measurements to be taken without any knowledge as to whether the sound field can be considered as diffuse or non-diffuse. For this reason, the sound field should not be modified for the purpose of the test by temporarily introducing additional furniture or diffusers into the receiving room.

NOTE 4 If measurements with additional diffusion are required, for example due to regulatory requirements or because the test result is to be compared with a laboratory measurement on a similar test element, the introduction of three diffusers will usually be sufficient each with an area of at least 1,0 m².

All measurement methods for the default procedure or the low-frequency procedure are equivalent. In case of dispute, the impact sound insulation determined using measurement methods without an operator inside the receiving room shall be taken to be the reference result.

NOTE 5 A reference result is defined because the background noise level with manual scanning is prone to variation in the self-generated noise from the operator. Significant variation does not tend to occur with fixed microphones or a mechanized continuously-moving microphone.