



SLOVENSKI STANDARD SIST EN ISO 12354-2:2017

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Akustika v stavbah - Ocenjevanje akustičnih lastnosti stavb iz lastnosti sestavnih delov - 2. del: Izolirnost pred udarnim zvokom med prostori (ISO 12354-2:2017)

Building acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 2: Impact sound insulation between rooms (ISO 12354-2:2017)

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Bauakustik - Berechnung der akustischen Eigenschaften von Gebäuden aus den Bauteileigenschaften - Teil 2: Trittschalldämmung zwischen Räumen (ISO 12354-2:2017)

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Acoustique du bâtiment - Calcul de la performance acoustique des bâtiments à partir de la performance des éléments - Partie 2: Isolement acoustique au bruit de choc entre des locaux (ISO 12354-2:2017)

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ICS:

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Building acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 2: Impact sound insulation between rooms (ISO 12354-2:2017)

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This European Standard was approved by CEN on 23 April 2017.

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European foreword

This document (EN ISO 12354-2:2017) 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of an identical text or by endorsement, at the latest by February 2018, and conflicting national standards shall be withdrawn at the latest by February 2018.

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.

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INTERNATIONAL
STANDARD

ISO
12354-2

First edition
2017-07

**Building acoustics — Estimation of
acoustic performance of buildings
from the performance of elements —**

**Part 2:
Impact sound insulation between
rooms**

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*Acoustique du bâtiment — Calcul de la performance acoustique des
bâtiments à partir de la performance des éléments —*

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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 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 the European Committee for Standardization (CEN) Technical Committee CEN/TC 126, *Acoustic properties of building elements and of buildings*, in collaboration with ISO Technical Committee TC 43, *Acoustics, SC 2, Building acoustics*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces ISO 15712-2:2005, which has been technically revised.

A list of all the parts in the ISO 12354 series can be found on the ISO website.

Introduction

This document is part of a series specifying calculation models in building acoustics.

Although this document covers the main types of building construction it cannot as yet cover all variations in the construction of buildings. It sets out an approach for gaining experience for future improvements and developments.

The accuracy of this document can only be specified in detail after widespread comparisons with field data, which can only be gathered over a period of time after establishing the prediction model. To help the user in the meantime, indications of the accuracy have been given, based on earlier comparisons with comparable prediction models and an estimation procedure, similar to the one proposed in ISO 12354-1 for airborne sound insulation, can be used for impact sound insulation. It is the responsibility of the user (i.e. a person, an organization, the authorities) to address the consequences of the accuracy, inherent for all measurement and prediction methods, by specifying requirements for the input data and/or applying a safety margin to the results or applying some other correction.

This document is intended for acoustical experts and provides the framework for the development of application documents and tools for other users in the field of building construction, taking into account local circumstances.

The calculation models described use the most general approach for engineering purposes, with a clear link to measurable quantities that specify the performance of building elements. The known limitations of these calculation models are described in this document. Other calculation models also exist, each with their own applicability and restrictions.

The models are based on experience with prediction for dwellings; they could also be used for other types of buildings provided the construction systems and dimensions of elements are not too different from those in dwellings.

This document also provides details for application to lightweight constructions (typically steel or wood framed lightweight elements as opposed to heavier masonry or concrete elements) and with the possibility of characterizing the impact sound performance of stairs (see [Annex E](#)).

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Building acoustics — Estimation of acoustic performance of buildings from the performance of elements —

Part 2: Impact sound insulation between rooms

1 Scope

This document specifies calculation models designed to estimate the impact sound insulation between rooms in buildings, primarily using measured data which characterize direct or indirect flanking transmission by the participating building elements and theoretically-derived methods of sound propagation in structural elements.

A detailed model is described for calculation in frequency bands, in the frequency range 1/3 octave 100 Hz to 3150 Hz in accordance with ISO 717-1, possibly extended down to 1/3 octave 50 Hz if element data and junction data are available (see Annex E); the single number rating of buildings can be determined from the calculation results. A simplified model with a restricted field of application is deduced from this, calculating directly the single number rating, using the single number ratings of the elements; the uncertainty on the apparent impact sound pressure level calculated using the simplified model can be determined according to the method described in ISO 12354-1:2017, Annex K (see [Clause 5](#)).

This document describes the principles of the calculation scheme, lists the relevant quantities and defines its applications and restrictions.

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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 717-1, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation*

ISO 717-2:2013, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 2: Impact sound insulation*

ISO 10140-2, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 2: Measurement of airborne sound insulation*

ISO 10140-3, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 3: Measurements of impact sound insulation*

ISO 10848-1, *Acoustics — Laboratory measurement of flanking transmission of airborne and impact sound between adjoining rooms — Part 1: Frame document*

ISO 10848-4, *Acoustics — Laboratory measurement of the flanking transmission of airborne and impact sound between adjoining rooms — Part 4: Application to junctions with at least one heavy element*

ISO 12354-1:2017, *Building Acoustics — Estimation of acoustic performance of buildings from the performance of elements — Part 1: Airborne sound insulation between rooms*

ISO 16283-2, *Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 2: Impact sound insulation*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions, and the symbols and units listed in [Annex A](#), apply.

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

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

3.1 Quantities to express building performance

NOTE The impact sound insulation between rooms in accordance with ISO 16283-2 can be expressed in two related quantities. These quantities are determined in frequency bands (one-third-octave bands or octave bands) from which the single number rating for the building performance can be obtained in accordance with ISO 717-2, for instance $L'_{n,w}$, $L'_{nT,w}$ or $(L'_{nT,w} + C_1)$.

3.1.1

normalized impact sound pressure level

L'_n
impact sound pressure level corresponding to the reference equivalent absorption area in the receiving room, which is evaluated from

$$L'_n = L_i + \left(10 \lg \frac{A}{A_0} \right) \text{dB}$$

where

- L_i is the impact sound pressure level measured in the receiving room, in decibels;
- A is the measured equivalent absorption area of the receiving room, in square metres;
- A_0 is the reference equivalent absorption area; for dwellings $A_0 = 10 \text{ m}^2$.

Note 1 to entry: This quantity shall be determined in accordance with ISO 16283-2.

3.1.2

standardized impact sound pressure level

L'_{nT}
impact sound pressure level corresponding to a reference value of the reverberation time in the receiving room, which is evaluated from

$$L'_{nT} = L_i - \left(10 \lg \frac{T}{T_0} \right) \text{dB}$$

where

- T is the reverberation time in the receiving room, in seconds;
- T_0 is the reference reverberation time (for dwellings: $T_0 = 0,5 \text{ s}$).

Note 1 to entry: This quantity shall be determined in accordance with ISO 16283-2.

3.2 Quantities to express element performance

NOTE 1 The quantities expressing the element performance are used as part of the input data to estimate building performance. These quantities are determined in one-third-octave bands and can also be expressed in octave bands. In relevant cases a single number rating for the element performance can be obtained from this, in accordance with ISO 717-2, for instance $L_{nw}(C_1)$, $\Delta L_w(C_{1\Delta})$ or ΔL_{lin} and $R_w(C; C_{tr})$.

NOTE 2 For the calculation, additional information on the elements can be necessary; for example, mass per unit area m' in k/m^2 , type of element, material, type of junction, etc.

3.2.1 normalized impact sound pressure level

L_n
impact sound pressure level corresponding to the reference equivalent sound absorption area in the receiving room, which is evaluated from

$$L_n = L_i + \left(10 \lg \frac{A}{A_0} \right) \text{dB}$$

where

L_i is the impact sound pressure level measured in the receiving room by using the standard tapping machine in accordance with ISO 16283-2, in decibels;

A is the measured equivalent absorption area of the receiving room, in square metres;

A_0 is the reference equivalent absorption area with $A_0 = 10 \text{ m}^2$.

Note 1 to entry: This quantity shall be determined in accordance with ISO 10140-3.

3.2.2 reduction of impact sound pressure level

ΔL
improvement of impact sound insulation
reduction in normalized impact sound pressure level resulting from installation of the test floor covering, which is evaluated from

$$\Delta L = L_{no} - L_n \text{ dB}$$

where

L_{no} is the normalized impact sound pressure level in the absence of floor covering, in decibels;

L_n is the normalized impact sound pressure level when the floor covering is in place, in decibels.

Note 1 to entry: This quantity shall be determined in accordance with ISO 10140-3.

3.2.3 reduction of impact sound pressure level

ΔL_d
reduction of impact sound pressure level by an additional layer on the receiving side of the separating element (floor)

Note 1 to entry: This quantity shall be determined in accordance with ISO 10140 (all parts).

3.2.4 normalized flanking impact sound pressure level

$L_{n,f}$
space and time average sound pressure level in the receiving room produced by a standardized tapping machine operating at different positions on the element in the source room, normalized to the reference equivalent sound absorption area (A_0) in the receiving room, which is evaluated from

$$L_{n,f} = L_i + \left(10 \lg \frac{A}{A_0} \right) \text{dB}$$