

**Ehitusakustika. Hoonete akustilise toimivuse  
hindamine elementide akustilise toime põhjal. Osa  
2: Ruumidevaheline löögiheli isolatsioon**

Building acoustics - Estimation of acoustic performance  
of buildings from the performance of elements - Part 2:  
Impact sound insulation between rooms

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 12354-2:2005 sisaldab Euroopa standardi EN 12354-2:2000 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 12.09.2000 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 22.03.2000.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 12354-2:2005 consists of the English text of the European standard EN 12354-2:2000.

This standard is ratified with the order of Estonian Centre for Standardisation dated 12.09.2000 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 22.03.2000.

The standard is available from Estonian standardisation organisation.

ICS 91.120.20

**Võtmesõnad:** akustika, ehitus, heliisolatsioon, löögiheli

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**English version**

Building acoustics

**Estimation of acoustic performance of buildings from  
the performance of elements**

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

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

Bauakustik – Berechnung der akustischen Eigenschaften von Gebäuden aus den Bauteileigenschaften – Teil 2: Trittschalldämmung zwischen Räumen

This European Standard was approved by CEN on 1999-08-20.

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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.

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**CEN**

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

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 126 "Acoustic properties of building products 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 September 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

It is the first version of a series of standards, specifying calculation models in building acoustics. Although the standard 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.

During the preparation of this standard and the related EN 12354-1:2000, it became clear that some of the element data necessary based on standardized measurement methods are not yet available, hence some informative annexes have been added to explain what is needed, to indicate possible measurement methods and to illustrate this with some indicative acoustical data. These annexes should form the basis for new or revised standards for building elements, which would replace these annexes. This standard includes six annexes. Annex A is normative and annexes B to F are informative.

The accuracy of this standard 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 mean time, indications of the accuracy have been given, based on earlier comparisons with comparable prediction models. It is the responsibility of the user (i.e. a person, an organisation, 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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## 1 Scope

This European Standard specifies calculation models designed to estimate the impact sound insulation between rooms in buildings, primarily on the bases of measured data which characterizes 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 ; 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.

This European Standard describes the principles of the calculation scheme, lists the relevant quantities and defines its applications and restrictions. It 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 standard. Users should, however, be aware that 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.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 140-1, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 1 : Requirements for laboratory test facilities with suppressed flanking transmission.* (ISO 140-1 : 1997).

EN ISO 140-3, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 3 : Laboratory measurements of airborne sound insulation of building elements.* (ISO 140-3 : 1995).

EN ISO 140-6, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 6 : Laboratory measurements of impact sound insulation of floors.* (ISO 140-6 : 1998).

EN ISO 140-7, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 7 : Field measurements of impact sound insulation of floors.* (ISO 140-7 : 1998).

EN ISO 140-8, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 8 : Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor.* (ISO 140-8 : 1997).

EN ISO 140-12, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 12 : Laboratory measurement of room-to-room airborne and impact sound insulation of an access floor.* (ISO 140-12 : 2000).

EN ISO 717-1, *Acoustics - Rating of sound insulation in buildings and of building elements - Part 1 : Airborne sound insulation* (ISO 717-1 : 1996).

EN ISO 717-2 : 1996, *Acoustics - Rating of sound insulation in buildings and of building elements - Part 2 : Impact sound insulation.* (ISO 717-2 : 1996).

EN 12354-1 : 2000, *Building Acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 1 : Airborne sound insulation between rooms.*

prEN ISO 10848-1, *Acoustics - Laboratory measurement of flanking transmission of airborne and impact sound between adjoining rooms - Part 1 : Frame document.* (ISO/DIS 10848-1 : 1999).

### 3 Relevant quantities

#### 3.1 Quantities to express building performance

The impact sound insulation between rooms in accordance with EN ISO 140-7 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 EN ISO 717-2 : 1996, for instance  $L'_{n,w}$ ,  $L'_{nT,w}$  or  $(L'_{nT,w} + C_1)$ .

**3.1.1 Normalized impact sound pressure level  $L'_n$  :** The impact sound pressure level corresponding to the reference equivalent absorption area in the receiving room.

$$L'_n = L_i + 10 \lg \frac{A}{A_0} \text{ dB} \quad (1)$$

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  $A_0 = 10 \text{ m}^2$ .

This quantity is to be determined in accordance with EN ISO 140-7.

**3.1.2 Standardized impact sound pressure level  $L'_{nT}$  :** The impact sound pressure level corresponding to a reference value of the reverberation time in the receiving room.

$$L'_{nT} = L_i - 10 \lg \frac{T}{T_0} \text{ dB} \quad (2)$$

where

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

This quantity is to be determined in accordance with EN ISO 140-7.

##### 3.1.1.1 Relation between quantities

The relation between the quantities  $L'_{nT}$  and  $L'_n$  is given by :

$$L'_{nT} = L'_n - 10 \lg \frac{0,16 V}{A_0 T_0} = L'_n - 10 \lg 0,032 V \text{ dB} \quad (3)$$

where

- $V$  is the volume of the receiving room, in cubic metres.