

**Acoustics - Measurement of sound insulation in buildings and of building elements - Part 11: Laboratory measurements of the reduction of transmitted impact sound by floor coverings on lightweight reference floors**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 140-11:2005 sisaldab Euroopa standardi EN ISO 140-11:2005 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 22.06.2005 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 140-11:2005 consists of the English text of the European standard EN ISO 140-11:2005.</p> <p>This document is endorsed on 22.06.2005 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></p> <p>This part of ISO 140 specifies methods for measuring the acoustic properties of floor coverings from the viewpoint of reducing impact sound transmission. The purpose of this part of ISO 140 is to establish a method for determining the impact sound insulation of a floor covering under standard test conditions.</p>	<p><b>Scope:</b></p> <p>This part of ISO 140 specifies methods for measuring the acoustic properties of floor coverings from the viewpoint of reducing impact sound transmission. The purpose of this part of ISO 140 is to establish a method for determining the impact sound insulation of a floor covering under standard test conditions.</p>
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English version

Acoustics - Measurement of sound insulation in buildings and of building elements - Part 11: Laboratory measurements of the reduction of transmitted impact sound by floor coverings on lightweight reference floors (ISO 140-11:2005)

Acoustique - Mesurage de l'isolement acoustique des immeubles et des éléments de construction - Partie 11: Mesurage en laboratoire de la réduction de la transmission des bruits de choc par les revêtements de sol sur les planchers de référence légers (ISO 140-11:2005)

Akustik - Messung der Schalldämmung in Gebäuden und von Bauteilen - Teil 11: Messung der Trittschallminderung durch Deckenauflagen auf leichten Bezugsdecken in Prüfständen (ISO 140-11:2005)

This European Standard was approved by CEN on 12 May 2005.

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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 Central Secretariat has the same status as the official versions.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN ISO 140-11:2005) 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 November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

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## Endorsement notice

The text of ISO 140-11:2005 has been approved by CEN as EN ISO 140-11:2005 without any modifications.

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**Acoustics — Measurement of sound  
insulation in buildings and of building  
elements —**

**Part 11:  
Laboratory measurements of the  
reduction of transmitted impact sound by  
floor coverings on lightweight reference  
floors**

*Acoustique — Mesurage de l'isolement acoustique des immeubles et  
des éléments de construction —*

*Partie 11: Mesurage en laboratoire de la réduction de la transmission  
des bruits de choc par les revêtements de sol sur les planchers de  
référence légers*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 140-11 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

ISO 140 consists of the following parts, under the general title *Acoustics — Measurement of sound insulation in buildings and of building elements*:

- *Part 1: Requirements for laboratory test facilities with suppressed flanking transmission*
- *Part 2: Determination, verification and application of precision data*
- *Part 3: Laboratory measurements of airborne sound insulation of building elements*
- *Part 4: Field measurements of airborne sound insulation between rooms*
- *Part 5: Field measurements of airborne sound insulation of façade elements and façades*
- *Part 6: Laboratory measurements of impact sound insulation of floors*
- *Part 7: Field measurements of impact sound insulation of floors*
- *Part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor*
- *Part 9: Laboratory measurements of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it*
- *Part 10: Laboratory measurement of airborne sound insulation of small building elements*
- *Part 11: Laboratory measurements of the reduction of transmitted impact sound by floor coverings on lightweight reference floors*
- *Part 12: Laboratory measurement of room-to-room airborne and impact sound insulation of an access floor*
- *Part 13: Guidelines*



- *Part 14: Guidelines for special situations in the field*
- *Part 16: Laboratory measurement of the sound reduction index improvement by additional lining*

The following parts are under preparation:

- *Part 17: Evaluation of the total loss factor*
- *Part 18: Laboratory measurement of sound generated by rainfall on building elements*



# Acoustics — Measurement of sound insulation in buildings and of building elements —

## Part 11:

# Laboratory measurements of the reduction of transmitted impact sound by floor coverings on lightweight reference floors

## 1 Scope

This part of ISO 140 specifies methods for measuring the acoustic properties of floor coverings from the viewpoint of reducing impact sound transmission. The purpose of this part of ISO 140 is to establish a method for determining the impact sound insulation of a floor covering under standard test conditions. The test is limited to the specification of procedures for the physical measurement of sound originating from an artificial impact source (tapping machine) under laboratory conditions and is not directly related to the subjective significance of the results.

In this part of ISO 140, a test method is described using the standard tapping machine to simulate impact sources like human footsteps with shoes. In addition, methods using a modified tapping machine and a heavy/soft impact source are also introduced in informative Annexes C and E for the assessment of impact sound insulation of a floor covering against impact sources with strong components at low frequencies, such as human footsteps or children jumping. As a simplified method for the measurement of the reduction of floor impact sound pressure level by soft and resilient floor coverings, the method using a wooden mock-up floor is introduced in Annex D.

This part of ISO 140 is applicable to all floor coverings, whether single or multi-layered, as installed on lightweight floors. In the case of multi-layered coverings, they can be factory-assembled or assembled at the test site. The test method is applicable only to laboratory measurements. It does not contain any provision that permits an assessment of the effectiveness of a floor covering *in situ*.

## 2 Normative references

The following referenced documents are indispensable for the application 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 140-1:1997, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 1: Requirements for laboratory test facilities with suppressed flanking transmission*

ISO 140-2:1991, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 2: Determination, verification and application of precision data*

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

ISO 140-8:1997, *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 354:2003, *Acoustics — Measurement of sound absorption in a reverberation room*

ISO 9052-1:1989, *Acoustics — Determination of dynamic stiffness — Part 1: Materials used under floating floors in dwellings*

ISO 9053:1991, *Acoustics — Materials for acoustical applications — Determination of airflow resistance*

IEC 61672-1:2002, *Electroacoustics — Sound level meters — Part 1: Specifications*

IEC 60942:2003, *Electroacoustics — Sound calibrators*

IEC 61260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters*

### 3 Terms and definitions

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

#### 3.1

##### average sound pressure level in a room

$L$

ten times the common logarithm of the ratio of the space and time average of the sound pressure squared to the square of the reference sound pressure, the space average being taken over the entire room with the exception of those parts where the direct radiation of a sound source or the near field of the boundaries (wall, etc.) is of significant influence

NOTE 1 If a continuously moving microphone is used,  $L$  is determined by

$$L = 10 \lg \frac{\frac{1}{T_m} \int_0^{T_m} p^2(t) dt}{p_0^2} \text{ dB} \quad (1)$$

where

$p(t)$  is the sound pressure, in pascals;

$p_0$  is the reference sound pressure and is equal to 20  $\mu\text{Pa}$ ;

$T_m$  is the integration time, in seconds.

NOTE 2 If fixed microphone positions are used,  $L$  is determined by

$$L = 10 \lg \frac{\sum_{j=1}^n p_j^2}{n \cdot p_0^2} \text{ dB} \quad (2)$$

where  $p_j$  is the r.m.s. sound pressure at  $n$  different positions in the room.

NOTE 3 In practice, the sound pressure levels  $L_j$  are usually measured. In this case  $L$  is determined by

$$L = 10 \lg \left( \frac{1}{n} \sum_{j=1}^n 10^{L_j/10} \right) \text{ dB} \quad (3)$$

where  $L_j$  is the sound pressure level  $L_1$  to  $L_n$  at  $n$  different positions in the room.

NOTE 4 Sound pressure level is expressed in decibels.