

**Acoustics - Laboratory measurement of sound
insulation of building elements - Part 3: Measurement of
impact sound insulation**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 10140-3:2010 sisaldab Euroopa standardi EN ISO 10140-3:2010 ingliskeelset teksti.

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English Version

Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurement of impact sound insulation (ISO 10140-3:2010)

Acoustique - Mesurage en laboratoire de l'isolation acoustique des éléments de construction - Partie 3: Mesurage de l'isolation au bruit de choc (ISO 10140-3:2010)

Akustik - Messung der Schalldämmung von Gebäudeteilen im Prüfstand - Teil 3: Messung der Trittschalldämmung (ISO 10140-3:2010)

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Foreword

This document (EN ISO 10140-3:2010) 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of an identical text or by endorsement, at the latest by March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.

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Endorsement notice

The text of ISO 10140-3:2010 has been approved by CEN as a EN ISO 10140-3:2010 without any modification.

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Introduction

ISO 10140 (all parts) concerns laboratory measurement of the sound insulation of building elements (see Table 1).

ISO 10140-1 specifies the application rules for specific elements and products, including specific requirements for preparation, mounting, operating and test conditions. ISO 10140-2 and this part of ISO 10140 contain the general procedures for airborne and impact sound insulation measurements, respectively, and refer to ISO 10140-4 and ISO 10140-5 where appropriate. For elements and products without a specific application rule described in ISO 10140-1, it is possible to apply ISO 10140-2 and this part of ISO 10140. ISO 10140-4 contains basic measurement techniques and processes. ISO 10140-5 contains requirements for test facilities and equipment. For the structure of ISO 10140 (all parts), see Table 1.

ISO 10140 (all parts) was created to improve the layout for laboratory measurements, ensure consistency and simplify future changes and additions regarding mounting conditions of test elements in laboratory and field measurements. It is intended for ISO 10140 (all parts) to present a well-written and arranged format for laboratory measurements.

It is intended to update ISO 10140-1 with application rules for other products. It is also intended to incorporate ISO 140-18 into ISO 10140 (all parts).

Table 1 — Structure and contents of ISO 10140 (all parts)

Relevant part of ISO 10140	Main purpose, contents and use	Detailed content
ISO 10140-1	It indicates the appropriate test procedure for elements and products. For certain types of element/product, it can contain additional and more specific instructions about quantities and test element size and about preparation, mounting and operating conditions. Where no specific details are included, the general guidelines are according to ISO 10140-2 and ISO 10140-3.	Appropriate references to ISO 10140-2 and ISO 10140-3 and product-related, specific and additional instructions on: <ul style="list-style-type: none"> — specific quantities measured; — size of test element; — boundary and mounting conditions; — conditioning, testing and operating conditions; — additional specifics for test report.
ISO 10140-2	It gives a complete procedure for airborne sound insulation measurements according to ISO 10140-4 and ISO 10140-5. For products without specific application rules, it is sufficiently complete and general for the execution of measurements. However, for products with specific application rules, measurements are carried out according to ISO 10140-1, if available.	<ul style="list-style-type: none"> — Definitions of main quantities measured — General mounting and boundary conditions — General measurement procedure — Data processing — Test report (general points)
ISO 10140-3	It gives a complete procedure for impact sound insulation measurements according to ISO 10140-4 and ISO 10140-5. For products without specific application rules, it is sufficiently complete and general for the execution of measurements. However, for products with specific application rules, measurements are carried out according to ISO 10140-1, if available.	<ul style="list-style-type: none"> — Definitions of main quantities measured — General mounting and boundary conditions — General measurement procedure — Data processing — Test report (general points)
ISO 10140-4	It gives all the basic measurement techniques and processes for measurement according to ISO 10140-2 and ISO 10140-3 or facility qualifications according to ISO 10140-5. Much of the content is implemented in software.	<ul style="list-style-type: none"> — Definitions — Frequency range — Microphone positions — SPL measurements — Averaging, space and time — Correction for background noise — Reverberation time measurements — Loss factor measurements — Low-frequency measurements — Radiated sound power by velocity measurement
ISO 10140-5	It specifies all information needed to design, construct and qualify the laboratory facility, its additional accessories and measurement equipment (hardware).	<p>Test facilities, design criteria:</p> <ul style="list-style-type: none"> — volumes, dimensions; — flanking transmission; — laboratory loss factor; — maximum achievable sound reduction index; — reverberation time; — influence of lack of diffusivity in the laboratory. <p>Test openings:</p> <ul style="list-style-type: none"> — standard openings for walls and floors; — other openings (windows, doors, small technical elements); — filler walls in general. <p>Requirements for equipment:</p> <ul style="list-style-type: none"> — loudspeakers, number, positions; — tapping machine and other impact sources; — measurement equipment. <p>Reference constructions:</p> <ul style="list-style-type: none"> — basic elements for airborne and impact insulation improvement; — corresponding reference performance curves.

Acoustics — Laboratory measurement of sound insulation of building elements —

Part 3: Measurement of impact sound insulation

1 Scope

This part of ISO 10140 specifies laboratory methods for measuring the impact sound insulation of floor assemblies.

The test results can be used to compare the sound insulation properties of building elements, classify elements according to their sound insulation capabilities, help design building products which require certain acoustic properties and estimate the *in situ* performance in complete buildings.

The measurements are performed in laboratory test facilities in which sound transmission via flanking paths is suppressed. The results of measurements made in accordance with this part of ISO 10140 are not applicable directly to the field situation without accounting for other factors affecting sound insulation, such as flanking transmission, boundary conditions, and loss factor.

A test method is specified that uses the standard tapping machine (see ISO 10140-5:2010, Annex E) to simulate impact sources like human footsteps when a person is wearing shoes. This part of ISO 10140 is applicable to all types of floors (whether heavyweight or lightweight) with all types of floor coverings. The test method applies only to laboratory measurements.

NOTE When the aim of impact sound insulation measurements is to have a strong correlation between a “real” impact source (e.g. a person walking or children jumping) and an artificial impact source (e.g. a tapping machine), it is intended that both sources apply the same input force spectrum to ensure the correct ranking of floors and floor coverings for the “real” and the artificial source, and it is intended that the impedance spectra of the sources be the same. If the “real” impact source is a walking person without shoes and the artificial source is a standard tapping machine such as that specified in Clause 4, the correlation is not strong.

An alternative method, using a heavy/soft impact source for assessing the impact sound insulation of a floor against impact sources with strong low-frequency components, such as human footsteps (bare feet) or children jumping, is given in Annex A. Alternative impact sources (i.e. a proposed modification of the standard tapping machine to make its dynamic source characteristics similar to those of a person walking barefoot and a heavy/soft impact source with dynamic source characteristics similar to those of children jumping) are defined in ISO 10140-5:2010, Annex F.

A method to test floor coverings is described in ISO 10140-1:2010, Annex H, for single- or multi-layer floor coverings installed on specific reference floors. In the case of multi-layer coverings, they can be factory-assembled or assembled at the test site.

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

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

ISO 10140-1, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 1: Application rules for specific products*

ISO 10140-4, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 4: Measurement procedures and requirements*

ISO 10140-5, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 5: Requirements for test facilities and equipment*

IEC 60942, *Electroacoustics — Sound calibrators*

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 purpose of this document, the following terms and definitions apply.

3.1

impact sound pressure level

L_i

energy average sound pressure level in a one-third octave band in the receiving room when the floor under test is excited by the standardized impact source

NOTE 1 L_i is expressed in decibels.

NOTE 2 The energy average sound pressure level in a room is defined in ISO 10140-4.

3.2

normalized impact sound pressure level

L_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

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

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

NOTE 1 L_n is expressed in decibels.

NOTE 2 The measured equivalent absorption area, A , of the receiving room is defined in ISO 10140-4.