INTERNATIONAL STANDARD

ISO 10140-1

First edition
2010-09-01

AMENDMENT 1
2012-02-01

Acoustics — Laboratory measurement of sound insulation of building elements —

Part 1: Application rules for specific products

AMENDMENT 1: Guidelines for the determination of the sound reduction index of joints filled with fillers and/or seals

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Acoustique — Mesurage en laboratoire de l'isolation acoustique des éléments de construction —

Partie 1: Règles d'application pour produits particuliers

AMENDEMENT 1: Lignes directrices pour la détermination de l'indice de réduction acoustique de joints comblés de matière de remplissage et/ou d'éléments d'étanchéité

Reference number
ISO 10140-1:2010/Amd.1:2012(E)

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Published in Switzerland

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Foreword

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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.

Amendment 1 to ISO 10140-1:2010 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

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Acoustics — Laboratory measurement of sound insulation of building elements —

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page v, Introduction

Add the following final paragraph.

Annex J has been developed for joints filled with fillers or seals.

page 1, Clause 2

Add the date "2010" to ISO 10140-2.

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page 31

Insert Annex J, which starts on page 2, before the Bibliography.

page 32, Bibliography

Add the following entries.

[15] EN 12354-3, *Building acoustics — Estimation of acoustic performance of buildings from the performance of elements — Part 3: Airborne sound insulation against outdoor sound*

[16] NEN 5273, *Akoestische prestatie van kier- en naaddichting — Laboratoriummeetmethode op basis van NEN-EN-ISO 140-3* [Acoustic performance of sealing — Laboratory measurement based on EN ISO 140-3]

[17] ERTEL, H., MECHEL, F.P. *Akustische Dichtung von Fugen durch akustisch wirksame Nebenvolumen -akustiche Filter- und akustische Lippendichtungen*. [Acoustic sealing of joints by acoustically effective supplementary volumes — Acoustic filter and acoustic lip seals]. Stuttgart: Fraunhofer IRB, 1979. 37 p. (IBP Report No. BS 35/79.)

[18] ERTEL, H. *Experimentelle Untersuchungen von akustischen Fugendichtungen — Prinziplösungen für wirksame Dichtungskonstruktionen* [Experimental investigations of acoustic joint seals — Principle of solutions for effective seal construction]. Stuttgart: Fraunhofer IRB, 1981. 44 p. (IBP Report No. BS 57/81.)

[19] FROELICH, H., SCHUMACHER, R., SAß, B. *Konstruktionsmerkmale für schalldämmende Wohnungseingangstüren und Bürotüren aus Holz und Holzwerkstoffen — Forschungsbericht*. [Design features of sound-absorbing residential entrance doors and office doors in wood and timber materials — Research report]. Stuttgart: Fraunhofer IRB, 1996. 175 p.

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Annex J
(normative)

Joints filled with fillers or seals — Sound reduction index

J.1 Application

This annex applies to acoustic sealing of slits (with or without fillers) and of gaps or joints between parts of windows or doors. Fillers are materials to fill in joints, e.g. foam or sealing tape, gaskets (or seals) are elements to close openable joints, e.g. retractable floor seals or rebate seals for doors and windows.

The general guidelines in the relevant clauses of ISO 10140-2 shall always be followed. The quantity to be determined is the sound reduction index of joints, R_s, per metre of a sealed gap or joint, in decibels as a function of frequency.

The sound reduction index of joints (of the slit, s) with sound transmission only through the joint or the slit is evaluated from Equation (J.1).

$$R_s = L_1 - L_2 + 10 \lg \frac{S_n\, l}{A\, l_n} \qquad \text{(J.1)}$$

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where

L_1 is the energy average sound pressure level in the source room, in decibels (see ISO 10140-2);

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L_2 is the energy average sound pressure level in the receiving room, in decibels (see ISO 10140-2);

l is the length of the joint, in metres;

S_n is the reference area, in square metres (S_n = 1 m^2);

l_n is the reference length, in metres (l_n = 1 m);

A is the equivalent absorption area in the receiving room, in square metres.

NOTE To achieve a better signal-to-noise ratio, simultaneous measurements can be performed on an element with enlarged length of the joint.

For this type of measurement, the influence of flanking transmission through the object in which the slits are present can be very important, so the maximum sound insulation of the test arrangement requires measurement, e.g. by sealing the test joint on both sides with elastic sealant, leading to $R_{s,max}$. Unless this value is 10 dB higher than the measured value, the measurement results require correction for this flanking transmission.

Test $R_{s,max}$ when the test arrangement is prepared.

The sound reduction index of joints (of the slit) R_s shall be calculated according to the rules of ISO 10140-2:2010, A.3, using Equation (J.2).

$$R_s = -10 \lg \left[10^{-R'_s/10} - 10^{-R_{s,max}/10} \right] \qquad \text{(J.2)}$$

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where R'_s is the sound reduction index measured with the test element in the test opening, in decibels.

If the difference $R_{s,max} - R'_s$ is less than 6 dB in any of the frequency bands, the correction shall be 1,3 dB.

If R'_s is larger than $R_{s,max}$ – 3 dB, the lower limit of the sound reduction index R_s may be set as $R_{s,max}$. The resulting number shall be presented in brackets and expressed as a minimum value, e.g ($R_s \geq 50,4$ dB).

The single number ratings are determined in accordance with ISO 717-1. If for one or more frequency bands the result is larger than $R_{s,max}$ – 3 dB, the single number rating is also determined with an infinitely high sound reduction index for those indicative bands. If that result differs by more than 1 dB from that first directly determined, the single number ratings shall also be presented in brackets.

The values which are evaluated can be used directly to compare products (e.g. fillers or sealings) or for the determination of the sound insulation of composite elements, taking into account the appropriate length of joints.

Besides the measurement results for well-described situations, this annex also presents a method to summarize results in a more global way, suitable for use as input data for prediction methods.

J.2 Test element

J.2.1 General

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The design of the joint to be tested should be similar to the application, because the geometry of the joint is an important parameter for the sound insulation of joints. For this, the design of the environment around the test element (filler or sealing) strongly depends on the application and this clause can only give advice with the description of examples for test elements.

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The length of the joint shall be greater than 1 m and the width of the joint shall be no greater than 50 mm.

J.2.2 Illustration 1 — Gaps between windows and doors

The test element shall have a high sound reduction index $R_{s,max}$ in order to be able to get reliable measurement results in the relevant part of the frequency range. The gap or joint under test shall have a length of at least 5,0 m with a uniform cross-section; this total length may be the sum of several gaps or joints. For comparisons, the cross-section shall comply with Figure J.1 where the relevant gap width b is also defined. Additionally other shapes can be applied, if relevant. These requirements can normally be fulfilled by using the specific small test opening as defined in this part of ISO 10140, with a panel as given in Figure J.2.

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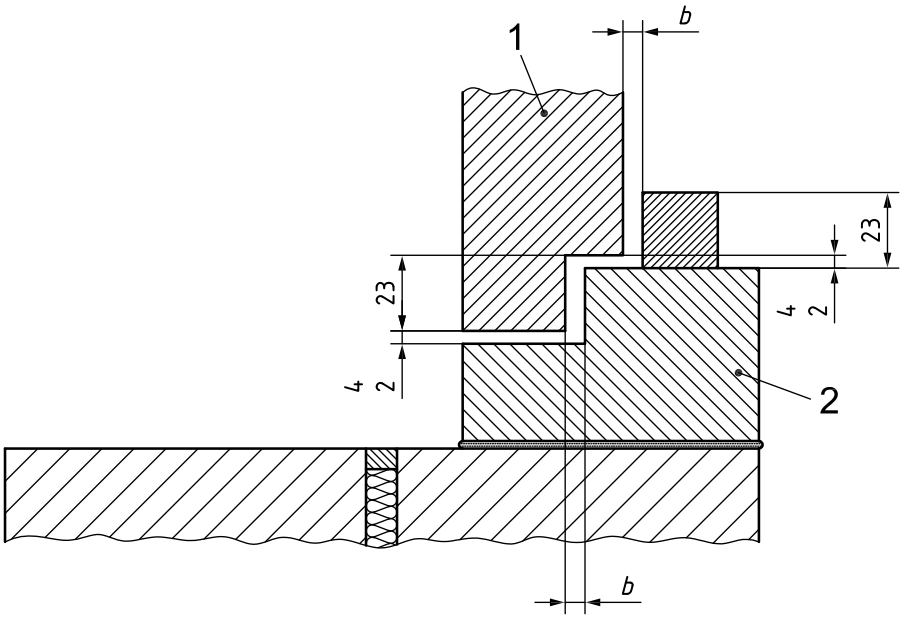
Dimensions in millimetres



Key

1 movable panel
2 frame
b variable gap width

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Figure J.1 — Cross-section of gap with definition of gap width

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With additional wood strips of identical dimensions (23 mm × 23 mm, with gap tolerances between 2 mm and 4 mm) this profile can also be adapted to double sealing systems, see Figure J.2.

As an example, Figure J.2 gives a test element in the specific small test opening, where the panel in the casement consists of steel sandwich plates of thickness 2 mm and a rectangular wooden frame of cross-section 54 mm × 90 mm, the cavity being filled with mineral wool of surface density 40 kg/m^2.

Determine the gap width at a minimum of four positions, evenly distributed over the total length of sealing. The results shall not deviate by more than 0,3 mm, otherwise readjust the mounting. The average value is denoted as gap width b.

NOTE With this construction, a maximum sound reduction index of $R_{s,max,w}(C;C_{tr})$ = 60(–5;–10) dB can be achieved.

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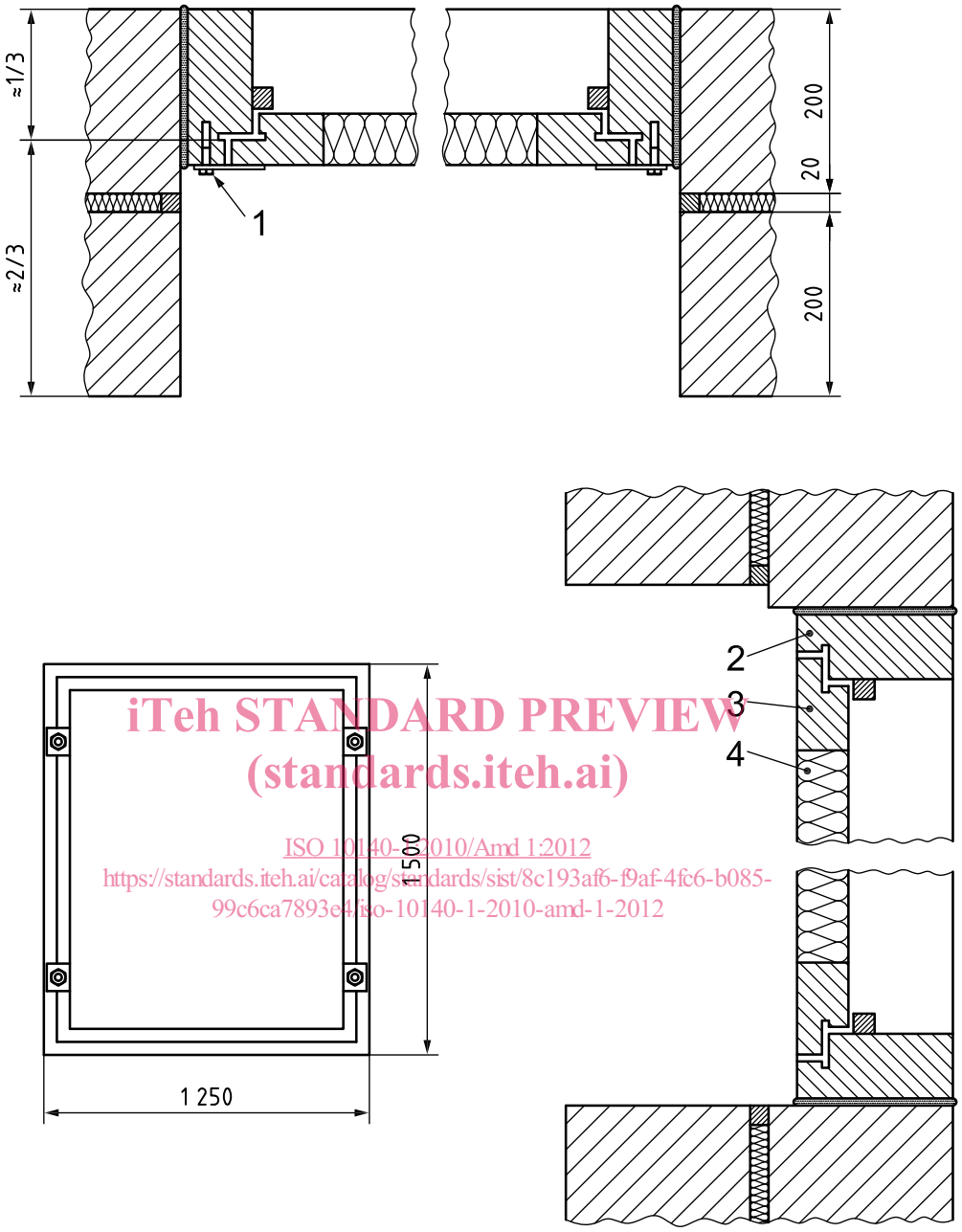
Dimensions in millimetres



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Key

1 adjustable closing mechanism, e.g. a steel plate with hole, screw and thumb-nut
2 frame 67 mm × 139 mm
3 frame 54 mm × 90 mm
4 sandwich panel

Figure J.2 — Illustration of a test element in the specific small test opening

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