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Second edition
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Acoustics — Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms —

Part 2: Application to Type B elements when the junction has a small influence

Acoustique — Mesurage en laboratoire et sur le terrain des transmissions latérales du bruit aérien, des bruits de choc et du bruit d'équipement technique de bâtiment entre des pièces —

Partie 2: Application aux éléments de Type B lorsque la jonction a une faible influence

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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 voluntary nature of standards, 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 Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

This second edition cancels and replaces the first edition (ISO 10848-2:2006), which has been technically revised. It also incorporates the Technical Corrigendum ISO 10848-2:2006/Cor. 1:2007. The main change is that the normalized flanking equipment sound pressure level has been introduced and it has been indicated that this document applies to Type B elements.

A list of all the parts in the ISO 10848 series can be found on the ISO website.

Acoustics — Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms —

Part 2:
Application to Type B elements when the junction has a small influence

1 Scope

ISO 10848 (all parts) specifies measurement methods to characterize the flanking transmission of one or several building components. This document considers only laboratory measurements.

The measured quantities can be used to compare different products, or to express a requirement, or as input data for prediction methods, such as ISO 12354-1 and ISO 12354-2. However, the measured quantities $D_{n,f}$, $L_{n,f}$ and $L_{ne0,f}$ only represent the performance with the dimensions for the test specimens described in this document.

This document is referred to in ISO 10848-1:2017, 4.5 as being a supporting part of the frame document. It applies to Type B elements as defined in ISO 10848-1, such as suspended ceilings, access floors, light uninterrupted façades or floating floors. The transmission from one room to another can occur simultaneously through the test element and via the plenum (if any). For measurements made according to this document, the total sound transmission is determined and it is not possible to separate the two kinds of transmission.

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 354, *Acoustics — Measurement of sound absorption in a reverberation room*

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

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

ISO 10848-1:2017, *Acoustics — Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms — Part 1: Frame document*

ISO 12999-1, *Acoustics — Determination and application of measurement uncertainties in building acoustics — Part 1: Sound insulation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
normalized flanking level difference
$D_{n,f}$
difference in the space and time averaged sound pressure level produced in two rooms by one or more sound sources in one of them, when the transmission only occurs through a specified flanking path and the result is normalized to an equivalent sound absorption area in the receiving room according to

$$D_{n,f} = L_1 - L_2 - 10\lg\frac{A}{A_0}$$

where

L_1 is the average sound pressure level in the source room, in dB;

L_2 is the average sound pressure level in the receiving room, in dB;

A is the equivalent sound absorption area in the receiving room, in m^2;

A_0 is the reference equivalent sound absorption area, in m^2; A_0 = 10 m^2.

Note 1 to entry: This quantity is expressed in decibels.

Note 2 to entry: For clarity, the term $D_{n,f}$ is used when only one flanking path determines the sound transmission (such as with suspended ceilings) and the term $D_{n,f,ij}$ is used when only one specified transmission path *ij* out of several paths is considered (such as with structure-borne sound transmission on junctions of three or four connected elements).

3.2
normalized flanking impact sound pressure level
$L_{n,f}$
space and time averaged sound pressure level in the receiving room produced by a tapping machine operating at different positions on a tested element (floor) in the source room, when the transmission only occurs through a specified flanking path and the result is normalized to an equivalent sound absorption area, in the receiving room according to

$$L_{n,f} = L_2 + 10\lg\frac{A}{A_0}$$

where

L_2 is the average sound pressure level in the receiving room, in dB;

A is the equivalent sound absorption area in the receiving room, in m^2;

A_0 is the reference equivalent sound absorption area, in m^2; A_0 = 10 m^2.

Note 1 to entry: This quantity is expressed in decibels.

Note 2 to entry: For clarity, the term $L_{n,f}$ is used when only one flanking path determines the sound transmission (such as with access floors) and the term $L_{n,f,ij}$ is used when only one specified transmission path *ij* out of several paths is considered (such as with structure-borne sound transmission on junctions of three or four connected elements).

3.3
normalized flanking equipment sound pressure level
$L_{ne0,f}$
space and time averaged sound pressure level in the receiving room produced by a structure-borne sound source injecting a unit power (1 W) at different positions on a tested element in the source room, when the transmission only occurs through a specified flanking path and the result is normalized to an equivalent sound absorption area in the receiving room and is expressed in decibels according to

$$L_{ne0,f} = L_{2e} + 10\lg\frac{A}{A_0} \quad (3)$$

where

L_{2e} is the average sound pressure level in the receiving room with a structure-borne sound source injecting 1 W into the tested element, in dB;

A is the equivalent sound absorption area in the receiving room, in m^2;

A_0 is the reference equivalent sound absorption area, in m^2; A_0 = 10 m^2.

Note 1 to entry: This quantity is expressed in decibels.

Note 2 to entry: For clarity, the term $L_{ne0,f}$ is used when only one flanking path determines the sound transmission (such as with equipment installed on access floors or light façades) and the term $L_{ne0,f,ij}$ is used when only one specified transmission path *ij* out of several paths is considered (such as with structure-borne sound transmission on junctions of three or four connected elements).

3.4
plenum space
entire void below an access floor or above a suspended ceiling in both rooms in the test facility

4 Instrumentation

The equipment shall fulfil the requirements of ISO 10848-1:2017, Clause 5.

5 Test arrangement

5.1 Requirements for the laboratory

5.1.1 General

The general requirements for the test facility and test elements shall be fulfilled according to ISO 10848-1:2017, 6.1.

Requirements on facilities for different kinds of test specimens are given in Figure 1 to Figure 4 and described in the relevant subclauses.

5.1.2 Construction of the test facility

The rooms shall be on the same level, except for the façade testing where the rooms may be placed one on top of the other.

For access floors and suspended ceilings, the ground plan of the test facility shall be rectangular. When the rooms are side-by-side, a vibration break shall be provided between the two rooms in order to ensure that structure-borne transmission through the test facility is negligible (see Figure 1).

When a plenum is used, the reverberation time of each room might be affected by sound transmission back from the other test room. In such cases, a suitable impervious plenum barrier shall be installed between the edge of the dividing wall and the bottom wall of the plenum during the reverberation time measurements.

5.1.3 Dimensions of the test facility

The width of the test facility shall be 4,5 m ± 0,5 m and the internal height of the source and receiving rooms shall be at least 2,3 m.

The volume, *V*, of each room shall be at least 50 m^3. It is recommended that the dividing wall be positioned such that the volumes of source and receiving room differ by at least 10 % when the test element is in position.

The minimum depth of both rooms shall be 3,5 m.

5.1.4 Dividing wall

The dividing wall divides the test facility into source and receiving room. The dividing wall shall be mounted in such a way that it is not loading the element. The gap between the dividing wall and the element shall be sealed with a flexible material. The thickness of the wall shall be less than 200 mm or tapered to 200 mm (for example, see Figure 1). The tapering between the widest part of the wall and the element shall be achieved by means of an angle not exceeding 45°. The construction of the dividing wall shall be such that $D_{n,f,max}$ is 10 dB higher than the $D_{n,f}$ of any element which is likely to be tested.

In cases where there is a plenum, for checking the airborne sound insulation of the facility, a suitable plenum barrier of construction similar to the dividing wall may be installed between the edge of the dividing wall and the wall of the test facility, without the element. In cases where there is no plenum, a suitable construction (for example, a lining of the internal face of the test element) could be necessary to determine $D_{n,f,max}$.

5.1.5 Plenum height

For access floors, the height as measured from the surface of the access floor to the surface of the floor of the test facility shall be either 0,3 m or, if this is not possible, then the nearest possible value shall be used. Other heights may be tested if they are intended to be used in practice.

For suspended ceilings, the height as measured from the lower surface of the ceiling to the lower surface of the test facility ceiling shall be between 0,7 m and 0,8 m. Other heights may be tested if they are intended to be used in practice.

5.1.6 Plenum lining

One sidewall of the plenum and both end walls of the plenum shall be lined with suitable sound absorbing material. This material shall have such properties that when tested as a plane absorber in accordance with ISO 354, it has sound absorption coefficients not less than those shown in Table 1.

NOTE The absorption coefficient for the 63 Hz octave band is not defined in Table 1.

Table 1 — Minimum sound absorption coefficients of sound absorbing material used as plenum lining

Octave band centre frequency, Hz	125	250	500	1 000	2 000	4 000
Sound absorption coefficient, α_s	0,65	0,80	0,80	0,80	0,80	0,80

For the other sidewalls and the floor, the sound absorption coefficient shall be less than 0,10 at all frequencies given in the table.

The thickness of the lining shall not exceed 150 mm.

In cases where there is no plenum, attention shall be given to avoiding an important outside airborne transmission path between the two parts of the test element, through the hall where the test facility is installed.

Typically, the ratio of the volume of the hall (in m^3) to its reverberation time (in s) should be larger than 500 m^3/s.

5.2 Installation of the test element

5.2.1 Installation of access floors

The area of a floor shall be equal to the area given by the length and width of the test facility.

The floor components shall be representative of those used in practice in actual field installations. The floor shall be installed in accordance with the recommended practice of the manufacturer or with the recommended practice of an installation standard.

For an example, see Figure 1.

5.2.2 Installation of suspended ceilings

The detail of the joint between the ceiling and the top of the dividing wall is of critical importance and care shall be taken to simulate actual field conditions.

The area of a continuous ceiling shall be equal to the area given by the length and width of the test facility.

For a ceiling with a break at the dividing wall, it may be necessary to add additional capping to the top of the dividing wall to complete the junction. The area of a discontinuous ceiling shall then be equal to the area given by the length and width of the test facility less the area of the capping on the top of the dividing wall.

The ceiling components shall be representative of those used in practice in actual field installations. The ceiling shall be installed in accordance with the recommended practice of the manufacturer or with the recommended practice of an installation standard.

In cases where normal installation practices would result in the use of custom-fitted ceiling tile of width or length less than 100 mm adjacent to one of the end walls of the facility parallel to the dividing wall, a filler material with a higher transmission loss may be substituted for the custom fitted pieces of ceiling tile.

For an example, see Figure 2.