INTERNATIONAL STANDARD

ISO 140-4

Second edition
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Acoustics — Measurement of sound insulation in buildings and of building elements —

Part 4:
Field measurements of airborne sound insulation between rooms

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

Partie 4: Mesurage in situ de l'isolement aux bruits aériens entre les pièces

Reference number
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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.

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.

International Standard ISO 140-4 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics.*

This second edition cancels and replaces the first edition (ISO 140-4:1978) which has been technically revised.

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 of laboratory test facilities with suppressed flanking transmission*

— *Part 2: Determination, verification and application of precision data*

— *Part 3: Laboratory measurement 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*

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

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— *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 measurement 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*

Annexes A and B form an integral part of this part of ISO 140. Annexes C to F are for information only.

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

Part 4:
Field measurements of airborne sound insulation between rooms

1 Scope

This part of ISO 140 specifies field methods for measuring the airborne sound insulation properties of interior walls, floors and doors between two rooms under diffuse sound field conditions in both rooms, and for determining the protection afforded to the occupants of the building.

The methods give values for airborne sound insulation which are frequency dependent. They can be converted into a single number, characterizing the acoustic performance, by application of ISO 717-1.

The results obtained can be used to compare sound insulation between rooms and to compare actual sound insulation with specified requirements.

NOTE 1 Laboratory measurements of airborne sound insulation of building elements are dealt with in ISO 140-3.

NOTE 2 Field measurements of airborne sound insulation of façade elements and façades are dealt with in ISO 140-5.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 140. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 140 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 354:1985, *Acoustics — Measurement of sound absorption in a reverberation room.*

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

IEC 60651:1979, *Sound level meters.*

IEC 60804:1985, *Integrating-averaging sound level meters.*

IEC 60942: 1988, *Sound calibrators.*

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

3 Definitions

For the purposes of this part of ISO 140, the definitions given in ISO 140-3 and following definitions apply.

3.1 average sound pressure level in a room, L: Ten times the logarithm to the base 10 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; it is expressed in decibels.

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

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

where L_j are the sound pressure levels L_1 to L_n at n different positions in the room.

3.2 level difference, D: Difference, in decibels, in the space and time average sound pressure levels produced in two rooms by one or more sound sources in one of them:

$$D = L_1 - L_2 \quad \ldots (2)$$

where

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

L_2 is the average sound pressure level in the receiving room.

3.3 normalized level difference, D_n: Level difference, in decibels, corresponding to the reference absorption area in the receiving room:

$$D_n = D - 10 \lg \frac{A}{A_0} \text{ dB} \quad \ldots (3)$$

where

D is the level difference, in decibels;

A is the equivalent sound absorption area of the receiving room, in square metres;

A_0 is the reference absorption area, in square metres (for rooms in dwellings or rooms of comparable size: A_0 = 10 m^2).

3.4 standardized level difference, D_{nT}: Level difference, in decibels, corresponding to a reference value of the reverberation time in the receiving room:

$$D_{nT} = D + 10 \lg \frac{T}{T_0} \text{ dB} \quad \ldots (4)$$

where

D is the level difference;