
**Building acoustics — Estimation of
acoustic performance of buildings from
the performance of elements —**

**Part 2:
Impact sound insulation between rooms**

*Acoustique du bâtiment — Calcul de la performance acoustique des
bâtiments à partir de la performance des éléments —*

Partie 2: Isolement acoustique au bruit de choc entre des locaux



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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 15712-2 was prepared by CEN/TC 126, *Acoustic properties of building products and of buildings* (as EN 12354-2:2000), and was adopted without modification by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

Building acoustics — Estimation of acoustic performance of buildings from the performance of elements —

Part 2:

Impact sound insulation between rooms

1 Scope

This European Standard specifies calculation models designed to estimate the impact sound insulation between rooms in buildings, primarily on the bases of measured data which characterizes direct or indirect flanking transmission by the participating building elements and theoretically derived methods of sound propagation in structural elements.

A detailed model is described for calculation in frequency bands ; the single number rating of buildings can be determined from the calculation results. A simplified model with a restricted field of application is deduced from this, calculating directly the single number rating, using the single number ratings of the elements.

This European Standard describes the principles of the calculation scheme, lists the relevant quantities and defines its applications and restrictions. It is intended for acoustical experts and provides the framework for the development of application documents and tools for other users in the field of building construction, taking into account local circumstances.

The calculation models described use the most general approach for engineering purposes, with a clear link to measurable quantities that specify the performance of building elements. The known limitations of these calculation models are described in this standard. Users should, however, be aware that other calculation models also exist, each with their own applicability and restrictions.

The models are based on experience with prediction for dwellings ; they could also be used for other types of buildings provided the construction systems and dimensions of elements are not too different from those in dwellings.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 140-1, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 1 : Requirements for laboratory test facilities with suppressed flanking transmission*. (ISO 140-1 : 1997).

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

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

EN ISO 140-7, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 7 : Field measurements of impact sound insulation of floors*. (ISO 140-7 : 1998).

EN ISO 140-8, *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 140-8 : 1997).

EN ISO 140-12, *Acoustics - Measurement of sound insulation in buildings and of building elements – Part 12 : Laboratory measurement of room-to-room airborne and impact sound insulation of an access floor*. (ISO 140-12 : 2000).

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

EN ISO 717-2 : 1996, *Acoustics - Rating of sound insulation in buildings and of building elements – Part 2 : Impact sound insulation*. (ISO 717-2 : 1996).

EN 12354-1 : 2000, *Building Acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 1 : Airborne sound insulation between rooms*.

prEN ISO 10848-1, *Acoustics - Laboratory measurement of flanking transmission of airborne and impact sound between adjoining rooms - Part 1 : Frame document*. (ISO/DIS 10848-1 : 1999).

3 Relevant quantities

3.1 Quantities to express building performance

The impact sound insulation between rooms in accordance with EN ISO 140-7 can be expressed in two related quantities. These quantities are determined in frequency bands (one-third octave bands or octave bands) from which the single number rating for the building performance can be obtained in accordance with EN ISO 717-2 : 1996, for instance $L'_{n,w}$, $L'_{nT,w}$ or $(L'_{nT,w} + C_1)$.

3.1.1 Normalized impact sound pressure level L'_n : The impact sound pressure level corresponding to the reference equivalent absorption area in the receiving room.

$$L'_n = L_i + 10 \lg \frac{A}{A_o} \text{ dB} \quad (1)$$

where

L_i is the impact sound pressure level measured in the receiving room, in decibels ;

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

A_o is the reference equivalent absorption area ; for dwellings $A_o = 10 \text{ m}^2$.

This quantity is to be determined in accordance with EN ISO 140-7.

3.1.2 Standardized impact sound pressure level L'_{nT} : The impact sound pressure level corresponding to a reference value of the reverberation time in the receiving room.

$$L'_{nT} = L_i - 10 \lg \frac{T}{T_o} \text{ dB} \quad (2)$$

where

T is the reverberation time in the receiving room, in seconds ;

T_o is the reference reverberation time (for dwellings : $T_o = 0,5 \text{ s}$).

This quantity is to be determined in accordance with EN ISO 140-7.

3.1.1.1 Relation between quantities

The relation between the quantities L'_{nT} and L'_n is given by :

$$L'_{nT} = L'_n - 10 \lg \frac{0,16 V}{A_o T_o} = L'_n - 10 \lg 0,032 V \text{ dB} \quad (3)$$

where

V is the volume of the receiving room, in cubic metres.