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Acoustics — Laboratory measurement of the reduction of transmitted impact noise by floor coverings on a small floor mock-up —

Part 1: Heavyweight compact floor

Acoustique — Mesurage en laboratoire de la réduction de la transmission du bruit de choc par les revêtements de sol sur un plancher normalisé de dimensions réduites —

Partie 1: Plancher lourd

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Principle **2**
5 Equipment **2**
5.1 Test setup 2
5.2 Instruments 3
6 Test procedure **3**
6.1 Installing the specimens 3
6.2 Placement of tapping machine and accelerometers 3
6.3 Frequency range 3
6.4 Measurement 4
6.5 Evaluation of results 4
7 Uncertainty **5**
8 Expression of results **5**
9 Test report **5**
Annex A (normative) **Test setup** **7**
Annex B (informative) **Design of presentation of results** **8**
Bibliography **10**

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

ISO 16251 consists of the following parts, under the general title *Acoustics — Laboratory measurement of the reduction of transmitted impact noise by floor coverings on a small floor mock-up*:

— *Part 1: Heavyweight compact floor*

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Introduction

The improvement of impact sound reduction is the main quantity for describing the acoustic behaviour of floor coverings. Its determination is described in the ISO 10140[4]series and requires the use of a special test facility. This facility consists of two rooms (the lower one of at least 50 m^3), separated by an approximately 14 cm thick concrete slab or a special timber joist floor. Manufacturers of floor coverings see the advantage of having their own test facilities, but the investment often is not affordable for small- and medium-sized enterprises. This part of ISO 16251 aims to reduce the effort for the determination of the impact sound reduction. A standardized test method is provided, which yields results comparable to those gained with the ISO 10140 series[4].

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Acoustics — Laboratory measurement of the reduction of transmitted impact noise by floor coverings on a small floor mock-up —

Part 1: Heavyweight compact floor

1 Scope

This part of ISO 16251 specifies a laboratory measurement method to determine the improvement of impact sound insulation by a floor covering when laid on a standard concrete floor mock-up and excited by a standard tapping machine. The method is restricted to soft, flexible floor coverings, which transmit impact sound mainly "locally" into the floor, i.e. through the area close to the points of excitation, so that the size of the flooring specimen does not have an influence on the results. Examples of such floor coverings are carpets, PVC, and linoleum. These floor coverings correspond to ISO 10140-1:2010[5], Annex H, category I.

The results only provide information about the noise radiated. A subjective classification of the quality of the floor coverings is not intended.

The method is kept as close as possible to the ISO 10140[4] series and yields the same results within the range of uncertainty and within the range of application. In the case of difference with ISO 10140, the result of the ISO 10140 measurement shall be used.

This part of ISO 16251 provides the measurement method. Product test codes can contain further requirements concerning the specimens, such as temperature range, the number of test specimens or special mounting conditions.

NOTE If non-soft, non-flexible floorings are tested, e.g. those with a laminated structure, increased deviations from the results of the ISO 10140[4] series method may occur due to the dependency on the specimen size.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 16063 (all parts), *Methods for the calibration of vibration and shock transducers*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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3.1
vibratory acceleration level
L_a
value given by Formula (1):

$$L_a = 10 \lg \frac{1}{T_m} \int_0^{T_m} \frac{a(t)^2 \, dt}{a_0^2} \text{ dB} \quad (1)$$

where T_m is the integration time, in seconds; a is the acceleration, in metres per second squared; a_0 is the reference acceleration (1×10^{-6} m/s^2).

3.2
improvement of impact sound insulation
ΔL
reduction of the vibratory acceleration level resulting from installation of the test floor covering for a given one-third octave band

Note 1 to entry: The improvement of impact sound insulation is expressed in decibels.

3.3
locally reacting floor coverings
floor coverings, where the impact is transmitted into the bearing floor predominantly through the area directly excited by the hammers of the tapping machine

Note 1 to entry: Thus the improvement of impact sound insulation does not depend on the size of the specimen.

4 Principle

The method in this part of ISO 16251 is directly based on the ISO 10140[4] series, where the test setup consists of two rooms above each other, separated by a standard concrete floor, on which the flooring to be tested is applied. In this part of ISO 16251, the two rooms are removed and the concrete floor is replaced by a small concrete plate of similar thickness (see Annex A). This plate is structurally decoupled from the surroundings by elastic suspensions. As in the ISO 10140[4] series, a standard tapping machine is used as an impact source and two sound levels "in the lower room" are determined, once with and once without the specimen on the plate. However, instead of the sound pressure level in the lower room, the structure-borne sound level at the lower surface of the concrete plate is determined. It is assumed that for locally reacting floor coverings the structure-borne sound level difference equals the impact sound reduction according to the ISO 10140[4] series.

In this part of ISO 16251, structure-borne sound levels are expressed in terms of acceleration levels. Nevertheless, the same procedures can be applied when measuring velocity or displacement levels instead.

5 Equipment

5.1 Test setup

The setup is shown in Annex A. It consists of a concrete slab, which is softly supported at its four corners. The area of each elastic support shall not exceed 10 cm × 10 cm. The vertical resonance of the concrete slab on the elastic bearings shall lie below 20 Hz.

The size of the slab shall be (120 ± 5) cm × (80 ± 5) cm × (20 ± 1) cm. It shall be homogeneous and of uniform thickness. Ensure that the surface of the slab is flat to ± 1 mm in a horizontal line from edge to edge, and sufficiently hard to endure the impacts of the tapping machine. A screed is allowed to provide sufficient flatness.

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