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Acoustics — Screens, furniture and single objects intended for interior use — Rating of sound absorption and sound reduction of elements based on laboratory measurements

Acoustique — Meubles, écrans et objets uniques destinés à usage intérieur — Note de l'absorption acoustique et de réduction acoustique des éléments basée sur des mesures en laboratoire

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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 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*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The interior design industry is progressing rapidly, and the acoustic characteristics of products have become an important technical aspect in the design of new products. Currently, interior design products are generally not well defined in terms of their acoustic characteristics, often leading to confusing and misleading product specifications and marketing materials. Further, it is often unclear how a product's reported acoustic characteristics are to be applied to determine its acoustic impact in a furnished room.

This document is intended to clarify the acoustic characteristics, and their application, for various interior design products. This is accomplished by a standardized test methodology for the measurement of sound absorption, and defining when an interior product is to be considered as a single object.

This document is intended to facilitate the measurement and evaluation procedure for any interior product currently on the market. By using it, different interior design products can be compared to each other in an equal manner. Additionally, product acoustic characteristics evaluated according to this document can be applied for room acoustic modelling and calculations.

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Acoustics — Screens, furniture and single objects intended for interior use — Rating of sound absorption and sound reduction of elements based on laboratory measurements

1 Scope

This document specifies how screens, furniture and single objects intended for interior use are assessed with regard to sound absorption and specifies the evaluation of sound attenuation for floor screens. It also specifies under which circumstances various interior products for offices, schools and other public spaces are considered as plane absorbers or as discrete single objects. A product considered as a single object and intended for interior use is measured according to ISO 354 and evaluated by its equivalent sound absorption area or object sound absorption coefficient in octave bands. This document defines interior products and single objects and it comprises additional information regarding measurements and assessment of single objects.

The sound absorption as specified in this document can be used to calculate:

a) reverberation time characteristics in rooms;

b) room acoustic parameters using ray tracing software.

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 354:2003, *Acoustics — Measurement of sound absorption in a reverberation room*

ISO 717-1:2013, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation*

ISO 10053, *Acoustics — Measurement of office screen sound attenuation under specific laboratory conditions*

ISO 10140-2, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 2: Measurement of airborne sound insulation*

ISO 11654:1997, *Acoustics — Sound absorbers for use in buildings — Rating of sound absorption*

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
interior acoustic product
object aimed for insertion loss and/or absorption of indoor sound

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3.2
single object
interior acoustic product (3.1) with a defined size and normally mounted by itself, i.e. at some distance to the nearest other single object

Note 1 to entry: Single objects are sometimes mounted tightly together to form an array or a large homogeneous surface. Single objects do not have the same acoustic performance when considered in larger groups.

3.3
desk screen
single object (3.2) intended to be mounted vertically on the side of a table top

3.4
floor screen
single object (3.2) intended to stand vertically on the floor

3.5
furniture ensemble
setup of furniture and screens, connected sofas, or any other combination considered as a *single object* (3.2)

3.6
equivalent sound absorption area per single object
A_{obj}
frequency-dependent value for the equivalent sound absorption area

Note 1 to entry: Measurements are carried out according to ISO 354. When the test specimen comprises several identical single objects, A_{obj} is found by dividing A_T (equivalent sound absorption area of the test specimen as defined in ISO 354) by the number of single objects.

Note 2 to entry: It is used to describe a single object's ability to absorb sound.

Note 3 to entry: The unit is absorption area in m^2.

3.7
practical sound absorption coefficient
α_p
frequency-dependent value of the sound absorption coefficient which is based on measurements on one-third-octave bands in accordance with ISO 354 and which is calculated in octave bands

[SOURCE: ISO 11654:1997, 3.1, modified — "in accordance with this International Standard" and Note 1 to entry have been deleted.]

3.8
weighted sound absorption coefficient
α_w
frequency weighted single number value evaluated from the *practical sound absorption coefficients* (3.7)

Note 1 to entry: The weighting procedure is described in ISO 11654.

3.9
single object's absorption coefficient
α_{obj}
single object (3.2)'s frequency-dependent absorption coefficient in octave bands (for use in 3D simulations) based on the product's *equivalent sound absorption area,* A_{obj} (3.6)

Note 1 to entry: Examples of evaluation are given in Annex B.

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3.10
screen sound attenuation
ΔL_S
floor screen (3.4) sound attenuation in different octave bands

Note 1 to entry: Measurements are carried out according to ISO 10053.

Note 2 to entry: For a screen with no air gap at the floor, ΔL_S is an approximation of the insertion loss that would have been obtained in a free field with a corresponding screen of infinite width and semi-infinite height.

3.11
weighted screen sound attenuation
$\Delta L_{S,W}$
single number value of the *screen sound attenuation* (3.10) weighted and evaluated from the measured octave band values

Note 1 to entry: The weighting procedure is described in ISO 10053.

3.12
sound reduction index
R
frequency-dependent measure describing how much sound energy is transmitted through a screen construction

Note 1 to entry: Measurements are carried out according to ISO 10140-2.

3.13
weighted sound reduction index
R_W
frequency weighted value evaluated from the frequency-dependent *sound reduction indexes* (3.12)

Note 1 to entry: The weighting procedure is described in ISO 717-1.

Note 2 to entry: Annex F gives additional information on which weighted sound reduction index it is reasonable to strive for depending on the screen height.

4 Methods to measure and evaluate various interior acoustic products

4.1 Single objects

4.1.1 General

Single objects are typically floor screens, desk screens, chairs, stools, desks, sofas or any other object that can absorb, scatter or spread sound within a room. They can also be unique products intended for wall application or for interior decoration, which have an added room acoustic effect.

Single objects are normally measured, evaluated and declared with regard to their sound absorption characteristics. For specific product categories or mounting conditions, additional acoustic characteristics may be measured and evaluated (see 4.3 and 4.5).

4.1.2 Single object sound absorption

The sound absorption of a single object is measured according to ISO 354 while additional specified mounting conditions are given in Annex E. The sound absorption of the object shall be given as the equivalent sound absorption area, A_{obj}, in the 1/3-octave bands between 100 Hz and 5 000 Hz and in

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