



SLOVENSKI STANDARD
oSIST prEN ISO 11654:2017
01-december-2017

Akustika - Absorberji zvoka - Vrednotenje koeficienta zvočne absorpcije (ISO/DIS 11654:2017)

Acoustics - Sound absorbers - Rating of sound absorption coefficients (ISO/DIS 11654:2017)

Akustik - Schallabsorber - Bewertung von Schallabsorptionsgraden (ISO/DIS 11654:2017)

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Acoustique - Absorbants - Évaluation des coefficients d'absorption acoustique (ISO/DIS 11654:2017)

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91.120.20	Akustika v stavbah. Zvočna izolacija	Acoustics in building. Sound insulation

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DRAFT INTERNATIONAL STANDARD

ISO/DIS 11654

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Acoustics — Sound absorbers — Rating of sound absorption coefficients

Acoustique — Absorbants — Évaluation de l'absorption acoustique coefficient

ICS: 91.120.20

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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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition which has been technically revised.

Acoustics — Sound absorbers — Rating of sound absorption coefficients

1 Scope

1.1 This International Standard specifies a method by which the frequency-dependent values of the sound absorption coefficient can be converted into a single number.

1.2 The single-number rating specified in this International Standard can be used to formulate requirements and to describe acoustical properties of sound-absorbing products. The rating is not appropriate when the products are to be used in qualified environments requiring careful acoustical design by expertise. In such cases, only complete sound absorption data as a function of frequency are satisfactory.

This International Standard is not applicable unless the applications cover the whole frequency range of the reference curve. This International Standard is, in principle, applicable to all products for which the sound absorption coefficient has been determined in accordance with ISO 354.

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*

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 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 in accordance with this International Standard

Note 1 to entry: For the value in the i^{th} octave band, the notation α_{pi} is used.

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3.2 weighted sound absorption coefficient

α_w
single-number frequency-independent value which equals the value of the reference curve at 500 Hz after shifting it as specified in this International Standard

3.3 shape indicators

L, M, H
indication showing practical sound absorption coefficients exceeding those of the shifted reference curve by 0,25 or more in different frequency ranges as specified in this International Standard.

Note 1 to entry: Negative deviations (values under the reference curve) are not considered as they are already maximized to 0,1 in the curve-shifting procedure.

4 Calculation

4.1 Practical sound absorption coefficient

Calculate the practical sound absorption coefficient, α_{pi} , for each octave band i from the arithmetic mean value of the three one-third-octave sound absorption coefficients, α_{i1} , α_{i2} , and α_{i3} within the octave:

$$\alpha_{pi} = \frac{(\alpha_{i1} + \alpha_{i2} + \alpha_{i3})}{3}$$

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The mean value is calculated to the second decimal and rounded in steps of 0,05 and maximized to $\alpha_{pi} = 1,00$ for rounded mean values $> 1,00$.

NOTE $x,y2$ is rounded to $x,y0$ and $x,y3$ is rounded to $x,y5$. $x,y7$ is rounded to $x,y5$ and $x,y8$ is rounded to $x,y + 0,1$.

EXAMPLE 0,92 is rounded to 0,90.

4.2 Weighted sound absorption coefficient

Use the α_{pi} values to calculate the weighted sound absorption coefficient α_w from the reference curve shown in Figure 1. Shift the reference curve in steps of 0,05 towards the measured value until the sum of the unfavourable deviations is less than or equal to 0,10. An unfavourable deviation occurs at a particular frequency when the measured value is less than the value of the reference curve. Only deviations in the unfavourable direction shall be counted. The weighted sound absorption α_w is defined as the value of the shifted reference curve at 500 Hz.

Examples of calculations of α_w are given in Annex A.

4.3 Shape indicators

Whenever a practical sound absorption coefficient α_{pi} exceeds the value of the shifted reference curve by 0,25 or more, one or more shape indicators shall be added in parentheses, to the α_w value.

If the excess absorption occurs at 250 Hz, use the notation L. If the excess absorption occurs at 500 Hz or 1 000 Hz, use the notation M. If the excess absorption occurs at 2 000 Hz or 4 000 Hz, use the notation H.

NOTE A shape indicator means that the sound absorption coefficient at one or more frequencies is considerably higher than the values of the shifted reference curve and that the interested parties are encouraged to look at the complete sound absorption coefficient curve.

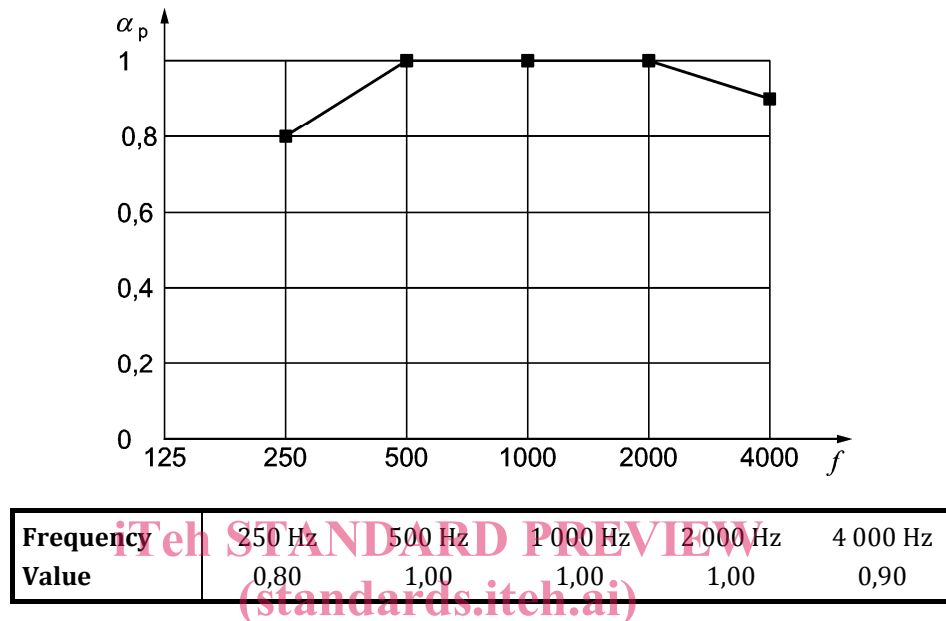


Figure 1 — Reference curve for evaluation of weighted sound absorption coefficient, α_w

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5 Presentation of results

Results shall be given in the formats specified in 5.1 to 5.4. Depending on the purpose of the presentation, one or more of the descriptors can be omitted, unless otherwise specified.

5.1 α_s values

Plot the values of the one-third-octave band sound absorption coefficients as, measured in accordance with ISO 354, on a diagram. Set out the frequency along the x -axis to a logarithmic scale and the values of α_s along the y -axis to a linear scale. The distance for an octave on the frequency scale shall be 15 mm; the distance for a range of 0,30 in absorption coefficient shall also be 15 mm. (See Annex B.)

Optionally, the diagram may be replaced or supplemented by a table. In that case, the values shall be given to two decimal places.

5.2 α_p values

Plot the values of the practical sound absorption coefficient α_p on a diagram. Set out the frequency along the x -axis to a logarithmic scale and the values of α_p along the y -axis to a linear scale. The distance for an octave on the frequency scale shall be 15 mm; the distance for a range of 0,30 in absorption

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coefficient shall also be 15 mm. Scale the y -axis from $\alpha_p = 0$ to $\alpha_p = 1,0$ and the x -axis in octave bands from 125 Hz to 4 000 Hz. (See Annex A.)

Optionally, the diagram may be replaced or supplemented by a table. In that case, the values shall be given to two decimal places.

5.3 α_w values and shape indicators (normative)

Express the weighted sound absorption coefficient α_w to two decimal places. Express the shape indicators, without commas, in parentheses, after the α_w value.

EXAMPLE $\alpha_w = 0,65(\text{MH})$

NOTE Whenever a shape indicator is given, the following sentence should be added: "It is strongly recommended to use this single-number rating in combination with the complete sound absorption coefficient curve that can be obtained on request."

5.4 α_w values, shape indicators and low frequency absorption (optional)

In case of the need to express the low frequency absorption together with the weighted sound absorption coefficient α_w and the shape indicators, add the α_p value calculated from the frequencies of 100Hz, 125Hz and 160Hz in parentheses, after the α_w value and the shape indicators.

EXAMPLE $\alpha_w = 0,65(\text{MH}) (0,15)$ or $\alpha_w = 0,65(\text{MH}) (\alpha_{p125} = 0,15)$

NOTE Whenever a shape indicator is given, the following sentence should be added: "It is strongly recommended to use this single-number rating in combination with the complete sound absorption coefficient curve that can be obtained on request."

5.5 Other information

For all products specify the depth of construction according to ISO 354 Annex B (e.g. see Figure 2 for E Type Mounting).

NOTE In Europe it is recommended to use at least a construction depth of 200 mm. In Japan it is recommended to use at least a construction depth of 300 mm. In North America it is recommended to use at least a construction depth of 400 mm.