



# SLOVENSKI STANDARD SIST EN 17823:2024

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## Akustične lastnosti gradbenih elementov in stavb - Laboratorijsko merjenje izoliranosti stopnic in stopniških izolacijskih elementov pred udarnim zvokom

Acoustic properties of building elements and of buildings - Laboratory measurement of the impact sound insulation of stairs and stair isolating elements

Akustische Eigenschaften von Bauteilen und von Gebäuden - Prüfstandsmessungen der Trittschalldämmung von Treppen und Treppen-Entkopplungselementen

Propriétés acoustiques des éléments de construction et des bâtiments - Mesurage en laboratoire de l'isolation au bruit de choc des escaliers et des éléments isolants d'escalier

**Ta slovenski standard je istoveten z: EN 17823:2024**

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## Acoustic properties of building elements and of buildings - Laboratory measurement of the impact sound insulation of stairs and stair isolating elements

Propriétés acoustiques des éléments de construction et  
des bâtiments - Mesurage en laboratoire de l'isolation  
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Akustische Eigenschaften von Bauteilen und von  
Gebäuden - Prüfstandsmessungen der  
Trittschalldämmung von Treppen und Treppen-  
Entkopplungselementen

This European Standard was approved by CEN on 12 May 2024.

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**EN 17823:2024 (E)****European foreword**

This document (EN 17823:2024) has been prepared by Technical Committee CEN/TC 126 “Acoustic properties of building elements and of buildings”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2024, and conflicting national standards shall be withdrawn at the latest by November 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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## Introduction

The procedure for characterizing the impact sound performance of stairs comes from EN ISO 12354-2:2017, Annex F, where the performance is expressed, like the performance of a floor covering, as a reduction of impact sound pressure level. This quantity allows the product comparison of stairs and stair isolating elements and predicting the impact sound of stairs in buildings using EN ISO 12354-2.

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**EN 17823:2024 (E)****1 Scope**

This document specifies procedures to measure in laboratory the impact sound level reduction of isolated heavy landings connected to a heavy wall, isolated heavy flights of stairs connected to a heavy landing, lower or upper floor, and lightweight stairs connected to a heavy wall, lower or upper floor.

This document also considers the characterization of isolating elements for heavy landings or heavy flights of stairs in terms of an insertion loss expressed as an impact sound level difference. The corresponding procedure is given in a normative annex (Annex A), separated from the other procedures for the sake of clarity.

The tests are performed in defined test configurations and the test results are firstly restricted to the test configurations as described in the test report. The data can be used for comparing the performance of products and as input for EN ISO 12354-2:2017, Annex F, to calculate the sound pressure levels produced by the same stairs and isolating elements when installed in buildings.

The test procedures defined in this document comprise the frequency range from 50 Hz to 5000 Hz.

**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.

EN 12354-5:2023, *Building acoustics — Estimation of acoustic performance of buildings from the performance of elements — Part 5: Sounds levels due to the service equipment*

EN 14366-1, *Laboratory measurement of airborne and structure-borne sound from service equipment — Part 1: Application rules for waste water installations*

EN 15657, *Acoustic properties of building elements and of buildings — Laboratory measurement of structure-borne sound from building service equipment for all installation conditions*

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

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

EN ISO 10140-3, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 3: Measurement of impact sound insulation (ISO 10140-3)*

EN ISO 10140-4, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 4: Measurement procedures and requirements (ISO 10140-4)*

EN ISO 10140-5:2021, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 5: Requirements for test facilities and equipment (ISO 10140-5)*

EN ISO 10848-1, *Acoustics — Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms — Part 1: Frame document (ISO 10848-1)*

EN ISO 12354-2:2017, *Building acoustics — Estimation of acoustic performance of buildings from the performance of elements — Part 2: Impact sound insulation between rooms (ISO 12354-2)*



EN ISO 12999-1, *Acoustics — Determination and application of measurement uncertainties in building acoustics — Part 1: Sound insulation (ISO 12999-1)*

### 3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### 3.1

##### **heavyweight stair**

stair made of reinforced concrete, consisting of flights of stairs, landings and optionally isolating elements between stair elements and building elements

Note 1 to entry: In buildings heavyweight stairs are usually located in stairwells and not inside dwellings.

Note 2 to entry: In this document a heavyweight reference stair is defined that forms a transmission system, together with the reference wall as part of which the stair and isolating elements are subjected to testing.

#### 3.2

##### **lightweight stair**

stair made of components like steps, string boards, handrails that are made of steel/wood/stone or glass (for typical examples see [5], [6]) and optionally isolating elements

Note 1 to entry: In buildings lightweight stairs are usually located inside dwellings.

Note 2 to entry: In this document a lightweight stair (system) is defined by all its components and forms a transmission system, together with the reference wall, reference lower floor and reference upper floor as part of which the stair is subjected to testing.

#### 3.3

##### **stair isolating element**

component of a stair that reduces the impact sound transmission of the stair into building elements (walls, lower and upper floors)

#### 3.4

##### **reference wall**

wall, where the stair is attached to and by which the impact sound is radiated to the receiving room when the reference heavy landing or the reference heavy flight or the lightweight stair is excited (see Figure 6, Figure 7 and Figure 8)

#### 3.5

##### **auxiliary wall**

wall opposite of the reference wall by which the reference landing is supported (see Figure 6 and Figure 7)

#### 3.6

##### **reference lower floor**

lower floor, where the stair is attached to and by which the sound is radiated when the lightweight stair is excited (see Figure 8)

**EN 17823:2024 (E)****3.7****reference upper floor**

upper floor to which the stair is attached to and by which the sound is radiated when the lightweight stair is excited (see Figure 8)

**3.8****reference landing**

heavyweight landing in the source room which, together with the reference wall, forms a transmission system as part of which the stair and isolating elements are subjected to testing (see Figure 6)

**3.9****reference flight**

heavyweight stair flight in the source room which, together with the reference wall and the reference landing, forms a transmission system as part of which the stair and isolating elements are subjected to testing (see Figure 7)

**3.10****receiver impact sound pressure level**
 $L_{i,receiver}$ 

energetically averaged sound pressure level in a one-third octave bands in the receiving room due to radiation of the reference wall ( $L_{i,wall}$ ), reference lower floor ( $L_{i,lower\ floor}$ ), reference upper floor ( $L_{i,upper\ floor}$ ), when excited by the tapping machine according to EN ISO 10140-5:2021, Annex E

Note 1 to entry:  $L_{i,receiver}$  is expressed in decibels.

Note 2 to entry: See EN ISO 10140-4 for definition of the energetically averaged sound pressure level.

Note 3 to entry: The impact sound pressure level of the reference wall  $L_{i,wall}$  is determined according to EN 12354-5:2023, Clause 5.3.2.3, from a transfer function measurement according to EN ISO 10848-1 and the theoretical force spectrum of the standard tapping machine according to EN 12354-5:2023, Clause 5.3.3 (see Clause 7.3.2).

**3.11****normalized receiver impact sound pressure level**
 $L_{n0,receiver}$ 

sum of the receiver impact sound pressure level,  $L_{i,receiver}$ , and a correction term, expressed in decibels, where the correction term is equal to ten times the common logarithm of the ratio of the measured equivalent sound absorption area,  $A$ , of the receiving room to that of the reference equivalent sound absorption area,  $A_0$

$$L_{n0,receiver} = L_{i,receiver} + 10 \lg \frac{A}{A_0} \quad (1)$$

where  $A_0 = 10 \text{ m}^2$

Note 1 to entry:  $L_{n0,receiver}$  is expressed in decibels.

Note 2 to entry: See EN ISO 10140-4 for definition of the measured equivalent sound absorption area,  $A$ , of the receiving room.

### 3.12 stair impact sound pressure level

$L_{i,\text{stair}}$

energetically averaged sound pressure level in the receiving room due to sound radiation of the reference wall, reference lower floor or reference upper floor, when reference landing ( $L_{i,\text{landing}}$ ), reference flight ( $L_{i,\text{flight}}$ ) or lightweight stair ( $L_{i,\text{lightweight stair}}$ ) is excited by the tapping machine according to EN ISO 10140-5:2021, Annex E

Note 1 to entry:  $L_{i,\text{stair}}$  is expressed in decibels.

Note 2 to entry: See EN ISO 10140-4 for definition of the energetically averaged sound pressure level.

### 3.13 normalized stair impact sound pressure level

$L_{n,\text{stair}}$

sum of the stair impact sound pressure level,  $L_{i,\text{stair}}$ , and a correction term, expressed in decibels, where the correction term is equal to ten times the common logarithm of the ratio of the measured equivalent sound absorption area,  $A$ , of the receiving room to that of the reference equivalent sound absorption area,  $A_0$

$$L_{n,\text{stair}} = L_{i,\text{stair}} + 10 \lg \frac{A}{A_0} \quad (2)$$

where  $A_0 = 10 \text{ m}^2$

Note 1 to entry:  $L_{n,\text{stair}}$  is expressed in decibels.

Note 2 to entry: See EN ISO 10140-4 for definition of the measured equivalent sound absorption area,  $A$ , of the receiving room.

### 3.14 landing impact sound pressure level reduction

$\Delta L_{\text{landing}}$

difference of the normalized wall impact sound pressure level and the normalized landing impact sound pressure level of the isolated landing

$$\Delta L_{\text{landing}} = L_{n0,\text{wall}} - L_{n,\text{landing}} \quad (3)$$

where

$L_{n0,\text{wall}}$  is the normalized impact sound pressure level of the reference wall;

$L_{n,\text{landing}}$  is the normalized impact sound pressure level of the isolated reference landing

Note 1 to entry:  $\Delta L_{\text{landing}}$  is expressed in decibels.