SIST

SLOVENSKI STANDARD
SIST EN 16272-2:2024

01-februar-2024

Železniške naprave - Infrastruktura - Protihrupne ovire in pripadajoče naprave, ki vplivajo na širjenje zvoka v zraku - Preskusna metoda za ugotavljanje akustičnih lastnosti - 2. del: Posebne karakteristike - Izolacija zvoka v zraku pri razpršenem zvočnem polju

Railway applications - Infrastructure - Noise barriers and related devices acting on airborne sound propagation - Test method for determining the acoustic performance - Part 2: Intrinsic characteristics - Airborne sound insulation under diffuse sound field conditions

Bahnanwendungen - Oberbau - Lärmschutzwände und verwandte Vorrichtungen zur Beeinflussung der Luftschallausbreitung - Prüfverfahren zur Bestimmung der akustischen Eigenschaften - Teil 2: Produktspezifische Merkmale - Luftschalldämmung unter den Bedingungen eines diffusen Schallfeldes

Applications ferroviaires - Infrastructure - Dispositifs de réduction du bruit - Méthode d'essai pour la détermination de la performance acoustique - Partie 2: Caractéristiques intrinsèques - Isolation au bruit aérien dans des conditions de champ acoustique diffus

Ta slovenski standard je istoveten z: EN 16272-2:2023

ICS:

17.140.30	Emisija hrupa transportnih sredstev	Noise emitted by means of transport
93.100	Gradnja železnic	Construction of railways

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16272-2

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ICS 93.100

Supersedes EN 16272-2:2012

English Version

Railway applications - Infrastructure - Noise barriers and related devices acting on airborne sound propagation - Test method for determining the acoustic performance - Part 2: Intrinsic characteristics - Airborne sound insulation under diffuse sound field conditions

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This European Standard was approved by CEN on 8 October 2023.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 16272-2:2023) has been prepared by Technical Committee CEN/TC 256 “Railway application”, the secretariat of which is held by DIN.

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 May 2024 and conflicting national standards shall be withdrawn at the latest by May 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.

This document supersedes EN 16272-2:2012.

With respect to the superseded document, the following changes have been made:

— The title has been slightly changed.

— The declaration of measurement uncertainty and the related confidence level is now mandatory.

— An annex with the values of the standard deviation of reproducibility and repeatability has been added; this makes possible the declaration of the measurement uncertainty and the related confidence level, which is now mandatory (Annex A).

— A detailed example has been added, including the declaration of the uncertainty (Annex B).

EN 16272-2 is part of a series of standards and should be read in conjunction with the other parts. All parts are listed below:

EN 16272-1, *Railway applications — Infrastructure — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 1: Intrinsic characteristics - Sound absorption under diffuse sound field conditions*

EN 16272-2, *Railway applications — Infrastructure — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 2: Intrinsic characteristics - Airborne sound insulation under diffuse sound field conditions* (the present document)

EN 16272-3-1, *Railway applications — Infrastructure — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 3-1: Normalized railway noise spectrum and single number ratings for diffuse sound field applications*

EN 16272-3-2, *Railway applications — Infrastructure — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 3-2: Normalized railway noise spectrum and single number ratings for direct sound field applications*

EN 16272-4, *Railway applications — Track — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 4: Intrinsic characteristics - In situ values of sound diffraction under direct sound field conditions*

EN 16272-5, *Railway applications — Infrastructure — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 5: Intrinsic characteristics - Sound absorption under direct sound field conditions*

EN 16272-6, *Railway applications — Infrastructure — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 6: Intrinsic characteristics - Airborne sound insulation under direct sound field conditions*

CEN/TS 16272-7, *Railway applications — Track — Noise barriers and related devices acting on airborne sound propagation — Test method for determining the acoustic performance — Part 7: Extrinsic characteristics - In situ values of insertion loss*

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.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

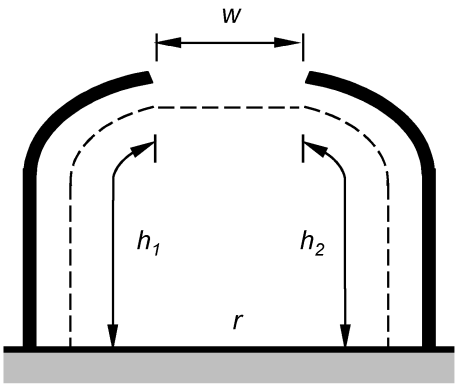
Noise barriers installed along railways should provide adequate sound insulation so that sound transmitted through the device is not significant compared with the sound diffracted over the top. This document specifies a test method for qualifying the intrinsic airborne sound insulation performance for noise barriers designed for railways in reverberant conditions, e.g. inside tunnels or deep trenches or under covers.

The measurement results of this method for airborne sound insulation are comparable but not identical with the results of the test method EN 16272-6, mainly because the present method uses a diffuse sound field, while the other method assumes a directional sound field. Research studies suggest that good correlation exists between field data, measured according to EN 16272-6 and laboratory data, measured according to the method described in the present document [1], [2], [3], [4].

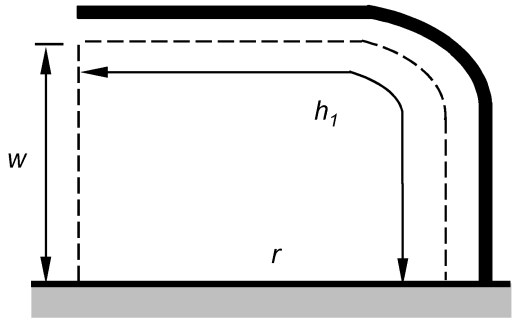
This document is not concerned with determining insertion loss (extrinsic performance) which additionally depends on factors that are not related to the product itself; e.g. the dimensions of the barrier and quality of installation work and site factors such as ground impedance, site geometry, etc. The test is designed to allow the intrinsic airborne sound insulation performance of the device to be measured; the resulting rating should aid the selection of devices for reverberant rail side applications.

For the purpose of this document reverberant conditions are defined based on the geometric envelope, e, across the railway formed by the barriers, trench sides or buildings (the geometric envelope does not include the rail surface) as shown by the dashed lines in Figure 1. Conditions are defined as being reverberant when the percentage of open space in the geometric envelope is less than or equal to 25 %, i.e. reverberant conditions occur when $w/e \leq 0{,}25$, where $e = (w+h_1+h_2)$.

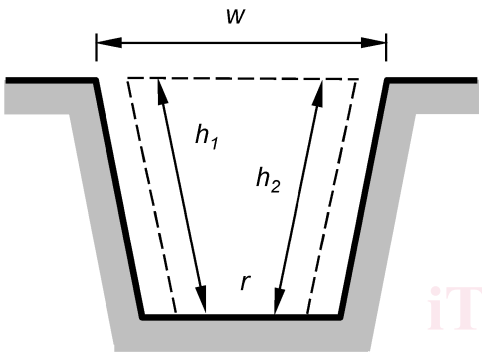
NOTE This method can be used to qualify noise barriers for other applications, e.g. to be installed nearby industrial sites. In this case, the single-number ratings can preferably be calculated using an appropriate spectrum.



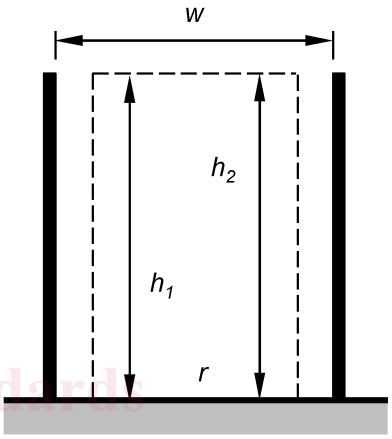
a) Partial cover on both sides of the railway; envelope, $e = w+h_1+h_2$



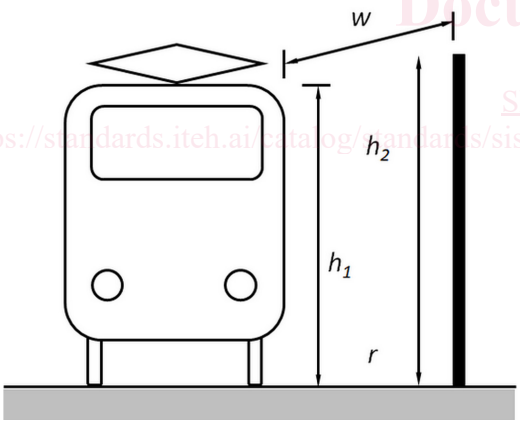
b) Partial cover on one side of the railway; envelope, $e = w+h_1$, $h_2 = 0$



c) Deep trench; envelope, $e = w+h_1+h_2$

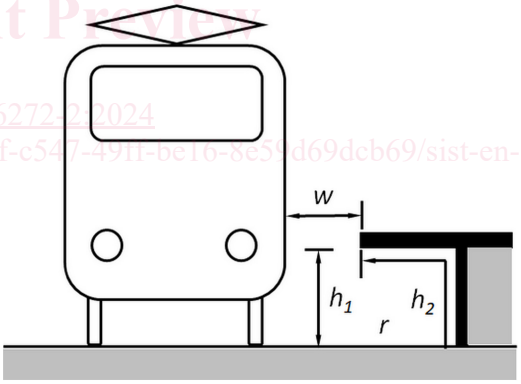


d) Tall barriers or buildings; envelope, $e = w+h_1+h_2$



e) Train passing close to a noise barrier

envelope, $e = w+h_1+h_2$



f) Train passing close to a platform at the station

envelope, $e = w+h_1+h_2$

Key

r	railway surface	h_1	Developed length of element, e.g. cover, trench side, barrier or building
w	width of open space	h_2	Developed length of element, e.g. cover, trench side, barrier or building

NOTE Figure 1 is not to scale.

Figure 1 — Sketch of the reverberant condition check in six cases

1 Scope

This document specifies the laboratory method for measuring the airborne sound insulation performance of railway noise barriers in reverberant conditions. It covers the assessment of the intrinsic performance of noise barriers and related devices acting on airborne sound propagation that can reasonably be assembled inside the testing facility described in EN ISO 10140-2 and EN ISO 10140-4.

This method is not intended for the determination of the intrinsic characteristics of airborne sound insulation of noise barriers to be installed on railway in non-reverberant conditions.

All noise reducing devices different from noise barriers and related devices acting on airborne sound propagation, e.g. devices for attenuation of ground borne vibration and on board devices, are out of the scope of this document.

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 16272-3-1, *Railway applications - Infrastructure - Noise barriers and related devices acting on airborne sound propagation - Test method for determining the acoustic performance - Part 3-1: Normalized railway noise spectrum and single number ratings for diffuse field applications*

EN ISO 10140-1, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1)*

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

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms, definitions, symbols and abbreviations

3.1 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/

NOTE For the purpose of this document, the following definitions take precedence over other definitions from the above websites.

3.1.1
noise barrier
noise reducing device, which obstructs the direct transmission of airborne sound emanating from railways and which will typically span between posts and also may overhang the railway

Note 1 to entry: Noise barriers are generally made of acoustic and structural elements (see 3.1.3 and 3.1.4).

Note 2 to entry: In some noise barriers, the acoustic function and the structural function cannot be clearly separated and attributed to different components.

3.1.2
cladding
noise reducing device, which is attached to a wall or other structure and reduces the amount of sound reflected

Note 1 to entry: Claddings are generally made of acoustic and structural elements (see 3.1.3 and 3.1.4).

3.1.3
acoustic element
element whose primary function is to provide the acoustic performance of the device

3.1.4
structural element
element whose primary function is to support or hold in place acoustic elements

3.1.5
added device
added component that influences the acoustic performance of the original noise-reducing device (acting primarily on the diffracted energy)