ICS 93.100 SLOVENSKÁ TECHNICKÁ NORMA Apríl 2024

STN	**Železnice Infraštruktúra Protihlukové bariéry a súvisiace zariadenia proti šíreniu zvuku Skúšobná metóda určovania akustických vlastností Časť 6: Vlastné charakteristiky Vzduchová nepriezvučnosť v podmienkach priameho zvukového poľa**	**STN EN 16272-6** 73 6381

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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

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

Applications ferroviaires - Infrastructure - Dispositifs de réduction du bruit - Méthode d'essai pour la détermination de la performance acoustique - Partie 6 : Caractéristiques intrinsèques - Isolation aux bruits aériens dans des conditions de champ acoustique direct

Bahnanwendungen - Oberbau - Lärmschutzwände und verwandte Vorrichtungen zur Beeinflussung der Luftschallausbreitung - Prüfverfahren zur Bestimmung der akustischen Eigenschaften - Teil 6: Produktspezifische Merkmale - In-situ-Werte zur Luftschalldämmung in gerichteten Schallfeldern

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

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European foreword

This document (EN 16272-6:2023) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, 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of an identical text or by endorsement, at the latest by May 2024 and conflicting national standards shall be withdrawn at the latest by May 2024.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 16272-6:2014.

With respect to the superseded document, the following changes have been made:

— The scanning technique is based on a nine-microphone grid; the use of a single microphone displaced in nine positions has been abandoned.

— A detailed annex on the relationship between low-frequency limit and window width has been added (Annex A).

— The way to evaluate the uncertainty of the measurement method has been improved, basing on reproducibility data from the European project QUIESST (Annex B).

— A detailed example is given, including the evaluation of measurement uncertainty (Annex C).

— a new annex on indoor measurements has been added (Annex D);

EN 16272-6 is part of a series 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 and related devices acting on airborne sound propagation alongside 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 assessing the intrinsic airborne sound insulation performance for noise barriers and related devices designed for railways in non-reverberant conditions. It can be applied indoors or outdoors. Indoors, it can be applied in a purposely built test facilities, e.g. inside a laboratory. Outdoors, it can be applied in a purposely built test facilities, e.g. near a laboratory or a factory, as well as *in situ*, i.e. where the noise barriers and related devices are installed. The method can be applied without damaging the surface of the noise barriers and related devices.

The method can be used to qualify products to be installed along railways as well as to verify the compliance of installed noise barriers and related devices to design specifications. Regular application of the method can be used to verify the long-term performance of noise barriers and related devices.

The method requires the averaging of results of measurements taken at different points behind the device under test. The method is able to investigate flat and non-flat products.

The method uses the same principles and equipment for measuring sound reflection (see EN 16272-5) and airborne sound insulation (the present document).

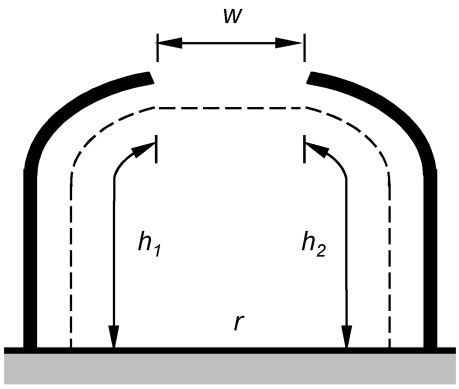
The measurement results of this method for airborne sound insulation are comparable but not identical with the results of the EN 16272-2 method, mainly because the present method uses a directional sound field, while the EN 16272-2 method assumes a diffuse sound field (where all angles of incidence are equally probable). Research studies suggest that good correlation exists between laboratory data, measured according to EN 16272-2 and field data, measured according to the method specified in the present document [4-9], [17-18].

The test method specified in this document should not be used to determine the intrinsic characteristics of airborne sound insulation for noise barriers and related devices to be installed in reverberant conditions, e.g. inside tunnels or deep trenches or under covers.

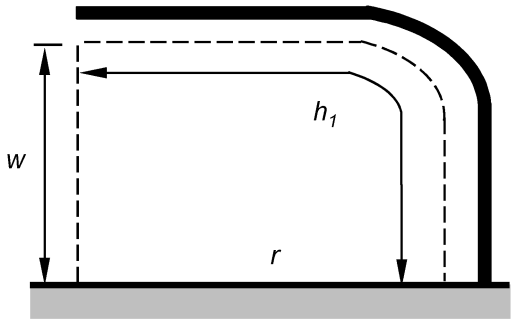
For the purpose of this document, reverberant conditions are defined based on the geometric envelope, *e*, across the road formed by the barriers, trench sides or buildings (the envelope does not include the road surface) as shown by the dashed lines in Figure 1. Conditions are defined as being reverberant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

This document introduces a specific quantity, called sound insulation index, to define the airborne sound insulation of noise barriers and related devices. This quantity should not be confused with the sound reduction index used in building acoustics, sometimes also called transmission loss.

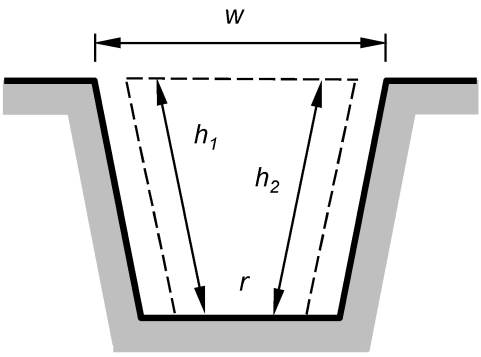
This method may be used to qualify noise barriers and related devices acting on airborne sound propagation for other applications, e.g. to be installed nearby industrial sites. In this case the single-number ratings (see EN 16272-3-2) should be calculated using an appropriate spectrum.



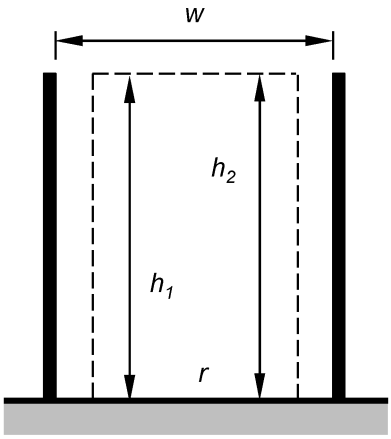
a) Partial cover on both sides of the railway; envelope, $e = w+h_1+h_2$



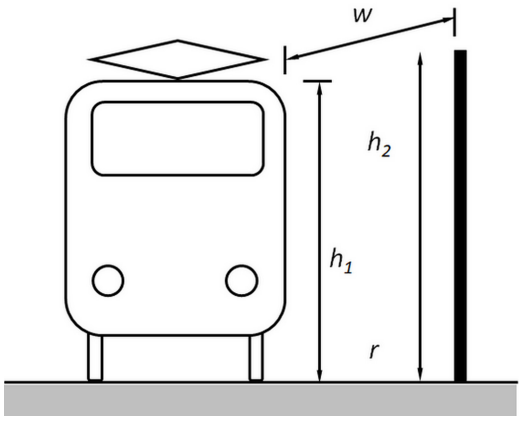
b) Partial cover on one side of the railway; envelope, $e = w+h_1$, $h_2 = 0$



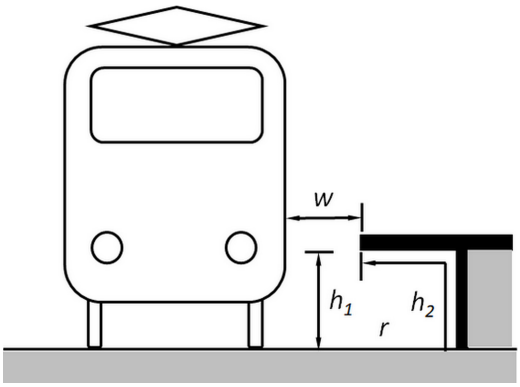
c) Deep trench; envelope, $e = w+h_1+h_2$



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	rail surface
w	width of open space
h_1	developed length of element, e.g. cover, trench side, barrier or building
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 some cases

1 Scope

This document describes a test method for measuring a quantity representative of the intrinsic characteristics of airborne sound insulation for rail noise barriers and related devices: the sound insulation index.

The test method is intended for the following applications:

— determination of the intrinsic characteristics of airborne sound insulation of noise barriers and related devices to be installed along railways, to be measured either on typical installations alongside railways or in laboratory conditions;

— determination of the intrinsic characteristics of airborne sound insulation of noise barriers and related devices in actual use;

— comparison of design specifications with actual performance data after the completion of the construction work;

— verification of the long-term performance of noise barriers and related devices (with a repeated application of the method);

— interactive design process of new products, including the formulation of installation manuals.

The test method is not intended for the determination of the intrinsic characteristics of airborne sound insulation of noise barriers and related devices to be installed in reverberant conditions, e.g. inside tunnels or deep trenches or under covers.

Results are expressed as a function of frequency in one-third octave bands, where possible, between 100 Hz and 5 kHz. If it is not possible to get valid measurement results over the whole frequency range indicated, the results need to be given in a restricted frequency range and the reasons for the restriction(s) need to be clearly reported.

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 16272-3-2, *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 16951-1, *Railway applications - Track - Noise barriers and related devices acting on airborne sound propagation - Procedures for assessing long term performance - Part 1: Acoustic characteristics*

EN 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications (IEC 61672-1)*

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