

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>See Eesti standard EVS-EN 16272-2:2023 sisaldab Euroopa standardi EN 16272-2:2023 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 29.11.2023.</p> <p>Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN 16272-2:2023 consists of the English text of the European standard EN 16272-2:2023.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 29.11.2023.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
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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 2: Intrinsic characteristics - Airborne sound insulation
under diffuse sound field conditions**

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

Bahnanwendungen - Infrastruktur - 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

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

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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

Contents

Page

European foreword.....	3
Introduction	5
1 Scope.....	7
2 Normative references.....	7
3 Terms, definitions, symbols and abbreviations.....	8
3.1 Terms and definitions	8
3.2 Symbols and abbreviations	9
4 Test arrangement.....	9
5 Test procedure and evaluation	10
5.1 Test method	10
5.2 Expression of results.....	10
6 Measurement uncertainty	10
7 Test report.....	11
Annex A (normative) Measurement uncertainty	12
A.1 General.....	12
A.2 Measurement uncertainty based upon reproducibility data.....	12
A.3 Standard deviation of repeatability and reproducibility of the sound reduction index....	12
Annex B (normative) Test report template	14
B.1 Overview	14
B.2 Test object (example)	15
B.3 Test situation (example)	17
B.3.1 Test rooms and test arrangement.....	17
B.3.2 Test equipment and test procedures	18
B.3.3 Test conditions.....	19
B.4 Test results (example)	19
B.5 Measurement uncertainty (example).....	20
Bibliography.....	21

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

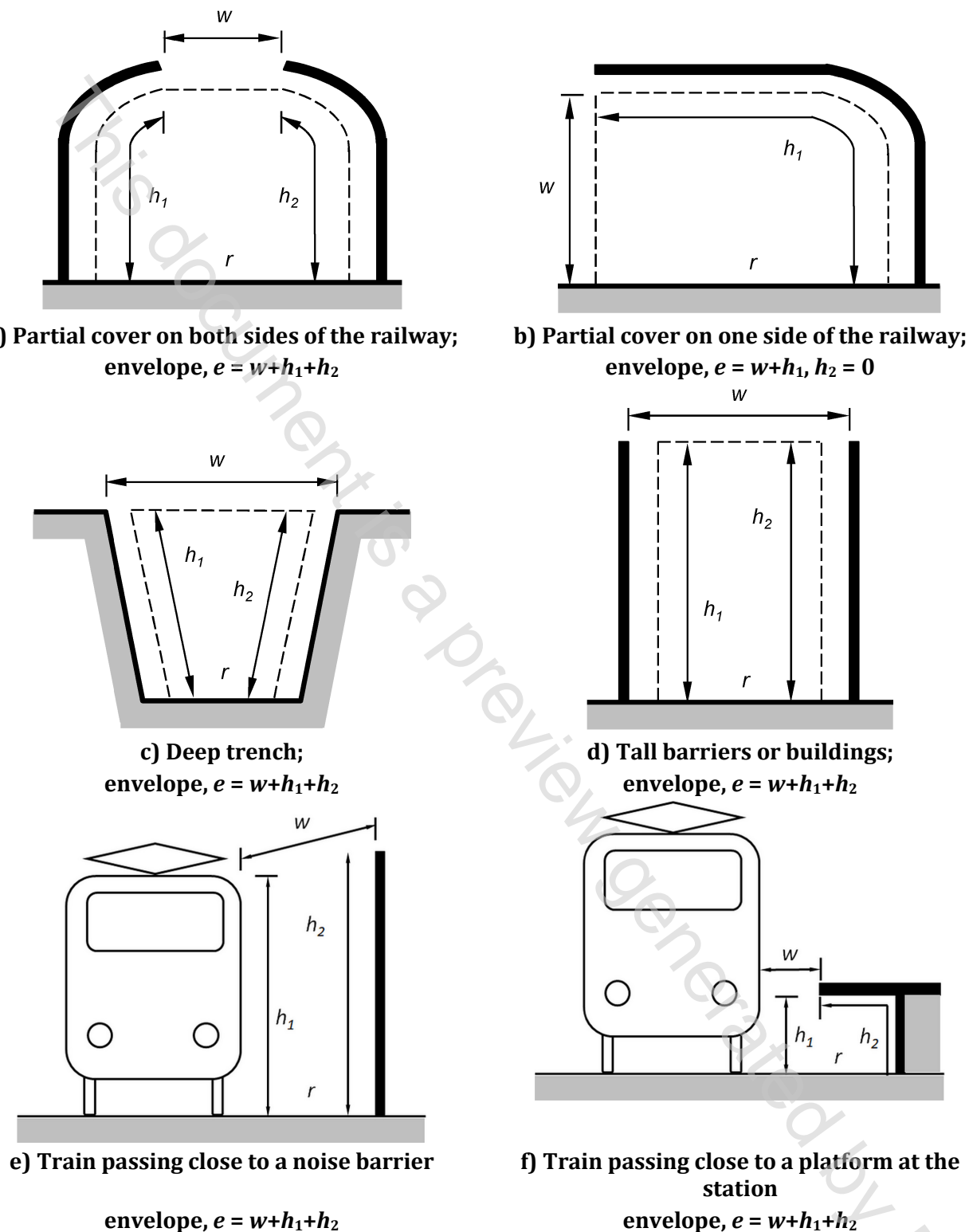
Noise barriers installed along railways should provide adequate sound insulation so that sound transmitted through the device is not significant compared with the sound diffracted over the top. This document specifies a test method for qualifying the intrinsic airborne sound insulation performance for 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.

**Key** r railway 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 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)*