

STN	Železnice. Koľaj. Protihlukové bariéry a súvisiace zariadenia proti šíreniu zvuku. Skúšobná metóda určovania akustických vlastností. Časť 4: Hodnoty in situ zvukovej difrakcie za podmienok priameho zvukového poľa.	STN EN 16272-4 73 6381
------------	--	--

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

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

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 02/17

Obsahuje: EN 16272-4:2016

124321

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2017
Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16272-4

September 2016

ICS 93.100

English Version

**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**

Applications ferroviaires - Voie - Dispositifs de
réduction du bruit - Méthode d'essai pour la
détermination des performances acoustiques - Partie
4: Caractéristiques intrinsèques - Valeurs in situ de la
diffraction acoustique dans des conditions de champ
acoustique direct

Bahnanwendungen - Oberbau - Lärmschutzwände und
verwandte Vorrichtungen zur Beeinflussung der
Luftschallausbreitung - Prüfverfahren zur Bestimmung
der akustischen Eigenschaften - Teil 4:
Produktspezifische Merkmale - In-situ -Werte zur
Schallbeugung in gerichteten Schallfeldern

This European Standard was approved by CEN on 25 March 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
European foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Symbols and abbreviations	9
5 Sound diffraction index difference measurements	10
5.1 General principle.....	10
5.2 Dimensions and specifications.....	15
5.2.1 Added devices.....	15
5.2.2 Reference walls.....	15
5.2.3 <i>In situ</i> tests.....	16
5.3 Positions of the sound source	16
5.4 Position of the microphone(s).....	16
5.5 Free-field measurements	17
5.6 Measured quantity.....	18
5.7 Measuring equipment	18
5.7.1 Components of the measuring system.....	18
5.7.2 Sound source.....	20
5.7.3 Test signal.....	20
5.8 Data processing.....	20
5.8.1 Calibration	20
5.8.2 Sample rate.....	21
5.8.3 Background noise	21
5.8.4 Measurement points	21
5.8.5 Adrienne temporal window	21
5.8.6 Placement of the Adrienne temporal window	22
5.8.7 Low frequency limit and sample size.....	24
5.9 Positioning of the measuring equipment.....	24
5.9.1 Selection of the measurement positions.....	24
5.9.2 Reflecting objects	25
5.9.3 Safety considerations.....	25
5.10 Sound diffraction index difference	25
5.11 Sample surface and meteorological conditions	25
5.11.1 Condition of the sample surface	25
5.11.2 Wind.....	26
5.11.3 Air temperature.....	26
6 Measurement uncertainty	26
7 Measuring procedure	26
8 Test report.....	27
8.1 Expression of results.....	27
8.2 Further information.....	27

Annex A (informative) Indoor measurements for product qualification	29
A.1 General	29
A.2 Parasitic reflections	29
A.3 Reverberation time of the room	29
Annex B (informative) Measurement uncertainty	31
B.1 General	31
B.2 Expression for the calculation of sound diffraction index	31
B.3 Contributions to measurement uncertainty	32
B.4 Expanded uncertainty of measurement	33
B.5 Measurement uncertainty based upon reproducibility data	33
Bibliography	34

European foreword

This document (EN 16272-4:2016) 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 March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.

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

This European Standard is one of the series EN 16272 “Railway applications – Track – Noise barriers and related devices acting on airborne sound propagation – Test method for determining the acoustic performance” as listed below:

- *Part 1: Intrinsic characteristics – Sound absorption in the laboratory under diffuse sound field conditions*
- *Part 2: Intrinsic characteristics – Airborne sound insulation in the laboratory under diffuse sound field conditions*
- *Part 3-1: Normalized railway noise spectrum and single number ratings for diffuse field applications*
- *Part 3-2: Normalized railway noise spectrum and single number ratings for direct field applications*
- *Part 4: Intrinsic characteristics – In situ values of sound diffraction under direct sound field conditions*
- *Part 5: Intrinsic characteristics – In situ values of sound reflection under direct sound field conditions*
- *Part 6: Intrinsic characteristics – In situ values of airborne sound insulation under direct sound field conditions*
- *Part 7: Extrinsic characteristics – In situ values of insertion loss*

This document should be read in conjunction with:

- EN 16272-3-2, *Railway applications – Track – 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 field applications*
- EN 16272-6, *Railway applications – Track – Noise barriers and related devices acting on airborne sound propagation – Test method for determining the acoustic performance – Part 6: Intrinsic characteristics – In situ values of airborne sound insulation under direct sound field conditions*

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Part of the market for railway noise barriers and related devices acting on airborne sound propagation includes products to be added to the top of noise barriers and intended to contribute to sound attenuation acting primarily on the diffracted sound field. These products are called here “added devices”. This standard has been developed to specify a test method for determining the acoustic performance of added devices.

The test method can be applied *in situ*, i.e. where the railway noise barriers and the added devices are installed. The method can be applied without damaging the railway noise barriers or the added devices.

The method can be used to qualify products before the installation along railways as well as to verify the compliance of installed added devices to design specifications. Repeated application of the method can be used to verify the long term performance of added devices.

This method could be used to qualify added devices for other applications, e.g. to be installed along roads or nearby industrial sites. In this case, special care has to be taken in considering the location of the noise sources and the single-number ratings should be calculated using an appropriate spectrum.

No other national or international standard exists about the subject of this standard.

1 Scope

This European Standard describes a test method for determining the intrinsic characteristics of sound diffraction of added devices installed on the top of railway noise barriers. The test method prescribes measurements of the sound pressure level at several reference points near the top edge of a noise barrier with and without the added device installed on its top. The intrinsic effectiveness of the added device is calculated as the difference between the measured values with and without the added devices, correcting for any change in height. In other words, the method described here gives the acoustic benefit of changing the shape and materials of the top edge over a simple barrier of the same height. This is an intrinsic characteristic of the added device, provided that the source and receiver positions are standardized. In practice, when the added device is placed over an existing barrier, it raises the height and this provides additional screening, depending on the source and receiver positions; this additional screening is not considered in this European Standard.

The test method is intended for the following applications:

- preliminary qualification, outdoors or indoors, of added devices to be installed on noise barriers;
- determination of the sound diffraction index difference of added devices in actual use;
- comparison of design specifications of an added device with actual performance data after the completion of the construction work;
- verification of the long term performance of added devices (with a repeated application of the method);
- interactive design process of new products, including the formulation of installation manuals.

The test method can be applied both in situ and on samples purposely built to be tested using the method described here.

Results are expressed as a function of frequency, in one-third octave bands between 100 Hz and 5 kHz. If it is not possible to get valid measurements results over the whole frequency range indicated, the results shall be given in the restricted frequency range and the reasons for the restriction(s) shall be clearly reported. A single-number rating is calculated from frequency data.

For indoor measurements, see Annex A.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 — Track — 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 field applications*

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

EN ISO 354, *Acoustics — Measurement of sound absorption in a reverberation room (ISO 354)*

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)*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN