

Road traffic noise reducing devices - Test method for determining the acoustic performance - Part 6: Intrinsic characteristics - In situ values of airborne sound insulation under direct sound field conditions

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 1793-6:2018+A1:2021 sisaldab Euroopa standardi EN 1793-6:2018+A1:2021 ingliskeelset teksti.	This Estonian standard EVS-EN 1793-6:2018+A1:2021 consists of the English text of the European standard EN 1793-6:2018+A1:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 10.03.2021.	Date of Availability of the European standard is 10.03.2021.
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English Version

Road traffic noise reducing devices - Test method for
determining the acoustic performance - Part 6: Intrinsic
characteristics - In situ values of airborne sound insulation
under direct sound field conditions

Dispositifs de réduction du bruit du trafic routier -
Méthode d'essai pour la détermination de la
performance acoustique - Partie 6 : Caractéristiques
intrinsèques - Valeurs in situ d'isolation aux bruits
aériens dans des conditions de champ acoustique
direct

Lärmschutzvorrichtungen an Straßen - Prüfverfahren
zur Bestimmung der akustischen Eigenschaften - Teil
6: Produktspezifische Merkmale - In-situ-Werte der
Luftschalldämmung in gerichteten Schallfeldern

This European Standard was approved by CEN on 19 February 2018 and includes Amendment 1 approved by CEN on 17 August 2020.

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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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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 1793-6:2018+A1:2021) has been prepared by Technical Committee CEN/TC 226 “Road equipment”, 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 September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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 includes Amendment 1 approved by CEN on 06 January 2020.

This document supersedes A1 EN 1793-6:2018 A1.

A1 Deleted text A1

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

EN 1793-6 is part of a series of documents and will be read in conjunction with the following:

- EN 1793-1, *Road traffic noise reducing devices - Test method for determining the acoustic performance - Part 1: Intrinsic characteristics of sound absorption under diffuse sound field conditions*;
- EN 1793-2, *Road traffic noise reducing devices - Test method for determining the acoustic performance - Part 2: Intrinsic characteristics of airborne sound insulation under diffuse sound field conditions*;
- EN 1793-3, *Road traffic noise reducing devices - Test method for determining the acoustic performance - Part 3: Normalized traffic noise spectrum*;
- EN 1793-4, *Road traffic noise reducing devices - Test method for determining the acoustic performance - Part 4: Intrinsic characteristics - In situ values of sound diffraction*;
- EN 1793-5, *Road traffic noise reducing devices - Test method for determining the acoustic performance - Part 5: Intrinsic characteristics - In situ values of sound reflection under direct sound field conditions*.

This European Standard has been prepared, under the direction of Technical Committee CEN/TC 226 “Road equipment”, by Working Group 6 “Noise reducing devices”.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Noise reducing devices alongside roads 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 reducing devices designed for roads in non-reverberant conditions. It can be applied *in situ*, i.e. where the noise reducing devices are installed. The method can be applied without damaging the surface of the noise reducing device.

The method can be used to qualify products to be installed along roads as well as to verify the compliance of installed noise reducing devices to design specifications. Regular application of the method can be used to verify the long term performance of noise reducing 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 1793-5) and airborne sound insulation (the present document).

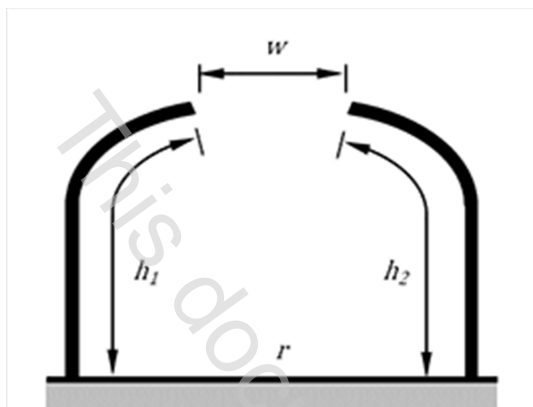
The measurement results of this method for airborne sound insulation are comparable but not identical with the results of the EN 1793-2 method, mainly because the present method uses a directional sound field, while the EN 1793-2 method assumes a diffuse sound field (where all angles of incidence are equally probable). Research studies suggest that good correlation exists between laboratory data, measured according to EN 1793-2 and field data, measured according to the method described in the present document [4], [5], [6], [7], [15].

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

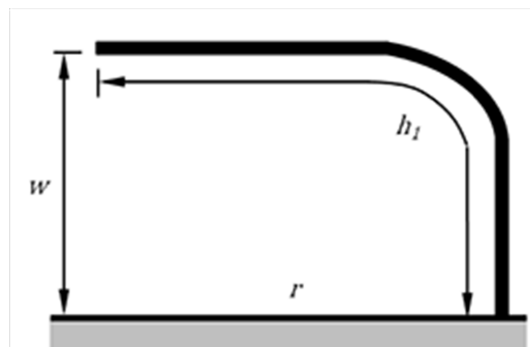
For the purpose of this document, reverberant conditions are defined based on the geometric envelope, e , across the road formed by the barriers, trench sides or buildings (the envelope does not include the road surface) as shown by the dashed lines in Figure 1. Conditions are defined as being reverberant 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 a noise reducing device. This quantity should not be confused with the sound reduction index used in building acoustics, sometimes also called transmission loss.

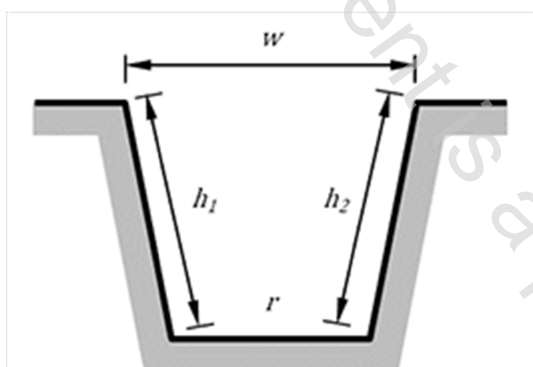
NOTE This method can be used to qualify noise reducing devices for other applications, e.g. to be installed nearby industrial sites. In this case, the single-number ratings can preferably be calculated using an appropriate spectrum.



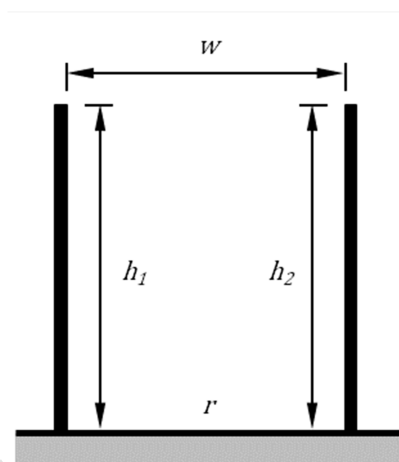
a) Partial cover on both sides of the road;
envelope, $e = w + h_1 + h_2$



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



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



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

Key

r road 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 four cases

1 Scope

This document describes a test method for measuring a quantity representative of the intrinsic characteristics of airborne sound insulation for traffic noise reducing 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 reducing devices to be installed along roads, to be measured either *in situ* or in laboratory conditions;
- determination of the *in situ* intrinsic characteristics of airborne sound insulation of noise reducing 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 reducing 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 reducing 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 will be given in a restricted frequency range and the reasons for the restriction(s) will 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 1793-3, *Road traffic noise reducing devices - Test method for determining the acoustic performance – Part 3: Normalized traffic noise spectrum*

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)*