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I.S. EN 1793-6:2012

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

I.S. EN 1793-6:2012

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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 29 September 2012.

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Foreword

This document (EN 1793-6:2012) 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of an identical text or by endorsement, at the latest by May 2013, and conflicting national standards shall be withdrawn at the latest by March 2014.

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 has been prepared, under the direction of Technical Committee CEN/TC 226 “Road equipment”, by Working Group 6 “Anti noise devices”.

EN 1793-6 is part of a series of documents and should 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*;
- 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*;
- CEN/TS 1793-4, *Road traffic noise reducing devices — Test method for determining the acoustic performance — Part 4: Intrinsic characteristics — In situ values of sound diffraction*;
- CEN/TS 1793-5, *Road traffic noise reducing devices — Test method for determining the acoustic performance — Part 5: Intrinsic characteristics — In situ values of sound reflection and airborne sound insulation*.

According to the CEN/CENELEC Internal Regulations, the national standards organisations 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

Noise reducing devices alongside roads have to provide adequate sound insulation so that sound transmitted through the device is not significant compared with the sound diffracted over the top. This European Standard 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.

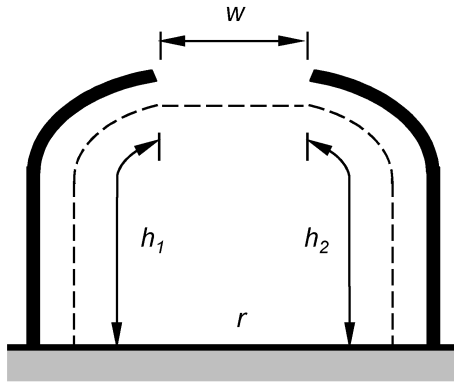
The method can be used to qualify products to be installed along roads as well as to verify the compliance of installed noise reducing devices to design specifications. Regular application of the method can be used to verify the long term performance of noise reducing devices.

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 CEN/TS 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). The test method described in this European Standard 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 European Standard, 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 $e = (w+h_1+h_2)$.



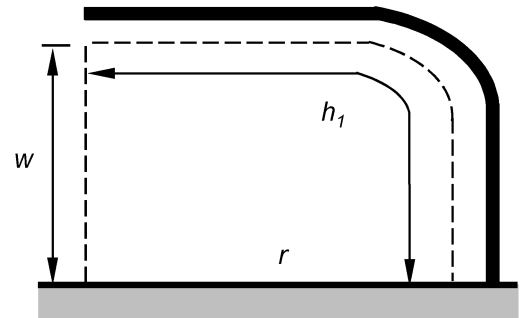
Key

h_1 : length of left barrier surface

h_2 : length of right barrier surface

envelope, $e = w + h_1 + h_2$

(a) Partial cover on both sides of the road

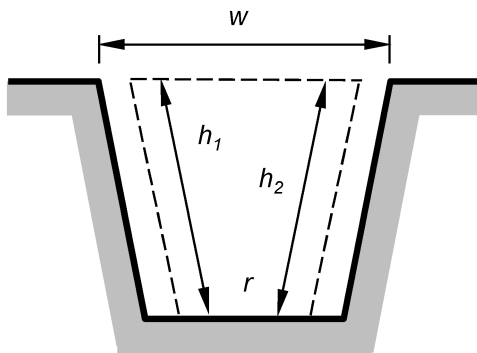


Key

h_1 : length of partial cover surface envelope

$e = w + h_1$

(b) Partial cover on one side of the road



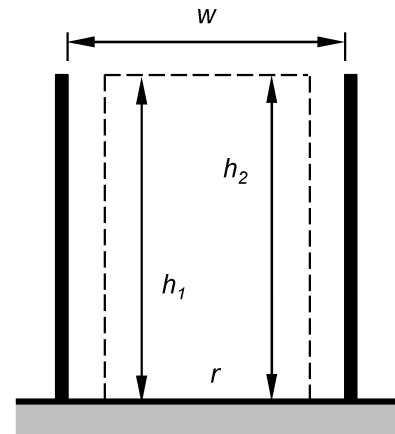
Key

h_1 : length of left trench side

h_2 : length of right trench side

envelope, $e = w + h_1 + h_2$

(c) Deep trench



Key

h_1 : length of left barrier/building

h_2 : length of right barrier/building

envelope, $e = w + h_1 + h_2$

(d) Tall barriers or buildings

In all cases:

r : road surface;

w : width of open space.

Figure 1 — Sketch of the reverberant condition check in four cases (not to scale)

This European Standard 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. Research studies suggest that a very good correlation exists between data measured according to EN 1793-2 and data measured according to the method described in this document.

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

1 Scope

This European Standard 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 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, 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 1793-3, *Road traffic noise reducing devices — Test method for determining the acoustic performance — Part 3: Normalized traffic noise spectrum*

IEC 61672-1:2002, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1

noise reducing device

device that is designed to reduce the propagation of traffic noise away from the road environment

Note 1 to entry: This may be a noise barrier, cladding, a road cover or an added device. These devices may include both acoustic and structural elements.

3.2

acoustical elements

elements whose primary function is to provide the acoustic performance of the device

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