



SLOVENSKI STANDARD

SIST EN 1794-1:1999

01-november-1999

Protihrupne ovire za cestni promet – Neakustične lastnosti – 1. del: Mehanske lastnosti in zahteve za stabilnost

Road traffic noise reducing devices - Non-acoustic performance - Part 1: Mechanical performance and stability requirements

Lärmschutzeinrichtungen an Straßen - Nichtakustische Eigenschaften - Teil 1: Mechanische Eigenschaften und Anforderungen an die Standsicherheit

Dispositifs de réduction du bruit du trafic routier - Performances non acoustiques - Partie 1: Performances mécaniques et exigences en matière de stabilité

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ICS:

17.140.30	Emisija hrupa transportnih sredstev	Noise emitted by means of transport
93.080.30	Cestna oprema in pomožne naprave	Road equipment and installations

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en

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EUROPEAN STANDARD

EN 1794-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 1998

ICS 93.080.30

Descriptors: environmental protection, acoustics, noise: sound, roads, traffic, lanes, acoustic shields, noise reduction, tests, mechanical properties, computation, loads: forces, stability

English version

Road traffic noise reducing devices - Non-acoustic performance - Part 1: Mechanical performance and stability requirements

Dispositifs de réduction du bruit du trafic routier -
Performances non acoustiques - Partie 1: Performances
mécaniques et exigences en matière de stabilité

Lärmschutzeinrichtungen an Straßen - Nichtakustische
Eigenschaften - Teil 1: Mechanische Eigenschaften und
Anforderungen an die Standsicherheit

This European Standard was approved by CEN on 21 June 1998.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard 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 January 1999, and conflicting national standards shall be withdrawn at the latest by January 1999.

This European Standard consists of the following Parts under the general title " Road traffic noise reducing devices - Non-acoustic performance " :

- Part 1 : Mechanical performance and stability requirements;
- Part 2 : General safety and environmental requirements.

Annexes A to E of this Part of EN 1794 are normative.

Another standard covering long term durability (service life) is in course of preparation.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

While performing their primary function, road traffic noise reducing devices are exposed to a range of forces due to wind, dynamic air pressure caused by passing traffic, and the self weight of its component parts. They may also be subjected to shocks caused by stones or other debris thrown up by vehicle tyres and, in some countries, the dynamic force of snow ejected by equipment used to clear roads in winter. The deflections of a noise reducing device under such loads during its design life should not reduce its effectiveness.

1 Scope

This European Standard specifies criteria to categorize road traffic noise reducing devices according to basic mechanical performance under standard conditions of exposure, irrespective of the materials used. A range of conditions and optional requirements is provided to allow for the wide diversity of practice within Europe. Individual aspects of performance are covered separately in the annexes. Safety considerations in the event of damage to noise reducing devices are covered in Part 2 of this European Standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ENV 1991-2-4	Eurocode 1 : Basis of design and actions on structures : Part 2 -4 : Wind actions
EN 1317-1	Road restraint systems - Part 1 : Terminology and general criteria for test methods
EN 1317-2	Road restraint systems - Part 2 : Performance classes, impact test acceptance criteria and test methods for safety barriers
EN 1794-2:1998	Road traffic noise reducing devices - Non-acoustic performance - Part 2 : General safety and environmental requirements

3 Definitions and symbols

3.1 Definitions

For the purposes of this standard, the following definitions apply :

3.1.1 noise barrier : Noise reducing device which obstructs the direct transmission of airborne sound emanating from road traffic.

3.1.2 cladding : Noise reducing device which is attached to a wall or other structure to reduce the amount of sound reflected.

3.1.3 cover : Noise reducing device which either spans or overhangs the highway.

3.1.4 structural element : Element whose primary function is to support or hold in place acoustic elements.

3.1.5 acoustic element : Element whose primary function is to provide the acoustic performance of the device.

3.1.6 mechanical test hammer : Device of the type used for measuring the elasticity of hard surfaces.

3.1.7 test area : Central area of a full size panel enclosed by a margin of 125 mm from each edge, as shown in figure C.2.

3.1.8 vehicle occupants safe device : A traffic safe noise reducing device for which a vehicle impact does not cause more danger to the occupants than allowed for safety barriers in EN 1317-2. However, it does not need to prevent the vehicle from going through it, nor is it presumed that parts of the device are prevented from becoming detached.

3.1.9 combined safety and noise barrier : A traffic safe noise reducing device which fulfils all the requirements for safety barriers in a given containment class as defined in EN 1317-2.

3.1.10 dynamic load : Load due to snow thrown against a noise reducing device by snow ploughing equipment.

3.1.11 ploughing speed : Speed of the snow ploughing equipment as it passes the noise barrier

3.2 Symbols

$C_e(z)$	exposure coefficient
C_p	pressure coefficient
d	deflection, in millimetres
d_{\max}	maximum deflection, in millimetres
h	total height of elements, in millimetres
L	length of elements, in millimetres
L_S	greatest length of structural element, in millimetres
L_A	greatest length of acoustic element, in millimetres
$q_{(v)}$	dynamic pressure due to passing vehicles, in pascals
S	load factor
S_G	load factor (weight)

S_w	load factor (wind).
V_{ref}	mean wind velocity at height z , in metres per second
W	wind pressure, in pascals
z	height above the ground, in metres
ρ	air density, in kilograms per cubic metre

4 Requirements

4.1 Wind load and static load

Limiting values for elastic and permanent deflections shall not exceed the values specified in annex A.

To ensure connections do not fail load factors shall be applied in accordance with annex A.

NOTE : This European Standard permits specifying authorities to indicate that there is no requirement for resistance to wind or static load.

4.2 Self weight

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Under standard conditions the deflections shall not exceed the limiting values given in annex B.

NOTE : This European Standard permits specifying authorities to indicate that there is no requirement for an element of a noise reducing device to support its own weight or the weight of other elements.

4.3 Impact of stones

Damage caused by controlled impacts shall not exceed the criteria specified in annex C.

NOTE : This European Standard permits specifying authorities to indicate that there is no requirement for resistance to the impact of stone.

4.4 Safety in collision

When safety in collision has to be assessed, the behaviour under impacts specified in EN 1317-2 shall be classified in accordance with annex D.

NOTE : This European Standard permits specifying authorities to indicate that there is no requirement for verification of safety in the event of an impact by an errant vehicle.

4.5 Dynamic forces from snow clearance

When the effects of dynamic forces from snow clearance have to be assessed, this shall be done in accordance with annex E.

NOTE : This European Standard permits specifying authorities to indicate that there is no requirement for resistance to the force of snow thrown sideways by clearance equipment.

5 Test report

5.1 Every test report on aspects of performance shall include the following information :

- a) the number and year of this European Standard, EN 1794-1:1998
- b) a full description of the element or system tested, including manufacturer(s), part numbers, place and date of origin ;
- c) a description of the method of sampling, if parts of manufactured elements are evaluated by testing ;
- d) the place and date of the assessment, and the name of the assessor ;
- e) a sufficient description of any tests carried out, any results measured and the conclusions drawn about the product together with any illustrations or photographs, all as specified in the appropriate annex.

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5.2 A summary report shall be produced, identifying the aspects of performance for which detailed reports are available and the level of performance assessed, where appropriate.

Annex A (normative)

Wind load and static load

A.1 General

The methods for calculating wind load on noise reducing devices have been harmonized to allow for the particular climatic conditions within each region.

As considerable differences existed in the methods of calculation used in different European countries, an effort has been made to define an acceptable level of performance by applying load factors to the basic load calculated to take account of its location. Limits are placed on deflections to avoid acoustic leakage either while the noise reducing device is being subjected to its design wind load or afterwards.

Adequacy of mechanical performance in fulfilling the structural criteria given in this annex is in general demonstrated by calculations taking into account the values of elastic limit, modulus of elasticity, and other factors relating to the materials employed in the construction. In cases where calculations are thought to be unreliable, tests are used to determine the resistance of the elements in the same arrangement as in the intended use of the noise reducing device.

The range of temperature over which performance is within acceptance criteria is determined to enable noise reducing devices to be appropriately specified for extreme conditions of heat or cold.

This annex specifies the mechanical requirements for noise reducing devices exposed to aerodynamic load, excepting the design of foundations. The method of calculating aerodynamic and static loads and the minimum mechanical requirements for structural and acoustical elements and fixing devices are given. Two sources of aerodynamic load are considered: firstly, wind forces and secondly, dynamic air pressure due to passing vehicles. The forces acting on noise absorbing cladding attached to supporting walls are also considered.

In the absence of specific Eurocodes existing Eurocodes for building are referred to.

A.2 Aerodynamic load

Aerodynamic load shall be considered acting normal to the exposed surface of the noise reducing device.

NOTE : Design wind load and dynamic pressure due to vehicles may be assumed not to act simultaneously.

A.2.1 Wind load

The wind load shall be calculated in accordance with ENV 1991-2-4, which is based on national maps showing basic wind speeds.

NOTE : The calculations can also be carried out taking a basic wind speed from more precise data, using a return period of 50 years.

The reference wind pressure in pascals, at height z above average ground level is calculated as :

$$q_{\text{ref}} = \frac{1}{2} \rho V_{\text{ref}}^2 \quad (\text{A.1})$$

The resulting wind pressure (or suction) in pascals, on a barrier or other vertical noise reducing device is then :

$$W = q_{\text{ref}} C_e(z) C_p \quad (\text{A.2})$$

A.2.2 Dynamic pressure due to vehicles

For the standard cases a) to c), the following values of dynamic pressure (or suction) in pascals, shall be used.

a) Traffic of vehicles in open air at a distance of 1 m from the noise reducing device and at a maximum speed of 100 km/h :

$$q_{(v)} = 650$$

b) Traffic of vehicles in open air at a distance of 3 m from the noise reducing device and at speeds higher than 120 km/h :

$$q_{(v)} = 800$$

c) Bi-directional traffic in a tunnel, at a distance of 1 m from the noise reducing device and maximum speed of 120 km/h :

$$q_{(v)} = 1\,500$$

d) In other cases, independent calculations shall be made to ascertain the magnitude of dynamic pressure.

A.3 Mechanical requirements for free standing noise barriers

A.3.1 General

The temperature range, within limits of -30 °C to $+70\text{ °C}$, over which the requirements in A.3.2 to A.4.4 are met shall be reported. For the purposes of calculation or test, temperature intervals of 10 °C shall be used.

A.3.2 Structural elements

A.3.2.1 General

In determining deflections of structural elements, rotation and displacements originating from foundations shall not be taken into account.