SLOVENSKI STANDARD
oSIST prEN 1794-1:2022

01-februar-2022

Protihrupne ovire za cestni promet - Neakustične lastnosti - 1. del: Metode določanja stabilnosti in mehanskih značilnosti

Road traffic noise reducing devices - Non-acoustic performance - Part 1: Methods of determination of the mechanical and stability characteristics

Lärmschutzvorrichtungen 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

Ta slovenski standard je istoveten z: **prEN 1794-1**

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

oSIST prEN 1794-1:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 1794-1

December 2021

ICS 93.080.30

Will supersede EN 1794-1:2018+AC:2018

English Version

Road traffic noise reducing devices - Non-acoustic performance - Part 1: Methods of determination of the mechanical and stability characteristics

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

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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 226.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, 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, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

This document (prEN 1794-1:2021) has been prepared by Technical Committee CEN /TC 226 "Road equipment", the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1794-1:2017.

The main change compared to the previous edition is the following:

— The Annexes A to D: the acceptance criteria given in the previous version of this standard have been transferred to EN 14388:2021.

EN 1794 consists of the following parts under the general title *"Road traffic noise reducing devices — Non-acoustic performance":*

— *Part 1: Methods of determination of the mechanical and stability characteristics*

— *Part 2: Methods of determination of the general safety and environmental characteristics*

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 can 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 document specifies criteria to categorize road traffic noise reducing devices according to basic mechanical characteristics under standard conditions of exposure, irrespective of the materials used. A range of conditions and optional requirements is provided in order to take into account the wide diversity of practice in Europe. Individual aspects of performance are covered separately in the annexes. Safety considerations in the event of damage to road noise reducing devices are covered in prEN 1794-2.

This document covers the current behaviour of the product. For the assessment of its long term characteristics, EN 14389-2 is applicable.

NOTE The test procedure described in Annex A does not consider the fatigue effect.

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 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 including vehicle parapets*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
road traffic noise reducing device
RTNRD
device designed to reduce the propagation of traffic noise away from the road environment

Note 1 to entry: The NRD may comprise acoustic elements (3.1.2) only or both structural (3.1.3) and acoustic elements.

Note 2 to entry: Applications of NRD include noise barriers (3.1.4), claddings(3.1.5), covers (3.1.6) and added devices (3.1.7).

3.1.2
acoustic element
element whose primary function is to provide the acoustic characteristic of the device

3.1.3
structural element
element whose primary function is to support or hold in place acoustic elements

3.1.4
noise barrier
noise reducing device which obstructs the direct transmission of airborne sound emanating from road traffic

3.1.5
cladding
noise-reducing device which is attached to a wall or other structure and reduces the amount of sound reflected

3.1.6
cover
noise-reducing device which either spans or overhangs the road

3.1.7
added device
additional component that influences the acoustic characteristic of the original noise-reducing device

Note 1 to entry: The added device is acting primarily on the diffracted energy.

3.1.8
test area
central area of a full size panel enclosed by a margin of 125 mm from each edge.

Note 1 to entry: As shown in Figure C.2.

3.1.9
vehicle occupants safe device
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

3.1.10
combined safety and noise barrier
traffic safe road noise reducing device which fulfils all the requirements for safety barriers in a given containment class as defined in EN 1317-2

3.1.11
substitute load due to dynamic actions from snow clearance
load due to snow thrown against a noise reducing device by snow ploughing equipment

3.1.12
ploughing speed
speed of the snow ploughing equipment as it passes the noise barrier

3.1.13
non-vertical noise barrier
noise barrier or a part of it (e.g. cantilever) which has a vertical inclination more than 15°

3.1.14
maximum load
maximum load (in kN/m^2) that the sample can withstand with fulfilment of specified criteria

3.2 Symbols

For the purposes of this document, the following symbols apply.

h	total height of the noise barrier, in millimetres
L	length of elements, in millimetres
L_S	bearing length of structural element, in millimetres
L_A	length of acoustic element, in millimetres
F_{safe}	maximum load the element can withstand, declared by the manufacturer and tested, in kN/m²
F_{d50}	load that corresponds to a deflection of 50 mm, in kN/m²
$F_{permanent_{L_A/500}}$	load that corresponds to a permanent deflection of $L_A/500$, in kN/m²
d	deflection, in millimetres
d_{hmax}	horizontal maximum deflection, in millimetres
d_{vmax}	vertical maximum deflection, in millimetres
$d_{selfweight}$	deflection of the sample in horizontal position under its own weight
d_{safe}	deflection after having applied the F_{safe} load
$d_{permanent}$	permanent deflection after charge
d_{50}	deflection of 50 mm
γ_G	partial factor for permanent actions, also accounting for model uncertainties and dimensional variations
γ_F	partial factor for actions, also accounting for model uncertainties and dimensional variations
γ	load factor
SF	safety factor

4 Characteristics

4.1 General

Under any of the loads specified in this Clause 4, it shall be reported whether elements become detached from their supports or fixings fail.

The influence of inhomogeneity shall be considered in the relevant verifications according to the specific Eurocodes.

All failure modes and deformation which may cause transient or permanent disorders should be considered. These modes can affect the overall behaviour of the structure or the behaviour of some elements.

4.2 Wind load and load due to passing vehicles

The manufacturer shall provide the result of the assessments done according to the methods described in Annex A.

4.3 Resistance to self-weight

The manufacturer shall provide the dry and wet (or reduced wet) weight according to Annex B.

The manufacturer shall provide the vertical load the product can withstand under the self-weight, as calculated or tested in Annex B, with reference to the requirements specified in Annex B.

4.4 Impact of stones

Damage caused by controlled impacts shall be tested in accordance with Annex C.

4.5 Safety in collision

When the functions of noise barrier and safety barrier are integrated in one system, the safety in collision shall be tested in accordance with EN 1317-1 and EN 1317-2. See also informative Annex D.

4.6 Substitute load due to dynamic actions from snow clearance

The effects of dynamic forces from snow clearance shall be tested in accordance with Annex E, where required or specified.

5 Test report

A test report shall be produced and shall include the following information:

a) number and year of this document, i.e. prEN 1794-1:2021;

b) full description of the test specimen including manufacturer's name and product identifier with sectional drawings and photographs showing mounting conditions; masses, densities, dimensions and specifications of panels, posts and seals, including any internal components;

c) description of the method of sampling, if parts of manufactured elements are evaluated by testing;

d) place and date of the test, and the name of the relevant responsible person(s);

e) sufficient description of any tests carried out, any results measured together with any illustrations or photographs, all as specified in the appropriate annex.

Annex A
(normative)

Resistance against wind load and load from passing vehicles

A.1 General

The objective of this annex is to provide test methods to demonstrate the capability of the product to withstand wind load and load from passing vehicles.

The methods and criteria to characterize the maximum load RTNRDs can withstand are provided within this annex. The methods for calculating the different loads that can act on RTNRDs are provided within Eurocode EN 1990.

Results shall be separate for acoustic and structural elements. In case acoustical and structural elements are combined, determination for structural elements apply. The temperature range, within limits of -40 °C to +70 °C, over which the requirements in A.3 to A.4 are met, shall be reported.

NOTE In consideration of the various characteristics of the materials (inhomogeneity, creep, de-formations, ageing), an additional reduction of the bearing capacity may become necessary.

A.2 Determination of the characteristics

A.2.1 Structural elements

For structural elements, applicable Eurocodes shall be used.

A.2.2 Acoustic elements

A.2.2.1 General

The acoustic elements shall be tested according to the following method.

The load test shall be carried out on a representative sample which shall include an appropriate number of acoustic elements of the longest span for the element type, with posts or other supports similar to those used in practice. The supports shall be held in the horizontal plane and restrained from lateral movement and rotation. The supports may be propped if only the flexure of the acoustic elements is to be tested, otherwise the supports shall be fixed as in intended use.

The test panel shall be allowed to reach equilibrium under laboratory conditions for at least 3 h before testing. Load tests shall be carried out at 20 °C. If the product is intended to be used at very low or very high temperatures, then the test may be repeated at -40 °C and/or +70 °C with appropriate conditioning time, if the material is regarded as being temperature sensitive.

If the strength or stiffness of the load carrying material depends on temperature, the effect of temperature differing from range +10 to +30 shall be taken into consideration in testing if the intended temperature range is wider than presented above.

Results shall show that temperature variation does not cause failure in the performance of joints (acoustic element detaches from posts in the lowest temperature of the specified range, connections (screw hole in the acoustic elements) allow for shrinkage and expansion in the whole range of temperatures specified by the manufacturer.

For RTNRD's with asymmetrical design (geometry, characteristic of materials ...), the results could be different on each side. In this case, the tests shall be performed on the weakest side.

In case of a family of products, the weakest product of the family has to be tested.

A.2.2.2 Determination by testing

A.2.2.2.1 General

The test shall be carried out in a horizontal arrangement as described in A.2.2.2.2.

The manufacturer fixes himself the F_{safe} he will declare for his product as being the relevant capacity of his product to withstand loads: the following tests will be done in order to demonstrate this declared performance.

In all cases, the applied loads do not exceed F_{safe}.

The maximum load to be considered for acoustic elements is 4 kN/m² (for F_{safe} or F_{d50}).

A.2.2.2.2 Test procedure

The sample to be tested shall be supported as described in A.2.2.1. The point of the acoustic element at which the vertical deflection will reach its maximum shall be determined and all measurements of deflection relative to a fixed datum level shall be taken at this point. After 30 min in this position, a deflection reading $d_{selfweight}$ shall be taken.

When placed horizontally, the sample to be tested already supports a load corresponding to its self-weight.

Additional loading shall then be simulated by an appropriate number of weights (e.g. small sand bags) that are uniformly distributed across the acoustic element. To prevent local damages of the acoustic element, it is recommended to cover the surface using a plastic film (thickness approximately 200 µm).

In any case, the total tested load F corresponds to the self-weight plus the additional loads.

a) If the sample under test cannot be charged up to a deflection of d = 50 mm:

The additional loading F is applied, that corresponds to F_{safe} minus the self-weight of the acoustic element. After 30 min under this loading F, the deflection reading d_{safe} shall be taken. Then, the applied weights shall be carefully removed from the acoustic element and, after 30 min, the deflection reading shall be repeated. The difference between this last deflection and $d_{selfweight}$ shall be described as the permanent deflection $d_{permanent}$: its value shall not exceed the maximum admissible permanent deformation $L_A/500$. In case this permanent deflection $d_{permanent}$, after having released the load, exceeds the limit of $L_A/500$, the test has to be redone (a new sample shall be used) with a reduced F_{safe} load until the limit of $L_A/500$ for $d_{permanent}$ is no more exceeded: this load has to be declared as $F_{permanent_{L_A/500}}$ (in kN/m²).

Afterwards, the same panel shall be reloaded up to a total load of $F_{safe} \cdot SF$ (including the self-weight). The manufacturer shall report a value for SF equal or greater than 1,5. After 30 min under this loading, the deflection reading shall be taken and this maximum deflection d_{max} is reported.