SLOVENSKI STANDARD
SIST EN 1463-1:1999

01-november-1999

Materiali za označevanje vozišča – Odsevniki – 1. del: Lastnosti novih odsevnikov

Road marking materials - Retroflecting road studs - Part 1: Initial performance requirements

Straßenmarkierungsmaterialien - Markierungsknöpfe - Teil 1: Anforderungen im Neuzustand

Produits de marquage routier - Plots rétroréfléchissants - Partie 1: Spécifications des performances initiales

Ta slovenski standard je istoveten z: **EN 1463-1:1997**

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

SIST EN 1463-1:1999 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1463-1

August 1997

ICS 93.080.30

Descriptors: Roads, signalling, marking, retroreflecting devices, definitions, tests, laboratory test, visibility, photometric properties, colorimetric properties, chromaticity

English version

Road marking materials - Retroreflecting road studs - Part 1: Initial performance requirements

Produits de marquage routier - Plots rétroréfléchissants - Partie 1: Spécifications des performances initiales

Straßenmarkierungsmaterialien - Markierungsknöpfe - Teil 1: Anforderungen im Neuzustand

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Contents

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of an identical text or by endorsement, at the latest by February 1998, and conflicting national standards shall be withdrawn at the latest by February 1998.

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.

1 Scope

This European Standard specifies the initial performance requirements and laboratory test methods for retroreflecting road studs intended for use as permanent and temporary road marking materials.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate place 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.

ISO/CIE 10526: 1991	CIE Standard colorimetric illuminants
ISO/CIE 10527: 1991	CIE Standard colorimetric observers
CIE publication No. 54 (TC-2.3): 1982	Retroreflection - Definition and measurement
CIE publication No. 17.4: 1986	International lighting vocabulary

3 Definitions

For the purposes of this European Standard, the definitions given in CIE publication 17.4 apply together with the following:

3.1 retroreflecting road stud (called "road stud" in this standard): A horizontal guiding device that reflects incident light by means of retroreflectors (see 3.2) in order to warn, guide or inform road users.

NOTE: Retroreflecting road studs may be constructed in either one or more integral parts and may be bonded to, anchored within or embedded within the road surface. The retroreflecting portion may be unidirectional or bidirectional, depressible or non depressible. This device may be either permanent (type P) or temporary (type T).

3.2 retroreflector: A device which reverses the direction of visible light striking it and returns it along a path substantially parallel to its original path.

NOTE: It may be made of glass (type 1), plastic (type 2) or plastic with an abrasion resistant surface (type 3). It may have a reflective coating at the back.

3.3 non depressible road stud: A substantially rigid road stud not designed to deform under the passage of traffic (type A).

3.4 depressible road stud: A road stud designed to have one or more parts which deform under traffic and recover to their original geometry after removal of the traffic load (type B).

3.5 bonded road stud: Road stud fixed to the road surface using an adhesive applied to the stud and/or to the road surface at the time of installation.

3.6 self-adhesive road stud: Road stud precoated with adhesive.

NOTE: An adhesion enhancer (see 3.7) may be required under some climatic conditions.

3.7 adhesion enhancer: An additional coating on the load bearing surface of the road stud or on the road surface which improves the performance of the adhesive bond.

3.8 anchored road stud: Road stud fixed to the road surface using an anchor or spigot.

NOTE: The anchor(s) or spigot(s) may be an extension of the road stud body or a separate part(s) supplied for the purpose. The principal load bearing interface of the road stud and the road is between the surface of the road and the underside of the road stud.

3.9 embedded road stud: Road stud fixed into a prepared cavity of an appropriate dimension cut into the road surface.

NOTE: The principal load bearing interface of the road stud and the road is between a downward facing surface of the road stud and an upward facing surface of the cavity.

4 Types of road stud

Road studs are classified in this European Standard in accordance with tables 1, 2 and 3.

Table 1 : Classification of road studs by use

Use	Type
Permanent road stud [1)]	P
Temporary road stud [2)]	T

[1)] Provides night-time warning guidance and information to road users.

[2)] Provides daytime and night-time warning guidance and information to the road user by stimulating the use of three senses. It is received visually and can be heard and felt through the rumble effect. Temporary road studs are used only at road construction/maintenance sites.

Table 2: Classification of road studs by reflector

Reflector	Type
Glass	1
Plastic	2
Plastic with abrasion resistant layer	3

NOTE: The abrasion resistant layer is applied on the surface exposed to traffic.

Table 3: Classification of road studs by design

Design	Type
Non depressible road stud	A
Depressible road stud	B

5 Performance requirements

5.1 Construction

For safety reasons the enveloping profile of the road studs shall not present any sharp edges to traffic.

If the road stud consists of two or more parts, each replaceable part shall be removable only with a tool recommended by the manufacturer.

5.2 Dimensions

The height of that part of a road stud designed to be above the road surface shall be as follows:

- class H 0 - no performance determined;
- class H 1 - up to 18 mm;
- class H 2 - from more than 18 mm to 20 mm;
- class H 3 - from more than 20 mm to 25 mm.

NOTE: Class H 0 road studs are not intended to be subjected to traffic load.

Maximum horizontal dimensions of that part of a road stud which is exposed to traffic after installation are classified as follows:

- class HD 0 - no performance determined;
- class HD 1 - in the direction of travel: length 250 mm, width 190 mm;
- class HD 2 - in the direction of travel: length 320 mm, width 230 mm.

NOTE: Class HD 0 road studs are intended for use when other functional needs of the road stud are required (e.g. to be snowploughed).

Minimum horizontal dimensions of that part of a **temporary** road stud which is exposed to traffic after installation are classified as follows:

- class HDT 0 - no performance determined;
- class HDT 1 - in the direction of travel: length 35 mm, width 84 mm;
- class HDT 2 - in the direction of travel: length 75 mm, width 90 mm.

5.3 Night-time visibility

5.3.1 Photometric requirements:

5.3.1.1 Permanent road stud:

When tested in accordance with annex A, each retroreflective face of the road stud shall have a coefficient of luminous intensity (R) as classified (see table 4) multiplied by the appropriate colour factor given in table 5:

- class PRP 0 - no performance determined;
- class PRP 1 - not less than given in table 4.

Table 4: Class PRP 1 - Minimum R values for type 1, type 2 and type 3 road studs as new

Entrance angle β_H $\beta_V = 0°$	Observation angle α	Min. R mcd · lx^{-1}		
		Type		
		1	2	3
±15°	2°	2	2,5	1,5
±10°	1°	10	25	10
±5°	0,3 °	20	220	150

Table 5: Colour factors for the retroreflectors of road studs

Colour	Colour factor
White	1,0
Yellow	0,6
Amber	0,5
Red	0,2
Green	0,2

5.3.1.2 Temporary road studs

When tested in accordance with annex A, each retroreflective face of the road stud shall have a coefficient of luminous intensity (R) as classified (see tables 6 to 8) multiplied by the appropriate colour factor given in table 5:

- class PRT 0 - no performance determined;
- class PRT 1 - not less than table 6;
- class PRT 2 - not less than table 7;
- class PRT 3 - not less than table 8.

The minimum R values for type 1, type 2 and type 3 road studs, as new, are given in tables 6 to 8;

Table 6 : Class PRT 1 - Minimum R values for type 1, type 2 and type 3 read studs as new

Entrance angle β_H $\beta_V = 0°$	Observation angle α	Min. R mcd · lx^{-1}		
		Type		
		1	2	3
±15°	2°	2	2,5	1,5
±10°	1°	10	25	10
±5°	0,3 °	20	220	150