



SLOVENSKI STANDARD

SIST EN 1463-1:2022

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SIST EN 1463-1:2009

Materiali za označevanje vozišča - Cestni odsevniki - 1. del: Zahtevane lastnosti novih cestnih odsevnikov

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

Straßenmarkierungsmaterialien - Markierungsknöpfe - Teil 1: Anforderungen im Neuzustand

Produits de marquage routier - Plots rétro réfléchissants - Partie 1 : Exigences initiales de performance

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93.080.20 Materiali za gradnjo cest Road construction materials

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1463-1

December 2021

ICS 93.080.20

Supersedes EN 1463-1:2009

English Version

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

Produits de marquage routier - Plots
rétro réfléchissants - Partie 1 : Exigences initiales de
performance

Straßenmarkierungsmaterialien - Markierungsknöpfe -
Teil 1: Anforderungen im Neuzustand

This European Standard was approved by CEN on 24 October 2021.

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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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EUROPEAN COMMITTEE FOR STANDARDIZATION
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 1463-1:2021) 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of an identical text or by endorsement, at the latest by June 2022, and conflicting national standards shall be withdrawn at the latest by September 2023.

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 supersedes EN 1463-1:2009.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

The main changes with respect to the previous edition are listed below:

- To adapt the structure of the standard to the new CEN instructions for candidate harmonized standards for construction products, the terminology and the Annex ZA have been adapted to CEN guidance and template.
- All content that refers to temporary products and to none of the mandated characteristics has been eliminated (deletion of content related to Temporary Road Studs and in use characteristics “Dimensions”).
- Clause 6 “Assessment and verification of constancy of performance — AVCP” has been added.
- Former Clause 4 “type-of road stud” has been moved to Clause 3 “Terms, definitions, symbols, units and abbreviated terms” under new subclause 3.10.
- Former Clause 5 “Performance Requirements” can be found in this standard under Clause 4 “Characteristics”.
- Subclause 4.1.1 “General explanation to angles” has been added to Clause 4 “Product characteristics” (former Clause 5 “Performance Requirements”) to avoid any misinterpretation.
- Former Tables 4 and 5, in former subclause 5.3.1.1, have been merged as specified in that subclause (see new Table 3 in 4.1.2.1) in order to make the interpretation of the threshold values corresponding to that characteristic easier, and subsequently avoid potential mistakes. Therefore, threshold levels specified for each type (1, 2 and 3) of road studs and colour specified in new Table 3 correspond to those given in the previous version of EN 1463-1.
- Former subclause 5.3.1 “Photometric requirements” can be found in this standard under 4.1.2.1 “Coefficient of luminous intensity (R)”.
- Former subclause 5.3.2 “Colorimetric requirements” can be found in this standard under 4.1.2.2 Chromaticity co-ordinates (x,y).

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- Subclause 4.2 “Durability of retro-reflectivity” has been added to give a clear link to EN 1463-2:2021. Notice that according to the answer to Mandate M/111 (CEN reference doc N 1318 dated June 2013) accepted by the European Commission, only Durability of retro-reflectivity expressed as coefficient of luminous intensity (R) is considered relevant.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, 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 the United Kingdom.

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1 Scope

This document specifies the product characteristics, laboratory test methods, the way of expressing results and the relevant procedures for assessment and verification of the constancy of performance for retroreflecting road studs, non depressible and depressible by design (designated as Type A and B, respectively) and which reflectors are made of glass, plastic or plastic with abrasion resistance layer (designated as Type 1, 2 and 3, respectively), to be used for permanent road markings, and delineation purposes, in circulation areas.

This document covers retroreflecting road studs (types - 1, 2, 3 - A, B) of white, yellow, amber, red and green colour of their reflectors.

This document does not cover:

- non-retroreflective road studs;
- temporary retroreflective road studs.

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.

EN 1463-2:2021, *Road marking materials - Retroreflecting road studs - Part 2: Road test performance specifications*

ISO/CIE 11664-1:2019, *Colorimetry - Part 1: CIE standard colorimetric observers*

ISO 11664-2:2007, *Colorimetry - Part 2: CIE standard illuminants*

CIE 054.2:2001, *Retroreflection: Definition and measurement*

CIE S 017/E:2020, *ILV: International Lighting Vocabulary, 2nd Edition*

3 Terms, definitions, symbols, units and abbreviated terms

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

3.1

retroreflecting road stud

horizontal guiding device that reflects incident light by means of *retroreflectors* (see 3.2) in order to warn, guide or inform road users

Note 1 to entry: Retroreflecting road stud called “road stud” in this document.

Note 2 to entry: Retroreflecting road stud may be constructed in either one or more integral parts and may be bonded to, anchored within or embedded within the road surface. The body is typically manufactured with plastic polymers, although solid glass is also used. The retroreflecting portion may be unidirectional or bidirectional, depressible or non depressible.

3.2

retroreflector

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

Note 1 to entry: 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.

EN 1463-1:2021 (E)**3.3****non depressible road stud**

substantially rigid road stud not designed to deform under the passage of traffic (type A)

3.4**depressible road stud**

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 pre-coated with adhesive

Note 1 to entry: An *adhesion enhancer* (see 3.7) may be required under some climatic conditions.

3.7**adhesion enhancer**

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 1 to entry: 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 1 to entry: 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.

3.10**type of road stud**

road studs are designated in this document in accordance with Tables 1 and 2

Table 1 — Designation of road studs by reflector

Retroreflector	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 2 — Designation of road studs by design

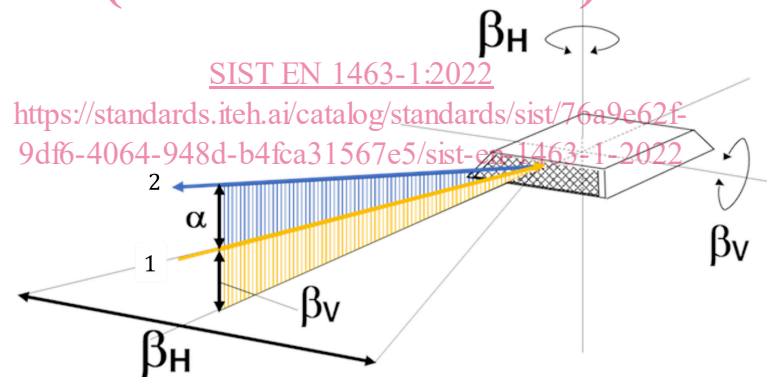
Design	Type
Non depressible road stud	A
Depressible road stud	B

4 Characteristics

4.1 Night time visibility

4.1.1 General explanation to angles

Figure 1 is explaining the angles and axis referred to in this document.



Key

- α is the observation angle ($0,3^\circ$, 1° , 2°)
- β_V is the entrance angle first axis (0°)
- β_H is the entrance angle second axis ($\pm 5^\circ$, $\pm 10^\circ$, $\pm 15^\circ$)
- 1 is the illumination axis
- 2 is the observation axis

Figure 1 — Definition of angular array (α , β_H , β_V)

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4.1.2 Retro-reflectivity

4.1.2.1 Coefficient of luminous intensity (R)

When assessing the coefficient of luminous intensity (R) this shall be determined according to 5.1.1.1. The performance of coefficient of luminous intensity shall be expressed as a value. Each retroreflective face of the road stud, regardless their design (type A or B), shall have, depending on their designation by reflector (type 1, 2 or 3) and colour, a minimum value of coefficient of luminous intensity (R) according to Table 3 as appropriate, provided that:

- a) R value of any individual measurement is higher than 80 % of the specified minimum; and
- b) R average value of the left (-) and right (+) measurements for the specific angle is higher than the specified minimum.

**Table 3 — Minimum R values for type 1, type 2 and type 3
under $\beta_v = 0^\circ$ road studs as new**

Colour of the reflector	Entrance angle β_H $\beta_v = 0^\circ$	Observation angle α	Average of the left and right (β_H) measurements Minimum R		
			mcd · lx ⁻¹		
			Type		
			1	2	3
White	$\pm 15^\circ$	2°	2	2,5	1,5
	$\pm 10^\circ$	1°	10	25	10
	$\pm 5^\circ$	$0,3^\circ$	20	220	150
Yellow	$\pm 15^\circ$	2°	1,2	1,5	0,9
	$\pm 10^\circ$	1°	6	15	6
	$\pm 5^\circ$	$0,3^\circ$	12	132	90
Amber	$\pm 15^\circ$	2°	1	1,25	0,75
	$\pm 10^\circ$	1°	5	12,5	5
	$\pm 5^\circ$	$0,3^\circ$	10	110	75
Red	$\pm 15^\circ$	2°	0,4	0,5	0,3
	$\pm 10^\circ$	1°	2	5	2
	$\pm 5^\circ$	$0,3^\circ$	4	44	30
Green	$\pm 15^\circ$	2°	0,4	0,5	0,3
	$\pm 10^\circ$	1°	2	5	2
	$\pm 5^\circ$	$0,3^\circ$	4	44	30

4.1.2.2 Chromaticity co-ordinates (x,y)

When measured as specified in 5.1.1.2, according to ISO/CIE 11664-1:2019 and ISO 11664-2:2007 (2° visual field) and with an entrance angle $\beta_V = 0^\circ$, $\beta_H = 5^\circ$ and an observation angle of $\alpha = 0,3^\circ$, the chromaticity co-ordinates (x,y) of retroreflected radiation shall lie within the corresponding colour region defined in Table 4.

Table 4 — Corner points of chromaticity regions for retroreflected radiation of road studs as new

Colour of the reflector	Point	x	y
White (uncoloured)	1	0,390	0,410
	2	0,440	0,440
	3	0,500	0,440
	4	0,500	0,390
	5	0,420	0,370
Yellow	1	0,539	0,460
	2	0,530	0,460
	3	0,580	0,410
	4	0,589	0,410
Amber	1	0,549	0,450
	2	0,543	0,450
	3	0,590	0,395
	4	0,605	0,395
Red	1	0,665	0,335
	2	0,645	0,335
	3	0,721	0,259
	4	0,735	0,265
Green	1	0,030	0,385
	2	0,228	0,351
	3	0,321	0,493
	4	0,302	0,692

If two of the points lie on the spectrum locus line, they should not be connected by a straight line but should, in this case, be joined by the boundary of the spectrum focus.

4.2 Durability of retro-reflectivity

When measured according to 5.2, the retained performance of coefficient of luminous intensity shall be expressed as a class in line with the classification given in EN 1463-2:2021.