



SLOVENSKI STANDARD
oSIST prEN 1463-3:2017
01-maj-2017

Materiali za označevanje vozišča - 3. del: Odsevniki

Road marking materials - Part 3: Active road studs

Straßenmarkierungsmaterialien - Markierungsknöpfe - Teil 3: Selbstleuchtende Markierungsknöpfe

Produits de marquage routiers - Partie 3 : Plots actifs

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ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

oSIST prEN 1463-3:2017

en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 1463-3

March 2017

ICS 93.080.20

English Version

Road marking materials - Part 3: Active road studs

Produits de marquage routiers - Partie 3 : Plots actifs

Straßenmarkierungsmaterialien - Markierungsknöpfe -
Teil 3: Selbstleuchtende Markierungsknöpfe

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prEN 1463-3:2017 (E)

European foreword

This document (prEN 1463-3:2017) 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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of Regulation (EU) Nr. 305/2011.

For relationship with Regulation (EU) Nr. 305/2011, see informative Annex ZA, which is an integral part of this document.

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Introduction

An active road stud is a horizontal guiding device that is fixed to the surface of a road and emits light in order to warn, guide or inform road users.

An active road stud provides a light output by itself, while a retroreflective road stud provides retroreflected light when illuminated by the headlamps of a vehicle. Retroreflective road studs are covered by EN 1463-1:2009.

An active road stud may be fitted with a retroreflector so that it provides a light output both directly and by retroreflection.

An active road stud may be self-contained in the sense that it incorporates all light generation means and does not rely on an external source of light or power. Light generation means include one or more light sources, typically LED's, and a power supply, typically a battery that is charged by a solar panel integrated in the upper surface of the road stud.

As opposed to a self-contained active road stud, an active road stud may also be hardwired in the sense that it receives light through fibre optics or power through a wire. Means to feed light or power are not considered in this standard.

An active road stud may have one or more luminous faces intended for emitting light in one or more traffic directions.

An active road stud may emit light that appears constant to the human eye or be flashing at a low frequency. The emitted light may be any of the colours white, yellow, orange, red, green or blue.

As with a retroreflective road stud, an active road stud may be fixed to a road surface by being bonded to, entered within or embedded within the road surface. Additionally, an active road stud may be depressible or non-depressible. Finally, an active road stud may be intended for permanent or temporary installation.

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1 Scope

This standard specifies the initial performance requirements and laboratory test methods for solar powered, hardwired and communicating active road studs intended for use as permanent and temporary road marking materials.

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 1463-2:2000, *Road marking materials - Retroreflecting road studs - Part 2: Road test performance specifications*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN ISO 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observer (ISO 11664-1)*

EN ISO 11664-2, *Colorimetry — Part 2: CIE standard illuminants (ISO 11664-2)*

CIE 15, *Colorimetry*

3 Terms and definitions

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

3.1 active road stud
horizontal guiding device fixed to the surface of a road and emitting light in order to warn, guide or inform road users

4 Product characteristics

4.1 Visibility characteristics expressed as day and night-time visibility

4.1.1 Luminance (for day and night-time visibility) expressed as light output (cd)

The luminous output of an active road stud, permanent or temporary, is described by the minimum luminous intensities supplied by each luminous face of the active road stud in a number of directions defined by a horizontal and a vertical angle. These directions shall cover all combinations of the two angles in a range of at least $\pm 7^\circ$ in steps of 1° in the horizontal angle and a range from 0° to at least 7° in steps of 1° in the vertical angle. Additionally, the luminous output is described by the maximum luminous intensity supplied by each luminous face of the luminous road stud in any direction.

When light is emitted in pulses in periods of less than 0,5 s, the luminous intensities are to be understood as effective luminous intensities I_{eff} calculated using the Blondell-Rey Formula (1):

$$I_{\text{eff}} = \frac{\int_{t_1}^{t_2} I(t) dt}{0,2 + (t_2 - t_1)} \quad (1)$$

t_2, t_1 are time instants at which $I(t) = I_{\text{eff}}$.

NOTE When light is emitted only within a time interval Δt and $I(t)$ is constant at I within that time interval, I_{eff} can be determined by:

$$I_{\text{eff}} = \frac{I \times \Delta t}{0,2 + \Delta t} \quad (2)$$

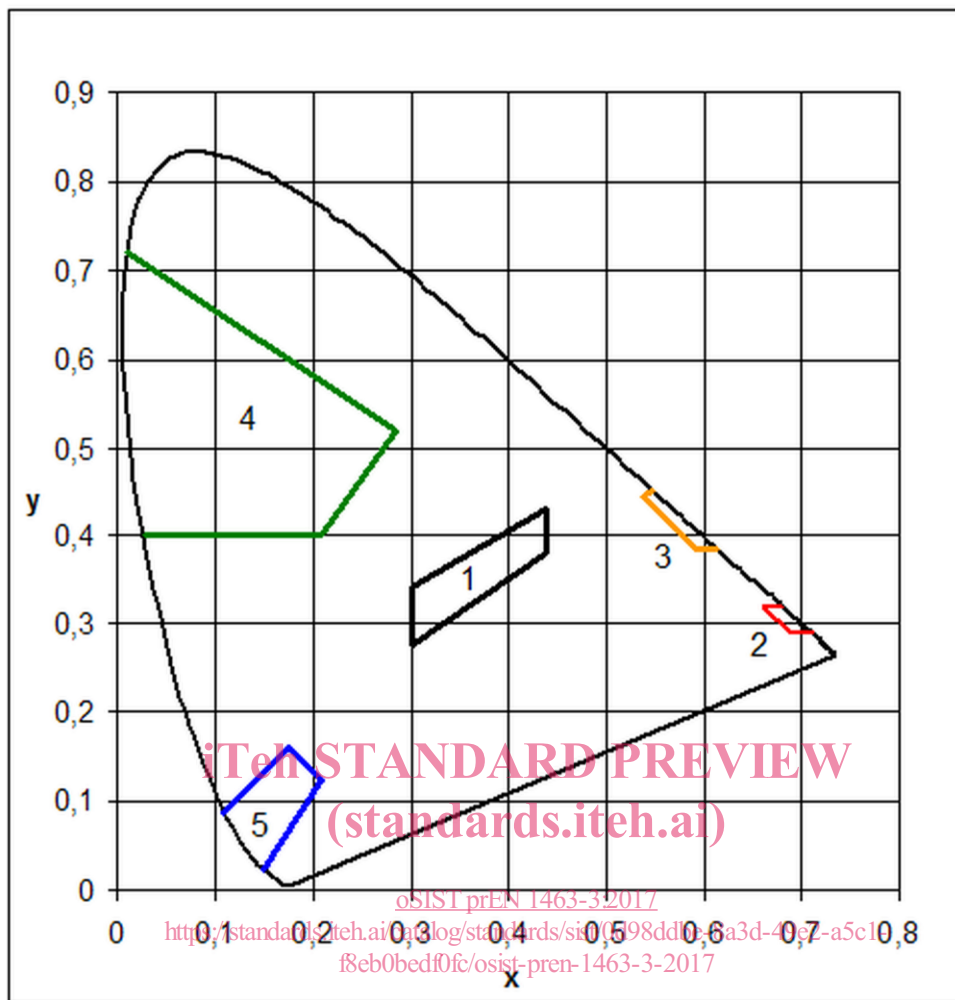
The declared values shall be tested in accordance with 5.1.

4.1.2 Chromaticity coordinates (x,y) (for day and night-time visibility)

When tested in accordance with 5.2, the emitted radiation of each luminous face of an active road stud shall have chromaticity coordinates as specified in Table 1 and illustrated in Figure 1. The chromaticity coordinates of the colours are defined in accordance with EN ISO 11664-1 Standard Colorimetric 2° Observer as referenced in CIE 15.

Table 1 — Corner points of chromaticity regions for emitted radiation of permanent and temporary active road studs

Colour		Colour coordinates of corner points			
		1	2	3	4
White	x	0,300	0,440	0,440	0,300
	y	0,342	0,432	0,382	0,276
Red	x	0,660	0,680	0,710	0,690
	y	0,320	0,320	0,290	0,290
Amber	x	0,536	0,547	0,613	0,593
	y	0,444	0,452	0,387	0,387
Green	x	0,009	0,284	0,209	0,028
	y	0,720	0,520	0,400	0,400
Blue	x	0,109	0,173	0,208	0,149
	y	0,087	0,160	0,125	0,025

**Key**

- 1 white
- 2 red
- 3 amber
- 4 green
- 5 blue

Figure 1 — Chromaticity regions for emitted radiation of permanent and temporary active road studs

4.2 Light output frequency

The lowest frequency of the light emitted shall be measured. This frequency shall not be less than 100 Hz.

4.3 Electromagnetic compatibility

Active road studs should comply with the electromagnetic testing compatibility EMC 2014/30/EU.

4.4 Ingress of dust and water

Declarations of protection against dust and water shall be tested in accordance with EN 60529.

4.5 Durability in road trials

The durability of active road studs shall be tested in a field trial in accordance with EN 1463-2 involving 50 active road studs.

The result of the test is expressed by the percentage of remaining conforming active road studs, and by the percentage of the remaining luminous intensity in the reference direction. These are derived as accounted for in 5.3.

4.6 Frequency of flashing light

When active road studs are used with a visible flash output the frequency of the flashes shall be determined.

NOTE Frequencies above 3 Hz cause a disturbing flicker.

4.7 Construction

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

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

4.8 Dimensions

Dimensions of an active road stud are expressed by the height, width and length of that part of the active road stud designed to be above the road surface after installation.

NOTE 1 For road studs with retroreflectors, classes of dimensions are provided in EN 1463-1:2009, 5.2.

NOTE 2 On roads where the use of studded tyres is common and for the winter maintenance, active road studs can be installed in a milled groove so that all parts are below the road surface.

4.9 Tolerance to temperature

The tolerance of an active road stud to temperature is expressed by a range of ambient temperature, in which the active road stud performs. A declared range shall be tested in accordance with 5.4.

4.10 Integral storage capacity

The integral storage capacity for a given mode of operation is expressed in terms of the number of operating hours.

The declared value shall be tested in accordance with 5.5.

4.11 Charging capacity of solar panels

The charging capacity is expressed in terms of the exposure of irradiation needed to fully charge the integral storage. The exposure shall be expressed as the product of the irradiance on the plane of the active road stud measured in $W \cdot m^{-2}$ and the duration of the exposure measured in hours.

The declared value shall be tested in accordance with 5.6.

4.12 Resilience of depressible active road studs

NOTE The resilience of depressible retroreflective road studs is provided in EN 1463-1:2009, 5.5.