SLOVENSKI STANDARD

SIST EN 12899-3:2008

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Stalna vertikalna cestna signalizacija - 3. del: Smerniki in svetlobno odbojna telesa

Fixed, vertical road traffic signs - Part 3: Delineator posts and retroreflectors

Ortsfeste, vertikale Straßenverkehrszeichen - Teil 3: Leitpfosten und Retroreflektoren

Signaux fixes de signalisation routière verticale - Partie 3: Délinéateurs et rétroréflecteurs

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English Version

Fixed, vertical road traffic signs - Part 3: Delineator posts and retroreflectors

Signaux fixes de signalisation routière verticale - Partie 3: Délinéateurs et rétroréflecteurs

Ortsfeste, vertikale Straßenverkehrszeichen - Teil 3: Leitpfosten und Retroreflektoren

This European Standard was approved by CEN on 4 February 2007.

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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 Management Centre has the same status as the official versions.

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Foreword

This document (EN 12899-3:2007) 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of an identical text or by endorsement, at the latest by May 2008, and conflicting national standards shall be withdrawn at the latest by August 2012.

No existing European Standard is superseded.

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 EU Directives.

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this document.

This European Standard consists of the following Parts under the general title:

Fixed, vertical road traffic signs —

Part 1: *Fixed signs*

Part 2: *Transilluminated traffic bollards (TTB)*

Part 3: (this part) *Delineator posts and retroreflectors*

Part 4: *Factory production control*

Part 5: *Initial type testing*

It is based on performance requirements and test methods published in CEN, CENELEC, CIE (International Commission on Illumination) and ISO documents together with standards of the CEN member organizations.

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

Introduction

This European Standard is designed for use by road authorities. It can also be used by private developers who wish to use signs on their own land similar to those used on public highways.

It can be used to implement type approval and certification testing.

It derives from performance requirements and test methods published in CEN, CENELEC, CIE and ISO documents together with standards of the CEN member organizations.

1 Scope

This Part 3 of EN 12899 specifies requirements for new delineator posts and for new retroreflectors as separate products or combined together to be used in traffic circulation areas.

It covers performance requirements and test methods.

Colorimetric and retroreflective properties are specified taking into account CIE recommendations.

Structural requirements include performance under static and dynamic loading.

Provision is made for safety in use, including vehicle impact.

To define durability this standard also includes performance levels to be maintained after natural weathering exposure.

No requirements are given for the use of colours, dimensions and tolerances of delineator posts and retroreflectors.

2 Normative references

The following referenced documents are indispensable for the application 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 12767, *Passive safety of support structures for road equipment — Requirements and test methods*

EN 12899-1:2007, *Fixed, vertical road traffic signs — Part 1: Fixed signs*

EN 12899-4:2007, *Fixed, vertical road traffic signs — Part 4: Factory production control*

EN 12899-5:2007, *Fixed, vertical road traffic signs — Part 5: Initial type testing*

EN ISO 877:1996, *Plastics — Methods of exposure to direct weathering, to weathering using glass-filtered daylight, and to intensified weathering by daylight using Fresnel mirrors (ISO 877:1994)*

EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2000)*

ISO 4:1997, *Information and documentation — Rules for the abbreviation of title words and titles of publications*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO/CIE 10526, *CIE standard illuminants for colorimetry*

ISO/CIE 10527, *CIE standard colorimetric observers*

CIE 15, *Colorimetry*

CIE 54.2, *Retroreflection — Definition and measurement*

3 Terms, definitions, symbols and abbreviations

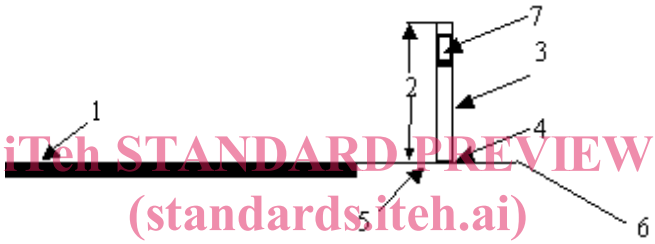
For the purposes of this document, the symbols and abbreviations given in ISO 4:1997 and the following apply.

3.1
delineator post
post, placed at the edge of a carriageway, to indicate the alignment of the road and/or to warn of a hazard during daytime conditions.

NOTE The delineator post can be equipped with one or more retroreflectors

3.2
ground line
notional horizontal line on the delineator post which, when it is installed correctly, is level with the ground (see Figure 1) or with the top of the safety barrier (see Figure 2) on which it is installed

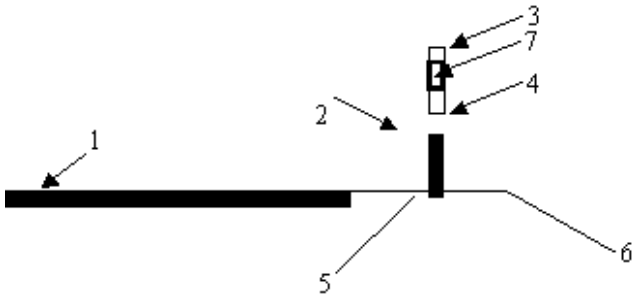
NOTE Delineator posts are normally installed in the level part of the verge so as to fulfil their function of indicating the alignment of that part of the highway on which it is safe to drive and/or to indicate the presence of a hazard.



Key:

1	Carriageway	5	Verge
2	Height	6	Slope
3	Delineator post	7	Retroreflector
4	Ground line		

Figure 1 — Illustration of ground line (1)



Key:

1	Carriageway	5	Verge
2	Safety barrier	6	Slope
3	Delineator post	7	Retroreflector
4	Ground line		

Figure 2 — Illustration of ground line (2)

3.3
retroreflector
device, made using any available technology, that retroreflects incident light.

NOTE Retroreflectors may be installed on delineator posts

3.4
test product
product (delineator post or retroreflector) in original size and design, or part of it prepared by the manufacturer or the supplier, to be subjected to testing in accordance with the applicable part of this standard

4 Dimensions and tolerances

Dimensions and tolerances of delineators and retroreflectors shall conform to the customer's requirements.

5 Types of delineator post and retroreflector

5.1 Types of delineator post

The classification of types of delineator post shall be:

D1 delineator posts for ground fixing which are not specifically designed to be reusable after the impact test described in 7.4.1.3;

D2 delineator posts for ground fixing which are designed to be reusable after the impact test described in 7.4.1.3 (e.g. those posts which may be dislodged, but are designed to be remounted);

D3 delineator posts for ground fixing which are designed to deflect and after the impact test as described in 7.4.1.3 return to an upright position (spring-back or flexible);

D4 delineator posts for fixing to structures (fixed), e.g. bridges, crash barriers and guard rails.

5.2 Types of retroreflector

The classification of types of retroreflector shall be:

— R1 retroreflective sheeting (material);

— R2 plastic corner cube retroreflectors;

— R3 biconvex glass retroreflectors.

6 Performance requirements

6.1 General

All parts of delineator posts of types D1, D2 and D3 shall present no sharp edges above the ground line.

If the materials are suitable for recycling this shall be indicated by the appropriate material code.

6.2 Fixing of retroreflectors on delineator posts

When fitted, retroreflectors shall be permanently fixed to delineator posts using a fixing method appropriate to the type and in accordance with the manufacturer's instructions.

6.3 Visual performance

6.3.1 Daytime chromaticity coordinates and luminance factor of delineator posts

When tested in accordance with 7.3.1, the chromaticity coordinates and luminance factor of the surfaces of delineator posts shall conform to Table 1.

Table 1 — Chromaticity coordinates and luminance factors of surface colours of delineator posts

:	1		2		3		4		Luminance factor
Colour	x	y	x	y	x	y	x	y	β
White	0,350	0,360	0,300	0,310	0,290	0,320	0,340	0,370	≥0,75
Yellow	0,522	0,477	0,470	0,440	0,427	0,483	0,465	0,534	≥0,45
Red	0,735	0,265	0,674	0,236	0,569	0,341	0,655	0,345	≥0,07
Green	0,313	0,682	0,313	0,453	0,177	0,362	0,026	0,399	≥0,10
Black	0,385	0,355	0,300	0,270	0,260	0,310	0,345	0,395	≤0,06

6.3.2 Retroreflectors

6.3.2.1 Daytime chromaticity coordinates and luminance factor

When tested in accordance with 7.3.2.1, the initial chromaticity coordinates and the luminance factors of the surfaces shall conform to EN 12899-1:2007, Table 1 or 2.

6.3.2.2 Night-time chromaticity of retroreflectors

When illuminated with CIE Standard Illuminant A and tested in accordance with 7.3.2.2, the retroreflected radiation of retroreflectors shall have initial chromaticity coordinates that lie within the regions defined in Table 2.

The nighttime chromaticity of retroreflective materials using microprismatic technology can be found in the relevant European Technical Approval (ETA).

Table 2 — Corner points of chromaticity regions for retroreflected radiation of retroreflectors

	1		2		3		4		5	
Colour	x	y	x	y	x	y	x	y	x	y
White/ uncoloured	0,390	0,410	0,440	0,440	0,500	0,440	0,500	0,390	0,420	0,370
Yellow	0,513	0,487	0,500	0,470	0,545	0,425	0,572	0,425		
Amber	0,560	0,440	0,530	0,440	0,583	0,387	0,612	0,387		
Orange	0,645	0,355	0,615	0,355	0,565	0,405	0,595	0,405		
Red	0,652	0,348	0,622	0,348	0,714	0,256	0,735	0,265		
Green	0,320	0,675	0,320	0,520	0,245	0,400	0,028	0,400		
If two of the points lie on the spectrum locus line, they shall not be connected by a straight line but shall be joined by the boundary of the spectrum locus. NOTE It is recommended that orange be not used in the same field of view as red.										

6.3.2.3 Coefficient of retroreflection R_A

All photometric tests shall be carried out in accordance with 7.3.2.3.

The minimum initial coefficient of retroreflection R_A of type R1 retroreflectors shall be classified as follows:

— R1, class RA1 as specified in EN 12899-1:2007, Table 3;

— R1, class RA2 as specified in EN 12899-1:2007, Table 4;

— R1, class 3 as specified in Table 3 of this standard multiplied by the appropriate colour factor given in Table 6.

Table 3 — Minimum initial coefficient of retroreflection R_A for type R1, class 3 retroreflectors

Entrance angle β_2 ($\beta_1 = 0°$)	Observation angle α	Coefficient of retroreflection R_A $cd \cdot lx^{-1} \cdot m^{-2}$ Type 1, class 3
+5°	20'	300
+30°	2,0°	2,5

NOTE Type R1, class RA1 and class RA2 refer to retroreflective sheeting based on glass bead technology. Type R1, class 3 refers to retroreflective sheeting based on microprismatic technology.

The minimum initial coefficient of retroreflection R_A of type R2 retroreflectors shall conform to Table 4 multiplied by the appropriate colour factor given in Table 6.

Table 4 — Minimum initial coefficient of retroreflection R_A for type R2 retroreflectors

Entrance angle β_2 (β_1 = 0°)	Observation angle α	Coefficient of retroreflection R_A cd·lx^{-1}·m^{-2}	Coefficient of retroreflection R_A cd·lx^{-1}·m^{-2}
		class 1	class 2
+5°	20'	200	400
+30°	2,0°	0,8	2,5

The minimum initial coefficient of retroreflection R_A of type R3 retroreflectors shall conform to Table 5 multiplied by the appropriate colour factor given in Table 6.

Table 5 — Minimum initial coefficient of retroreflection R_A for type R3 retroreflectors

Entrance angle β_2 (β_1 = 0°)	**Observation angle** α	**Coefficient of retroreflection R_A** cd·lx^{-1}·m^{-2}
+5°	20'	120
+30°	2,0°	2,0

Table 6 — Colour factors for retroreflectors

Colour	**Colour factor of retroreflectors**
White	1,0
Yellow	0,6
Amber	0,5
Orange	0,3
Red	0,2
Green	0,2

6.4 Physical performance

6.4.1 Delineator posts

6.4.1.1 Static requirement (wind loading)

When tested in accordance with 7.4.1.1, delineator posts of types D1, D2 and D3 shall not be damaged or show a permanent deflection not exceeding 5 % of the height above the ground line. The temporary deflection shall not exceed the values shown in Table 7.

Table 7 — Static load – maximum temporary deflection

Classes	Maximum temporary deflection of delineator post height above ground line
WL 0	No performance determined
WL 1	15 %
WL 2	5 %

6.4.1.2 Dynamic impact resistance (material requirement)

When tested in accordance with 7.4.1.2, delineator posts of types D1 and D2 shall remain intact and type D3 shall return to the vertical. No delineator post shall be damaged or splintered into pieces.