



# SLOVENSKI STANDARD

## oSIST prEN 12352:2015

01-februar-2015

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### Oprema za nadzor in vodenje cestnega prometa - Svetlobne signalne naprave (SSN)

Traffic control equipment - Warning and safety light devices

Anlagen zur Verkehrssteuerung - Warn- und Sicherheitsleuchten

Equipement de régulation du trafic - Feux de balisage et d'alerte

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#### **ICS:**

93.080.30	Cestna oprema in pomožne naprave	Road equipment and installations
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## Traffic control equipment - Warning and safety light devices

Équipement de régulation du trafic - Feux de balisage et d'alerte

Anlagen zur Verkehrssteuerung - Warn- und Sicherheitsleuchten

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.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (prEN 12352:2014) 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 12352:2006.

### The main changes in this revision are as follows.

The Introduction has been re written to clarify applications of warning lights.

Definitions 3.1 to 3.4 added for additional clarity

Previous definition 3.10 "Principle Axis" removed, and "reference axis" definition updated, adding clarity with fewer axes defined.

4.1.1. Descriptive note changed to improve clarity

4.1.2.1. and 4.1.2.2. Reference to Lens changed to light emitting surface (allowing flexibility for those solutions created without the use of a specific lens).

4.1.4. Wording changed to add flexibility in the types of light sources.

4.1.5. Clarified wording about plane of measurement.

4.2.1.1. Requirements for electrical safety clarified as being EN 50556 specification for the traffic market now nominated under the LVD.

4.2.1.2.1. The idea of linked pairs or groups of warning lights added.

4.2.1.2.3. Classes added.

4.2.1.4. Clarified that it is the luminous intensity that is expected to be compliant over the voltage range.

4.2.2.1. The idea of linked pairs or groups of warning lights added, classes F5 and F6 added.

4.2.2.2. Classes O4 and O5 added.

4.3.1. References to test method sections updated (due to the removal of the old section 5 "Samples" the test method section 6 became 5).

4.3.2.3. Corrosion test specification reference updated.

Old section 5 "Sampling" removed.

Section 6 "Test Methods" has now become section 5 with the removal of the old section 5 "Sampling"

5.2. Luminous Intensity test method redefined.

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Section 6 new Assessment and Verification of constancy of Performance AVCP in accordance with new Construction Products Regulations CPR.

Section 7 References updated

Old Section 9 "Evaluation of conformity", removed, as it is replaced by the earlier new section 6 AVCP.

ZA Annex updated to align with the requirements of the new Construction Products Regulation.

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## Introduction

Warning lights are installed on or at road areas for both permanent and temporary use.

Examples of permanent use are warning lights at pedestrian crossings, railway crossings, exits for fire trucks and ambulances etc. Such warning lights are generally supplied by the mains or some other permanent power supply with a lower voltage.

Permanently installed warnings lights may have properties in terms of photometric and colorimetric performance, electrical and functional properties and construction as described in this European Standard, or they may be in family with signal heads having properties as described in EN 12368 Traffic control – Signal heads.

Temporary use may be at construction sites to warn against uneven ground or obstacles. Warning lights for this purpose often emit constant red light.

The predominant temporary use is, however, at road works. Warning lights for this purpose generally emit flashing yellow light or in some cases alternating yellow light with longer light periods.

The use at road works is varied and includes warning lights mounted on obstacles, warning lights mounted single or in pairs on road signs or barriers to create attention, warning lights used in groups to form running lights to delineate temporary changes of the run of the road, and warning light used in groups to form crosses or arrows mounted on trailers or vehicles in order to inform of blocked lanes or change of lane.

Warnings lights for temporary use either have batteries incorporated into the housing of the warning lights or are supplied by means of electrical wires to large batteries placed elsewhere. The intention of using flashing or alternating light is to enhance the warning aspect and to draw more attention than is obtained with constant light. Because of delay in the response of the eye, a flashing light appears with a lower luminous intensity than the average intensity during the flash. In terms of visibility, the intensity of a flashing light is described by an effective intensity derived by means of a particular equation.

There is some saving of emitted luminous flux associated with flashing or alternating light compared to constant light. The corresponding saving of power from the battery supply has practical significance.

The classic warning lights are based on incandescent lamps, mostly low voltage halogen incandescent lamps. The on-time of the flashes of these warnings lights cannot be short because of the delay in the response of low voltage halogen incandescent lamps.

A development is based on xenon flash lamps with very short flashes. These lamps use less power than low voltage halogen incandescent lamps. The shortness of the flash has the negative effect that it is difficult to perceive the position of the warning light.

A further development is based on Light Emitting Diodes, LED's. LED's in themselves have characteristic colours of the emitted light, for instance red, yellow, green and blue depending of the types, and are used with the colour of light intended for the warning lights – mostly yellow. This eliminates the need for obtaining the colour by means of filtering in a coloured front lens or glass and improves the overall luminous efficacy.

The LED's are well suited for control of the light output, the on-time and the cycle period. This has the practical advantage that a single product can be used for more than one application.

## 1 Scope

This European Standard specifies the requirements for individual electrically operated light devices, called warning lights, emitting a continuous or regular intermittent light of a single colour, which by their colour and position alone, are used to warn, inform or guide road users. It specifies the requirements for visual, structural and operational performances and the relevant test methods to be used. These devices rely upon existing furniture to provide the mounting.

This European Standard is not applicable to lighting devices which convey messages by additional means (e.g. variable message signs) or which convey a mandatory instruction (e.g. traffic signals) or which are covered by vehicle lighting regulations.

This European Standard does not consider horizontal loads because it is the mounting to which they are fixed, which is not covered by this European Standard, which has to resist applied horizontal loads.

## 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 50293, *Electromagnetic compatibility — Road traffic signal systems — Product standard*

EN 60068-2-1, *Environmental testing — Part 2-1: Tests — Test A: Cold*

EN 60068-2-2, *Basic environmental testing procedures — Part 2-2: Tests — Test B: Dry heat*

EN 60529, *Degree of protection provided by enclosures (IP code)*

EN 60598-1:2008, *Luminaires — Part 1: General requirements and tests*

EN 12899-3, *Fixed, vertical road traffic signs - Part 3: Delineator posts and retroreflectors*

CIE 15, *Colorimetry*

CIE 70, *The measurement of absolute luminous intensity distributions*

CIE 54.2:2001, *Retroreflection — Definition and measurement*

EN 50556, *Road traffic signal systems*

## 3 Terms and definitions

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

### 3.1

#### **steady, alternating and flashing lights**

lights emitting respectively continuous light, continuous light in periods of minimum 0,5 seconds and pulses of light in periods of less than 0,5 seconds



### 3.2

**cycle period** (flashing and alternating lights only)

$t_{\text{cycle}}$

the duration of the complete on/off cycle measured in seconds (s)

### 3.3

**flash or alternation rate** (flashing and alternating lights only)

the number of flashes or light periods per minute

### 3.4

**on-time** (flashing and alternating lights only)

$t_{\text{on}}$

flashing lights: part of a single light pulse during which the actual luminous intensity is equal to or greater than the effective luminous intensity measured in seconds (s)

alternating lights: duration of a single light period in seconds (s)

### 3.5

**state of dimming**

actual state of dimming characterized in a unique manner

### 3.6

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**mode of operation**

actual mode of operating a warning light defined by flash or alternation rate, on-time and state of dimming

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### 3.7

**effective luminous intensity** (flashing lights only)

$I_{\text{eff}}$

luminous intensity (cd) of a steady light source that would have the same visual range as the flashing light in question

effective luminous intensity  $I_{\text{eff}}$  for flashing warning lights is that calculated using the Blondell-Rey equation (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  $I(t) = I_{\text{eff}}$  and define the on-time by  $t_{\text{on}} = t_2 - t_1$

### 3.8

**horizontal plane** (360° warning lights only)

plane which passes through the photometric centre of the warning light when the warning light is in its normal operating position

### 3.9

**light emitting surface**

single continuous area of surface emitting light

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## 3.10

**minimum reference luminous intensity** $I_{Rmin}$ 

required minimum (effective) luminous intensity, at the nominal voltage, measured on the reference axis or in the reference plane

## 3.11

**minimum area luminous intensity** $I_{Amin}$ 

minimum permissible (effective) luminous intensity, at the nominal voltage, in any direction within a specified angular range

Note 1 to entry: This is expressed as a percentage of  $I_{Rmin}$  in Table 1.

## 3.12

**maximum area luminous intensity** $I_{Amax}$ 

maximum permissible (effective) luminous intensity at the nominal voltage, in any direction within a specified angular range

## 3.13

**minimum voltage luminous intensity** $I_{Umin}$ 

minimum permissible (effective) luminous intensity, at the minimum voltage specified by the manufacturer, in any direction within a specified angular range

Note 1 to entry: This is expressed as a percentage of  $I_{Rmin}$  in Table 1.

## 3.14

**rated voltage**

voltage of the electrical power supply (battery or mains) as specified by the manufacturer

## 3.15

**photometric centre**

unless otherwise specified by the manufacturer, the photometric centre is the geometric centre of the area of the light emitting surface

## 3.16

**reference axis** (excluding 360° warning lights)

axis specified by the manufacturer, used for environmental and optical tests

## 3.17

**reference plane** (360° lights only)

plane specified by the manufacturer, used for environmental and optical tests

**3.18****test module**

sample of the finished product

**3.19****manufacturer**

party with legal responsibility for placing the product on the market

**3.20****supplier**

producer of components (e.g. fixing devices, optical devices, luminous sources etc.) for the product.

**3.21****Factory Production Control (FPC)**

permanent internal control of production exercised by the manufacturer

**3.22****batch**

quantity of a product manufactured with no change in raw material, equipment, settings or operation as defined in the FPC system of the manufacturer

**3.23****individual (and non-series)**

where manufacturing process is different to the manufacturers usual process

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## 4 Requirements

### 4.1 Photometric and colorimetric performance

#### 4.1.1 Luminous intensity

When measured in accordance with 5, within the angular range specified for the relevant class in Table 1, the luminous intensities for warning lights emitting yellow light (C yellow 1 and C yellow 2 as defined in 4.1.4) shall comply with the maximum and minimum limits specified in Table 1.

For warning lights emitting red light (C red as defined in 4.1.4) all minimum luminous intensity values shall be reduced to 35 % of those specified in Table 1. Maximum luminous intensity values shall be as specified in Table 1.

NOTE 4 In Table 1 warning lights are divided into classes primarily by the area of the light emitting surface, the angular range for photometric performance and the luminous intensity within those angular ranges. Class L2 is sub-divided into Low (L) and High (H) luminous intensity; class L8 is subdivided into Very low (G), Low (L), Medium (M) and High (H) luminous intensity and L9 is sub-divided into Low (L), Medium (M) and High (H) luminous intensity.

All the values given for the luminous intensity in Table 1 are given as the actual continuous values for steady and alternating warning lights and as effective luminous intensity for flashing warning lights.

In order to take account of uneven polar luminous intensity distribution for 360° warning lights only, luminous intensities below the minimum values in Table 1 shall be disregarded provided that they are contained within no more than two sectors each of 30° of the full 360°.

All angles given in Table 1 shall be measured from the reference plane for 360° warning lights (L1) and from the reference axis for all other warning lights.

Table 1 — Classes of warning lights

Class	Area of light emitting surface in $\text{cm}^2$	Angle ranges		Luminous intensity			
				At the nominal voltage			At the minimum voltage
		Horizontal	Vertical	$I_{Rmin}$ in cd	$I_{Amin}$ (% of $I_{Rmin}$ )	$I_{Amax}$ in cd	$I_{Umin}$ (% of $I_{Rmin}$ )
L1	(See 4.1.2)	360°	+5° to -5°	1	100	100	50
L2L	$\geq 18$	+7° to -7°	+7° to -7°	25	25	100	25
L2H	$\geq 18$	+7° to -7°	+7° to -7°	150	25	1 500	25
L3	$\geq 75$	+10° to -10°	+5° to -5°	2	50	100	25
L4 <sup>a)</sup>	$\geq 140$	+10° to -10°	+5° to -5°	43	25	100	15
L5	$\geq 140$	+2° to -2°	+2° to -2°	500	25	2 000	25
L6	$\geq 2 \times 250$	+10° to -10°	+5° to -5°	10	25	100	12,5
L7	$\geq 250$	+10° to -10°	+5° to -5°	20	25	100	12,5
L8G	$\geq 250$	+7,5° to -7,5°	+5° to -5°	25	25	100	12,5
L8L	$\geq 250$	+7,5° to -7,5°	+5° to -5°	250	25	500	12,5
L8M	$\geq 250$	+7,5° to -7,5°	+5° to -5°	500	25	1 500	12,5
L8H	$\geq 250$	+7,5° to -7,5°	+5° to -5°	1 500	25	5 000	12,5
L9L	$\geq 700$	+1,5° to -1,5°	+1,5° to -1,5°	500	25	2 000	12,5
L9M	$\geq 700$	+1,5° to -1,5°	+1,5° to -1,5°	2 000	25	8 000	12,5
L9H	$\geq 700$	+1,5° to -1,5°	+1,5° to -1,5°	20 000	25	40 000	12,5

<sup>a)</sup> this class is used only for lights flashing in accordance with class F4

#### 4.1.2 Light emitting surface

##### 4.1.2.1

For 360° warning lights (class L1) the minimum area of the light emitting surface projected in any horizontal direction shall be not less than 30  $\text{cm}^2$  and the height of the light emitting surface shall be not less than 6 cm.

##### 4.1.2.2

In all other classes (L2 to L9) the total area of the light emitting surface as indicated by the manufacturer shall be not less than the values given in Table 1 and shall comply with the requirements for uniformity of luminance (4.1.3). For the projection of the light emitting surface there shall be 2 classes P defined:

- class P0: no requirements;
- class P1: the projection is a roundel