SLOVENSKI STANDARD

SIST EN 12352:2006

01-julij-2006

Nadomeġļa:

SIST EN 12352:2002

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

Ta slovenski standard je istoveten z: EN 12352:2006

ICS:

93.080.30

SIST EN 12352:2006 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12352

April 2006

ICS 93.080.30

Supersedes EN 12352:2000

English Version

Traffic control equipment - Warning and safety light devices

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

Anlagen zur Verkehrssteuerung - Warn- und Sicherheitsleuchten

This European Standard was approved by CEN on 27 February 2006.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, 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.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 12352:2006: E

Contents

Page

Foreword

This European Standard (EN 12352:2006) 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of an identical text or by endorsement, at the latest by October 2006, and conflicting national standards shall be withdrawn at the latest by January 2008.

This European Standard supersedes EN 12352:2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

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 referenced documents are indispensable for the application of this European Standard. 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: Tests — Test A: Cold (IEC 60068-2-1:1990)*

EN 60068-2-2, *Basic environmental testing procedures — Part 2: Tests — Test B: Dry heat (IEC 60068-2-2:1974 + IEC 60068-2-2A:1976)*

EN 60529, *Degree of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60598-1:2004, *Luminaires — Part 1: General requirements and tests (IEC 60598-1:2003 + Corrigendum 2004, modified)*

CIE 15, *Colorimetry*

CIE 17-4:1987, *International lighting vocabulary*

CIE 39.2, *Recommendations for surface colours for visual signalling*

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

CIE 69, *Methods of characterizing illuminance meters and luminance meters — Performance, characteristics and specifications*

HD 384.4, *Electrical installation of buildings — Part 4: Protection for safety*

HD 638, *Road traffic signal systems*

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits

3 Terms and definitions

For the purposes of this European Standard, the terms, definitions and units used of CIE 17-4:1987 and the following apply.

3.1
effective luminous intensity
effective luminous intensity I_{eff} for flashing warning lights is that calculated using the Blondell-Rey equation (1):

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

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

3.2
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

3.3
light emitting surface
single continuous area of surface emitting light

3.4
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

3.5
minimum area luminous intensity
I_{Amin}
minimum permissible (effective) luminous intensity, at the nominal voltage, within the area of the specified angle ranges excluding the reference axis or the reference plane

NOTE This is expressed as a percentage of I_{Rmin} in Table 1.

3.6
maximum area luminous intensity
I_{Amax}
maximum permissible (effective) luminous intensity at the nominal voltage, measured at any point within the specified in angle ranges including the reference axis or the reference plane

3.7
minimum voltage luminous intensity
I_{Umin}
minimum permissible (effective) luminous intensity, at the minimum voltage specified by the manufacturer, measured at any point within the specified angle ranges including the reference axis or the reference plane

NOTE This is expressed as a percentage of I_{Rmin} in Table 1.

3.8
rated voltage
voltage of the electrical power supply (battery or mains) as specified by the manufacturer

3.9
photometric centre
unless otherwise specified by the manufacturer, the photometric centre is the geometric centre of the area of the light emitting surface

3.10
principal axis (excluding 360° warning lights)
horizontal axis which lies on the vertical plane of symmetry of the lens and passes through the photometric centre of the warning light when in its normal operating position

3.11
reference axis (excluding 360° warning lights)
unless otherwise specified by the manufacturer the reference axis is the axis of maximum luminous intensity within 2° in any direction of the principal axis

3.12
reference plane (360° lights only)
unless otherwise specified by the manufacturer the reference plane is the plane of maximum luminous intensity within 2° above or below the horizontal plane

3.13
on-time ($t_2 - t_1$, flashing lights only)
part of a single light pulse during which the actual luminous intensity is equal to or greater than the effective luminous intensity

NOTE On-time is expressed as a percentage of the complete on/off cycle.

3.14
test module
sample of the finished product

3.15
manufacturer
party with legal responsibility for placing the product on the market

3.16
supplier
producer of components (e.g. fixing devices, optical devices, luminous sources etc.) for the product.

3.17
Factory Production Control (FPC)
permanent internal control of production exercised by the manufacturer

3.18
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

3.19
individual (and non-series)
where manufacturing process is different to the manufacturers usual process

4 Requirements

4.1 Photometric and colorimetric performance

4.1.1 Luminous intensity

When measured in accordance with Clause 6, within the angle ranges 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 1 In Table 1 warning lights are divided into classes primarily by area of lights emitting surface, angular limits for photometric performance and luminous intensities within those angles. Classes L2, L8 and L9 are sub-divided into High (H), Medium (M) and Low (L) luminous intensity bands within the overall luminous intensity limits for each class.

NOTE 2 All the values given for the luminous intensity in Table 1 are given as actual continuous values for steady warning lights and are given as effective luminous intensity for flashing warning lights. Except where limited to a specific Class F designation, shown in brackets, the luminous intensity values given apply to both steady and flashing warning lights in the same L Class.

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 cm^2	Angle ranges		Luminous intensity			
				Nominal voltage			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)	300°	+5° to –5°	1	100	100	50
L2L	≥18	+7° to –7°	+7° to –7°	25	25	100	25
L2H	≥18	+7° to –7°	+7° to –7°	150	25	1 500	25
L3	≥75	+10° to –10°	+5° to –5°	2	50	100	25
L4(F2)	≥140	+10° to –10°	+5° to –5°	43	25	100	15
L5	≥140	+2° to –2°	+2° to –2°	500	25	2 000	25
L6	≥2 × 250	+10° to –10°	+5° to –5°	10	25	100	12,5
L7	≥250	+10° to –10°	+5° to –5°	20	25	100	12,5
L8G	≥250	+7,5° to –7,5°	+5° to –5°	25	25	100	12,5
L8L	≥250	+7,5° to –7,5°	+5° to –5°	250	25	500	12,5
L8M	≥250	+7,5° to –7,5°	+5° to –5°	500	25	1 500	12,5
L8H	≥250	+7,5° to –7,5°	+5° to –5°	1 500	25	5 000	12,5
L9L	≥700	+1,5° to –1,5°	+1,5° to –1,5°	500	25	2 000	12,5
L9M	≥700	+1,5° to –1,5°	+1,5° to –1,5°	2 000	25	8 000	12,5
L9H	≥700	+1,5° to –1,5°	+1,5° to –1,5°	20 000	25	40 000	12,5

4.1.2 Light emitting surface

4.1.2.1 For 360° warning lights (class L1) the minimum area of the lens projected in any horizontal direction shall be not less than 30 cm^2 and the height of the lens 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 lens there shall be 2 classes P defined:

— class P0: no requirements;

— class P1: the projection is a roundel

4.1.3 Uniformity of luminance

4.1.3.1 There is no requirement for uniformity of luminance for warning lights in class L1.

4.1.3.2 The luminance of the light emitting surface of a warning light in classes L2 to L5 inclusive shall be such that, when tested in accordance with 6.3.1 and 6.3.2, the ratio of luminance I_{out}/I_{total} is ≥0,17.

4.1.3.3 The luminance of the light emitting surface of a warning light in classes L6 to L9 inclusive shall be such that when tested in accordance with 6.3.1 and 6.3.3 the ratio of the luminance L_{min}/L_{max} is ≥0,07.

4.1.4 Colorimetric performance

The class C for the colour of light emitted by warning lights shall be one of the following:

— class C red;

— class C yellow 1;

— class C yellow 2 (for light classes L2 and L5 only).

When tested in accordance with 6.4 light emitted from an assembled warning light, fitted with the light source specified by the manufacturer, shall be within the boundaries of chromaticity specified in Table 2.

NOTE Warning lights meeting the requirements of class C yellow 1 will automatically meet the requirements of class C yellow 2.

Table 2 — Colours of warning lights

Colour of warning light	Equation	Boundary
C red	y = 0,290	red
	y = 0,980 – x	purple
	y = 0,320	yellow
C yellow 1	y = 0,387	red
	y = 0,98 – x	white
	y = 0,727 x + 0,054	green
C yellow 2	y = 0,380	red
	y = 0,940 – x	white
	y = 0,500	green

4.1.5 Retro-reflective devices

All warning lights shall meet the requirements of one of the following three classes R for retro-reflectivity:

— class R0: no requirements;

— class R1: shall not incorporate retro-reflective areas;

— class R2: shall be fitted with retro-reflectors of the colour within the limits of chromaticity specified for C yellow class 2 in CIE 39.2.

When projected in all horizontal directions for warning lights, of class L1 and in the direction of the principal axis for all other warning lights the retro-reflective area shall be at least a minimum of 50 cm^2.

For all retro-reflective areas the minimum coefficients of retro-reflection R' shall be as specified in Table 3 for $ß_1$ when measured in accordance with CIE 54.2 with $ß_2$ equal to 0.

Table 3 — Coefficients of retro-reflection

Entrance angle β_1 (β_2 = 0)	Observation angle 12'	Observation angle 20'	Observation angle 1°
5°	50 cd × lx^{-1} × m^2	35 cd × lx^{-1} × m^2	3 cd × lx^{-1} × m^2
15°	35 cd × lx^{-1} × m^2	20 cd × lx^{-1} × m^2	2 cd × lx^{-1} × m^2

4.2 Electrical and functional requirements

4.2.1 Electrical requirements

4.2.1.1 Electrical safety

Warning lights with a supply voltage in excess of 50 V and all warning lights with a lower rated supply voltage, but with parts having a higher voltage than 50 V shall fulfil the requirements of the Low Voltage Directive 73/23/EEC.

4.2.1.2 On/Off and variable intensity photosensitive switches

4.2.1.2.1 General

Warning lights may be fitted with photosensitive devices to switch them on and off or to switch them between different levels of luminous intensity in response to ambient light conditions. When tested in accordance with 6.5.3, photosensitive switches shall not be actuated by a vertical plane illumination of 500 lx or less.

4.2.1.2.2 Photosensitive On/Off switches

When tested in accordance with 6.5.2 automatic photosensitive switches shall comply with one of the following classes:

— class A0: no requirements;

— class A1: warning lights fitted with a photosensitive On/Off switch which operates automatically to switch the warning light both on and off within the range of ambient horizontal illuminance (see CIE 69) 250 lx minimum to 1 000 lx maximum.

4.2.1.2.3 Variable intensity photosensitive switch

A warning light fitted with a photosensitive device to switch the warning light between operation at different luminous intensities that device shall operate automatically (both to increase and to decrease the luminous intensity) within the range of ambient open air light levels 500 lx minimum to 3 000 lx maximum when tested in accordance with 6.5.2.

4.2.1.3 Voltage indicator (battery operated warning lights only)

Where a battery operated warning light is fitted with a device to indicate that the battery voltage is at or approaching the minimum voltage, the voltage indication shall comply with one of the following classes:

— class I0: no requirements;