



SLOVENSKI STANDARD

SIST EN 12368:2002

01-september-2002

Traffic control equipment - Signal heads

Traffic control equipment - Signal heads

Anlagen zur Verkehrssteuerung - Signalleuchten

Equipement de régulation du trafic - Tetes de feux

Ta slovenski standard je istoveten z: **EN 12368:2000**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12368

January 2000

ICS 93.080.30

English version

Traffic control equipment - Signal heads

Équipement de régulation du trafic - Têtes de feux

Anlagen zur Verkehrssteuerung - Signalleuchten

This European Standard was approved by CEN on 15 November 1999.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Annex A is informative.

Introduction

Signal lights are mainly used to transfer safety messages to the road user to achieve specific reactions. Signal lights in road traffic transfer this information optically by signal lights which have a specific meaning and which differ in their colour of light and in the design of their illuminating surface.

The visibility of a signal light depends on the colour, luminous intensity, luminous intensity distribution, luminance and luminance uniformity, the surrounding luminance (background luminance), the size of the illuminating area of the signal light, the phantom light and the distance and angle between observer and signal head.

Four angular distributions of luminous intensities for signal lights are specified. The user may choose between an extra wide, wide, medium and narrow beam signal to obtain a good recognition of the signal for short distances in urban areas, for long distances in rural areas. To achieve a good performance the standard provides a number of different performance levels and two different diameters for the roundels.

The optical performance of signal heads in use is a function of lens soiling, mirror soiling and a decrease of luminous flux from the lamp. To maintain the performance of the signal heads during service, it is important to ensure that after lamp replacement and cleaning of lens and mirror the light output is restored to as near 100 % as possible and never lower than 80 % of the certified specified performance(s).

This standard does not require limits for the recognition of red or green signals with reduced luminous intensities

operating in a failure mode. These limits depend on the surrounding lights (on or off) and on the situation. However, for a simple rule a red signal is considered as failed if the luminous intensity in the reference axes is $I \leq 10$ cd, and a green signal is considered as being in operation if the luminous intensity is $I \geq 0,05$ cd.

The working environment for signal heads is relatively harsh and equipment that is deemed "fit for purpose" is expected to last in this exposed, corrosive environment for a minimum of 10 years. It is essential that all materials and manufacturing processes take this into account. The supplier should detail all steps taken to comply with this clause.

For devices randomly selected from series production it is important that the requirements as to minimum luminous intensity of the light emitted are in each relevant direction of the minimum values prescribed.

This European Standard deals with non-break away safety poles. For break-away safety poles see prEN 12767.

1 Scope

This European Standard only applies to red, yellow and green signal lights for road traffic with 200 mm and 300 mm roundels. It defines the requirements for the visual, structural, environmental performances and testing of signal heads for pedestrian and road traffic use. Portable signal lights are specifically excluded from the scope of this standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

CIE Publ. 17.4

International lighting vocabulary

CIE Publ. 69

Methods of characterizing illuminance meters and luminance meters; performance, characteristics and specifications

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EN 60529

Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)

EN 60598-1

Luminaires – Part 1: General requirements and tests (IEC 60598-1:1996, modified)

prEN 12899-1:1997

Road equipment - Fixed vertical road traffic signs - Part 1: Signs

prEN 50278:1997

Road traffic signal systems

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 68-2-2A:1976)

IEC 60068-2-5

Environmental testing – Part 2: Tests

Test Sa: Simulated solar radiation at ground level

IEC 60068-2-14

Basic environmental testing procedures – Part 2: Tests

Test N: Change of temperature

IEC 60068-2-30

Basic environmental testing procedures – Part 2: Tests

Test Db and guidance: Damp heat, cyclic (12+12-hour cycle)

3 Definitions

For the purposes of this European Standard the definitions and units of the International Lighting Vocabulary (ILV), CIE Publication 17.4 and the following apply:

3.1 signal head: A device which comprises one or more optical units, including the housing(s), together with all the mounting brackets, fixings, hoods, visors, cowls and background screens, whose task is to convey a visual message to vehicle and pedestrian traffic.

3.2 optical unit: An assembly of components designed to produce a light of the specified nominal size, colour, luminous intensity and shape.

3.3 optical surface: This is the surface of the material adjacent to the atmosphere. It is the surface to which the impact, water and dust ingress tests are applied.

NOTE: In many cases it is the external surface of the lens.

3.4 lens: A light transmitting element of the optical unit which distributes the luminous flux from the light source into preferred directions of the signal light.

3.5 background screen: An opaque board placed around the optical unit to increase the contrast and to enhance visibility.

NOTE: The background screen can be incorporated in the housing of the optical unit or can be detachable.

3.6 hood (visor, cowl): A device located above the front of an optical unit to reduce phantom effect or to restrict the field of view.

3.7 phantom signal: A false signal that is created by sunlight striking an optical unit.

3.8 reference axis: Axis specified by the supplier, used for environmental and optical tests.

4 Constructional requirements SIST EN 12368:2002

4.1 General

The manufacturer shall ensure the design is such that there is a minimum requirement for maintenance. Any component requiring change shall be designed such that this is easily accommodated and does not affect the optical performance.

The construction and choice of materials shall be such that they will provide suitable performance for the lifetime of the product as verified by the relevant tests and certification given in this standard.

The complete signal head shall be made of suitable materials and meet the impact requirements according to EN 60598-1 as specified in clause 7.

The constructional integrity shall be suitable to meet the vibration test and impact test specified in clause 7.

The supplier shall detail in his documentation what maintenance shall be carried out, including cleaning methods and materials, to ensure that the optical performance shall be maintained to at least 80 % of the minimum values set out in the appropriate parts of 6.3 and 6.4.

During the expected lifetime of the optical unit the colours shall remain within the colour boxes of table 7.

4.2 Signal head

There are 4 classes for the IP rating in accordance with EN 60529 of a signal head:

Class I: IP34

Class II: IP44

Class III: IP54

Class IV: IP55

Where separate protection of the optical units is required they shall be protected to IP55.

The signal head, including its optical components, shall be so designed that after installation, during its lifetime as defined by the supplier, including any replacement of components, the optical and mechanical requirements are guaranteed.

4.3 Mountings: Poles, poles with bracket and catenaries

Mountings for signal heads come in a variety of forms, which can be grouped generally: poles, poles with brackets and catenaries. Whichever form they come in they shall be able to sustain the wind loading specified by the customer for a maximum number of signal heads also specified by the customer.

Where electrical/electronic equipment is housed in a pole it shall be protected to IP54 either by special enclosure or by the pole and/or signal head assembly, providing the necessary protection.

Surface protection, finishing and marking of mountings shall be as specified by the customer.

4.4 Deflection

When installed and aligned directly on a pole, temporary deflection of the signal head in any horizontal direction by wind loading shall not exceed 2 % of the total length of the pole and permanent deflection shall not exceed 0,04 %.

When installed and aligned on a mounting in the form of a pole with bracket or a catenary, temporary deflection of the signal head in any horizontal direction and in the vertical direction by wind loading and/or other external loading shall not exceed 4 % of the total length of the pole(s) or the mounting and permanent deflection shall not exceed 0,08 %.

The wind load and other external load are specified by the customer. Wind load and deflections shall be calculated or measured in accordance with prEN 12899-1:1997.

5 Environmental, electromagnetic compatibility (EMC) and electrical requirements

5.1 Environmental requirements

The signal heads shall comply with one of the following classes of operational temperature ranges:

Class A +60 °C to -15 °C

Class B +55 °C to -25 °C

Class C +40 °C to -40 °C

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5.2 Electrical safety and EMC requirements

The signal heads shall comply with the requirements of prEN 50278:1997.

6 Optical requirements

6.1 General

The supplier shall state what visors, anti-phantom devices and protective screens are provided to meet the requirements of the standard.

NOTE 1: Different luminous intensities and luminous intensity distributions are recommended for different locations and situations.

NOTE 2: The rules governing these issues can in some cases be a matter of individual national rules or legislation.

6.2 Diameter of signal lights

Roundel signal lights for road traffic conditions shall have a nominal diameter of 200 mm or 300 mm ± 10 %.

NOTE: As the requirements for visibility depend on the local conditions of road lay-out and infrastructure, on traffic conditions and light conditions, it is not feasible to give strict rules for the situations where either 200 mm or 300 mm roundel signals should be used.

6.3 Luminous intensities of signal lights

The performance levels for signal lights, for both 200 mm and 300 mm roundels, shall be as specified in table 1.

NOTE: The standard does not give values for reduced output operation.

Table 1: Luminous intensities (I) for red, yellow and green signal lights in the reference axis

Performance level	1	2	3
I_{\min}	100 cd	200 cd	400 cd
I_{\max} class 1	400 cd	800 cd	1000 cd
I_{\max} class 2	1100 cd	2000 cd	2500 cd

For example the performance level 2/1 is the designation of a signal light with $I_{\min} = 200$ cd, $I_{\max} = 800$ cd

6.4 Distribution of luminous intensity

In tables 2, 3, 4 and 5 four angular distributions of luminous intensity for signal lights are specified as minimum luminous intensities, expressed as percentage values dependent on the choice of the following categories:

- A - as a percentage of the measured values on the axis 0° horizontal and 0° vertical (the reference axis)
- B - as a percentage of the minimum values as defined in table 1 required on the axis 0° horizontal and 0° vertical (the reference axis)

Outside the area described in tables 2 to 5 (as applicable) the luminous intensities shall not exceed the maximum of the relevant class of performance level.

The tables 2 to 5 contain the minimum luminous intensities in % of the values in their reference axis. Only the listed combinations of classes and performance levels shall be applied.

**Table 2: Extra wide-beam signal (Type E)
possible combinations B 1/1, B 2/2**

α_{horiz}	0°	$\pm 2,5^\circ$	$\pm 5^\circ$	$\pm 10^\circ$	$\pm 15^\circ$	$\pm 20^\circ$	$\pm 30^\circ$
α_{vert}							
0°	100	—	85	80	—	60	40
$-1,5^\circ$	—	—	SIST EN 12368:2002		—	60	40
-3°	80	—	https://standards.iteh.ai/catalog/standards/sist/8c686461-4dd5-4c02-ac8f-28cc7752004/sist-en-12368-2002		—	—	—
-5°	60	—	—	45	—	—	—
-10°	50	—	—	—	—	20	—
-20°	20	—	—	—	—	—	10
— means no specific values are required							

Table 3: Wide beam signal (Type W)
possible combinations A 1/1; A 2/1; A 3/1
B 1/2; B 2/2; B 3/2

α_{horiz}	0°	±2,5°	±5°	±10°	±15°	±20°	±30°
α_{vert}							
0°	100	–	85	55	–	3	1
-1,5°	–	–	–	–	–	–	–
-3°	80	–	75	–	–	–	–
-5°	60	–	–	35	–	–	–
-10°	30	–	–	–	–	8	–
-20°	2	–	–	–	–	–	2
– means no specific values are required							

Table 4: Medium wide beam signal (Type M)
possible combinations A 2/1; A 3/1
A 2/2; A 3/2

α_{horiz}	0°	±2,5°	±5°	±10°	±15°	±20°	±30°
α_{vert}							
0°	100	–	75	40	10	1	*
-1,5°	–	–	–	–	–	–	*
-3°	75	–	60	–	–	–	*
-5°	50	–	–	20	–	–	*
-10°	12,5	–	–	–	–	6	*
-20°	1,5	–	–	–	–	–	1
– means no specific values are required * means no requirements							

Table 5: Narrow beam signal (Type N)
possible combinations A 2/1; A 3/1
B 2/2; B 3/2

α_{horiz}	0°	±2,5°	±5°	±10°	±15°	±20°	±30°
α_{vert}							
0°	100	75	65	15	1,5	*	*
-1,5°	95	90	–	–	–	*	*
-3°	70	–	45	–	–	*	*
-5°	40	–	–	10	–	*	*
-10°	6	–	–	–	5	*	*
-20°	*	*	*	*	*	*	*
– means no specific values are required * means no requirements							

Within the field of measurement, the light pattern shall be substantially uniform, i. e. the light intensity in each direction at each test point shall meet at least the level achieved by the next consecutive measurement.

6.5 Luminance uniformity

The luminance uniformity of the roundel as the ratio of the lowest and greatest luminance $L_{\min} : L_{\max}$ shall be $\geq 1 : 10$ for types E, W and M and $\geq 1 : 15$ for type N.

6.6 Maximum phantom signal

For each signal colour the maximum phantom signal I_{ph} for light incident at an angle of 10° to the reference axis shall comply with of table 6, where I_s is the actual measured luminous intensity I of the signal light:

Table 6: Requirement for the ratio of I_s to I_{ph}

Signal light function	Class 1	Class 2	Class 3	Class 4	Class 5
Red, yellow	>1	>5	>4	> 8	>16
Green	>1	>5	>8	>16	>16

6.7 Colours of signal lights

The colours of signal lights are red, yellow and green and they shall comply with table 7 when using anti-phantom devices and including combined colours from real signal and all classes of phantom light, except class 1.

Table 7: Required chromaticity regions for the colour boundaries of signal lights and combined colours from real signal and phantom light

Colour of signal light	Colour boundaries of signal lights	Boundary
Red	$y = 0,290$ $y = 0,980 - x$ $y = 0,320$	red purple yellow
Yellow	$y = 0,387$ $y = 0,980 - x$ $y = 0,727x + 0,054$	red white green
Green	$y = 0,726 - 0,726 x$ $x = 0,625y - 0,041$ $y = 0,400$	yellow white blue

6.8 Signal lights with symbols

Symbols shall only be placed on roundels of signal lights which comply with 6.3 to 6.7. The optical performance for symbols is derived by using the performance of the full roundel.

Class S1: Symbols placed on roundels meeting 100 % of one of the levels set out in table 1.

Class S2: Symbols placed on roundels meeting 50 % of one of the levels set out in table 1 (only pedestrian traffic).

6.9 Background screen of signal lights

Signal lights shall have an opaque background screen or a rim of 25 mm which gives suitable contrast. The background screen can be incorporated in the housing of the signal head or can consist of a detachable screen. The dimensions of the background screen for three-colour-signal heads shall comply with one of the four classes specified in table 8. The classes are expressed in the overall dimensions (height and width) of the opaque background screen and for 200 mm and 300 mm roundels.

Table 8: Dimensions of background screens for three-colour-signal heads

Class	Heights		Width	
	$d = 200$ mm	$d = 300$ mm	$d = 200$ mm	$d = 300$ mm
C1	≥ 647 mm	≥ 980 mm	≥ 222 mm	≥ 336 mm
C2	≥ 995 mm	≥ 1367 mm	≥ 350 mm	≥ 650 mm
C3	≥ 982 mm	≥ 1517 mm	≥ 450 mm	≥ 800 mm
C4	≥ 1000 mm	≥ 1500 mm	≥ 600 mm	≥ 900 mm

NOTE: There can be national additional requirements for background screens. These can include colour and the provision for contrasting borders.

7 Constructional and environmental test methods

The test methods for four environmental ranges are detailed in table 9, table 10, table 11 and table 12. The latter is generally considered an electrical test but in this case ingress of dust and moisture can adversely affect optical performance hence are included in this section.

Table 9: Impact resistance

IMPACT test EN 60598-1 Clause 4.13.4	0,51 kg ball of 50 mm diameter dropped from:	class IR1	class IR2	class IR3
		100 mm	400 mm	1300 mm

NOTE: Surface cracks are allowed providing complete penetration does not occur, i. e. the integrity of the seal is not broken.

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Table 10: Constructional integrity

Random vibration	Frequency range: 10 Hz to 500 Hz
IEC 60068-2-34 Test Fd	ASD spectrum levels: 0,02 g ² /Hz (10 Hz to 50 Hz) 0,01 g ² /Hz (50 Hz to 150 Hz) 0,002 g ² /Hz (150 Hz to 500 Hz) Overall RMS acceleration 1,58 g Duration: 2 hours in each of the 3 axes

Table 11: Ingress

Water penetration and dust EN 60529 test 13 and 14	As required for the specified IP rating
NOTE: Ingress is allowed into the signal head provided it does not affect its performance either electrically or optically.	