SLOVENSKI STANDARD

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Oprema za nadzor in vodenje cestnega prometa - Signalni dajalci

Traffic control equipment - Signal heads

Anlagen zur Verkehrssteuerung - Signalleuchten

Equipement de régulation du trafic - Signaux

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Traffic control equipment - Signal heads

Equipement de régulation du traffic - Signaux

Anlagen zur Verkehrssteuerung - Signalleuchten

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

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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 Central Secretariat has the same status as the official versions.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard (EN 12368:2006) 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of an identical text or by endorsement, at the latest by October 2006, and conflicting national standards shall be withdrawn at the latest by January 2008.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 12368:2000.

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.

Introduction

Signal heads are mainly used to transfer safety messages to the road user to achieve specific reactions. Signal heads 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 can 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 declared specified performance(s).

This European 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.

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 European Standard.

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 12767, *Passive safety of support structures for road equipment — Requirements and test methods*

EN 12899-1:2001, *Fixed, vertical road traffic signs — Part 1: Fixed signs*

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 60068-2-5, *Environmental testing — Part 2: Tests — Test Sa: Simulated solar radiation at ground level (IEC 60068-2-5:1975)*

EN 60068-2-14, *Environmental testing — Part 2: Tests — Test N: Change of temperature (IEC 60068-2-14:1984 + A1:1986)*

EN 60068-2-30, *Environmental testing — Part 2: Tests — Test Db and guidance: Damp heat, cyclic (12+12-hour cycle) (IEC 60068-2-30:1980 + A1:1985)*

EN 60068-2-64, *Environmental testing — Part 2: Test methods — Test Fh: Vibration, broad-band random (digital control) and guidance (IEC 60068-2-64:1993 + Corrigendum 1993)*

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

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

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

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

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

HD 638, *Road traffic signal systems*

3 Terms and definitions

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

3.1
signal head
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
assembly of components designed to produce a light of the specified nominal size, colour, luminous intensity and shape

3.3
optical surface
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
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
opaque board placed around the optical unit to increase the contrast and to enhance visibility

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

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

3.7
phantom signal
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

3.9
Factory Production Control (FPC)
permanent internal control of production exercised by the manufacturer

3.10
batch
quantity of a product manufactured with no change in raw material, equipment, settings or operation as defined in the FPC system manual of the manufacturer

3.11
individual (and non-series)
where the manufacturing process is different to the manufacturer's usual process

4 Constructional requirements

4.1 General

The manufacturer shall ensure the design is such that there is a facility for maintenance. Any component requiring replacement shall be designed such that this is easily accommodated and does not affect the optical performance of the signal head.

The construction and choice of materials shall be such that they will provide declared performance for a reasonable economic lifetime of the product as verified by the relevant tests given in this European Standard.

The complete signal head shall be made of suitable materials to 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 declared 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 declared by the manufacturer for the designed maximum number of signal heads.

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.

Where required for the purpose of demonstrating passive safety, mountings shall comply with EN 12767.

Surface protection and finishing shall be declared by the manufacturer and marking of mountings shall be as Clause 10.

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 %.

Wind load and deflections shall be calculated or measured in accordance with EN 12899-1:2001.

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

5.2 Electrical safety and EMC requirements

The signal heads shall comply with the requirements of EN 50293.

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 6.6 and 6.9.

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

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	1 000 cd
I_{max} class 2	1 100 cd	2 000 cd	2 500 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.

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.

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

α_{horiz}	0°	±2,5°	±5°	±10°	±15°	±20°	±30°
α_{vert}							
0°	100	–	85	80	–	60	40
–1,5°	–	–	–	–	–	–	–
–3°	80	–	75	–	–	–	–
–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 2/1,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