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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 traffic - Têtes de feux

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Traffic control equipment - Signal heads

Équipement de régulation du trafic - Têtes de feux

Anlagen zur Verkehrssteuerung - Signalleuchten

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 226.

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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
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Foreword

This document (FprEN 12368:2014) 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 Unique Acceptance Procedure.

This document will supersede EN 12368:2006.

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 Directive(s).

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

NOTE Due to fact that the Framework Partnership Agreement between the Commission and CEN & CENELEC is not signed yet, there are currently no New Approach Consultants in place for 2014. Therefore the provisions of CEN-CENELEC Guide 15 cannot be met.

This shall not prevent the processing of draft standards nor the offering of harmonized standards to the Commission. In particular, draft standards can be sent to vote without Consultant assessment.

This note will be removed from the Foreword of the finalized publication.

The main changes in this revision are as follows:

- a) Introduction: Paragraph 6 added outlining reasons for possible degradation of optical performance;
 - b) Scope: Individual optical units included in addition to complete signal heads which were in the previous version;
 - c) Clauses 4 to 8 Requirements re phrased to clearly identify Product Characteristics as required in the CPR;
 - 1) 4.2 Signal head:- Class V IP65 added as some signals are required with the higher sealing for example in tunnels. A warning note was also added that higher sealing levels can lead to risk of trapped moisture;
 - 2) 4.3 Mountings, poles with brackets and catenaries: removed as topic considered outside of the scope of this standard as the infrastructure to which signals are mounted are the subject of other standards. Table ZA.1 and Clause 8 of DoP updated accordingly to remove these characteristics;
 - 3) 4.4 Deflection: removed as infrastructure, poles, gantries catenaries etc considered outside of the scope of this standard, as the infrastructure to which signals are mounted are the subject of other standards. Table ZA.1 and Clause 8 of DoP updated accordingly to remove these characteristics;
- New sub-clause 4.3 Added to clearly state Product Characteristic of Performance Under Impact;
- New sub-clause 4.4 Added to clearly state Product Characteristic of Constructional Integrity;
- 4) 5.2. Electrical safety: Addition detail added noting intended use of signal in a traffic system and that therefore electrical requirements of EN 50556 also apply;
 - 5) 6.1 General: Note added noting that whilst it is normally expected that all aspects in a signal would be of the same performance, this can vary for special applications;
 - 6) 6.3 Luminous Intensities: Allowance for dimming of signals added;
 - 7) 6.4 Distribution if Luminous Intensity: Clarification added as to the meaning of the wording "substantially uniform" distribution;

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8) 6.6 Phantom Signal: Notes 1 and 2 added;

9) 6.9 Background screen of signals: Simplified. Table 8 of background screen sizes removed and all subsequent tables re numbered (i.e. Tables 9 to 17 have become 8 to 14);

10) 6.10 Visible Flicker: Charactersitic added;

11) 7 Construction and environmental test methods: Clarification added with reference to optical units of different diameters;

Table 9:- Class AJ2 replaced with duration and axis, as the AJ2 reference was a reference to EN 50556 simply for the duration and axis of the tests as the spectrum was always defined in EN 12368;

12) 8.1 General: Clarification of test tolerances added, optical measurement tolerances and measurement environment temperature tolerance;

13) 8.2 Measurement of luminous intensities: A method of stabilisation added;

14) 8.3. Measurement of luminance for uniformity tests: Method clarified;

15) 8.4. Measurement of phantom signal: specification for the illuminance source change to simplify the equipment needed;

16) 8.6. Measurement of combined colours: The need to plot colours on the chromaticity diagram Figure 3 clarified;

d) 10.1 Marking and labelling: The labelling needs changed increasing the level of information available adding diameter and dimming;

e) 10.2 Product Information: definition of reference axis clarified to include reference centre and the relationship to the light emitting surface. Need for instructions for safe use as required in the CPR article 11.6 also added to this sub-clause;

f) Clause 11: Clause updated to align with AVCP format for CPR, Table 15 removed as not part of the revised AVCP;

11.2.2. Test Modules: Definition expanded to cover alternative types of enclosures;

g) Table A.1: Dimmed operation added;

h) Annex ZA to align with Annex ZA format for CPR;

Table ZA.1: Scope increased to include dimming performance where signals have dimming;

Table ZA.2: Intended uses expanded to indicate possible use of visors and hoods;

Figures ZA1: updated to show diameter and dimming performance.

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.

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.

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).

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

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1 Scope

This European Standard applies to signal heads with one or more signal lights of the colours red, yellow and/or green signal lights for road traffic with 200 mm and 300 mm roundels and to optical units to be integrated in signal heads to produce the individual signal lights. It defines the product characteristics for the visual, structural, environmental performances and testing of signal heads and optical units for pedestrian and road traffic use.

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 50556, *Road traffic signal systems*

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

EN 60068-2-2, *Environmental testing — Part 2-2: Tests — Test B: Dry heat (IEC 60068-2-2)*

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

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

EN 60068-2-30, *Environmental testing — Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) (IEC 60068-2-30)*

EN 60068-2-64, *Environmental testing — Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64)*

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

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 1 to entry: 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, either incorporated in the housing of the optical unit or detachable, intended to increase the contrast and to enhance visibility

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)

product manufactured under a manufacturing process that is specifically conceived for one unique production.

4 Constructional Product Characteristics

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 pass the tests specified in Clause 7 for impact resistance, constructional integrity, ingress and tolerance to temperature, damp heat and solar radiation.

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The manufacturer 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 5 classes for the Ingress Protection, IP, rating in accordance with EN 60529 of a signal head:

Class I: IP34

Class II: IP44

Class III: IP54

Class IV: IP55

Class V: IP65

Where separate protection of the optical units is required they shall be protected to IP55 or IP65.

NOTE A level of sealing in accordance with IP65 may result in a risk of water collection within the optic housing due to condensation.

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 product characteristics are guaranteed.

4.3 Performance under impact product characteristic

There are 3 classes of performance under impact, IR1, IR2 and IR3. When required by the regulatory authority this characteristic shall be determined in accordance with Clause 7 Constructional and environmental test methods Table 8 — Impact resistance.

4.4 Constructional integrity product characteristic

The product is expected to survive levels of vibration that may be expected in normal operation. This characteristic shall be determined in accordance with Clause 7 Constructional and environmental test methods Table 9 — Constructional integrity.

5 Environmental, electromagnetic compatibility (EMC) and electrical product characteristics**5.1 Environmental characteristics**

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 characteristics

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

Whilst this specification is for a traffic signal product, it is clear that this product is connected to a "Traffic system" and as such the connections/wiring etc that is required between it and any controller shall meet the requirements of EN 50556 for electrical safety and in particular attention is drawn to 5.2 Electric safety.

6 Optical Product Characteristics

6.1 General

The optical units of a signal head should normally be of the same classes regarding luminous intensity, dimming, distribution of luminous intensity and phantom light, but it is permissible in special cases that the classes are different.

EXAMPLE In signal head with red, yellow and green signals it may be requested that the red be brighter than the yellow and green on high speed roads.

6.2 Diameter of signal lights

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

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.

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 0	200 cd	400 cd	600 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.

Dimmed operation is an operating mode of the road traffic signal system in which the luminous intensity of the signal heads is reduced. These classes of dimmed operation are available:

Class D0 Dimmed operation is not required.

Class D1 As declared by the manufacturer.

For Class D1, the manufacturer shall declare the performance of their signal in dimmed operation against the optical product characteristics of this specification and operational voltage ranges.

NOTE Refer to CLC/TS 50509 Annex B regarding dimmed operation in the Netherlands and Annex C regarding dimmed operation in Spain.

FprEN 12368:2014 (E)**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. e.g. if at 0,0 the measurement is 100 and at +5 the measurement is 85 then in between the two a measurement should be at least 85. If doubt arises during the testing of luminance (test 8.2), then test 8.2 can be stopped and Uniformity test 8.3 can be completed. It should be noted that the maximum luminous intensity is defined by the classes selected by the regulatory authority from Table 1 — Luminous intensities (*I*) for red, yellow and green signal lights in the reference axis

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