



# SLOVENSKI STANDARD

## SIST EN 13201-2:2004

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### Cestna razsvetljava – 2. del: Zahtevane lastnosti

Road lighting - Part 2: Performance requirements

Straßenbeleuchtung - Teil 2: Gütemerkmale

Eclairage public - Partie 2: Exigences de performance

**Ta slovenski standard je istoveten z: EN 13201-2:2003**

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Street lighting and related  
equipment

**SIST EN 13201-2:2004**

**en**

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English version

## Road lighting - Part 2: Performance requirements

Eclairage public - Partie 2: Exigences de performance

Straßenbeleuchtung - Teil 2: Güteermkmale

This European Standard was approved by CEN on 1 September 2003.

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 Management Centre 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 Management Centre 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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## Foreword

This document (EN 13201-2:2003) has been prepared by Technical Committee CEN/TC 169 "Light and lighting", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by May 2004, and conflicting national standards shall be withdrawn at the latest by May 2004.

This document EN 13201-2 has been worked out by the Joint Working Group of CEN/TC 169 "Light and lighting" and CEN/TC 226 "Road Equipment", the secretariat of which is held by AFNOR.

Annexes A and B are informative.

This document includes a Bibliography.

This standard, EN 13201 *Road Lighting*, consists of three parts. This document is;

Part 2: Performance requirements

The other parts of EN 13201 are:

Part 3: Calculation of performance

Part 4: Methods of measuring lighting performance

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## Introduction

A lighting class is defined by a set of photometric requirements aiming at the visual needs of certain road users in certain types of road areas and environment.

The purpose of introducing lighting classes is to make it easier to develop and use road lighting products and services in CEN member countries. The lighting classes have been defined with consideration of road lighting standards in these countries aiming at harmonization of requirements where possible. However, some lighting classes and subclasses reflect particular situations and national approaches based on traditional, climatic or other conditions.

The ME classes are intended for drivers of motorized vehicles for use on traffic routes, and in some countries also residential roads, allowing medium to high driving speeds.

The CE classes are also intended for drivers of motorized vehicles, but for use on conflict areas such as shopping streets, road intersections of some complexity, roundabouts and queuing areas. These classes have applications also for pedestrians and pedal cyclists.

The S and A classes are intended for pedestrians and pedal cyclists for use on footways and cycleways, emergency lanes and other road areas lying separately or along the carriageway of a traffic route, residential roads, pedestrian streets, parking areas, schoolyards etc.

The ES classes are intended as an additional class in situations where public lighting is necessary for the identification of persons and objects and in road areas with a higher than normal crime risk.

The EV classes are intended as an additional class in situations where vertical surfaces need to be seen in such road areas as toll stations, interchange areas etc.

The requirements of the lighting classes reflect the category of road user in question or the type of road area. Thus the ME classes are based on the road surface luminance, while the CE, S and A classes are based on the illumination of the road area. The S and A classes reflect different priorities to the road lighting. The ES classes are based on semi-cylindrical illuminance, while the EV classes are based on the vertical plane illuminance.

The ME classes present increasingly stronger requirements in the order ME 6, ME 5,...ME 1 forming steps of the lighting level as measured for instance in illuminance. The other classes are arranged in the same way, and so that their steps interlock.

Environmental aspects of road lighting are considered in clause 7 in terms of day time appearance, night time appearance and light emitted in directions, where it is neither necessary nor desirable. The purpose is to point to matters that can be included in tender specifications or similar, when relevant.

Installed intensity classes for the restriction of disability glare and control of obtrusive light G.1, G.2, G.3, G.4, G.5 and G.6 are introduced in the informative annex A. The use of G classes is mentioned in clause 5 for conflict areas and in clause 7 on appearance and environmental aspects.

Installed glare index classes for the restriction of discomfort glare D.0, D.1, D.2, D.3, D.4, D.5 and D.6 are introduced in the informative annex A as well. These classes are intended mainly for road areas lighted for the benefit of pedestrians and pedal cyclists.

Local lighting of pedestrian crossings is considered in the informative annex B. The intention of local lighting is to attract the attention of drivers of motorized vehicles to the presence of the pedestrian crossing and to illuminate pedestrians in or at the crossing area.

## 1 Scope

This part of this European Standard defines, according to photometric requirements, lighting classes for road lighting aiming at the visual needs of road users, and it considers environmental aspects of road lighting.

NOTE Installed intensity classes for the restriction of disability glare and control of obtrusive light and installed glare index classes for the restriction of discomfort glare are defined in annex A.

## 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 (including amendments).

EN 13201-3, *Road lighting — Part 3: Calculation of performance.*

EN 13201-4, *Road lighting — Part 4: Methods of measuring lighting performance.*

## 3 Terms and definitions

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

### 3.1

**average road surface luminance (of a carriageway of a road) ( $L$ )**  
luminance of the road surface averaged over the carriageway

NOTE Unit is candelas per square metre ( $\text{cd/m}^2$ ).

### 3.2

**longitudinal uniformity (of road surface luminance of a driving lane)**

ratio of the lowest to the highest road surface luminance found in a line in the centre along a driving lane

### 3.3

**longitudinal uniformity (of road surface luminance of a carriageway) ( $U_l$ )**

lowest of the longitudinal uniformities of the driving lanes of the carriageway

### 3.4

**threshold increment ( $T_l$ )**

measure of the loss of visibility caused by the disability glare of the luminaires of a road lighting installation

### 3.5

**surround ratio (of illumination of a carriageway of a road) ( $SR$ )**

average illuminance on strips just outside the edges of the carriageway in proportion to the average illuminance on strips just inside the edges

**3.6**

**average illuminance (on a road area) ( $\bar{E}_{hs}$ )**

horizontal illuminance averaged over a road area

NOTE Unit is lux (lx).

**3.7**

**minimum illuminance (on a road area) ( $E_{min}$ )**

lowest illuminance on a road area

NOTE Unit is lux (lx).

**3.8**

**hemispherical illuminance (at a point on a road area) ( $E_{hs}$ )**

luminous flux on a small hemisphere with a horizontal base, divided by the surface area of the hemisphere

NOTE Unit is lux (lx).

**3.9**

**average hemispherical illuminance (on a road area) ( $\bar{E}$ )**

hemispherical illuminance averaged over a road area

NOTE Unit is lux (lx).

**3.10**

**overall uniformity (of road surface luminance, illuminance on a road area or hemispherical illuminance) ( $U_o$ )**

ratio of the lowest to the average value

**3.11**

**maintained level (of average road surface luminance, average or minimum illuminance on road area, average hemispherical illuminance, minimum semi-cylindrical illuminance or minimum vertical plane illuminance)**

design level reduced by a maintenance factor to allow for depreciation

**3.12**

**semi-cylindrical illuminance (at a point) ( $E_{sc}$ )**

total luminous flux falling on a curved surface of a very small semi-cylinder divided by the curved surface area of the semi-cylinder. The direction of the normal on the flat back area inside the semi-cylinder should be the direction of orientation of the semi-cylinder

NOTE Unit is lux (lx).

**3.13**

**minimum semi-cylindrical illuminance (on a plane above a road area) ( $E_{sc,min}$ )**

lowest semi-cylindrical illuminance on a plane at a height of 1,5 m above a road area

NOTE Unit is lux (lx).

**3.14**

**vertical plane illuminance (at a point) ( $E_v$ )**

illuminance on a vertical plane

NOTE Unit is lux (lx).



**3.15****minimum vertical plane illuminance (on a plane above a road area) ( $E_{v,min}$ )**

lowest vertical plane illuminance on a plane at a specified height above the road area

NOTE Unit is lux (lx).

**4 ME/MEW-series of lighting classes**

The ME and MEW classes in Tables 1a and 1b are intended for drivers of motorized vehicles on traffic routes of medium to high driving speeds.

NOTE 1 Guidance on the application of these classes is given in prCEN/TR 13201-1.

The average road surface luminance ( $\bar{L}$ ), the overall uniformity of the luminance ( $U_o$ ), the longitudinal uniformity of the luminance ( $U_l$ ), the threshold increment ( $Tl$ ) and the surround ratio ( $SR$ ) are to be calculated and measured in accordance with EN 13201-3 and EN 13201-4.

**Table 1a — ME-series of lighting classes**

Class	Luminance of the road surface of the carriageway for the dry road surface condition			Disability glare	Lighting of surroundings
	$\bar{L}$ in $\text{cd/m}^2$ [minimum maintained]	$U_o$ [minimum]	$U_l$ [minimum]	$Tl$ in % <sup>a</sup> [maximum]	$SR$ <sup>2b</sup> [minimum]
ME1	2,0	0,4	0,7	10	0,5
ME2	1,5	0,4	0,7	10	0,5
ME3a	1,0	0,4	0,7	15	0,5
ME3b	1,0	0,4	0,6	15	0,5
ME3c	1,0	0,4	0,5	15	0,5
ME4a	0,75	0,4	0,6	15	0,5
ME4b	0,75	0,4	0,5	15	0,5
ME5	0,5	0,35	0,4	15	0,5
ME6	0,3	0,35	0,4	15	no requirement
<sup>a</sup> An increase of 5 percentage points in $Tl$ can be permitted where low luminance light sources are used. (see note 6) <sup>b</sup> This criterion can be applied only where there are no traffic areas with their own requirements adjacent to the carriageway.					

NOTE 2 The road surface luminance is the result of the illumination of the road surface, the reflection properties of the road surface and the geometrical conditions of observation. Conventions are given in EN 13201-3 and EN 13201-4, aiming at driving along stretches of road with viewing distances of between 60 m and 180 m.

NOTE 3 The average luminance ( $\bar{L}$ ) reflects the general luminance level at which the driver performs. At the low level of lighting used for road lighting, performance improves with luminance in terms of increasing contrast sensitivity, increasing visual acuity and amelioration of glare.

NOTE 4 The overall uniformity ( $U_o$ ) measures in a general way the variation of luminances and indicates how well the road surface serves as a background for road markings, objects and other road users.