SLOVENSKI STANDARD
oSIST prEN 13201-3:2026

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Cestna razsvetljava - 3. del: Izračun fotometričnih lastnosti

Road lighting - Part 3: Calculation of performance

Straßenbeleuchtung - Teil 3: Berechnung der Gütemerkmale

Eclairage public - Partie 3: Calcul des performances

Ta slovenski standard je istoveten z: **prEN 13201-3**

ICS:

93.080.40	Cestna razsvetljava in pripadajoča oprema	Street lighting and related equipment

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EUROPEAN STANDARD

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English Version

Road lighting - Part 3: Calculation of performance

Eclairage public - Partie 3: Calcul des performances

Straßenbeleuchtung - Teil 3: Berechnung der Gütemerkmale

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 169.

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

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European foreword

This document (prEN 13201-3:2026) has been prepared by Technical Committee CEN/TC 169 “Light and lighting”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13201-3:2015.

This document includes the following significant technical changes with respect to EN 13201-3:2015:

— The number of decimal digits for the presentation of quality characteristics has been updated (4.2),

— The former Annex A (Mathematical information technology conventions and flow chart diagrams) was deleted except for Figure A.1 which is included in Clause 7,

— Additional information to better aid understanding when calculating edge illuminance ratio $R_{\mathrm{EI},}$

—- Update of the Symbols and abbreviations section,

— Improved alignment with CIE 140,

— Correction to Table 3.

Introduction

The calculation methods described in EN 13201-3 enable road lighting quality characteristics to be calculated by agreed procedures so that results obtained from different designers will have a uniform basis.

1 Scope

This document specifies the conventions and mathematical procedures to be adopted in calculating the photometric performance of road lighting installations designed in accordance with the parameters described in EN 13201-2 to ensure that every lighting calculation is based on the same mathematical principles.

The design procedure of a lighting installation also requires the knowledge of the parameters involved in the described model, their tolerances and variability. These aspects are not considered in this document but a procedure to analyse their contribution in the expected results is suggested in EN 13201-4 and it can also be used in the design phase.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13032-1, *Light and lighting — Measurement and presentation of photometric data of lamps and luminaires — Part 1: Measurement and file format*

EN 13201-2, *Road lighting - Part 2: Performance requirements*

EN 12665, *Light and lighting - Basic terms and criteria for specifying lighting requirements*

3 Terms and definitions

3.1 List of terms and definitions

For the purposes of this document, the terms and definitions given in EN 12665 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1
vertical photometric angle
γ
angle between the light path and the downward vertical axis both passing through the luminaire photometric centre

Note 1 to entry: Unit ° (degree).

Note 2 to entry: The direction $\gamma = 0$ is therefore oriented to the nadir.

Note 3 to entry: See Figure 1.

3.1.2
azimuth
C
angle between the vertical half plane passing through the light path and the reference half plane

Note 1 to entry: I.e. the vertical half plane passing through the second axis of a luminaire, when the luminaire is at its tilt during measurement.

Note 2 to entry: Unit ° (degree).

Note 3 to entry: See Figure 1.

3.1.3
angle of incidence
ε
angle between the light path at a point on a surface and the normal to the surface

Note 1 to entry: Unit ° (degree).

Note 2 to entry: See Figure 4, Figure 13 and Figure 14.

3.1.4
angle of deviation
β
angle between the oriented vertical planes through the observer to the point of observation and from the point of observation through the luminaire (with respect to luminance coefficient)

Note 1 to entry: Unit ° (degree).

Note 2 to entry: See Figure 4.

3.1.5
luminance coefficient
q
quotient of the luminance of a surface element in a given direction by the illuminance on the surface element

Note 1 to entry: Unit sr^{-1}.

Note 2 to entry:

$$q = \frac{L}{E} \tag{1}$$

where

q is the luminance coefficient, in reciprocal steradians (sr^{-1});

L is the luminance, in candelas per square metre ($cd \cdot m^{-2}$);

E is the illuminance, in lux (lx).

3.1.6
reduced luminance coefficient
r

luminance coefficient of a surface element multiplied by the cube of the cosine of the angle of incidence of the light on the surface element

Note 1 to entry: Unit sr^{-1}.

Note 2 to entry: This can be expressed by the formula:

$$r = q \cos^3 \varepsilon \text{ (refer to CIE 066)} \quad (2)$$

where

q is the luminance coefficient, in reciprocal steradians;

ε is the angle of incidence, in degree.

Note 3 to entry: The angle of observation, α in Figure 4, affects the value of r. In accordance with the requirements specified in EN 13201-2, consider this angle fixed at 1° and this value is adopted for the calculation described in this standard, r is reasonably constant for values of α between 0,5° and 1,5°.

3.1.7
tilt during measurement
θ_m

angle between a defined datum axis on a luminaire and the horizontal when the luminaire is mounted for photometric measurement

Note 1 to entry: Unit ° (degree).

Note 2 to entry: See Figure 7.

Note 3 to entry: The defined datum axis can be any feature of the luminaire, but generally for a side-mounted luminaire it lies in the mouth of the luminaire canopy, in line with the spigot axis. Another commonly used feature is the spigot entry axis.

3.1.8
tilt for calculation
δ

difference in angle between the tilt in application and the tilt during measurement of a luminaire

Note 1 to entry: Unit ° (degree).

Note 2 to entry: See Figure 7.

3.1.9
tilt in application
θ_f
angle between a defined datum axis on a luminaire and the horizontal when the luminaire is mounted for field use

Note 1 to entry: Unit ° (degree).

Note 2 to entry: See Figure 7.

Note 3 to entry: The defined datum axis can be any feature of the luminaire but generally for a side-mounted luminaire it lies in the mouth of the luminaire canopy, in line with the spigot axis. Another commonly used feature is the spigot entry axis.

3.1.10
orientation
v
angle a chosen reference direction makes with the C = 0°, γ = 90° measurement direction of a luminaire when the first photometric axis of the luminaire is vertical

Note 1 to entry: Unit ° (degree).

Note 2 to entry: When the road is straight the reference direction is longitudinal.

Note 3 to entry: See Figure 6, which illustrates the sign conventions.

3.1.11
rotation
ψ
angle the first photometric axis of a luminaire makes with the nadir of the luminaire in the plane C = 0°, C = 180°, when the tilt during measurement is zero

Note 1 to entry: Unit ° (degree).

Note 2 to entry: See Figure 6, which illustrates the sign conventions.

3.1.12
first photometric axis (of a luminaire when measured in the (C, γ) coordinate system)
axis through the photometric centre of a luminaire and perpendicular to the plane which is representative of the main light emitting area

Note 1 to entry: The polar axis of the (C, γ) coordinate system does not necessarily coincide with the first axis of the luminaire if the luminaire is tilted during measurement.

3.1.13
longitudinal direction
direction parallel to the axis of the road

3.1.14
transverse direction
direction at right angles to the axis of the road

Note 1 to entry: On a curved road the transverse direction is that of the radius of curvature at the point of interest on the road.

3.1.15
installation azimuth
φ
angle a chosen reference direction (which is longitudinal for a straight road) makes with the vertical plane through a given point on the road surface and the photometric centre of a luminaire, when the luminaire is at its tilt during measurement

Note 1 to entry: Unit (degree).

Note 2 to entry: See Figure 4.

3.2 List of symbols and abbreviations

Table 1 — Symbols and abbreviations

Quantity		
Symbol	**Name or description**	**Unit**
A_y	Age of observer	y
C	Photometric azimuth angle (Figure 1)	°(degree)
D	Spacing between calculation points in the longitudinal direction (see Figure 10 and Figure 15)	m
D	Spacing between calculation points in the transverse direction (see Figure 10 and Figure 15)	m
$\overline{E}$	Generic symbol used for average illuminance	lx
$\overline{E}_{hi}$	Initial average horizontal illuminance of the lit surface (see 8.5.3)	lx
E_h	Horizontal illuminance at a point	lx
E_{hs}	Hemispherical illuminance at a point	lx
E_{sc}	Semi-cylindrical illuminance at a point	lx
E_v	Vertical illuminance at a point	lx
f_M	Overall maintenance factor	–
f_{TI}	Threshold increment	%
H	Mounting height of a luminaire	m
$I(C, y)$	Luminous intensity table in the C, y system. Also named I-table	cd
j, m	Integers indicating the row or column of a table	–
$\overline{L}$	Generic symbol used for average luminance	$cd \cdot m^{-2}$
$\overline{L}_i$	Initial average horizontal luminance of the lit surface (see 8.5.3)	$cd \cdot m^{-2}$
L_v	Equivalent veiling luminance	$cd \cdot m^{-2}$
L	Luminance at a point	$cd \cdot m^{-2}$
N	Number of calculation points in the longitudinal direction of a grid (see Figure 10 and Figure 15)	–