SLOVENSKI STANDARD
SIST EN 12665:2018

01-oktober-2018

Nadomešča:
SIST EN 12665:2011

Svetloba in razsvetljava - Osnovni izrazi in merila za specifikacijo zahtev za razsvetljavo

Light and lighting - Basic terms and criteria for specifying lighting requirements

Licht und Beleuchtung - Grundlegende Begriffe und Kriterien für die Festlegung von Anforderungen an die Beleuchtung

Lumière et éclairage - Termes de base et critères pour la spécification des exigences en éclairage

Ta slovenski standard je istoveten z: **EN 12665:2018**

ICS:

01.040.91	Gradbeni materiali in gradnja (Slovarji)	Construction materials and building (Vocabularies)
91.160.01	Razsvetljava na splošno	Lighting in general

SIST EN 12665:2018 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12665

June 2018

ICS 01.040.91; 91.160.01

Supersedes EN 12665:2011

English Version

Light and lighting - Basic terms and criteria for specifying lighting requirements

Lumière et éclairage - Termes de base et critères pour la spécification des exigences en éclairage

Licht und Beleuchtung - Grundlegende Begriffe und Kriterien für die Festlegung von Anforderungen an die Beleuchtung

This European Standard was approved by CEN on 8 February 2018.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (EN 12665:2018) 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 December 2018, and conflicting national standards shall be withdrawn at the latest by December 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document will supersede EN 12665:2011.

The main technical changes in this revision are the inclusion of terms previously absent, collated from:

— EN 1837;

— EN 1838;

— EN 12193;

— EN 12464;

— EN 13032;

— EN 13201; and

— EN 15193.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard specifies a basic framework intended to be used for the specification of lighting requirements.

Where a term is contained in CIE Publication CIE S 017/E:2011 ILV, *International Lighting Vocabulary* or IEC 60050-845, *International Electrotechnical Vocabulary*, *Chapter 845*: *Lighting*, a reference is given to the equivalent term where the terms in both documents are, for all practical purposes, identical. For some terms additional explanation is given in informative Annex A. An index of terms is given in informative Annex B.

The lighting requirements for a space are determined by the need to provide:

— adequate illumination for safety and movement;

— conditions that will facilitate visual performance and colour perception; and

— acceptable visual comfort for the occupants in the space.

The relative importance of these factors will vary for different applications. This basic framework covers aspects in the field of vision, photometry and colorimetry, involving natural and man-made optical radiation over the UV, the visible and the IR regions of the spectrum, and application subjects covering all usages of light, indoors and outdoors, including environmental, energy and sustainability requirements and aesthetics and non- image forming biological aspects.

Peculiar and specific terms can be defined in application standards.

Considerations should also be given to the energy used by lighting and to maintenance.

The parameters that need to be specified to ensure good visual conditions and an efficient lighting installation are common to many applications. These are dealt with in Clause 4 of this standard.

LED terms and definitions already existing within EN 62504 have not been included in this standard.

For terms and definitions concerning daylight openings within a building envelope the following standards may also be consulted:

EN 12216, Shutters, external blinds, internal blinds - Terminology, glossary and definitions

EN 12519, Windows and pedestrian doors - Terminology

1 Scope

This document defines basic terms and definitions for use in all lighting applications. This document also sets out a framework for the specification of lighting requirements, giving details of aspects that are to be considered when setting those requirements.

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.

IEC 60050-845:1987, *International Electrotechnical Vocabulary — Chapter 845: Lighting*

CIE S 017/E:2011, *ILV: International Lighting Vocabulary*

3 Terms and definitions

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

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

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

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

3.1 Eye and vision

3.1.1
adaptation
process by which the state of the visual system is modified by previous and present exposure to stimuli that can have various luminances, spectral distributions and angular subtenses

Note 1 to entry: The terms light adaptation and dark adaptation are also used, the former when the luminances of the stimuli are of at least several candelas per square metre, and the latter when the luminances are of less than some hundredths of a candela per square metre.

Note 2 to entry: Adaptation to specific spatial frequencies, orientations, sizes, etc. are recognized as being included in this definition.

[SOURCE: IEC 60050-845:1987 845-02-07 / CIE S 017/E:2011; 17-18]

3.1.2
accommodation
adjustment of the dioptric power of the crystalline lens by which the image of an object, at a given distance, is focused on the retina

[SOURCE: IEC 60050-845:1987 845-02-44 / CIE S 017/E:2011; 17-10]

3.1.3
visual acuity
visual resolution
<qualitatively> capacity for seeing distinctly fine details that have very small angular separation

[SOURCE: IEC 60050-845:1987 845-02-43 / CIE S 017/E:2011; 17-1403, modified - quantitative definition detached, see 3.1.15]

3.1.4
brightness
DEPRECATED: luminosity
attribute of a visual perception according to which an area appears to emit, or reflect, more or less light

Note 1 to entry: The use of this term is not restricted to primary light sources.

[SOURCE: IEC 60050-845:1987 845-02-28 / CIE S 017/E:2011; 17-110]

3.1.5
contrast
<perceptual> assessment of the difference in appearance of two or more parts of a field seen simultaneously or successively (hence: brightness contrast, lightness contrast, colour contrast, simultaneous contrast, successive contrast, etc.)

EXAMPLE By the proportional variation in contrast near the luminance threshold ($\Delta L/L$) or by the ratio of luminances for much higher luminances (L_1/L_2).

[SOURCE: IEC 60050-845:1987 845-02-47 / CIE S 017/E:2011; 17-251, modified - definition of contrast in the physical sense detached, see 3.1.16]

3.1.6
brightness contrast
subjective assessment of the difference in brightness between two or more surfaces seen simultaneously or successively

3.1.7
colour contrast
subjective assessment of the difference in colour between two or more surfaces seen simultaneously or successively

3.1.8
glare
condition of vision in which there is discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or by extreme contrasts

Note 1 to entry: See also “disability glare”, “discomfort glare”

[SOURCE: IEC 60050-845:1987 845-02-52 / CIE S 01/E 7:2011; 17-492]

3.1.9
flicker
impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time

[SOURCE: IEC 60050-845:1987 845-02-49 / CIE S 017/E:2011; 17-443]

3.1.10
visual field
field of vision
extent of space in which objects are visible to an eye in a given position and direction of view

Note 1 to entry: In the horizontal plane meridian the field of vision extends to nearly 190° with both eyes open, the area seen binocularly is about 120°, and the area seen by one eye only is about 154°.

Note 2 to entry: The extent of the field of vision tends to diminish with age

[SOURCE: CIE S 017/E:2011; 17-430]

3.1.11
visual performance
performance of the visual system as measured for instance by the speed and accuracy with which a visual task is performed

[SOURCE: IEC 60050-845:1987 845-09-04]

3.1.12
visual comfort
subjective condition of visual well-being induced by the luminous environment

3.1.13
reaction time
minimum time interval between the occurrence of an event demanding immediate action and the response to the event (unit: s)

Note 1 to entry: The reaction time includes the time needed for perception, taking a decision and acting.

3.1.14
visual task
visual elements of the activity being undertaken

Note 1 to entry: The main visual elements are the size of the structure, its luminance, its contrast against the background and its duration.

3.1.15
visual acuity
visual resolution
<quantitatively> any of a number of measures of spatial discrimination such as the reciprocal of the value of the angular separation in minutes of arc of two neighbouring objects (points or lines or other specified stimuli) which the observer can just perceive to be separate

[SOURCE: IEC 60050-845:1987 845-02-43 / CIE S 017/E:2011; 17-1403, modified - qualitative definition detached, see 3.1.3]

3.1.16
contrast
<physical> quantity intended to correlate with the perceived brightness contrast, usually defined by one of a number of formulae that involve the luminances of the stimuli considered

EXAMPLE By the proportional variation in contrast near the luminance threshold ($\Delta L/L$) or by the ratio of luminances for much higher luminances (L_1/L_2).

[SOURCE: IEC 60050-845:1987 845-02-47 / CIE S 017/E:2011; 17-251, modified - definition of contrast in the perceptual sense detached, see 3.1.5]

3.2 Light and colour

3.2.1
luminous flux
Φ_v
quantity derived from radiant flux Φ_e by evaluating the radiation according to its action upon the CIE standard photometric observer (unit: lm)

Note 1 to entry: For photopic vision:

$$\Phi_v = K_m \int_0^\infty \frac{d\Phi_e(\lambda)}{d\lambda} V(\lambda) d\lambda$$

where

$\frac{d\Phi_e(\lambda)}{d\lambda}$ is the spectral distribution of the radiant flux;

$V(\lambda)$ is the spectral luminous efficiency function

Note 2 to entry: For the values of K_m (photopic vision) and K'_m (scotopic vision), see CIE S 017/E:2011; 17–730.

Note 3 to entry: Luminous flux may also be denoted using the symbol Φ.

[SOURCE: IEC 60050-845:1987 845-01-25, CIE S 017/E:2011; 17-738, modified - Note 2 and Note 3 to entry added]

3.2.2
luminous intensity
I_v
<of a source, in a given direction> quotient of the luminous flux, $d\Phi_v$, leaving the source and propagated in the element of solid angle $d\Omega$ containing the given direction, by the element of solid angle (unit: cd = lm · sr $^{-1}$)

$$I_v = \frac{d\Phi_v}{d\Omega}$$

Note 1 to entry: The definition holds strictly only for a point source.

Note 2 to entry: Luminous intensity may also be denoted using the symbol I.

[SOURCE: IEC 60050-845:1987 845-01-31 / CIE S 017/E:2011: 17-739, modified - Note 2 to entry added]

3.2.3
Luminance
L_v
<in a given direction, at a given point of a real or imaginary surface> quantity defined by the formula (unit: $cd \cdot m^{-2} = lm \cdot m^{-2} \cdot sr^{-1}$)

$$L_v = \frac{d\Phi_v}{dA \cos\vartheta d\Omega}$$

where

$d\Phi_v$ is the luminous flux transmitted by an elementary beam passing through the given point and propagating in the solid angle $d\Omega$ containing the given direction;

dA is the area of a section of that beam containing the given point;

ϑ is the angle between the normal to that section and the direction of the beam.

Note 1 to entry: The above equation does not represent a derivative (i.e. a rate of change of flux with solid angle or area) but rather the quotient of an element of flux by an element of solid angle and an element of area. In strict mathematical terms the definition could be written:

$$L_v = \lim_{A,\Omega \to 0} \frac{\Phi_v}{A\Omega \cos\vartheta}$$

In practical measurements, A and Ω should be small enough that variations in Φ_v do not affect the result. Otherwise, the ratio $\frac{\Phi_v}{A\Omega \cos\vartheta}$ gives the average luminance and the exact measurement conditions shall be specified

Note 2 to entry: Luminance may also be denoted using the symbol L.

[SOURCE: IEC 60050-845:1987 845-01-35, CIE S 017/E:2011; 17-711, modified - Note 2 to entry added]

3.2.4
average luminance
L_{av}
luminance averaged over the specified surface (unit: $cd \cdot m^{-2}$)

Note 1 to entry: In practice, this may be approximated by an average of the luminances at a representative number of points on the surface. The number and position of these points should be specified in the relevant application guide.

Note 2 to entry: Average illuminance may also be denoted using thy symbol $\bar{L}$.

[SOURCE: CIE S 017/E:2011; 17-65]

3.2.5
minimum luminance
L_{min}
lowest luminance of any relevant point on the specified surface (unit: $cd \cdot m^{-2}$)

Note 1 to entry: The relevant points at which the luminances are determined should be specified in the appropriate application standard.

3.2.6
maximum luminance
L_{max}
highest luminance of any relevant point on the specified surface (unit: cd · m^{-2})

Note 1 to entry: The relevant points at which the luminances are determined should be specified in the appropriate application standard.

3.2.7
maintained luminance
$\bar{L}_m$
value below which the average luminance on the specified surface shall not fall (unit: cd · m^{-2})

Note 1 to entry: It is the average luminance at the time maintenance should be carried out

[SOURCE: CIE S 017/E:2011; 17-751]

3.2.8
initial average luminance
$\bar{L}_i$
average luminance of the specified surface when the installation is new (unit: cd · m^{-2})

[SOURCE: CIE S 017:2011; 17-583]

3.2.9
luminance contrast
photometric quantity intended to correlate with brightness contrast, usually defined by one of a number of formulae which involve the luminances of the stimuli considered

Note 1 to entry: See also 3.1.5.

Note 2 to entry: Luminance contrast can be defined as luminance ratio:

$C_1 = L_2/L_1$ (usually for successive stimuli),

or by the following formula:

$C_2 = (L_2 - L_1) / L_1$ (usually for surfaces viewed simultaneously),

when the areas of different luminance are comparable in size and it is desired to take an average, the following formula can be used instead:

$C_3 = (L_2 - L_1) / 0{,}5(L_2 + L_1)$

where

L_1 is the luminance of the background, or largest part of the visual field;

L_2 is the luminance of the object

3.2.10
illuminance
E_v
(unit: lx = lm · m^{-2})

1. <at a point of a surface> quotient of the luminous flux dΦ_v incident on an element of the surface containing the point, by the area dA of that element

2. <at a point of a surface> equivalent definition: integral, taken over the hemisphere visible from the given point, of the expression:

$$L_v \cdot \cos\ \theta \cdot d\Omega$$

where

L_v is the luminance at the given point in the various directions of the incident elementary beams of solid angle dΩ, and

θ is the angle between any of these beams and the normal to the surface at the given point

$$E_v = \frac{d\Phi_v}{dA} = \int_{2\pi} L_v \cos\theta d\Omega$$

Note 1 to entry: Illuminance may also be denoted using thy symbol E.

[SOURCE: IEC 60050-845:1987 845-01-38 / CIE S 017/E:2011; 17-550, modified - Note 1 to entry added]

3.2.11
average illuminance
$\bar{E}$
illuminance averaged over the specified surface (unit: lx)

Note 1 to entry: In practice this can be derived either from the total luminous flux falling on the surface divided by the total area of the surface, or alternatively from an average of the illuminances at a representative number of points on the surface.

Note 2 to entry: The specification shall include a clear indication of the type of illuminance on the surface or at the points of the surface, i.e. horizontal, vertical, spherical, cylindrical or semi-cylindrical.

[SOURCE: CIE S 017/E:2011; 7-63]

3.2.12
minimum illuminance
E_{min}
lowest illuminance at any relevant point on the specified surface (unit: lx)

3.2.13
maximum illuminance
E_{max}
highest illuminance at any relevant point on the specified surface (unit: lx)

3.2.14
maintained illuminance
$\bar{E}_{m}$
value below which the average illuminance on the specified area shall not fall (unit: lx)

Note 1 to entry: It is the average illuminance at the time maintenance should be carried out.

[SOURCE: CIE S 017/E:2011; 17-750]

3.2.15
initial illuminance
E_{av}
average illuminance on the specified surface when the installation is new (unit: lx)

Note 1 to entry: Initial illuminance may also be denoted using thy symbol $\bar{E}_{i}$.

[SOURCE: CIE S 017/E:2011; 17-582, modified - Note 1 to entry added]

3.2.16
spherical illuminance
E_{o}
<at a point> total luminous flux falling on the whole surface of a very small sphere located at the specified point divided by the surface area of the sphere (unit: lx)

Note 1 to entry: See also IEC 60050–845:1987 845 / CIE S 017/E:2011: 17–1245 spherical irradiance.

3.2.17
hemispherical illuminance
E_{hs}

<at a point> total luminous flux falling on the curved surface of a very small hemisphere located at the specified point divided by the curved surface area of the hemisphere (unit: lx)

Note 1 to entry: The base of the hemisphere is taken to be horizontal unless stated otherwise.

3.2.18
cylindrical illuminance
E_{z}
<at a point, for a direction> total luminous flux falling on the curved surface of a very small cylinder located at the specified point divided by the curved surface area of the cylinder (unit: lx)

Note 1 to entry: The axis of the cylinder is taken to be vertical unless stated otherwise.

Note 2 to entry: See also IEC 60050–845:1987 845 / CIE S 017/E:2011: 17–274 cylindrical irradiance.

3.2.19
semi-cylindrical illuminance
E_{sz}
<at a point> total luminous flux falling on the curved surface of a very small semi-cylinder located at the specified point, divided by the curved surface area of the semi-cylinder (unit: lx)

Note 1 to entry: The axis of the semi-cylinder is taken to be vertical unless stated otherwise. The direction of the curved surface should be specified.

3.2.20
reference surface
surface on which optical quantities are measured or specified

[SOURCE: CIE S 017/E:2011; 17-1057]

3.2.21
disability glare
glare that impairs the vision of objects without necessarily causing discomfort

[SOURCE: IEC 60050-845:1987 845-02-57 / CIE S 017/E:2011; 17-330]

3.2.22
discomfort glare
glare that causes discomfort without necessarily impairing the vision of objects

[SOURCE: IEC 60050-845:1987 845-02-56 / CIE S 017/E:2011; 17-333]

3.2.23
veiling reflections
specular reflections that appear on the object viewed and that partially or wholly obscure the details by reducing contrast

[SOURCE: IEC 60050-845:1987 845-02-55 / CIE S 017/E:2011; 17-1396]

3.2.24
luminous environment
physical conditions of light in a scene considered in relation to its physiological and psychological effects on humans

Note 1 to entry: See also IEC 60050–845:1987 luminous environment.

3.2.25
colour rendering
effect of an illuminant on the colour appearance of objects by conscious or subconscious comparison with their colour appearance under a reference illuminant

Note 1 to entry: In German, the term “Farbwiedergabe” is also applied to colour reproduction.

[SOURCE: IEC 60050-845:1987 845-02-59 / CIE S 017/E:2011; 17-221]

3.2.26
CIE 1974 general colour rendering index
R_a
mean of the CIE 1974 special colour rendering indices for a specified set of eight test colour samples

[SOURCE: IEC 60050-845:1987 845-02-63 / CIE S 017/E:2011; 17-154]

3.2.27
colour stimulus
visible radiation entering the eye and producing a sensation of colour, either chromatic or achromatic

[SOURCE: IEC 60050-845:1987 845-03-02 / CIE S 017/E:2011; 17-229]