
Svetloba in razsvetljava – Merjenje in podajanje fotometrijskih podatkov svetlobnih virov in svetilk – 2. del: Podajanje podatkov za delovna mesta v notranjih prostorih in na prostem

Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 2: Presentation of data for indoor and outdoor work places

Licht und Beleuchtung - Messung und Darstellung photometrischer Daten von Lampen und Leuchten - Teil 2: Darstellung der Daten für Arbeitsstätten in Innenräumen und im Freien

Lumière et éclairage - Mesure et présentation des caractéristiques photométriques des lampes et luminaires - Partie 2 : Présentation des données utilisées dans les lieux de travail intérieurs et extérieurs

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EUROPEAN STANDARD
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**Light and lighting - Measurement and presentation of
photometric data of lamps and luminaires - Part 2: Presentation
of data for indoor and outdoor work places**

Lumière et éclairage - Mesure et présentation des
caractéristiques photométriques des lampes et luminaires -
Partie 2 : Présentation des données utilisées dans les lieux
de travail intérieurs et extérieurs

Licht und Beleuchtung - Messung und Darstellung
photometrischer Daten von Lampen und Leuchten - Teil 2:
Darstellung der Daten für Arbeitsstätten in Innenräumen
und im Freien

This European Standard was approved by CEN on 15 November 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Contents		Page
Foreword.....		3
Introduction.....		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Lamp data	6
5	Luminaire data	7
Annex A (normative) Calculation of UF-tables		10
Bibliography		18

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Foreword

This document (EN 13032-2:2004) 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 June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

There are many lighting solutions that can satisfy the lighting criteria specified in EN 12464-1 and prEN 12464-2. To design these solutions, photometric data of the equipment are required. The equipment may include the commonly used general purpose luminaires as well as uplighters, wall washers, adjustable directional lights, floodlights, desk lights, etc. This document specifies the required data.

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1 Scope

This document specifies the required data for lamps and luminaires for the verification of conformity to the requirements of EN 12464-1 and prEN 12464-2. It also specifies data that are commonly used for lighting of indoor and outdoor work places. When these data are provided, they should conform to this document.

2 Normative references

The following referenced documents are indispensable for the application 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.

prEN 12464-2, *Light and lighting — Lighting of work places — Part 2: Outdoor work places*

EN 12665:2002, *Light and lighting — Basic terms and criteria for specifying lighting requirements*

CIE 117:1995, *Discomfort glare in interior lighting*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12665:2002 and the following apply.

NOTE This Clause defines terms and quantities that are in use and important to this document, and which are not given in IEC 60050-845.

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correction factor

factor to modify the luminaire data as presented on a particular photometric data sheet to those of similar luminaires (for example: Ballast Lumen Factor, length, lumen corrections)

3.2 **essential data**

lamp and luminaire data required for the verification of conformity to the requirements of EN 12464-1 and prEN 12464-2

3.3 **lamp code**

any combination of letters and numbers by which the lamp type is identified

3.4 **lamp dimensions**

all dimensions of the lamp that are relevant for the luminaire

3.5 **lamp energy efficiency class (LEEC)**

lamp energy efficiency class assigned to the lamp in accordance with the energy efficiency index defined in the Lamps Directive 98/11/EC and measured in accordance with EN 50285

3.6 **luminaire code**

any combination of letters and numbers by which the luminaire type is identified

EN 13032-2:2004 (E)**3.7****nominal lamp wattage (W_{lamp})**

approximate wattage used to designate or identify the lamp

NOTE The nominal lamp wattage is also (incorrectly) known as rated lamp wattage.

3.8**shielding angle**

angle between the horizontal plane and the first line of sight at which the luminous parts of the lamps in the luminaire are directly visible

3.9**spacing to height ratio (SHR)**

ratio of spacing to the height of the geometric centres of an array of luminaires above the reference plane

3.10**useful data**

lamp and luminaire data beneficial to the designers and users in the planning and operation of lighting installations

3.11**utilisation factor (UF)**

the ratio of the luminous flux of a luminaire in an installation received by the reference surface to the sum of the rated lamp luminous fluxes of the lamps of the installation (see EN 12665)

NOTE In practice the reference surface generally is the surface at the height of the working plane and with the length and width of the floor surface.

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4 Lamp data

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4.1 Essential lamp data

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The following lamp data shall be provided for verification:

4.1.1 Lamp code**4.1.2 Lamp dimensions****4.1.3 Luminous flux****4.1.4 Lamp lumen maintenance factor ($LLMF$)**

NOTE The lamp lumen maintenance factor may be presented both as a graph or data in a table. However, to allow the designer to set up an optimal maintenance scheme, it is recommended to present these data in a tabular form.

4.1.5 Lamp survival factor (LSF)

NOTE The lamp survival factor may be presented both as a graph or as data in a table. However, to allow the designer to set up an optimal maintenance scheme, it is recommended to present these data in a tabular form.

4.1.6 General colour rendering index (R_a)**4.1.7 Correlated colour temperature (T_{CP})****4.2 Useful lamp data**

The following lamp data may be provided:

4.2.1 Lamp energy efficiency class (LEEC)**4.2.2 Nominal lamp wattage (W_{lamp})****5 Luminaire data****5.1 Essential luminaire data**

The following luminaire data shall be provided for verification, where applicable:

5.1.1 Luminaire code**5.1.2 Dimensions of the luminous parts of the luminaire**

The dimensions of those parts of the luminaire from which light is emitted shall be given in m or m².

5.1.3 Normalised intensity table

The tabulated luminous intensity values normalised to a total bare lamp flux in the luminaire of 1 000 lm shall be given in cd·klm⁻¹. <https://standards.iteh.ai/catalog/standards/sist/095bc540-a4cd-4415-9107-fd0e8b69fa8b/sist-en-13032-2-2005>

These values correspond to the Light Output Ratio (LOR) of the luminaire (see also 5.2.5).

The number of C-planes and γ -angles at which the I-values shall be specified, is given in Tables 1 and 2.

Table 1 — Number of C-planes for various intensity distributions

Luminous intensity distribution	C-planes
Radially symmetric	One C-plane
Symmetric about two planes	Every 15° from 0° to 90°
Symmetric about one plane	Every 15° from 0° to 180° or every 15° from 90° to 270°
Asymmetric	Every 15° from 0° to 360°

Table 2 — Number of γ angles for various types of luminaires

Type of luminaire	Downward Flux Fraction (DFF)	γ angles
Downlighting	> 0,9	Every 5° from 0° to 90°
Downlighting with upward component	0,1 to 0,9	Every 5° from 0° to 180°
Uplighting	< 0,1	Every 5° from 90° to 180°

For floodlights, both used in indoor and outdoor lighting installations, the measurement and presentation of the normalised I -table might be in B - β instead of C - γ notation.

NOTE 1 The Downward Flux Fraction (DFF) is the ratio of the Downward Light Output Ratio ($DLOR$) and the Light Output Ratio (LOR) of the luminaire: $DFF = DLOR/LOR$ (see also 5.2.5).

NOTE 2 Luminaires with a concentrated intensity distribution may require more angles at which the luminous intensity data are presented (e.g. every 1° in the area where 90% of the luminous flux is emitted).

5.1.4 Normalised luminance table

The table shall give the average luminaire luminance at elevation angles γ of 55°, 65°, 75° and 85° from the downward vertical in C -planes as specified in Table 1, for indoor work places where display screens, which are vertical or inclined up to 15° tilt angle, are used.

The values in the luminance table shall be normalised to a bare lamp flux in the luminaire of 1 000 lm and shall be presented in $\text{cd}\cdot\text{m}^{-2}\cdot\text{klm}^{-1}$.

NOTE In the case of a unique lamp/luminaire combination, the luminance values may be given in $\text{cd}\cdot\text{m}^{-2}$; the luminous flux of the lamp should then be stated.

5.1.5 Unified Glare Rating (UGR) table

The Unified Glare Rating method shall be used to specify glare from indoor lighting installations. For UGR data presentation the tabular method as described in CIE Publication no. 117:1995 shall be used.

Manufacturers publishing UGR tables, calculated at spacing to height ratios (SHR) other than the ratio described in CIE publication no. 117, shall declare the ratio used in the photometric data presentation.

NOTE For determining UGR , the reference plane for SHR calculation is at eye level (1,2 m above the floor).

5.1.6 Glare rating (GR)

The glare rating of the installed luminaires (outdoor) shall be calculated in accordance with prEN 12464-2.

5.1.7 Correction factors

When the electrical performance of the ballast, used in the photometric measurements, deviates more than 5 % from standard, then a Ballast Lumen Factor (BLF) shall be specified.

5.1.8 Shielding angle

5.2 Useful luminaire data

5.2.1 General

The following luminaire data may be provided:

5.2.2 Physical dimensions of the luminaire

The physical dimensions are basically the length and width or diameter of the luminaire and its height.

NOTE Other useful dimensions are for example: the height of an uplighter above the floor, the height above the desk of a desk top luminaire and the (maximum) length of a pendant.

5.2.3 Intensity diagram

The intensity distribution presented as a graph is mainly intended to give a first impression of the shape of the luminous intensity distribution. The graph may be in any form (e.g. polar, Cartesian, etc.).

5.2.4 Spacing to height ratio (*SHR*)

NOTE 1 For indoor lighting the reference plane is usually the horizontal working plane.

NOTE 2 The maximum spacing to height ratio (SHR_{max}) is the maximum ratio at which the uniformity requirements are just fulfilled.

NOTE 3 The nominal spacing to height ratio (SHR_{nom}) is the nearest lower step value to be used in the calculation of the *UF* values.

NOTE 4 Luminaires with symmetry about two planes may have two spacing to height ratios.

5.2.5 Light output ratios

NOTE For luminaires emitting light in both the upper and the lower hemisphere the terms Downward Light Output Ratio (*DLOR*) and Upward Light Output Ratio (*ULOR*) may be used.

5.2.6 Luminaire maintenance factor (*LMF*)

NOTE The luminaire maintenance factor (*LMF*) may be presented both as a graph or as data in a table. However, to allow the designer to set up an optimal maintenance scheme, it is recommended to present these data in a tabular form.

5.2.7 Utilisation factor (*UF*) tables

The utilisation factor tables for general purpose indoor luminaires can be used for lumen method of scheme design.

In most photometric data sheets the utilisation factors are presented in a table for various room sizes (room indices) and sets of reflectance combinations. When a *UF* table forms part of the photometric data presentation, the values in the table shall be calculated according to the harmonised European *UF* method as described in Annex A. This allows data to be produced for rectangular rooms at nominal spacing-to-height ratios ($SHRNOM$) of 1,00, 1,25, 1,50, 1,75 and 2,00. The nominal spacing-to-height ratio shall be declared.