

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

General lighting – LEDs and LED modules – Terms and definitions

Eclairage général – LED et modules de LED – Termes et définitions

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**GENERAL LIGHTING –
LEDs AND LED MODULES –
TERMS AND DEFINITIONS**

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IEC 62504, which is a technical specification, has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
34A/1355/DTS	34A/1418/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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GENERAL LIGHTING – LEDs AND LED MODULES – TERMS AND DEFINITIONS

1 Scope

This Technical Specification presents terms and definitions relevant for lighting with LED light sources. It provides both descriptive terms (such as “built-in LED module”) and measurable terms (such as “luminance”).

NOTE Annex A gives an overview of systems composed of LED modules and control gear.

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.

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

IEC 60061-1, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-845 and the following apply.

3.1

ambient temperature

t_{amb}

average temperature of air or another medium in the vicinity of the LED or LED module

NOTE 1 During the measurement of the ambient temperature, the measuring instrument/probe should be shielded from draughts and radiant heating.

[IEC 60050-826:2004, definition 826-10-03, modified]

[see also CIE 127, Subclause 2.2.5]

NOTE 2 Ambient temperature is expressed in Celsius degrees.

3.2

angular subtense

α

angle subtended by an apparent source as viewed from a point in space

The angle extension is determined by the observation distance, but at no distance smaller than the minimum distance of accommodation.

NOTE 1 The location and angular subtense of the apparent source depends on the viewing position in the beam.

NOTE 2 The angular subtense of an apparent source is only applicable in the wavelength range from 380 nm to 1 400 nm, where eye hazard exists.

NOTE 3 The angular subtense of the source should not be confused with the beam divergence. The angular subtense of the source cannot be larger than the divergence of the beam, but it is usually smaller than the divergence of the beam

NOTE 4 In terms of optical radiation safety, the LED radiation source is a “middle sized source”, whose images are projected on the retina under angles between 1,5 mrad and 100 mrad, i.e. the diameter of the retina image extends between about 25 μm and 1 700 μm . For such sources, particularly, the hazard is strongly related to the angular subtense on the observer's retina.

[IEC 60825-1:2007, 3.7, modified]

NOTE 5 The angular subtense is expressed in degrees ($^{\circ}$).

3.3 apparent source

for a given evaluation location of the retinal hazard, the real or virtual object that forms the smallest possible retinal image (considering the accommodation range of the human eye)

NOTE 1 The accommodation range of the eye is assumed to be variable from 100 mm to infinity. The location of the apparent source for a given viewing position in the beam is that location to which the eye accommodates to produce the most hazardous retinal irradiance condition.

NOTE 2 This definition is used to determine, for a given evaluation position, the location of the apparent origin of laser radiation in the wavelength range of 380 nm to 1 400 nm. In the limit of vanishing divergence, i.e. in the case of a well collimated beam, the location of the apparent source goes to infinity.

[IEC 60825-1:2007, 3.10, modified]

3.4 beam angle

angle between two imaginary lines in a plane through the optical beam axis, such that these lines pass through the centre of the front face of the lamp and through points at which the luminous intensity is 50 % of the centre beam intensity

[IEC/TR 61341:2010, 2.4]

NOTE The beam angle is expressed in degrees ($^{\circ}$).

3.5 bin

restricted range of LED performance characteristics used to delimit a subset of LEDs near a nominal LED performance as identified by photometric performance and forward voltage

NOTE As the result of small but meaningful variations in the manufacturing process of LED wafers and subsequent dies, the electrical and photometric characteristics of LEDs may vary from LED to LED, even when the dies are from the same wafer. LEDs are sorted or binned in accordance with these characteristics, but there is no existing standard for binning.

3.6 built-in LED module

LED module, generally designed to form a replaceable part built into a luminaire, a box, an enclosure or the like and not intended to be mounted outside a luminaire, etc. without special precautions

3.7 built-in self-ballasted LED module

self-ballasted LED module, generally designed to form a replaceable part built into a luminaire, a box, an enclosure or the like and not intended to be mounted outside a luminaire, etc. without special precautions

3.8 chromaticity coordinates

ratio of each of a set of three tristimulus values to their sum

NOTE 1 As the sum of the three chromaticity coordinates equals 1, two of them are sufficient to define a chromaticity.

NOTE 2 In the CIE standard colorimetric systems, the chromaticity coordinates are represented by the symbols x , y , z and x_{10} , y_{10} , z_{10} .

[CEI 60050-845:1987, definition 845-03-33]

3.9

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

[CEI 60050-845:1987, definition 845-02-63]

NOTE New definition of R_a for LED is under study.

3.10

dominant wavelength (of a colour stimulus)

λ_{dom}

wavelength of the monochromatic stimulus at 25 °C ambient temperature that when additively mixed in suitable portions with the specified achromatic stimulus, matches the colour stimulus considered

For characterising LED modules the reference achromatic stimulus should be illuminant E which has the chromaticity coordinates $x_E = 0,3333$, $y_E = 0,3333$.

NOTE 1 A value for dominant wavelength should only be stated for coloured modules. For white modules no meaningful value for dominant wavelength can be given.

NOTE 2 Figure 12 in CIE 127 shows the relationship between colour locus C of LED and value of dominant wavelength D. N is the locus of achromatic stimulus E.

NOTE 3 Deviating from the peak emission wavelength, the dominant wavelength determines visual impression.

[IEC 60050-845:1987, definition 845-03-44, modified]

NOTE 4 The dominant wavelength is expressed in nm.

3.11

forward direction

direction of current that results when the P-type semiconductor region connected to one terminal is at positive potential relative to the N-type region connected to the other terminal

NOTE If temperature compensation diodes are included, these are ignored in the determination of forward direction.

[IEC 60747-3:1985, 1.3 dans la Section 2]

3.12

forward voltage

U_F

potential difference pertaining to the forward direction, dependent on the forward current at 25 °C ambient temperature

NOTE The forward voltage is expressed in V.

3.13

illuminance (at a point of a surface)

E , E_v

quotient of the luminous flux $d\Phi_v$ incident on an element of the surface containing the point, by the area dA of that element