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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

General lighting – Light emitting diode (LED) products and related equipment – Terms and definitions

Éclairage général – Produits à diode électroluminescente (LED) et équipements associés – Termes et définitions

IEC 62504:2014-06+AMD1:2018-03 CSV(en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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GENERAL LIGHTING – LIGHT EMITTING DIODE (LED) PRODUCTS AND RELATED EQUIPMENT – TERMS AND DEFINITIONS

FOREWORD

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IEC 62504 edition 1.1 contains the first edition (2014-06) [documents 34/200/FDIS and 34/205/RVD] and its amendment 1 (2018-03) [documents 34/476A/FDIS and 34/490/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 62504 has been prepared by IEC technical committee 34: Lamps and related equipment in collaboration with representatives from CIE.

The significant changes with respect to IEC TS 62504 are as follows:

a) Terms from the International Electrotechnical Vocabulary that have not been modified are deleted.
b) Alignment with the CIE has been done.
c) An introduction has been added

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

The committee has decided that the contents of the base publication and its amendment 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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- replaced by a revised edition, or
- amended.

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INTRODUCTION

0.1 Principles of this International Standard

This document is based on IEC TS 62504:2011, General Lighting – LEDs and LED modules – Terms and definitions, which was under the responsibility of SC 34A but this revision as International Standard IEC 62504 transfers responsibility to TC 34.

The objective of this introduction is to help the reader to understand which terms are included and to have an understanding of the LED product overview.

Compared with IEC TS 62504, the main changes are as follows.

0.2 Terms to include

General lighting terms in IEC 60050-845:1987, International Electrotechnical Vocabulary that have not been modified will not be included in this standard.

Alignment with CIE is done. IEC will be the reference for products and related equipment and CIE for lighting terminology. Alignment with ANSI RP16-10, Chapter 6.8 was also considered.

The terms included are as far as possible used in LED standards and manufacturers' literature.,

Process to update IEC 60050-845:1987, the International Electrotechnical Vocabulary for definitions that will be considered as relevant is underway in IEC TC34.

0.3 Alphabetic sequence

In order to find the term in a logical sequence, we have grouped similar terms of a product, example:

LED lamp

– integrated LED lamp ,
– non-integrated LED lamp .

For each term, reference is made to the relevant standard if appropriate.

0.4 LED product tree:

The sequence from the first component, the LED die up to the LED luminaire is drawn.

The term LED does not represent a product, so no technical data can be linked to the term LED.

GENERAL LIGHTING – LIGHT EMITTING DIODE (LED) PRODUCTS AND RELATED EQUIPMENT – TERMS AND DEFINITIONS

1 Scope

This International Standard IEC 62504 is of assistance in the common understanding of terms and definitions, relevant for general lighting with LED technology. The terms included are those already available in IEC LED standards or used in manufacturers' literature.

This standard provides descriptive terms (like “LED light sources”) and measurable terms when modified from IEC 60050-845 (like “colour rendering index”).

NOTE Annex A gives overviews of LED package design and systems composed of LED light sources and controlgear.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>).

CIE Technical Report 127:2007, *Measurement of LEDs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-845, with the exception of those modified below, and the following apply.

3.1
ageing
preconditioning period of the LED light source before initial values are taken

3.2
angular subtense
α
angle subtended by an apparent source as viewed from a point in space

Note 1 to entry: Angular subtense is expressed in radians (rad).

Note 2 to entry: The angle extension is determined by the observation distance, but at no distance smaller than the minimum distance of accommodation of the eye.

Note 3 to entry: The location and angular subtense of the apparent source depends on the viewing position in the beam.

Note 4 to entry: The angular subtense of an apparent source is only applicable in the wavelength range from 380 nm to1 400 nm.

Note 5 to entry: IEC TR 62778 gives additional information with regards to beam divergence.

[SOURCE: IEC 60825-1, 3.7, modified – Notes 1, 2 and 5 to entry are added and in the note 4 to entry the value of the wavelength range has been changed from '400 nm to 1 400 nm' to '380 nm to 1 400 nm'; IEC 62471, 3.2, modified.]

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 to entry: 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 to entry: 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.

[SOURCE: IEC 60825-1, 3.10, modified – In the note 2 to entry the value of the wavelength range is changed from '400 nm to 1 400 nm' to '380 nm to 1 400 nm'.]

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

Note 1 to entry: Beam angle is expressed in degrees (°).

Note 2 to entry: This angle is a full angle measure, not a half angle measure.

[SOURCE: IEC TR 61341, 2.4, modified, – The notes to entry are added.]

3.5
bin
restricted range of LED performance characteristics used to delimit a subset of LED dies or LED packages near a nominal LED performance as identified by chromaticity, photometric, radiometric and/or electrical characteristics

3.6 controlgear

3.6.1
controlgear for LED module
LED controlgear
unit inserted between the electrical supply and one or more LED modules, which serves to supply the LED module(s) with its (their) rated voltage or rated current, and may consist of one or more separate components and may include means for dimming, correcting the power factor and suppressing radio interference, and further control functions

Note 1 to entry: The controlgear consists of a power supply and a control unit.

Note 2 to entry: The controlgear may be partly or totally integrated in the LED module.

Note 3 to entry: When no confusion is expected like when used in a LED standard for example, “controlgear” may also be used. Both terms “controlgear” or “control gear” are acceptable.

[SOURCE: IEC 61347-2-13, 3.1, modified – The word 'electronic' is deleted from the term and the words “further control functions” and the notes to entry are added.]

3.6.2
power supply of the controlgear
electronic device, being part of the controlgear, capable of controlling current, voltage or power within design limits, containing no additional LED control capabilities

Note 1 to entry: For LEDsi modules, the power supply of the controlgear is separate from the LED module on a distant location.

Note 2 to entry: The energy source of a power supply can be either a battery or the electrical supply system.

3.6.3
control unit of the controlgear
electronic device, being part of the controlgear, responsible for controlling the electrical energy to the LED light sources as well as colour mixing, response to depreciating luminous flux and further performance features

Note 1 to entry: In LEDsi modules, the control unit of the controlgear is on board of the LED module and separate from the power supply of the controlgear.

3.7
dominant wavelength <of a colour stimulus>
λ_d
wavelength of the monochromatic stimulus that, when additively mixed in suitable proportions with the specified achromatic stimulus, matches the colour stimulus considered in the CIE 1931 x,y chromaticity diagram

Note 1 to entry: Dominant wavelength is expressed in nanometres (nm).

Note 2 to entry: In the case of purple stimuli, the dominant wavelength is replaced by the complementary wavelength.

Note 3 to entry: For characterising LED light sources the reference achromatic stimulus should be illuminant E which has the chromaticity coordinates x_E = 0,3333, y_E = 0,3333.

Note 4 to entry: A value for dominant wavelength should only be stated for LED light sources emitting coloured light. For LED light sources emitting white light no meaningful value for dominant wavelength can be given.

Note 5 to entry: Figure 12 in CIE 127:2007 shows the relationship between chromaticity coordinate C of LED light sources and value of dominant wavelength D. N is the chromaticity coordinate of achromatic stimulus E.

Note 6 to entry: Deviating from the peak wavelength, the dominant wavelength determines perceived colour.

[SOURCE: IEC 60050-845:1987, 845.03.44, modified – The words 'in the CIE 1931 x,y chromaticity diagram' and the notes to entry 3 to 6 have been added; CIE S 017/E:2011, 17-345, modified – The notes to entry 3 to 6 have been added.]

3.8
failure
termination of the ability of an item to perform a required function

Note 1 to entry: After failure the item has a fault.

Note 2 to entry: "Failure" is an event, as distinguished from "fault", which is a state.

Note 3 to entry: This concept as defined does not apply to items consisting of software only.

[SOURCE: IEC 60050-191, 191.04.01]

3.9
failure fraction
F
fraction of the population that lost the ability to perform a required function in a specified time interval

Note 1 to entry: Failure fraction is dimensionless.

3.10
failure fraction at rated life
F_y
ratio *y* of failed LED products of the same type at their rated life to the test quantity

Note 1 to entry: The ratio is expressed in percent.

Note 2 to entry: This failure fraction expresses the combined effect of all components of a LED product including mechanical, as far as the light output is concerned. The effect of the LED could either be less light than claimed or no light at all.

Note 3 to entry: For LED products normally a failure fraction of 10% or/and 50% are being applied, indicated as F_{10} and/or F_{50}.

3.11
family
group of LED light sources or LED luminaires, having the same characteristics and method of control (integrated, semi-integrated, non integrated), the groups are distinguished by common features of materials, components, and/or method of processing

3.12
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 1 to entry: If temperature compensation diodes are included, these are ignored in the determination of forward direction.

[SOURCE: IEC 60050-521, 521.05.03, modified – The words 'connected to one terminal', 'potential' and 'connected to the other terminal' as well as note 1 to entry have been added.]

3.13
forward voltage
U_F
potential difference pertaining to the forward direction, dependent on the forward current at a given temperature

Note 1 to entry: Forward voltage is expressed in Volts (V).

Note 2 to entry: Forward voltage for LED die is measured normally at 25 °C ambient temperature.

3.14
heat output to the luminaire
P_d
power to be transferred to the luminaire by means of heat-conduction in order to stay below the t_c or t_p temperature

Note 1 to entry: Heat output is expressed in Watts (W).

Note 2 to entry: P_d is below the rated power of a LED module.

Note 3 to entry: For LED modules which do not need heat-conduction to the luminaire for keeping t_c , P_d is equal to zero.

Note 4 to entry: A measurement method is under consideration.

3.15
LED lamp
~~LED light source provided with (a) cap(s) incorporating one or more LED module(s) and possibly including one or more of the following; electrical, optical, mechanical, and thermal components, interfaces and controlgear~~
electric lamp based on LED technology

Note 1 to entry: An LED lamp ~~may~~ can be integrated (LEDi lamp) or semi-integrated (LEDsi lamp) or non-integrated (LEDni lamp).

~~Note 2 to entry: Single and double-capped lamps are included.~~

Note 2 to entry: An LED lamp can include at least one LED module.

~~Note 3 to entry: A LED lamp is designed so that it can be replaced by an ordinary person (as defined in IEC 60050-826, 826.18.03).~~

3.15.1
integrated LED lamp
LEDi lamp
LED lamp, incorporating controlgear, and any additional elements necessary for stable operation of the light source, designed for direct connection to the supply voltage

3.15.2
non-integrated LED lamp
LEDni lamp
LED lamp which needs a separate controlgear to operate

3.15.3
retrofit LED lamp
LED lamp intended as a replacement of a non-LED lamp without requiring internal modification of the luminaire

3.15.4
semi-integrated LED lamp
LEDsi lamp
LED lamp which carries the control unit of the controlgear, and is operated by the separated power supply of the controlgear

3.16
LED light source
electrical light source based on LED technology

Note 1 to entry: A luminaire may include LED light sources but is not considered itself as a light source.

Note 2 to entry: LED light source(s) for a LED luminaire represents one or more LED lamp(s) or LED module(s).

3.17
LED luminaire
luminaire designed to incorporate one or more LED light source(s)

3.18
non-repairable, factory-sealed LED luminaire,
luminaire which cannot be dismantled without being permanently damaged, and incorporating LED light source(s) and any additional elements necessary for starting and stable operation of the light source

3.19
LED module
LED light source having either at least one PCB cap or no cap, and incorporating at least one ~~or more~~ LED package~~(s) on a printed circuit board, and possibly including one or more of the following: electrical, optical, mechanical, and thermal components, interfaces and controlgear~~

Note 1 to entry: A LED module ~~may~~ can be integrated (LEDi module, Type 1) or semi-integrated (LEDsi module, Type 2) or non-integrated (LEDni module, Type 3).

Note 2 to entry: ~~The~~ An LED module is usually designed to be part of an LED lamp or an LED luminaire.

Note 3 to entry: An LED module can include one or more of the following: electric, optical, mechanical, and thermal components, interfaces and controlgear.

[SOURCE: IEC 62031, 3.2, modified – The definition is reworded and notes to entry are added.]