

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Self-ballasted LED lamps for general lighting services with supply voltages  
> 50 V – Performance requirements**

**Lampes à LED autoballastées pour l'éclairage général avec des tensions  
d'alimentation > 50 V – Exigences de performances**

[IEC 62612:2013](https://standards.iteh.ai)

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SELF-BALLASTED LED LAMPS FOR GENERAL  
LIGHTING SERVICES WITH SUPPLY VOLTAGES > 50 V –  
PERFORMANCE REQUIREMENTS**

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**IEC 62612 edition 1.1 contains the first edition (2013-06) [documents 34A/1662/FDIS and 34A/1679/RVD] and its corrigendum 1 (2016-10), and its amendment 1 (2015-10) [documents 34A/1824/CDV and 65C/1854/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 62612 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This edition includes the following significant technical changes with respect to IEC/PAS 62612.

- a) The standard explicitly states that real life time tests are not part of the test regime. Instead, a period of up to 6 000 h is chosen in order to assess manufacturers' claims of maintenance.
- b) Technical features have been adapted to IEC/PAS 62717 (performance of LED modules) as far as possible. Examples are the family approach and the temperature measuring point.
- c) Marking requirements are shifted from the product to the packaging.
- d) The number of lamps to be tested is made test specific, not general.
- e) First requirements are given for setting the colour for colour adjustable lamps and the luminous flux level of dimmable lamps.
- f) The structure of tests is clearly divided between requirement and compliance.
- g) Statistical compliance is separated into individual and average.
- h) Light output requirements are extended to luminous intensity distribution, peak intensity, beam angle and efficacy.
- i) The use of the terms "correlated colour temperature" and "chromaticity coordinates" is corrected.
- j) The number of tolerance categories is reduced from 8 to 4, and split between initial and maintained values.
- k) Colour rendering is differently assessed at initial and maintained state.
- l) Three lumen maintenance categories are given instead of five.
- m) The endurance tests are completely re-established.
- n) The verification (formerly: assessment) clause is completed.
- o) Information for luminaire design is added.
- p) Stabilisation is more precise (Annex A on the method of measuring lamp characteristics) and extension is made for the additional photometric and colorimetric parameters.
- q) Annex B on measuring luminous flux is contained in Annex A. New Annex B provides the photometric code.
- r) Further annexes are added: Annex C and D for displacement factor, Annex E for life time metrics/reliability and Annex F for examples of LED dies and LED packages.

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

In this standard, the following print types are used:

- requirements: roman type;
- *test specifications: italic type;*
- notes: small roman type.

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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## INTRODUCTION

This International Standard is the first edition of a performance standard (precursor: IEC/PAS 62612) for self-ballasted LED lamps for general lighting applications and acknowledges the need for relevant tests for this new source of electrical light, sometimes called “solid state lighting”.

The provisions in this standard represent the technical knowledge of experts from the fields of the semiconductor (LED chip) industry and of those of the traditional electrical light sources.

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## SELF-BALLASTED LED LAMPS FOR GENERAL LIGHTING SERVICES WITH SUPPLY VOLTAGES > 50 V – PERFORMANCE REQUIREMENTS

### 1 Scope

This International Standard specifies the performance requirements, together with the test methods and conditions, required to show compliance of LED lamps with integral means for stable operation, intended for domestic and similar general lighting purposes, having:

- a rated power up to 60 W;
- a rated voltage of > 50 V a.c. up to 250 V a.c.;
- a lamp cap as listed in IEC 62560.

These performance requirements are additional to the safety requirements in IEC 62560.

The only feature provided by this standard, when applied for replacement purposes, is information on maximum lamp outlines.

The requirements of this standard relate to type testing. This standard covers LED lamps that intentionally produce white light, based on inorganic LEDs.

Recommendations for whole product testing or batch testing are under consideration.

The life time of LED lamps is in most cases much longer than the practical test times. Consequently, verification of manufacturer's life time claims cannot be made in a sufficiently confident way, because projecting test data further in time is not standardised. For that reason the acceptance or rejection of a manufacturer's life time claim, past an operational time as stated in 7.1, is out of the scope of this standard.

Instead of life time validation, this standard has opted for lumen maintenance codes at a defined finite test time. Therefore, the code number does not imply a prediction of achievable life time. The categories, represented by the code, are lumen-depreciation character categories showing behaviour in agreement with manufacturer's information, provided before the test is started.

In order to validate a life time claim, several methods of test data extrapolation exist. A general method of projecting measurement data beyond limited test time is under consideration.

The pass/fail criterion of the life time test as defined in this standard is different from the life time metrics claimed by manufacturers. For explanation of recommended life time metrics, see Annex E.

NOTE When lamps are operated in a luminaire the claimed performance data can deviate from the values established via this standard due to e.g. luminaire components that impact the performance of the lamp.

It can be expected that self-ballasted LED lamps, which comply with this standard will start and operate satisfactorily at voltages between 92 % and 106 % of rated supply voltage and at an ambient air temperature between –20 °C and 40 °C and in a luminaire complying with IEC 60598-1.

If a supplier claims suitability for operation at different conditions (for instance, at higher voltage, temperature or humidity) then:

- a) Lamps shall be tested under claimed different conditions; and
- b) Lamps shall start and operate satisfactorily under claimed different conditions; and
- c) Lamps shall meet the performance claims under the claimed different conditions, which may differ from the general conditions for measurement specified in A.1.

## 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>>).

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: change of temperature*

IEC 60081, *Double-capped fluorescent lamps – Performance specifications*

IEC 60630, *Maximum lamp outlines for incandescent lamps*

IEC 61000-3-2:2005, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16\text{A}$  per phase)*, Amendment 2:2009.

IEC 61000-4-7, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques. General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*

IEC/TR 61341, *Method of measurement of centre beam intensity and beam angle(s) of reflector lamps*

IEC/TS 62504, *General lighting – LEDs and LED modules – Terms and definitions*

IEC 62560, *Self-ballasted LED-lamps for general lighting services by voltage  $> 50\text{ V}$  – Safety specifications*

IEC/TR 62732, *Three-digit code for designation of colour rendering and correlated colour temperature*

CIE 13.2:1974, *Methods of measuring and specifying colour rendering properties of light sources*

CIE 13.3:1995, *Method of measuring and specifying colour rendering of light sources*

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

CIE 121:1996, *The photometry and goniophotometry of luminaires*

CIE 177:2007, *Colour rendering of white LED light sources*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC/TS 62504 and IEC 60050-845 as well as the following apply.

#### 3.1

##### **rated value**

quantity value for a characteristic of an LED lamp for specified operating conditions

Note 1 to entry: The value and the conditions are specified in this standard, or assigned by the manufacturer or responsible vendor.

#### 3.2

##### **test voltage**

voltage at which tests are carried out

Note 1 to entry: Specification of test voltage is made in A.2.

#### 3.3

**lumen maintenance** (of an LED lamp)

##### **luminous flux maintenance**

ratio of the luminous flux emitted by an LED lamp at a given time in its life to its initial luminous flux, the lamp being operated under specified conditions

Note 1 to entry: This ratio  $x$  is generally expressed in per cent.

Note 2 to entry: The lumen maintenance of an LED lamp is the effect of decrease of the lumen output of the LED(s) or a combination of this with failure(s) of LED(s) if the lamp contains more than one LED.

[SOURCE: IEC 60050-845:1987, 845.07.65, modified — the term "LED" and the note 2 to entry are added]

#### 3.4

##### **initial value**

photometric, colorimetric and electrical characteristics at the end of the ageing period and stabilisation time

#### 3.5

##### **maintained value**

photometric, colorimetric and electrical characteristics at an operational time, including stabilisation time

Note 1 to entry: The operational time is stated in 7.1.

#### 3.6

##### **life (of an individual LED lamp)**

$L_x$

length of time during which an LED lamp provides at least claimed percentage of the initial luminous flux, under standard conditions

Note 1 to entry: An LED lamp has thus reached its end of life, when it no longer provides claimed percentage of the initial luminous flux. Life is always published in combination of life ( $L_x$ ) at lumen maintenance ( $x$ ) and the failure fraction ( $F_y$ ) (see 3.8)

Note 2 to entry: Any built-in electronic controlgear, however, may show a sudden end of life failure. The definition 3.6 implies that an LED lamp giving no light at all, due to an electronic failure, has actually reached end of life, since it no longer complies with the minimum luminous flux level as declared by the manufacturer or responsible vendor.