

SINGAPORE STANDARD

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

– Part 2 : Performance requirements

[Identical adoption of IEC 62612:2013]



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CONTENTS

NATIONAL FOREWORD	8
FOREWORD	8
INTRODUCTION	11
1 Scope	12
2 Normative references	13
3 Terms and definitions	13
4 General requirements on tests	16
5 Marking	17
5.1 General requirements for marking	17
5.2 Places of marking	17
6 Dimensions	17
7 Test conditions	18
7.1 General test conditions	18
7.2 Creation of lamp families to reduce test effort	18
7.2.1 General	18
7.2.2 Variations within a family	18
7.2.3 Compliance testing of family members	19
8 Lamp input	19
8.1 Lamp power	19
8.2 Displacement factor	20
9 Light output	20
9.1 Luminous flux	20
9.2 Luminous intensity distribution, peak intensity and beam angle	20
9.2.1 General	20
9.2.2 Measurement	20
9.2.3 Luminous intensity distribution	21
9.2.4 Peak intensity value	21
9.2.5 Beam angle value	21
9.3 Efficacy	21
10 Colour nomenclature, variation and rendering	21
10.1 Colour variation categories	21
10.2 Colour rendering index (CRI)	23
11 Lamp life	23
11.1 General	23
11.2 Lumen maintenance	23
11.3 Endurance tests	25
11.3.1 General	25
11.3.2 Temperature cycling test	25
11.3.3 Supply switching test	26
11.3.4 Accelerated operational life test	26
12 Verification	26

Annex A (normative) Method of measuring lamp characteristics	28
Annex B (normative) Explanation of the photometric code	35
Annex C (normative) Measurement of displacement factor	36
Annex D (informative) Explanation of displacement factor	38
Annex E (informative) Explanation of recommended life time metrics	40
Annex F (informative) Examples of LED dies and LED packages	45
Bibliography	47
Figure 1 – Luminous flux depreciation over test time	25
Figure A.1 – Relation of rated voltage to test voltage.....	29
Figure A.2 – Relation of rated frequency to test frequency.....	29
Figure A.3 – Relation of type of tests to test voltage and test frequency	30
Figure C.1 – Definition of the 1 st harmonic current phase-angle (φ_1) (I_1 leads U_{mains} , $\varphi_1 > 0$)	36
Figure C.2 – Definition of the 1 st harmonic current phase-angle (φ_1) (I_1 lags U_{mains} , $\varphi_1 < 0$)	37
Figure E.1 – Life time specification for gradual light output degradation	40
Figure E.2 – Life time specification for abrupt light output degradation	42
Figure E.3 – Reliability curve R_{gradual} for gradual light output degradation.....	43
Figure E.4 – Reliability curve R_{abrupt} for abrupt light output degradation	43
Figure E.5 – Combined R_{gradual} and R_{abrupt} degradation.....	44
Figure F.1 – Schematic drawings of LED dies.....	45
Figure F.2 – Schematic drawings of LED packages	46
Table 1 – Required markings	17
Table 2 – Variations allowed within a family.....	19
Table 3 – Colour.....	22
Table 4 – Tolerance (categories) on rated chromaticity co-ordinate values	22
Table 5 – Lumen maintenance code at an operational time as stated in 7.1	23
Table 6 – Sample sizes	27
Table A.1 – Relation of rated voltage to test voltage	30
Table A.2 – Initial tests	32
Table A.3 – Lifetime and endurance tests	32
Table D.1 – Recommended values for displacement factor	39
Table E.1 – Recommended x and y values for life time metrics to be used in life time specification	44

National Foreword

This Singapore Standard was prepared by a Working Group appointed by the Technical Committee on Building Facilities and Services under the direction of the Electrical and Electronic Standards Committee.

This standard is an identical adoption of International Standard IEC 62612:2013, 'Self-ballasted LED lamps for general lighting services with supply voltages > 50 V – Performance requirements' published by the International Electrotechnical Commission.

Attention is drawn to the following:

1. Where appropriate, the words 'International Standard' shall be read as 'Singapore Standard'. The reference to 'IEC 62560' shall be replaced by 'SS 609-1'.
2. The comma has been used throughout as a decimal marker whereas in Singapore Standards it is a practice to use a full point on the baseline as the decimal marker.

SS 609 comprises the following two parts under the general title 'Self-ballasted LED lamps for general lighting services with supply voltages > 50 V':

Part 1: Safety specifications (Identical adoption of IEC 62560:2011)

Part 2: Performance requirements

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

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62612 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This first edition of IEC 62612 cancels and replaces IEC/PAS 62612. This edition constitutes a technical revision.

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.

The text of this standard is based on the following documents:

FDIS	Report on voting
34A/1662/FDIS	34A/1679/RVD

Full information on the voting for the approval of this standard 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.

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 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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.

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.

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*