IEC 62560

Edition 1.0 2011-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Self-ballasted LED-lamps for general lighting services by voltage > 50 V – Safety specifications

Lampes à DEL autoballastées pour l'éclairage général fonctionnant à des tensions > 50 V – Spécifications de sécurité

IEC 62560:2011

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub
The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub
Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv
If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:
Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm
Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,…). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub
Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org
Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:
Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

IEC 62560

Edition 1.0 2011-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Self-ballasted LED-lamps for general lighting services by voltage > 50 V – Safety specifications

Lampes à DEL autoballastées pour l'éclairage général fonctionnant à des tensions > 50 V – Spécifications de sécurité

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX T

ICS 29.140.30

ISBN 978-2-88912-355-1

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SELF-BALLASTED LED-LAMPS FOR GENERAL LIGHTING SERVICES BY VOLTAGE > 50 V – SAFETY SPECIFICATIONS

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62560 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

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

FDIS	Report on voting
34A/1425/FDIS	34A/1447/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 proper: in roman type.

– *test specifications: in italic 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.

The contents of the corrigenda 1 (January 2012) and 2 (July 2015) have been included in this copy.

INTRODUCTION

There will be and are already LED products in the market which substitute existing lamps, either as retrofit mains voltage incandescent or self-ballasted fluorescent lamps or as replacement for tungsten halogen lamps below 50 V.

The present document takes up the supply voltage range from > 50 V up to 250 V. A proposal for a safety standard for LED lamps with voltages ≤ 50 V may follow in due time.

Future work will also consequently comprise performance standards for all kind of LED lamps, including minimum photometric requirements for type testing.

Due to the urgent need of establishing this standard, it will be a stand-alone standard for the time being, not excluding a future relocation as a part of IEC 60968, self-ballasted lamps.

SELF-BALLASTED LED-LAMPS FOR GENERAL LIGHTING SERVICES BY VOLTAGE > 50 V – SAFETY SPECIFICATIONS

1 Scope

This International Standard specifies the safety and interchangeability requirements, together with the test methods and conditions required to show compliance of LED-lamps with integrated means for stable operation (self-ballasted LED-lamps), intended for domestic and similar general lighting purposes, having:

– a rated wattage up to 60 W;

– a rated voltage of > 50 V up to 250 V;

– caps according to Table 1.

The requirements of this standard relate only to type testing.

Recommendations for whole product testing or batch testing are identical to those given in Annex C of IEC 62031.

NOTE Where in this standard the term "lamp(s)" is used, it is understood to stand for "self-ballasted LED-lamp(s)", except where it is obviously assigned to other types of lamps.

2 Normative references

The following reference 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 reference document (including any amendments) applies.

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

IEC 60061-3, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 3 : Gauges*

IEC 60360, *Standard method of measurement of lamp cap temperature rise*

IEC 60432-1, *Incandescent lamps – Safety specifications – Part 1: Tungsten filament lamps for domestic and similar general lighting purposes*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60598-1:2008, *Luminaires – Part 1: General requirements and tests*

IEC 60695-2-10:2000, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods; Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end products*

IEC 60695-2-12:2000, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods; Glow-wire flammability test method for materials*

IEC 60695-2-13:2000, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods; Glow-wire ignitability test method for materials*

IEC 61199:1999, *Single-capped fluorescent lamps – Safety specifications*

IEC 61347-1:2007, *Lamp controlgear – Part 1: General and safety requirements*

IEC 62031:2008, *LED modules for general lighting – Safety requirements*

IEC/TR 62471-2, *Photobiological safety of lamps and lamp systems – Part 2: Guidance on manufacturing requirements relating to non-laser optical radiation safety*

IEC/TS 62504, *Terms and definitions of LEDs and LED modules in general lighting*[1]

ISO 4046-4:2002, *Paper, board, pulp and related terms – Vocabulary – Part 4: Paper and board grades and converted products*

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC/TS 62504 (in preparation), IEC 62031 and the following apply.

3.1
self-ballasted LED-lamp
unit which cannot be dismantled without being permanently damaged, provided with a lamp cap and incorporating a LED light source and any additional elements necessary for stable operation of the light source

NOTE Lamp caps are given in IEC 60061-1.

3.2
rated voltage
voltage or voltage range marked on the lamp

3.3
rated wattage
wattage marked on the lamp

3.4
rated frequency
frequency marked on the lamp

3.5
cap temperature rise
Δt_s
surface temperature rise (above ambient) of a standard test lampholder fitted to the lamp, when measured in accordance with the standard method, in case of an Edison screw cap or a bayonet cap

NOTE The standard method for Edison screw cap or bayonet cap is that given in IEC 60360.

3.6
live part
conductive part which may cause an electric shock in normal use

---

[1] To be published.

3.7
type
lamps that have an identical electrical rating and a similar cap

3.8
type test
test or series of tests made on a type test sample for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard

3.9
type test sample
sample consisting of one or more similar units submitted by the manufacturer or responsible vendor for the purpose of the type test

4 General requirements and general test requirements

4.1 The lamps shall be so designed and constructed that in normal use they function reliably and cause no danger to the user or surroundings.

In general, compliance is checked by carrying out all the tests specified.

4.2 Self-ballasted LED-lamps are non-repairable, factory-sealed units. They shall normally not be opened for any tests. In the case of doubt based on the inspection of the lamp and the examination of the circuit diagram, and in agreement with the manufacturer or responsible vendor, either the output terminals shall be short-circuited or, in agreement with the manufacturer, lamps specially prepared so that a fault condition can be simulated shall be submitted for testing (see Clause 13).

4.3 In general, all tests are carried out on each type of lamp or, where a range of similar lamps is involved, for each wattage in the range or on a representative selection from the range, as agreed with the manufacturer.

4.4 When the lamp fails safely during one of the tests, it is replaced, provided that no fire, smoke or flammable gas is produced. Further requirements on failing safe are given in Clause 12.

5 Marking

5.1 Lamps shall be clearly and durably marked with the following mandatory markings:

a) mark of origin (this may take the form of a trademark, the manufacturer's name or the name of the responsible vendor);
b) rated voltage or voltage range (marked "V" or "volts");
c) rated wattage (marked "W" or "watts");
d) rated frequency (marked in "Hz").

5.2 In addition, the following information shall be given by the lamp manufacturer on the lamp or immediate lamp wrapping or container or in installation instructions.

a) Burning position, if restricted, shall be marked with the appropriate symbol. Symbol examples are shown in Annex B.
b) rated current (marked "A" or "ampere");
c) "For lamps with a weight significantly higher than that of the lamps for which they are a replacement, attention should be drawn to the fact that the increased weight may reduce the mechanical stability of certain luminaires and lampholders and may impair contact making and lamp retention."

d) Special conditions or restrictions which shall be observed for lamp operation, for example operation in dimming circuits. Where lamps are not suitable for dimming, the following symbol in Figure 1 may be used:

Figure 1 – Dimming not allowed

e) For eye protection, see requirements of IEC/TR 62471-2

5.3 Compliance is checked by the following:

Presence and legibility of the marking required in 5.1 – by visual inspection.

The durability of the marking is checked by trying to remove it by rubbing lightly for 15 s with a piece of cloth soaked with water and, after drying, for a further 15 s with a piece of cloth soaked with hexane. The marking shall be legible after the test.

Availability of information required in 5.2 – by visual inspection.

6 Interchangeability

6.1 Cap interchangeability

Interchangeability shall be ensured by the use of caps in accordance with IEC 60061-1 and gauges in accordance with IEC 60061-3, see Table 1.

Compliance is checked by the use of the relevant gauges.

Table 1 – Interchangeability gauges and lamp cap dimensions

Lamp cap	Cap sheet no. from IEC 60061-1	Cap dimensions to be checked by the gauge	Gauge sheet no. from IEC 60061-3
B15d	7004-11	A max. and A min. D1 max. N min.	7006-10 and 7006-11
B22d	7004-10	Diametrical position of the pins Insertion in lampholder Retention in lampholder	 7006-4A 7006-4B
E11	7004-6	"Go"	7006-6
E12	7004-28	"Go" Additional "Go" "Not Go" Contact-making	7006-27H 7006-27J 7006-28C 7006-32
E14	7004-23	Max. dimensions of the screw thread Min. major diameter of the screw thread Dimension *S*1 Contact making	7006-27F 7006-28B 7006-27G 7006-54
E17	7004-26	Max. dimensions of the screw thread Min. major diameter of the screw thread Contact making	7006-27K 7006-28F 7006-26D
E26	7004-21A	Max. dimensions of the screw thread Min. major diameter of the screw thread	7006-27D 7006-27E
E27	7004-21	Max. dimensions of the screw thread Min. major diameter of the screw thread Dimension *S*1 Contact making	7006-27B 7006-28A 7006-27C 7006-50
GU10	7004-121	"Go" and "Not Go"	7006-121
GZ10	7004-120	"Go" and "Not Go"	7006-120
GX53	7004-142	"Go" and "Not Go" "Not Go" "Go" and "Not Go" for checking keyways "Not Go" for checking keyways	7006-142 7006-142D 7006-142E 7006-142F

6.2 Bending moment, axial pull and mass

The value of the bending moment, imparted by the lamp at the lampholder shall not exceed the value given in Table 2.

The bending moment shall be determined by measuring the weight of the lamp (e. g. by means of a balance) at the tip of the bulb of the horizontally held lamp and multiplying this force by the distance between the tip of the bulb and the pivot line. The pivot line shall lie at the bottom end of the cylindrical part (for Edison and bayonet caps) or at the end of the contact pins (for pin caps). It shall be supported by an upright held thin metal sheet or a similar means.

The lamp construction shall withstand externally applied axial pull and bending moment.

For the measurement method, see A.2.1 of IEC 61199.

The mass as given in Table 2 shall not be exceeded.

Table 2 – Bending moments and masses

Cap	Bending moment (Nm)	Mass (kg)
B15d	1	*
B22d	2	1
E11	0,5	*
E12	0,5	*
E14	1	*
E17	1	*
E26	2	*
E27	2	1
GU10	0,1	*
GZ10	0,1	*
GX53	0,3	*

* Under consideration.

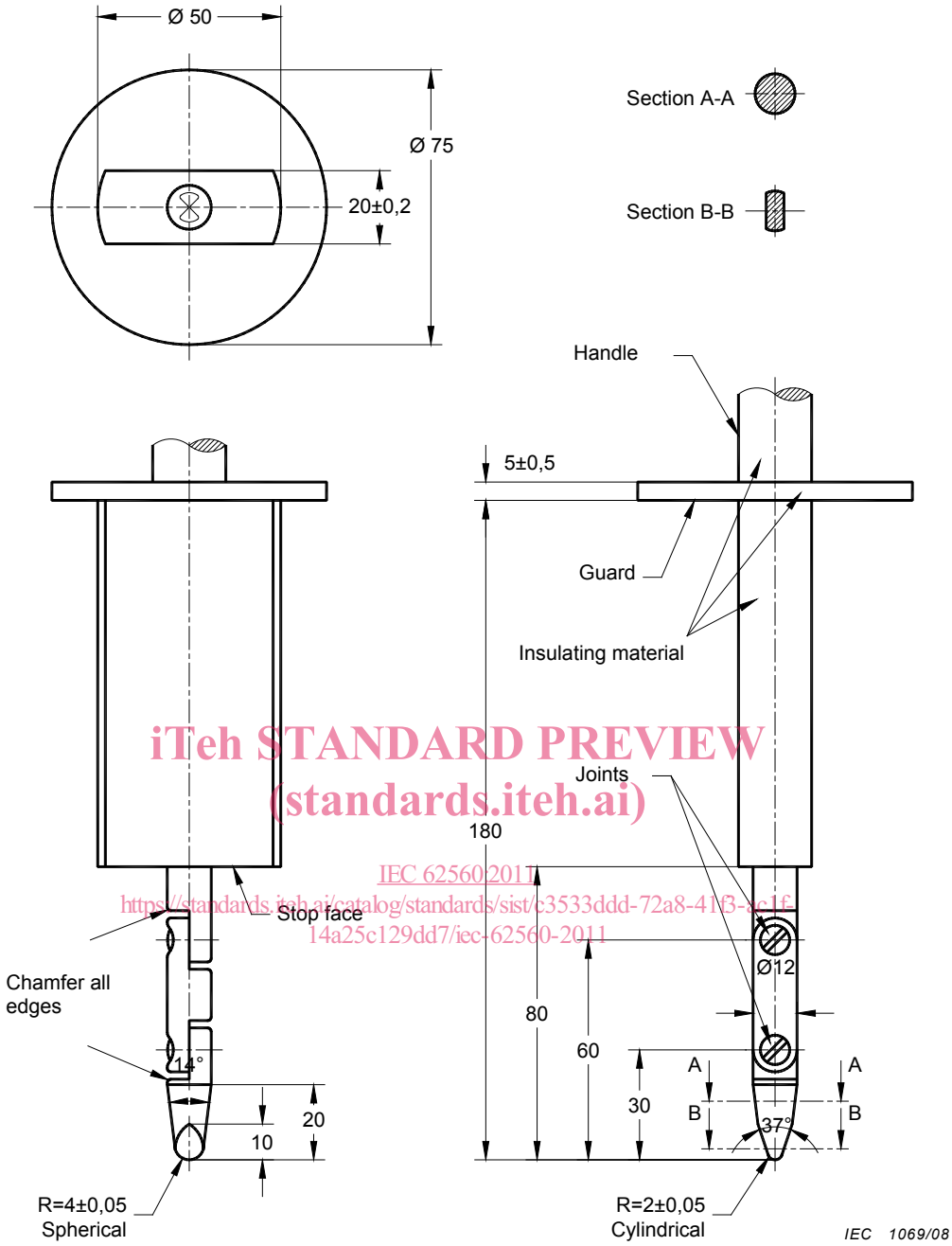
NOTE 1 For lamps with caps different to those in Table 2, the effect of the bending moment should be regarded and limited. A measurement method for these lamps with these caps is under consideration.

NOTE 2 It should be taken care that the luminaire surface where the lampholder is fixed to can withstand the bending moment. For the calculation of this bending moment, the length of the lampholder needs to be taken into account when measuring the overall length. This should be made sure for the elevated temperature during operation in order to check the possible softening of the surface material.

7 Protection against accidental contact with live parts

The lamps shall be so constructed that, without any additional enclosure in the form of a luminaire, no internal metal parts, basic insulated external metal parts or live metal parts of the lamp cap or of the lamp itself are accessible when the lamp is installed in a lampholder according to the relevant IEC lampholder data sheet.

Compliance is checked by means of the test finger specified in Figure 2, if necessary, with a force of 10 N.



Linear dimensions in millimetres

Material: metal, except where otherwise specified

Tolerances on dimensions without specific tolerance:

- on angles: $^{+0}_{-10'}$
- on linear dimensions:
  - up to 25 mm: $^{+0}_{-0,05}$
  - over 25 mm: ± 0,2 mm

Both joints shall permit movement in the same plane and the same direction through an angle of 90° with a 0° to +10° tolerance.

Figure 2 – Standard test finger (according to IEC 60529)
(from IEC 60400, Figure 41)