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Edition 3.0 2015-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Self-ballasted fluorescent lamps for general lighting services – Safety requirements

Lampes à fluorescence à ballast intégré pour l'éclairage général – Règles de sécurité

IEC 60968:2015-02(en-fr)

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

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SELF-BALLASTED FLUORESCENT LAMPS FOR GENERAL LIGHTING SERVICES – SAFETY REQUIREMENTS

FOREWORD

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International Standard IEC 60968 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition, where additions have been made to the following:

a) caps and prevention of cap misuse;
b) interchangeability;
c) mechanical and electrical strength;
d) creepage distances and clearances;
e) end of lamp life precaution;
f) abnormal operation;

g) test conditions for dimmable and three-way lamps;

h) water contact related marking;

i) verification, and assessment;

j) information for luminaire design in the form of annexes.

The text of this third edition is based on the following documents:

FDIS	Report on voting
34A/1811/FDIS	34A/1838/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.*

– Explanatory matter: in smaller 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- withdrawn,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.

The contents of the corrigendum of March 2015 have been included in this copy.

SELF-BALLASTED FLUORESCENT LAMPS FOR GENERAL LIGHTING SERVICES – SAFETY REQUIREMENTS

1 Scope

This International Standard specifies the safety and interchangeability requirements, together with the test methods and conditions required to show compliance of tubular fluorescent lamps with integrated means for controlling starting and stable operation (self-ballasted fluorescent lamps).

These lamps are intended for domestic and similar general lighting purposes, having a rated voltage of 50 V to 250 V, having a rated frequency of 50 Hz or 60Hz and having IEC 60061-1 compliant caps.

For a cap-holder system not specifically mentioned in this standard, the relevant information on safety related tests provided by the manufacturer will apply.

The requirements of this standard relate only to type testing.

Recommendations for whole product testing or batch testing are given in Annex A.

This part of the standard covers photobiological safety according to IEC 62471 and IEC TR 62471-2. Blue light and infrared hazards are below the level which requires marking.

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

IEC 60695-2-10, *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 60901, *Single-capped fluorescent lamps – Performance specifications*

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

IEC 61347-1:2015, *Lamp controlgear – Part 1: General and safety* requirements

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 following terms and definitions apply:

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

3.2
nominal value
approximate quantity value used to designate or identify a lamp

[SOURCE: IEC 60901:1997, 1.4.3]

3.3
rated value
quantity value for a characteristic of a 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.

[SOURCE: IEC 60901:1997, 1.4.4, modified — The second sentence is moved to a note to entry.]

3.4
cap temperature rise
Δt_s
surface temperature rise (above ambient) of a standard test lampholder fitted to the lamp's cap, when measured in accordance with the standard method described in IEC 60360

[SOURCE: IEC 60432-1:1999, 1.3.8

3.5
live part
conductive part which may cause an electric shock in normal use

3.6
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

3.7
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

3.8
specific effective radiant UV power
effective power of the UV radiation of a lamp related to its luminous flux

Note 1 to entry: The specific effective radiant UV power is expressed in mW/klm.

Note 2 to entry: The effective power of the UV radiation is obtained by weighting the spectral power distribution of the lamp with the UV hazard function $S_{UV}(\lambda)$. Information about the relevant UV hazard function is given in IEC 62471. It only relates to possible hazards regarding UV exposure of human beings. It does not deal with the possible influence of optical radiation on materials, like mechanical damage or discoloration.

3.9
test family
lamp groups which are distinguished by common features of materials relevant to the test applied

4 General requirements and general test requirements

4.1 Self-ballasted 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 All measurements unless otherwise specified in this standard, shall be carried out at rated voltage and frequency and in a draught-proof room. The ambient temperature shall be from 23 °C to 27 °C inclusive and shall not vary by more than 1 °C during the measurements.

If lamps are rated for alternative frequencies the test shall be carried out at the most onerous of these.

The test voltages are specified in the relevant clauses.

4.3 Self-ballasted lamps are non-repairable factory sealed units. They shall not be opened for any tests with exemption of 13.2. In the case of substantiated doubt based on the inspection of the lamp and the examination of the circuit diagram, and in agreement with the manufacturer or responsible vendor, lamps specially prepared so that a fault condition can be simulated shall be submitted for testing (see Clause 13 and Clause 15).

5 Marking

5.1 Lamp marking

The following information shall be marked on the lamp.

1) Mark of origin (this may take the form of a trademark, the manufacturer's name or the name of the responsible vendor).
2) Rated voltage(s) or rated voltage range (marked "V" or "volts").
3) Rated power (marked "W" or "watts").
4) Rated frequency (frequencies) (marked in "Hz").
5) Any further information needed to identify the product type e.g. model number or type reference.

5.2 Additional marking

In addition the following information shall be given by the lamp manufacturer either on the lamp, the packaging or in the installation instructions.

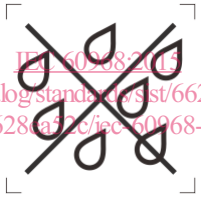
1) Rated lamp current.
2) For lamps with a weight significantly higher than that of the lamps for which they are a replacement, attention should be drawn to the fact that the increased weight may reduce the mechanical stability of certain luminaires.

3) Lamps that are not suitable for dimming shall be marked according to Figure 1 or be provided with a written cautionary notice. The marking shall be provided on the packaging or accompanying information and its height shall be at least 5 mm.

IEC

Figure 1 – Dimming not allowed

4) Lamps shall be marked with the symbol according to Figure 2. The marking shall be provided on the packaging or accompanying information. The symbol is not needed if a written cautionary notice is provided.



[SOURCE: IEC 60417-6179-1 (2014-10)]

Figure 2 – Lamp to be used in dry conditions or in a luminaire that provides protection

5.3 Compliance of marking

Compliance is checked by the following.

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

2) The durability of the marking is checked by trying to remove it by rubbing lightly for 15 s with a piece of cloth soaked in water. The marking shall be legible after the test.

3) Availability of information required in 5.2 – by visual inspection.

5.4 Locations where marking is required (See Table 1)

Table 1 – Locations where marking is required

Marking item	Product	Product Packaging	Product datasheets or leaflets
Mark of origin	x	x	x
Rated voltage(s) or rated voltage range	x	x	x
Rated power	x	x	x
Rated frequency	x	x	x
Product identification	x	x	x
Rated lamp current	-	x	x
Access weight	-	x	x
Dimming restriction	-	x	x
Water contact prevention	-	x	x
x = required – = not required but optional			

6 Interchangeability, mass and bending moment

6.1 Interchangeability

Interchangeability shall be ensured by the use of caps in accordance with IEC 60061-1.

Compliance of the finished lamp shall be checked by the use of gauges for checking the dimensions controlling interchangeability in accordance with IEC 60061-3.

6.2 Bending moment and mass imparted by the lamp at the lampholder

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 downward force of the lamp (e.g. by means of a scale) 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 point. 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. Sample test arrangement for bending moment test is shown in Figure 3. For lamps with caps different to those in Table 2, the effect of the bending moment shall be regarded and limited. A measurement method for these lamps with these caps is under consideration. It shall 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 shall be taken into account when measuring the overall length. This shall be ensured for the elevated temperature during operation in order to check the possible softening of the surface material.

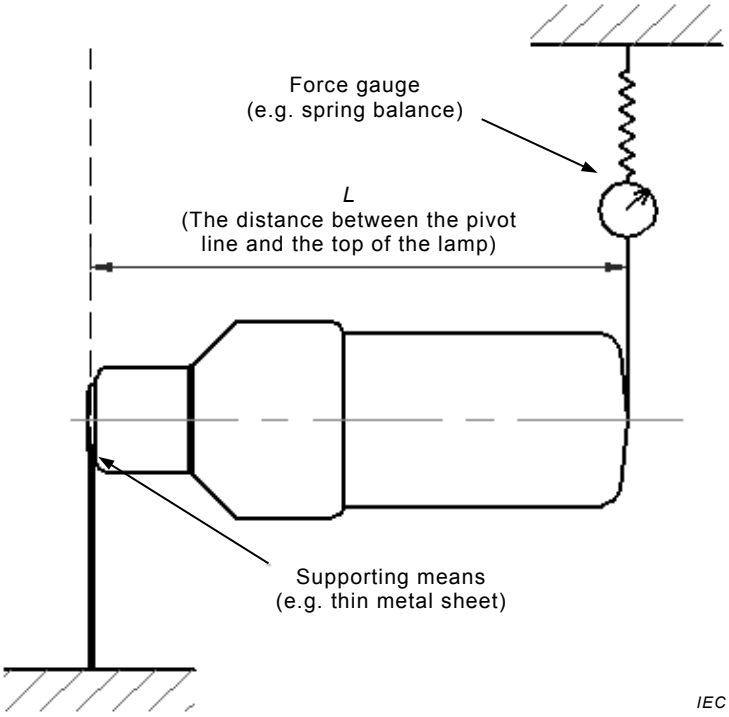


Figure 3 – Sample test arrangement for bending moment imparted by the lamp at the lampholder

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

Table 2 – Bending moments and masses

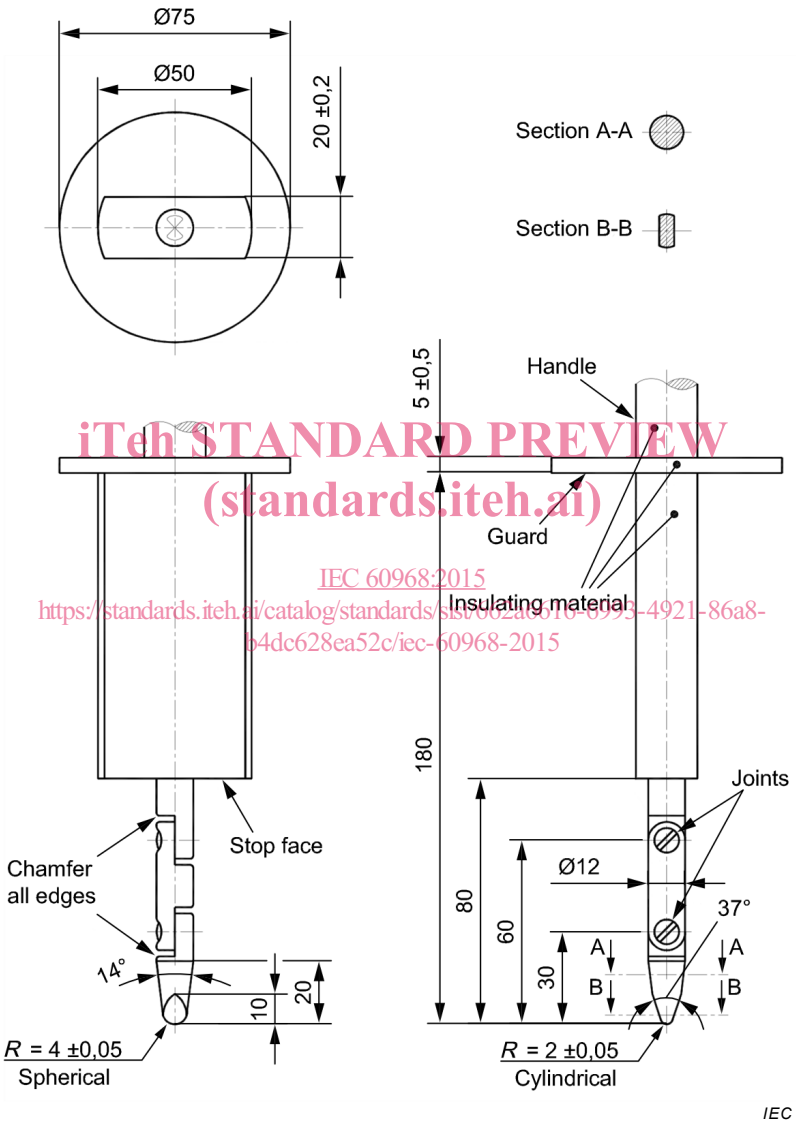
Cap	Bending moment Nm	Mass kg
B15d	1	[a]
B22d	2	1
E11	0,5	[a]
E12	0,5	[a]
E14	1	[a]
E17	1	1
E26	2	1
E27	2	1
E39	1[a]	[a]
E40	1 [a]	[a]
GU10	0,1	[a]
GZ10	0,1	[a]
GX53	0,3	[a]
R7s	[a]	1[a]
[a] Under consideration.		

7 Protection against electric shock

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 4 with a force of 10 N if necessary.

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 4 – Standard test finger (according to IEC 60529)

Requirements for lamps with GX53 caps are under consideration.

External metal parts other than current-carrying metal parts of the cap shall not be or become live. For testing, any movable conductive material shall be placed in the most onerous position without using a tool.

Compliance is checked by means of the insulation resistance and electric strength test (see Clause 8).

8 Insulation resistance and electric strength

8.1 General

Insulation resistance and electric strength shall be adequate between live parts of the lamp and accessible parts of the lamp.

During the test, the supply contacts of the cap are short-circuited. Accessible parts of the lamp are fully covered with metal foil. Care shall be taken that the metal foil is placed so that no flashover occurs at the edges. The creepage distance between the foil and the live parts shall be equal to or greater than the creepage distance of reinforced insulation according to Clause 11 of IEC 60598-1, with a maximum distance of 6 mm.

The lamp shall be conditioned for 48 h in a cabinet containing air with a relative humidity between 91 % and 95 %. The temperature of the air is maintained within 1 °C of any convenient value between 20 °C and 30 °C. The tests of 8.2 and 8.3 shall be carried out in the humidity cabinet under the above conditions.

8.2 Insulation resistance

Insulation resistance shall be measured with a DC voltage of approximately 500 V, 1 min after application of the voltage.

The insulation resistance between live parts of the cap and the foil shall be not less than 4 MΩ. The requirements of Annex A of IEC 61347-1: — shall be complied with.

NOTE The insulation resistance of bayonet caps between shell and contacts is under consideration.

8.3 Electric strength

Electric strength shall be measured between the live parts and the foil and shall withstand a voltage test for 1 min with an AC voltage as follows.

Initially, no more than half the voltage prescribed in Table 10.2 of IEC 60598-1 for Class II luminaires is applied between the contacts and the metal foil. It is then gradually raised to the full value.

No flashover or breakdown shall occur during the test.

9 Mechanical strength

9.1 General

The lamp construction shall withstand externally applied axial pull and bending moment. For the measurement method, see A.2.1 of IEC 61199. Pull force resistance for GRZ10d and GRZ10t caps shall be as specified in A.1.1 of IEC 61199, for GR10q caps.