

INTERNATIONAL STANDARD



Self-ballasted compact fluorescent lamps for general lighting services –
Performance requirements

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SELF-BALLASTED COMPACT FLUORESCENT
LAMPS FOR GENERAL LIGHTING SERVICES –
PERFORMANCE REQUIREMENTS**

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60969 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamp and related equipment.

This second edition cancels and replaces the first edition published in 1988, Amendment 1:1991 and Amendment 2:2000. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) title change;
- b) scope is now limited to compact fluorescent lamps, but expanded to cover all lamps of voltages greater than 50 V and all power ratings;
- c) introduction of requirements for lamp equivalency claims, switching withstand, starting time, low temperature, run up time, treatment of claims for different operating conditions;
- d) enhanced assessment and compliance criteria especially for lifetime;
- e) introduction in-rush test conditions and displacement factor.

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

FDIS	Report on voting
34A/1923/FDIS	34A/1945/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.

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- withdrawn,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 January 2017 have been included in this copy.

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.

SELF-BALLASTED COMPACT FLUORESCENT LAMPS FOR GENERAL LIGHTING SERVICES – PERFORMANCE REQUIREMENTS

1 Scope

This document specifies performance requirements together with test methods and conditions required to show compliance of ~~tubular self-ballasted compact fluorescent and other gas-discharge lamps with integrated means for controlling starting and stable operation (self-ballasted lamps)~~ intended for ~~domestic and similar general lighting purposes services having~~.

- ~~— a rated wattage up to 60 W;~~
- ~~— a rated voltage of 100 V to 250 V;~~
- ~~— Edison screw or bayonet caps.~~

This document applies to self-ballasted compact fluorescent lamps of voltages > 50 V and all power ratings with lamp caps complying with IEC 60061-1.

NOTE Some features of this document could be applicable to self-ballasted compact fluorescent lamps of voltages ≤ 50 V and to other types of self-ballasted gas discharge lamps.

The requirements of this document relate only to type testing.

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

The performance requirements specified in this document are additional to the safety requirements specified in IEC 60968.

It can be expected that self-ballasted compact fluorescent lamps, which comply with this document, will start and operate satisfactorily at normal conditions (voltages between 92 % and 106 % of rated supply voltage, ambient air temperature of between -10 °C and 40 °C and in a luminaire complying with IEC 60598-1).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60630, *Maximum lamp outlines for incandescent lamps*

IEC 60968, *Self-ballasted fluorescent lamps for general lighting services – Safety requirements*

IEC 61000-3-2:2014, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

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*

CIE 015-2004, *Colorimetry*

CIE 13.3, *Method of Measuring and Specifying Colour Rendering Properties of Light Source*

~~3—Dimensions~~

~~The lamp dimensions shall comply with the requirements as indicated by the manufacturer or responsible vendor.~~

3 Terms and definitions

For the purposes of this document the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

self-ballasted lamp

integrated lamp

~~a tubular fluorescent or other discharge lamp unit that incorporates, permanently enclosed, all elements that are necessary for starting and for stable operation, and which does not include any replaceable or interchangeable parts.~~

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

Note 1 to entry: A self-ballasted lamp is referred to as a lamp in this document.

[SOURCE: IEC 60968:2015, 3.1, modified – The admitted term and note have been added]

3.2

new lamp

lamp which has not been energized since manufacture

~~2.3~~

~~rated voltage~~

~~the voltage or voltage range marked on the lamp~~

3.3

rated value

quantity value, assigned by the supplier, for a lamp characteristic under specified operating conditions

EXAMPLE Rated luminous flux.

3.4

test voltage

input voltage at which tests are carried out

[SOURCE: IEC 62612:2013, 3.2, modified – The word "input" has been added.]

2.5**rated wattage**

~~the wattage marked on the lamp~~

3.5**initial values**

photometric and electrical characteristics **measured** at the end of the 100 h ageing period

2.6**rated frequency**

~~the frequency marked on the lamp or declared as such by the manufacturer or responsible vendor~~

3.6**lamp failure**

moment at which the lamp fails to light up, fails to remain alight or delivers low light output (in case of doubt, low light output refers to less than approximately 50 % of rated light output)

2.7**rated luminous flux**

~~the flux marked on the lamp or declared as such by the manufacturer or responsible vendor~~

3.7**lamp life**

<of an individual lamp> number of operating hours to lamp failure

3.8**median of lamp life**

number of operating hours elapsed at which point 50 % of a representative group of lamps have failed, when operated under specified test conditions

3.9**starting time**

time required for a lamp to develop an electrically stable arc discharge, the time being measured from the moment the lamp circuit is energized

2.10**life (of an individual lamp)**

~~the length of time during which a complete lamp operates to burn-out or to any other criterion of life performance laid down in this standard~~

3.10**run-up time**

~~the time needed, after the supply voltage is switched on, for the lamp to reach 80 % of its final luminous flux~~

time required for a lamp to reach a specified percentage of its (stable) luminous flux, the time being measured from the moment the lamp circuit is energized

2.11**average life (life to 50 % failures)**

~~the length of time during which 50 % of the lamps reach the end of their individual lives~~

3.11**displacement factor**

cosine of the phase-angle between the fundamental harmonic current and the mains voltage

Note 1 to entry: Displacement factor is explained in Annex J.

2.12**rated average life (rated life to 50 % failures)**

~~the life declared by the manufacturer or responsible vendor as being the expected time at which 50 % of any large number of lamps reach the end of their individual lives~~

3.12**distortion factor**

factor indicating the level of harmonic current distortion

Note 1 to entry: Distortion factor is explained in Annex J.

2.13**colour**

~~the colour characteristics of a lamp are defined by the colour appearance and the colour rendition~~

a) ~~The actual colour of the lamp is called colour appearance and is defined in terms of the spectral tristimulus values (colour co-ordinates) according to the recommendations of the CIE.~~

b) ~~The spectral characteristics of the light emitted by the lamp have an effect on the appearance of the objects it illuminates; this effect is called colour rendition.~~

2.14**rated colour**

~~the colour appearance as declared by the manufacturer or responsible vendor, or the colour corresponding to the colour designation marked on the lamp~~

3.13**power factor**

under periodic conditions, ratio of the absolute value of the active power to the apparent power

Note 1 to entry: Alternatively, the power factor is the product of the displacement and distortion factor.

3.14**lumen maintenance**

luminous flux at a given time in the life of a lamp, divided by the initial ~~value of the~~ luminous flux of the lamp

Note 1 to entry: Lumen maintenance is expressed as a percentage of the initial luminous flux.

3.15**lamp type**

lamps that, independent of the type of cap ~~or base, are identical in photometric and electrical rating,~~ have identical rated values in relation to the relevant compliance test

3.16**lamp stabilization time**

~~the burning time of the lamp required to obtain stable operating electrical and photometric characteristics~~

time required for a lamp to reach stable conditions for measurement

3.17**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

[SOURCE: IEC 60598-1:2014, 1.2.44]

3.18

type test sample

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

[SOURCE: IEC 60598-1:2014, 1.2.45]

3.19

luminous efficacy

quotient of the lamp luminous flux by the lamp power consumption

3.20

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

[SOURCE: IEC TR 61341:2010, 2.4]

3.21

ageing

preconditioning of lamps by operating them at controlled conditions for a specified period

3.22

supplier

manufacturer, responsible vendor or importer

3.23

dimnable lamp

lamp that is capable of producing varying levels of light when paired with a control or dimmer

3.24

inrush current

<of lamp> transient current associated with energizing a lamp

3.25

chromaticity coordinates

ratio of each of a set of three tristimulus values to their sum

[SOURCE: IEC 60050-845:1987, 845-03-33, modified – The notes have been deleted]

3.26

correlated colour temperature

CCT

temperature of the Planckian radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions

Note 1 to entry: The correlated colour temperature is expressed in K.

Note 2 to entry: This note applies to the French language only.

[SOURCE: IEC 60050-845:1987, 845-03-50, modified – The abbreviated term has been added and the notes have been replaced]

3.27 colour rendering index CRI

measure of the degree to which the psychophysical colour of an object illuminated by the test illuminant conforms to that of the same object illuminated by the reference illuminant, suitable allowance having been made for the state of chromatic adaptation

Note 1 to entry: This note applies to the French language only.

[SOURCE: IEC 60050-845:1987, 845-02-61]

3.28 colour code

3-digit code expressing the rated colour rendering index and the rated correlated colour temperature as described in IEC TR 62732

Note 1 to entry: The light colour designation is detailed in IEC TR 62732.

4 Marking

For this performance standard the following data shall be provided (in addition to the mandatory data required by IEC 60968) by the supplier and located as specified in Table 1. The rated values refer to performance claims under the general conditions for measurement as specified in Clause A.1.

Table 1 – Locations where marking of rated values is required

Parameter (rated)	Product	Product packaging	Product datasheets or leaflets
a) Initial luminous flux of the lamp (lm) (luminous flux for reflector lamps is under consideration)	-	x	x
b) Beam angle (degrees) and centre beam intensity (cd) measured in accordance with IEC TR 61341 for reflector lamps	-	x	x
c) Initial luminous efficacy (lm/W)	-	-	x
d) Correlated colour temperature (K) For the product a colour code is permissible.	x	x	x
e) Colour rendering index For the packaging a colour code is permissible.	-	x	x
f) Chromaticity coordinates	-	-	x
g) Median lamp life (h)	-	x	x
h) Lumen maintenance (%) Including operating hours at which lumen maintenance value(s) are claimed	-	-	x
i) Switching withstand (no. of cycles)	-	-	x
j) Special operating requirements e.g. dimming, orientation (base up/down), restricted operating temperature range	-	x	x
k) Starting time (s)	-	-	x
l) Low temperature starting time (s) (and temperature if different from -10 °C)	-	-	x
m) Run-up time (s)	-	x	x
n) Displacement factor	-	-	x
o) Dimensions (mm)	-	-	x

Parameter (rated)	Product	Product packaging	Product datasheets or leaflets
p) Performance claims for different conditions	-	-	x
q) Location of additional information (how to find product datasheets or leaflets)	-	x	-
(x = required, – = not required but optional)			
NOTE In Japan, the power factor is used instead of displacement factor and the requirement on colour classification and indication is specified in JIS Z9112.			

If equivalence with an incandescent lamp is claimed, the claimed equivalent incandescent lamp power (rounded to 1 W) for lamps with CCT values less than 4 500 K shall be that corresponding in Table 2 below unless superseded by regional requirements. The intermediate values of both the luminous flux and the claimed incandescent lamp power (rounded to 1 W) shall be calculated by linear interpolation between two adjacent values.

Table 2 – Equivalency with non-directional incandescent lamps

Claimed equivalent incandescent lamp power W	(for 220-240 V regions)	(for 110-120 V regions)
	Minimum rated luminous flux lm	Minimum rated luminous flux lm
15	125	
25	229	250
40	432	450
60	741	800
75	970	1 100
100	1 398	1 600
150	2 253	2 550
200	3 172	

~~5— Starting and run-up~~

~~The starting and run-up time shall comply with the values as indicated by the manufacturer or responsible vendor.~~

5 Test conditions

~~Test~~ Conditions for testing ~~electrical and photometric characteristics, lumen maintenance and life~~ are given in annex A.

For lamps with special features for example dimming and daylight sensing, the supplier shall provide advice on how to disable these features in order to test the lamp.

Where applicable, sample sizes and compliance conditions for various requirements are given in Table 3.

Where 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