IEC 61199

Edition 3.1 2012-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Single-capped fluorescent lamps – Safety specifications

Lampes à fluorescence à culot unique – Spécifications de sécurité

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SINGLE-CAPPED FLUORESCENT LAMPS – SAFETY SPECIFICATIONS

FOREWORD

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This consolidated version of IEC 61199 consists of the third edition (2011) [documents 34A/1468/FDIS and 34A/1493/RVD] and its amendment 1 (2012) [documents 34A/1538/CDV and 34A/1578/RVC]. It bears the edition number 3.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

International Standard IEC 61199 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 1999. It constitutes a technical revision. Main technical changes are the introduction of requirements for high frequency operation, a new temperature measurement position and few new cap-holder fits.

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

The committee has decided that the contents of the base publication and its amendments 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

For the ease of measurement, a new location for measuring the maximum cap temperature and maximum cap temperature rise has been introduced with this third edition of this standard, resulting in new temperature values. However, the design of lampholders is based on the traditional measurement location. Therefore, a new Annex I has been introduced, providing the previous methods and values for those lamp types and kinds of lamp operation, which have been already covered in the previous edition of this standard. For lamps, which are operated by means of an electronic ballast however, also a new measurement method and temperature limits are given.

Special attention has been given to the requirements related to high frequency operation, not covered in the previous edition.

The standards IEC 62471,and IEC/TR 62471-2, contain horizontal requirements available that need to be introduced into product standards, e.g. to IEC 61199.

The horizontal requirements are transformed into requirements for single-capped fluorescent lamps.

The lamps within the scope of this standard are general lighting service (GLS) lamps according to the definition 3.11 of IEC 62471;2006. "...lamps intended for lighting spaces that are typically occupied or viewed by people..."

According to Clause 6 of IEC 62471:2006, radiation of GLS lamps is measured at a distance equivalent to 500 lx.

Measured at the 500 lx distance, GLS lamps will not exceed risk group 1 for blue light hazard and risk group 0 for IR radiation. This combination of risk group and hazard does not require marking (Table 1 of IEC/TR 62471-2:2009).

Hazards from UV radiation of GLS lamps are sufficiently covered in 4.11 of IEC 61199,.

Hence, IEC 62471 does not require any additional marking for GLS lamps.

INTRODUCTION TO THE AMENDMENT

The standards IEC 62471, and IEC/TR 62471-2, contain horizontal requirements available that need to be introduced into product standards, e.g. to IEC 61199.

In IEC 61199 the column names in Table F.1 are a bit misleading. These names are:

– “Pre-heat current safety limit (A) (abnormal operation)” in column 2,

– “Discharge current safety limit (A) (normal operation)” in column 3 and

– “SoS safety limit (A²) (normal operation)” in column 4.

Although the additions in brackets of “abnormal operation” and “normal operation” indicate that the corresponding data are dedicated to magnetic ballasts (abnormal operation) and electronic ballasts (normal operation) this is nowhere really stated in IEC 61199.

In fact the “Pre-heat current safety limit” in column 2 of Table F.1 in IEC 61199 is only valid for magnetic operation with internal or external starters. With electronic control gears this limit might be and will be exceeded. It is no safety risk for electronic control gears because there is already a requirement for electronic control gears to avoid any overheating of the base by the pre-heat current in case a lamp does not start (Annex H of IEC 61199). In case of magnetic operation with internal or external starters it might happen that the starter sticks at end of lamp life and the preheat current will be supplied continuously. To avoid a safety risk in this case, with magnetic ballasts the “Pre-heat current safety limit” needs to be observed.

SINGLE-CAPPED FLUORESCENT LAMPS – SAFETY SPECIFICATIONS

1 Scope

This International Standard specifies the safety requirements for single-capped fluorescent lamps for general lighting purposes of all groups having caps according to Table 1.

It also specifies the method a manufacturer should use to show compliance with the requirements of this standard on the basis of whole production appraisal in association with his test records on finished products. This method can also be applied for certification purposes. Details of a batch test procedure which can be used to make limited assessment of batches are also given in this standard.

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.

NOTE Compliance with this standard concerns only safety criteria and does not take into account the performance of single-capped fluorescent lamps for general lighting purposes with respect to luminous flux, colour, starting and operational characteristics. For this information, readers are referred to IEC 60901.

Table 1 – Sheet references of IEC 60061

Cap type	Sheet numbers	
	IEC 60061-1 Lamp caps	IEC 60061-3 Cap gauges
2G7	7004-102	7006-102
2GX7	7004-103	7006-102
2G8	7004-141	7006-141, 141H, 141J, 141K
GR8	7004-68	7006-68A, 68B, 68E
G10q	7004-54	7006-79
GR10q	7004-77	7006-77A, 68B, 68E
GU10q	7004-123	7006-123, 123A
GX10q	7004-84	7006-79, 84, 84A and 84B
GY10q	7004-85	7006-79, 85 and 85A
GZ10q	7004-124	7006-79
2G10	7004-118	7006-118
2G11	7004-82	7006-82
2GX11-1	7004-82A	7006-82F, 82G, 82H
2GX13	7004-125	7006-125A, 125B
G23	7004-69	7006-69
GX23	7004-86	7006-86
G24, GX24	7004-78	7006-78
GZ24q	*	*
GX32	7004-87	7006-87

* to be developed.

It may be expected that lamps which comply with this standard will operate safely at supply voltages between 90 % and 110 % of rated supply voltage of the used ballast and when operated with a ballast complying with IEC 61347-2-3 or IEC 61347-2-8 with a starting device complying with IEC 60155 (if applicable) and in a luminaire complying with IEC 60598-1.

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 60061-2, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 2: Lampholders*

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

IEC 60061-4, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 4: Guidelines and general information*

IEC 60155, *Glow-starters for fluorescent lamps*

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

IEC 60410, *Sampling plans and procedures for inspection by attributes*

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

IEC 60598-1:2008, *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 60901, *Single-capped fluorescent lamps – Performance specifications*

IEC 61347-2-3, *Lamp control gear – Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps*

IEC 61347-2-8, *Lamp control gear – Part 2-8: Particular requirements for ballasts for fluorescent lamps*

3 Terms and definitions

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

3.1
single-capped fluorescent lamp
low-pressure mercury discharge lamp having a single cap in which most of the light from the lamp is emitted by a layer of fluorescent material excited by the ultraviolet radiation from the discharge

3.2
group
lamps having the same electrical and cathode characteristics, the same physical dimensions and the same starting method

3.3
type
lamps of the same group having the same photometric and colour characteristics

3.4
family
lamp groups which are distinguished by common features of materials, components, tube diameter and/or method of processing

3.5
nominal value
approximate quantity value used to designate or identify a lamp

3.6
rated value
quantity value for a characteristic of a lamp for specified operating conditions

The value and the conditions are specified in this standard, or assigned by the manufacturer or responsible vendor.

3.7
design test
test made on a sample for the purpose of checking compliance of the design of a family, group or a number of groups with the requirements of the relevant clause

3.8
periodic test
test, or series of tests, repeated at intervals in order to check that a product does not deviate in certain respects from the given design

3.9
running test
test repeated at frequent intervals to provide data for assessment

3.10
batch
all lamps of one family and/or group and identified as such and put forward at one time for test or checking compliance

3.11
whole production
production during a period of twelve months of all types of lamps within the scope of this standard and nominated in a list of the manufacturer for inclusion in the certificate

3.12
SoS value
abbreviation for the “sum of the squares” (SoS) of the two currents through the two lead wires at a lamp electrode

The currents are measured as r.m.s. values. The lead current at one electrode coil, which gets the higher r.m.s. current value is called I_{LH} (“lead high”), the lead current with the lower r.m.s. value is called I_{LL} (“lead low”). The values of the two currents have to be squared and added (SoS = $I_{LH}^2 + I_{LL}^2$).

3.13
specific effective radiant UV power
effective power of the UV radiation of a lamp related to its luminous flux

Unit: mW/klm

NOTE 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.

4 Safety requirements

4.1 General

Lamps shall be so designed and constructed that in normal use they present no danger to the user or the surroundings.

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

4.2 Marking

4.2.1 The following information shall be legibly and durably marked on the lamps:

a) mark of origin (this may take the form of a trade mark, the manufacturer's name or the name of the responsible vendor);
b) the nominal wattage (marked "W" or "watts") or any other indication which identifies the lamp.

4.2.2 Compliance is checked by the following:

a) presence and legibility of the marking by visual inspection;
b) durability of marking by applying the following test on unused lamps.

The area of the marking on the lamp shall be rubbed by hand with a smooth cloth damped with water for a period of 15 s.

After this test, the marking shall still be legible.

4.3 Mechanical requirements for caps

4.3.1 Construction and assembly

Caps shall be so constructed and assembled to the tube(s) that the whole assembly remains intact and attached during and after operation. In case of lamps with G10q, GZ10q and 2GX13 caps, the caps shall be capable of being rotated like described in Annex A.

Compliance is checked by carrying out the tests given in Annex A.

At the end of the tests, the caps shall show no damage that impairs safety.

4.3.2 Dimensional requirements for caps

4.3.2.1 Lamps shall use standardized caps in accordance with the dimensional requirements of IEC 60061-1.

4.3.2.2 Compliance is checked by using the gauges shown in Table 1.

4.3.3 Pin connections and keying configurations

4.3.3.1 Pin connections

The connection of lamp cathodes to the pins of caps having four pins shall conform to the requirements shown in Annex E for the relevant cap.

Compliance is checked by electrical continuity tests between relevant pins and/or by visual inspection.

4.3.3.2 Key configuration

For those cap types incorporating keys which ensure non-interchangeability with similar lamp types, the caps shall conform to the cap/key version given in the relevant lamp data sheet of IEC 60901. Annex F gives guidance to which cap/key shall be used when designing lamps to operate on a certain ballast.

Compliance is checked by a suitable measuring system and/or visual inspection.

4.4 Insulation resistance

4.4.1 The insulation resistance between the metal parts, if any, of the cap and all pins connected together shall not be less than 2 MΩ.

4.4.2 Compliance is checked by measurement with suitable test equipment using a d.c. voltage of 500 V.

In the case of caps made entirely from insulating material, the test is made between all pins connected together and metal foil wrapped over those surfaces that are accessible when the cap has been connected to a lampholder with minimum shrouding dimensions, as given in IEC 60061-2.

4.5 Electric strength

4.5.1 The insulation between the same parts as those referred to in 4.4 shall withstand the test voltage of 4.5.2. No flash-over or breakdown shall occur during the test.

4.5.2 Compliance is checked with a 1 500 V a.c. voltage of substantially sine-wave form, with a frequency of 50 Hz or 60 Hz and applied for 1 min. Initially, not more than half the prescribed voltage shall be applied; it shall then be raised rapidly to the full value.

Glow discharges without a drop in voltage are neglected.

4.6 Parts which can become accidentally live

4.6.1 Metal parts, if any, intended to be insulated from live parts shall not be or become live.

4.6.2 With the exception of cap pins, no live part shall project from any part of the cap.

4.6.3 Compliance is checked by a suitable measuring system which may include visual inspection where appropriate. In addition, there shall be regular daily checks of the equipment or a verification of the effectiveness of the inspection. See 5.5.4.