

INTERNATIONAL STANDARD

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**AC and/or DC-supplied electronic control gear for tubular fluorescent lamps –
Performance requirements**

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**Appareillages électroniques alimentés en courant alternatif et/ou continu pour
lampes tubulaires à fluorescence – Exigences de performances**

IEC 60929:2011

<https://standards.iteh.ai/catalog/standards/iec/5231ecc7-56df-4d5b-8216-d4239cd51ffa/iec-60929-2011>



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IEC 60929

Edition 4.1 2015-10
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.140.30

ISBN 978-2-8322-2972-9

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**AC and/or DC-SUPPLIED ELECTRONIC CONTROL GEAR
FOR TUBULAR FLUORESCENT LAMPS –
PERFORMANCE REQUIREMENTS**

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IEC 60929 edition 4.1 contains the fourth edition (2011-05) [documents 34C/963/FDIS and 34C/976/RVD] and its amendment 1 (2015-10) [documents 34C/1114/CDV and 34C/1157/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60929 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

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

NOTE 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 the base publication and its amendment 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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Document Preview

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INTRODUCTION

This International Standard covers performance requirements for electronic control gear for use on a.c., at 50 Hz or 60 Hz, and/or d.c. supplies up to 1 000 V with operating frequencies deviating from the supply frequency, associated with tubular fluorescent lamps as specified in IEC 60081 and IEC 60901, and other tubular fluorescent lamps for high frequency operation, still to be standardised.

These control gear are intended to operate lamps at various frequencies including high frequencies and at various lamp powers. Attention is drawn to the fact that operating frequencies below 20 kHz may cause audio noise disturbance, whereas frequencies above 50 kHz may increase radio interference problems.

Some lamps may be specifically designed for high-frequency operation on high-frequency control gear. Two starting modes, preheat and non-preheat, are described.

NOTE Lamps, only specified for preheat starting may be operated on other types of circuits. The control gear manufacturer should provide test data which shows satisfactory starting and operation similar as the ones stated in Clause 6.

In order to obtain satisfactory performance of fluorescent lamps and electronic control gears, it is necessary that certain features of their design be properly co-ordinated. It is essential, therefore, that specifications for them be written in terms of measurement made against some common baseline of reference, permanent and reproducible.

These conditions may be fulfilled by reference ballasts. Moreover, the testing of control gear for fluorescent lamps will, in general, be made with reference lamps and, in particular, by comparing results obtained on such lamps with control gear to be tested and with reference ballast.

Whereas the reference ballast for frequencies of 50 Hz or 60 Hz is a self-inductive coil, the high-frequency reference ballast is a resistor because of its independence of frequency and the lack of influence of parasitic capacitance.

AC and/or DC-SUPPLIED ELECTRONIC CONTROL GEAR FOR TUBULAR FLUORESCENT LAMPS – PERFORMANCE REQUIREMENTS

1 Scope

This international Standard specifies performance requirements for electronic control gear for use on a.c. at 50 Hz or 60 Hz and/or d.c. supplies, both up to 1 000 V, with operating frequencies deviating from the supply frequency, associated with fluorescent lamps as specified in IEC 60081 and IEC 60901, and other fluorescent lamps for high-frequency operation.

NOTE 1 Tests in this standard are type tests. Requirements for testing individual control gear during production are not included.

NOTE 2 There are regional standards regarding the regulation of mains current harmonics and immunity for end-products like luminaires and independent control gear. In a luminaire, the control gear is dominant in this respect. Control gear, together with other components, should comply with these standards.

NOTE 3 Requirements for the digital addressable lighting interface of electronic control gear are given in IEC 62386.

2 Normative references

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

IEC 60081:1997, *Double-capped fluorescent lamps – Performance specifications*

Amendment 1(2000)

Amendment 2 (2003)

Amendment 3 (2005)

Amendment 4 (2010)

IEC 60901:1996, *Single-capped fluorescent lamps – Performance specifications*

Amendment 1(1997)

Amendment 2 (2000)

Amendment 3 (2004)

Amendment 4 (2007)

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

Amendment 1(2010)¹

IEC 61347-2-3:2000, *Lamp controlgear – Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps*

Amendment 1(2004)

Amendment 2 (2006)

IEC 62386 (all parts), *Digital addressable lighting*

IEC TR 62750:2012, *Unified fluorescent lamp dimming standard calculations*

¹ There exists a consolidated edition 2.1 (2010) that comprises IEC 61347-1:2007 and its Amendment 1 (2010).

3 Terms and definitions

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

3.1

starting aid

a conductive strip affixed to the outer surface of a lamp, or a conductive plate which is spaced within an appropriate distance from the lamp

A starting aid is usually connected to earth potential, and can only be effective when it has an adequate potential difference from one end of the lamp.

3.2

ballast lumen factor

blf

ratio of the luminous flux of the lamp when the ballast under test is operated at its rated voltage, to the luminous flux of the same lamp operated with the appropriate reference ballast supplied at its rated voltage and frequency

3.3

reference ballast

special ballast, either inductive for lamps for operation on a.c. mains frequencies, or resistive for lamps for operation on high frequency

It is designed for the purpose of providing comparison standards for use in testing ballasts, for the selection of reference lamps and for testing regular production lamps under standardised conditions. It is essentially characterised by the fact that, at its rated frequency, it has a stable voltage/current ratio which is relatively uninfluenced by variations in current, temperature and magnetic surroundings, as outlined in this standard.

[IEC 60050-845:1987, 845-08-36, modified]

3.4

reference lamp

lamp selected for testing control gear which, when associated with a reference ballast, has electrical characteristics which are close to the nominal values as stated in the relevant lamp standard

NOTE Specified conditions are given in Annex C.

3.5

total circuit power

total power dissipated by control gear and lamp in combination, at rated voltage and frequency of the control gear

3.6

circuit power factor

λ

power factor of the combination of a control gear and the lamp or lamps for which the control gear is designed

3.7

preheat starting

type of circuit in which the lamp electrodes are brought to emission temperature before the lamp actually ignites

3.8

non-preheat starting

type of circuit which utilises a high open-circuit voltage causing secondary electron emission from electrodes

3.9

electronic control gear life time

declared average life time at which 90 % of the electronic control gears are still operating

NOTE 1 In the context of life time, an electronic control gear is “operating” if it still fulfils its intended functions.

NOTE 2 The manufacturer applies suitable methods, e.g. statistical calculation and/or reliability testing.

3.10

ambient temperature

t_a

temperature range of the air surrounding the electronic control gear declared by the manufacturer to indicate the normal operating temperature range for the electronic control gear

NOTE 1 The lifetime of the electronic control gear is given at the ambient temperature t_a ; for ease of measurement, also the corresponding temperature of the t_c point is given.

NOTE 2 The measurement test condition for the ambient temperature assigned to the DUT should be in accordance to Annex D of IEC 61347-1 at the rated voltage.

4 General notes on tests

4.1 Tests according to this standard are type tests.

NOTE The requirements and tolerances permitted by this standard are based on the testing of a type test sample submitted by the manufacturer for that purpose. In principle this type test sample should consist of units having characteristics typical of the manufacturer's production and be as close to the production centre point values as possible.

It may be expected with the tolerances given in this standard that products manufactured in accordance with the type test sample will ensure compliance with the standard for the majority of the production. However, due to the production spread, it is inevitable that there will sometimes be products outside the specified tolerances. For guidance on sampling plans and procedures for inspection by attributes, see IEC 60410.

4.2 The tests are carried out in the order of the clauses, unless otherwise specified.

4.3 One control gear is submitted to all tests, unless otherwise stated.

4.4 In general, all tests are made on each type of control gear or where a power range of similar control gear is involved, for each rated power in the range or on a representative selection from the range as agreed with the manufacturer.

4.5 The tests are made under the conditions specified in Annex A. Lamp data sheets not published in an IEC publication shall be made available by the lamp manufacturer.

4.6 All control gear specified in this standard shall comply with the requirements of IEC 61347-2-3.

4.7 Attention is drawn to lamp performance standards which contain “information for control gear design”; this should be followed for proper lamp operation; however, this standard does not require the testing of lamp performance as part of the type test approval for control gear.

5 Marking

5.1 Mandatory marking

Electronic control gear shall be clearly marked with the following mandatory marking as applicable.

- a) Circuit power factor, e.g. 0,85.

If the power factor is less than 0,95 capacitive, it shall be followed by the letter C, e.g. 0,85 C.

The following marking shall also be added, if appropriate:

- b) The symbol \bar{Z} which indicates that the control gear is designed to comply with the conditions for audio-frequency impedance.

5.2 Additional mandatory Information

In addition to the above mandatory markings, the following information shall either be given on the control gear or be made available in the manufacturer's catalogue or the like.

- a) a clear indication regarding the type of starting, viz. preheat or non-preheat;
- b) indication whether a control gear needs a starting aid;
- c) ballast lumen factor if different from $1 \pm 0,05$;
- d) life time of the control gear is linked to the ambient temperature and the measured temperature on the reference point t_c .

For the information, the format of Table 1 has to be used. Corresponding to the fixed ambient temperature values 40 °C, 50 °C and 60 °C, the values of the temperature measured on the reference point t_c and the declared life time have to be inserted by the manufacturer. The value of the temperature of the t_c point given in the table shall never exceed the t_c (IEC 61347-1), therefore, in that case, the column where the temperature of t_c -point exceeds t_c will be left blank; but at least the column with ambient temperature 40 °C shall always be filled.

Table 1 – Control gear life time information

Ambient temperature	40 °C	50 °C	60 °C
Temperature measured on the reference point t_c	XX ^a	XX ^a	XX ^a
Life time	XX XXX ^b	XX XXX ^b	XX XXX ^b
^a "°C" values declared by the control gear manufacturer			
^b "h" values declared by the control gear manufacturer			

NOTE 1 Additional information from the control gear manufacturer to the ambient temperature and life time given in Table 1 is allowed.

NOTE 2 For multi power control gear the most adverse load condition or a table for each lamp-control gear combination should be given.

5.3 Non-mandatory information

Non-mandatory information which may be made available by the manufacturer:

- a) rated output frequency at rated voltage, with and without lamp operating;
- b) limits of the ambient temperature range within which the control gear will operate satisfactorily at the declared voltage (range);
- c) total circuit power.