SLOVENSKI STANDARD

SIST EN 60929:2004

september 2004

Izmenično napajane elektronske predstikalne naprave za cevaste fluorescentne svetilke – Zahteve za lastnosti (IEC 60929:2003)

A.C. supplied electronic ballasts for tubular fluorescent lamps - Performance requirements (IEC 60929:2003)

ICS 29.140.30

Referenčna številka
SIST EN 60929:2004(en)

EUROPEAN STANDARD **EN 60929**

NORME EUROPÉENNE

EUROPÄISCHE NORM March 2004

ICS 29.140.30

Supersedes EN 60929:1992 + A1:1995 + A2:1996

English version

A.C. supplied electronic ballasts for tubular fluorescent lamps - Performance requirements
(IEC 60929:2003)

Ballasts électroniques alimentés en courant alternatif pour lampes tubulaires à fluorescence - Prescriptions de performances
(CEI 60929:2003)

Wechselstromversorgte elektronische Vorschaltgeräte für röhrenförmige Leuchtstofflampen - Anforderungen an die Arbeitsweise
(IEC 60929:2003)

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 34C/618/FDIS, future edition 2 of IEC 60929, prepared by SC 34C, Auxiliaries for lamps, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60929 on 2004-03-01.

This European Standard Supersedes EN 60929:1992 + A1:1995 + A2:1996.

In this new edition digital signal control of electronic ballasts has been introduced.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-12-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-03-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60929:2003 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60081	- [1)]	Double-capped fluorescent lamps - Performance specifications	EN 60081	1998 [2)]
IEC 60410	- [1)]	Sampling plans and procedures for inspection by attributes	-	-
IEC 60669-2-1 (mod)	- [1)]	Switches for household and similar fixed electrical installations Part 2-1: Particular requirements - Electronic switches	EN 60669-2-1	- [3)]
IEC 60901	- [1)]	Single-capped fluorescent lamps - Performance specifications	EN 60901	1996 [2)]
IEC 61000-3-2 (mod)	2000	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)	EN 61000-3-2	2000
A1	2001		-	-
IEC 61347-1	- [1)]	Lamp controlgear Part 1: General and safety requirements	EN 61347-1 + corr. July	2001 [2)] 2003
IEC 61347-2-3	- [1)]	Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps	EN 61347-2-3 + corr. July	2001 [2)] 2003
IEC 61547	- [1)]	Equipment for general lighting purposes - EMC immunity requirements	EN 61547	1995 [2)]

1) Undated reference.

2) Valid edition at date of issue.

3) In preparation.

NORME INTERNATIONALE

INTERNATIONAL STANDARD

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Deuxième édition
Second edition
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Ballasts électroniques alimentés en courant alternatif pour lampes tubulaires à fluorescence – Prescriptions de performances

AC-supplied electronic ballasts for tubular fluorescent lamps – Performance requirements

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

AC-SUPPLIED ELECTRONIC BALLASTS FOR TUBULAR FLUORESCENT LAMPS – PERFORMANCE REQUIREMENTS

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

This second edition cancels and replaces the first edition published in 1990, Amendment 1 (1994) and Amendment 2 (1996). This second edition constitutes a technical revision.

In this new edition digital signal control of electronic ballasts has been introduced.

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

FDIS	Report on voting
34C/618/FDIS	34C/622/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 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

INTRODUCTION

This International Standard covers performance requirements for electronic ballasts for use on a.c. supplies up to 1 000 V at 50 Hz or 60 Hz 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 standardized.

These ballasts 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 ballasts. Two starting modes, preheat and non-preheat, are described.

NOTE The possibility exists for operation of lamps designed for preheat starting on circuits of the non-preheat type. Lamps specified for operation on both types of circuits may appear in IEC 60081, or lamp manufacturers can authorize such operation of their lamps.

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

These conditions may be fulfilled by reference ballasts. Moreover, the testing of ballasts for fluorescent lamps will, in general, be made with reference lamps and, in particular, by comparing results obtained on such lamps with ballasts to be tested and with a 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 independency of frequency and the lack of influence of parasitic capacitance.

AC-SUPPLIED ELECTRONIC BALLASTS FOR TUBULAR FLUORESCENT LAMPS – PERFORMANCE REQUIREMENTS

1 Scope

This International Standard specifies performance requirements for electronic ballasts for use on a.c. supplies up to 1 000 V at 50 Hz or 60 Hz 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.

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

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, *Double-capped fluorescent lamps – Performance specifications*

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

IEC 60669-2-1, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic switches*

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

IEC 61000-3-2:2000, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current <= 16A per phase)*
Amendment 1 (2001)

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

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

IEC 61547, *Equipment for general lighting purposes – EMC immunity requirements*

3 Terms and definitions

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

3.1
starting aid
aid that can be either a conductive stripe affixed to the outer surface of a lamp, or a conductive plate which is spaced within an appropriate distance from a lamp.

NOTE A starting aid can only be effective when it has an adequate potential difference from one end of the lamp.

3.2
ballast lumen factor
ratio of the light output of the lamp when the ballast under test is operated at its rated voltage, compared with the light output of the same lamp operated with the appropriate reference ballast supplied at its rated voltage and frequency

3.3
reference ballast
special ballast designed for the purpose of providing comparison standards for testing ballasts and for selecting reference lamps

NOTE It is essentially characterized 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.

3.4
reference lamp
lamp selected for testing ballasts which, when associated with a reference ballast under specified conditions, has electrical characteristics which are close to the nominal values as stated in the relevant lamp standard for that particular type of lamp

3.5
calibration current of a reference ballast
value of the current on which are based the calibration and functioning of the ballast

3.6
total circuit power
total power dissipated by ballast and lamp in combination, at rated voltage and frequency of the ballast

3.7
circuit power factor
λ
power factor of the combination of a ballast and the lamp or lamps for which the ballast is designed

3.8
high power factor ballast
ballast having a circuit power factor of at least 0,85

NOTE 1 The value of power factor takes into account the effect of the distortion of the current waveform.

NOTE 2 For North America, high power factor is defined as a power factor of at least 0,9.

3.9
high audio-frequency impedance ballast
ballast of which the impedance in the frequency range 250 Hz to 2 000 Hz exceeds the values specified in Clause 14 of this standard

3.10
low-distortion type ballast
ballast of which the harmonic content complies with the more severe requirements of 12.1 of this standard

3.11
preheat starting
type of circuit in which the lamp electrodes are brought to emission temperature before the lamp actually ignites

3.12
non-preheat starting
type of circuit which utilizes a high open-circuit voltage causing field emission from electrodes

3.13
pre-start time
for ballasts according to 3.12, period after switching on the supply voltage during which the lamp current is ≤10 mA

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 ballast is submitted to all tests.

4.4 In general, all tests are made on each type of ballast or where a range of similar ballasts is involved for each rated wattage 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 ballasts specified in this standard shall comply with the requirements of IEC 61347-1 and IEC 61347-2-3.

5 Marking

5.1 Ballasts shall be clearly marked with the following mandatory marking:

a) Circuit power factor, for example 0,85.

   If the power factor is less than 0,95 leading, it shall be followed by the letter C, for example 0,85 C.

   The following markings shall also be added, if appropriate:

b) The symbol $Z\approx$ which indicates that the ballast is designed to comply with the conditions for audio-frequency impedance.

c) The symbol *H* which indicates that the ballast is not of the low distortion type.

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