



SLOVENSKI STANDARD
SIST EN 60929:1995

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A.C. supplied electronic ballasts for tubular fluorescent lamps - Performance requirements (IEC 929:1990 + corrigendum June 1991)

A.C. supplied electronic ballasts for tubular fluorescent lamps - Performance requirements

Wechselstromversorgte elektronische Vorschaltgeräte für röhrenförmige Leuchtstofflampen - Anforderungen an die Arbeitsweise

Ballasts électroniques alimentés en courant alternatif pour lampes tubulaires à fluorescence - Prescriptions de performances

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Ta slovenski standard je istoveten z: EN 60929:19- &

ICS:

29.140.30 Fluorescenčne sijalke. Sijalke Fluorescent lamps.
Discharge lamps

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en

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EUROPEAN STANDARD

EN 60929

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EUROPÄISCHE NORM

June 1992

UDC 621.327:620.1

Descriptors: Tubular lamp, fluorescent lamp, electrical ballast, A.C.,
specification, electrical starting test, operating
condition, marking

ENGLISH VERSION

A.C.-supplied electronic ballasts for tubular
fluorescent lamps - Performance requirements
(IEC 929:1990 + Corrigendum June 1991)

Ballasts électroniques alimentés
en courant alternatif pour
lampes tubulaires à fluorescence
Prescriptions de performances

(CEI 929:1990 + corrigendum
juin 1991)

Wechselstromversorgte
elektronische Vorschaltgeräte
für röhrenförmige
Leuchtstofflampen
Anforderungen an die
Arbeitsweise

(IEC 929:1990 + Corrigendum
Juni 1991)

STANDARD PREVIEW
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SIST EN 60929:1995

This European Standard was approved by CENELEC on 1992-03-24.
CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations
which stipulate the conditions for giving this European Standard the status of
a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards
may be obtained on application to the Central Secretariat or to any CENELEC member.

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium,
Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg,
Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

FOREWORD

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 929:1990 and its corrigendum of June 1991 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 60929 on 24 March 1992.

The following dates were fixed:

- latest date of publication of
an identical national standard (dop) 1993-03-01
- latest date of withdrawal of
conflicting national standards (dow) 1993-03-01

For products which have complied with the relevant national standard before 1993-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1998-03-01.

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given only for information.
In this standard, annex D is informative and annexes A, B, C and ZA are normative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 929:1990 and its corrigendum of June 1991 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD
WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

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

| <u>IEC</u> <u>Publication</u> | <u>Date</u> | <u>Title</u> | <u>EN/HD</u> | <u>Date</u> |
|----------------------------------|-------------|---|--------------|-------------|
| 81 | 1984 | Tubular fluorescent lamps for general | | |
| + A1 | 1987 | lighting service | | |
| + A2 | 1988 | | EN 60081 | 1989 |
| 410 | 1973 | Sampling plans and procedures for inspection by attributes | - | - |
| 555-2 (mod) | 1982 | Disturbances in supply systems caused | | |
| + A1 | 1985 | by household appliances and similar | EN 60555-2* | 1987 |
| + A2 | 1988 | electrical equipment Part 2: Harmonics | | |
| 901 | 1987 | Single-capped fluorescent lamps Safety and performance requirements | EN 60901* | 1990 |
| 928 | 1990 | A.C.-supplied electronic ballasts for tubular fluorescent lamps - General and safety requirements | EN 60928 | 1991 |

* EN 60555-2:1987 does not include A2:1988
A1:1989 to IEC 901 was endorsed as EN 60901/A1:1990

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NORME
INTERNATIONALE
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STANDARD

CEI
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929

Première édition
First edition
1990-12

Ballasts électroniques alimentés en courant
alternatif pour lampes tubulaires à fluorescence –
Prescriptions de performances

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**A.C.-supplied electronic ballasts for tubular
fluorescent lamps – Performance requirements**

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Numéro de référence
Reference number
CEI/IEC 929: 1990

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

A.C.-SUPPLIED ELECTRONIC BALLASTS FOR TUBULAR FLUORESCENT LAMPS – PERFORMANCE REQUIREMENTS

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.
- 4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

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This standard has been prepared by Sub-Committee 34C: Auxiliaries for discharge lamps, of IEC Technical Committee No. 34: Lamps and related equipment.

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It constitutes the first edition of IEC 929.

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

| Six Months' Rule | Report on Voting |
|------------------|------------------|
| 34C(CO)173 | 34C(CO)192 |

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

Annexes A, B and C are normative. Annex D is informative.

In this standard, the following print types are used:

- requirements proper: in roman type;
- test specifications: in italic type;
- notes: in smaller roman type.

INTRODUCTION

This 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 81 and 901, 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. 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 81 or lamp manufacturers will have to 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.

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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.

A.C.-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 81 and 901 and other tubular fluorescent lamps for high frequency operation.

NOTES

- 1 Tests in this standard are type tests. Requirements for testing individual ballasts during production are not included.
- 2 Requirements for dimming ballasts are under consideration.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 81: 1984, *Tubular fluorescent lamps for general lighting service* (Amendment No. 1: 1987, Amendment No. 2: 1988).

IEC 410: 1973, *Sampling plans and procedures for inspection by attributes*.

IEC 555-2: 1982, *Disturbances in supply systems caused by household appliances and similar electrical equipment Part 2: Harmonics* (Amendment No. 2: 1988)

IEC 901: 1987, *Single-capped fluorescent lamps - Safety and performance requirements*.

IEC 928: 1990, *A.C.-supplied electronic ballasts for tubular fluorescent lamps - General and safety requirements*.

3 Definitions

For the purposes of this International Standard, the following definitions apply:

3.1 **starting aid:** Starting aid 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. 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. 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 control 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 (symbol 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.

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

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.

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

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 410.

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 928.

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5 Marking

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

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

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

The following markings shall also be added, if appropriate:

b) The symbol \bar{Z} 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:

a) a clear indication regarding the type of starting, viz. preheat or non-preheat;

b) indication whether a ballast needs a starting aid.

5.3 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 ballast will operate satisfactorily at the declared voltage (range);

c) ballast lumen factor and total circuit power in combination.