SLOVENSKI STANDARD
SIST EN 50294:2000

01-april-2000

Measurement method of total input power of balast-lamp circuits

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Verfahren zur Messung der Gesamteingangsleistung von Vorschaltgerät-Lampe-Schaltungen

Méthode de mesure de la puissance d'entrée totale des circuits ballasts/lampes

Ta slovenski standard je istoveten z: **EN 50294:1998**

ICS:

29.140.99	Drugi standardi v zvezi z žarnicami	Other standards related to lamps

SIST EN 50294:2000 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50294

December 1998

ICS 29.140.99

Descriptors: Lamps, fluorescent lamps, electric ballast, electric circuits, definitions, measurements, power, luminous flux, correction ratio

English version

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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

Ref. No. EN 50294:1998 E

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 34Z, Luminaires and associated equipment.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50294 on 1998-08-01.

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)	1999-06-01
- date on which national standards conflicting with the EN have to be withdrawn	(dow)	1999-06-01

This standard has been drafted in response to a request from the European Commission for a measurement method for total input power of ballast-lamp circuits to support a common European classification system.

The measured total input power, with account taken of different ballast lumen factors for the different circuits is intended to be used for the classification of ballast-lamp circuits.

Consideration is being given to include in a future edition of this standard:

- Ballast-high intensity discharge (HID) lamp circuits;
- Transformer or step-down converter - low voltage halogen lamp circuits;
- Ballast-linear fluorescent lamps and single ended (compact) lamp circuits not currently included in this standard.

Contents

1 Scope

This Standard gives the measurement method of the total input power for ballast-lamp circuits when operating with their associated fluorescent lamp(s). This standard applies to electrical ballast-lamp circuits comprised solely of the ballast and of the lamp(s).

NOTE: Requirements for testing individual ballasts during production are not included.

It specifies the measurement method for the total input power for all ballasts sold for domestic and normal commercial purposes operating with the following fluorescent lamps:

- linear lamps with power equal to or greater than 15 W;
- single ended (compact) lamps with power equal to or greater than 18 W;
- other general purpose lamps.

This standard does not apply to:

- ballasts which form an integral part of the lamp;
- ballast-lamp circuits with capacitors connected in series;
- controllable wire-wound magnetic ballasts;
- luminaires, which rely on additional optical performance aspects.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 60081		Double-capped fluorescent lamps - Performance specifications (IEC 60081)
EN 60901		Single-capped fluorescent lamps - Performance requirements (IEC 60901)
EN 60920	1991	Ballasts for tubular fluorescent lamps - General and safety requirements (IEC 60920:1990)
EN 60921	1991	Ballasts for tubular fluorescent lamps - Performance requirements (IEC 60921:1998, modified)
EN 60928	1995	Auxiliaries for lamps - A.C. Supplied electronic ballasts for tubular fluorescent lamps - General and safety requirements (IEC 60928:1995)
EN 60929	1992	A.C. supplied electronic ballasts for tubular fluorescent lamps - Performance requirements (IEC 60929:1990 + corr. June 1991).

3 Definitions

For the purpose of this standard the following definitions apply:

3.1
nominal value
A suitable approximate quantity value used to designate or identify a component, device or equipment.

3.2
limiting value
In a specification the greatest or smallest admissible value of one of the quantities.

3.3
rated value
A quantity value for specified operating conditions of a component, device or equipment. The value and conditions are specified in the relevant standard or assigned by the manufacturer or responsible vendor.

3.4
ballast

Unit inserted between the supply and one or more discharge lamps which by means of inductance, capacitance, or a combination of inductance and capacitance serves mainly to limit the current of lamp(s) to the required value. The ballast may consist of one or more separate components. It may also include means for transforming the supply voltage and arrangements which help provide the starting voltage, preheating current, prevent cold starting, reduce stroboscopic effects, correct the power-factor and/or suppress radio interference.

3.5
a.c. supplied electronic ballast
Mains supplied a.c. to a.c. invertor including stabilizing elements for starting and operating one or more tubular fluorescent lamps, generally at high frequency.

3.6
fluorescent lamp
Discharge lamp of the low pressure mercury type, in which most of the light is emitted by one or several layers of phosphors excited by the ultra-violet radiation from the discharge.

3.7
ballast-lamp circuit
The electrical circuit, or part thereof, normally built in a luminaire. It consists of the ballast and lamp(s)

3.8
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.

3.9
reference lamp
Lamp selected for testing ballasts which, when associated with a reference ballast, has electrical characteristics which are close to the rated values as stated in the relevant lamp standard.

3.10
rated voltage (of a ballast)
A voltage specified by the ballast manufacturer for a given ballast that applies to a given operation condition (normally 230 V).

3.11
rated power (of a lamp)
The power, expressed in watts, of a given lamp type specified by the manufacturer or the supplier, the lamp being operated under specified conditions.

3.12
ballast lumen factor (BLF)
Ratio of the light output of the reference 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.

3.13
total input power
The total power supplied to the ballast-lamp circuit measured at rated input voltage. The rated power specified is related to a specific ballast lumen factor (BLF).

4 General

4.1 Applicability

These measurement methods shall only be used for ballasts which conform to EN 60920, EN 60921, EN 60928 and EN 60929 and which also conform to EC Directive 89/336/EEC (EMC Directive), 73/23/EEC (Low Voltage Directive) and 93/68/EEC (CE Directive).

4.2 Declaration of ballast lumen factor

For every ballast-lamp combination submitted for test the manufacturer shall declare the ballast lumen factor. The ballast lumen factor for the test ballast as defined in 3.12 of this standard applies to a.c. supplied electronic ballasts as well as to wire-wound magnetic ballasts.

The declared ballast lumen factor shall be in the range 1,00 to 0,925 for conventional ballasts and 1,075 to 0,925 for electronic ballasts. Test ballasts outside this range are not suitable for testing.

4.3 Controllable ballasts

Sufficient cathode temperature shall be produced by the heating circuit at any possible dimming position within the available dimming range of the ballast control system.

NOTE: A test procedure is under consideration.

4.4 Multi-lamp-type ballast

When a ballast-lamp combination suitable for more than one type of lamp is supplied for test the manufacturer shall declare for every lamp type the relevant BLF.

4.5 Accuracy of measurement

The accuracy of the measurements shall be in accordance with EN 60929, A.1.2. and A.1.7. The total accuracy of the measurement arrangement shall be within ± 1,5% for magnetic wire-wound ballast-lamp circuits and ± 2,5%, for electronic ballast-lamp circuits, including the accuracy of the photometric measurement.

4.6 Sampling of ballasts for testing

Tests in this standard are type tests. The requirements and tolerances specified in this standard are based on the testing of a type test sample submitted by the manufacturer for that purpose. This 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.

4.7 Number of samples

One specimen shall be tested.

5 Method of measurement of total input power of ballast-lamp circuits

5.1 Correction for ballast lumen factor

The total input power measured is corrected to a BLF of 0,95 for wire-wound magnetic ballast and of 1,00 for high frequency (HF) electronic ballast. Additionally tolerances of reference lamps are compensated.

5.2 Method of measurement

If the ballast is marked with a voltage range the ballast shall be measured the mid value of the range.

The measurements are carried out with the wattmeter connected to measure the total input power into the ballast-lamp circuit, using :

- <u>for magnetic wire wound ballast-lamp circuits:</u> the conditions specified in A6.1 of EN 60921:1991 and the test circuit of Figure 4.
- <u>for a.c. supplied electronic ballast-lamp circuits:</u> the conditions specified in A6.2 of EN 60921:1991, as far as applicable, and the test circuit of Figure 5.

The tests specified in A.1.1, A.1.2, A.1.3, A.1.4, and A.4.5 of EN 60920 shall apply. The value of the total input power ($P_{tot.meas.}$) is recorded when a steady state has been reached (ballast temperature and lamp current stabilized).

The measurements with the test ballast in the ballast-lamp circuit are to be made with supply voltage which is equal to the rated voltage of the test ballast.

$P_{Lnom.}$ of a reference lamp in some cases may deviate from the rated value of the lamp.