

# INTERNATIONAL STANDARD

# IEC 60925

Edition 1.2  
2001-08

Edition 1:1989 consolidated with amendments 1:1996 and 2:2001

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## DC supplied electronic ballasts for tubular fluorescent lamps – Performance requirements

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*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DC SUPPLIED ELECTRONIC BALLASTS FOR  
TUBULAR FLUORESCENT LAMPS –  
Performance requirements**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 60925 has been prepared by subcommittee 34C: Auxiliaries for discharge lamps, of IEC technical committee 34: Lamps and related equipment.

This consolidated version of IEC 60925 consists of the first edition (1989) [documents 34C(BC)146 and 34C(BC)157], its amendment 1 (1996) [documents 34C/329/FDIS et 34C/376/RVD] and its amendment 2 (2001) [documents 34C/524/FDIS et 34C/530/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 1.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

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 following IEC publications are quoted in this standard:

IEC 60081:1984, *Tubular fluorescent lamps for general lighting service*

IEC 60571:1977, *Rules for electronic equipment used on rail vehicles*

IEC 60921:1988, *Ballasts for tubular fluorescent lamps: Performance requirements*

IEC 60924:1988, *DC supplied electronic ballasts for tubular fluorescent lamps – General and safety requirements*

IEC 61547:1995, *Equipment for general lighting purposes – EMC immunity requirements*

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2004-11. At this date, the publication will be

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

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# DC SUPPLIED ELECTRONIC BALLASTS FOR TUBULAR FLUORESCENT LAMPS –

## Performance requirements

### Section one – General performance requirements

#### 1 Scope

This standard specifies general performance requirements for electronic ballasts for use on d.c. supplies having rated voltages not exceeding 250 V, associated with fluorescent lamps complying with IEC 60081. It shall be read in conjunction with IEC 60924.

Performance requirements for electronic ballasts for general, public transport and aircraft lighting are specified in Sections Two, Three and Four of this standard.

NOTE 1 In order to obtain satisfactory performance of fluorescent lamps with d.c. supplied electronic ballasts, it is necessary that certain features of their designs be properly co-ordinated. It is essential, therefore, that specifications for them be written in terms of measurement made against some common base-line of reference, which must be reasonably permanent and reproducible.

NOTE 2 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 as specified in IEC 60921.

#### 2 Definitions

##### 2.1

##### **starting aid**

either a conductive strip affixed to the outer surface of a lamp, or a conductive plate which is spaced 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

##### 2.2

##### **ballast lumen factor**

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

##### 2.3

##### **reference ballast**

a special inductive-type ballast designed for the purpose of providing comparison standards for use in testing ballasts, and for the selection of reference lamps. It is essentially characterized by a stable voltage-to-current ratio, which is relatively uninfluenced by variations in current, temperature and the magnetic surroundings (see annex B)

##### 2.4

##### **symmetrical inverter**

a definition is under consideration

##### 2.5

##### **asymmetrical inverter**

a definition is under consideration



### 3 General note on tests

Tests shall be made under the conditions specified in annex A.

All ballasts specified in this standard shall comply with the requirements of IEC 60924.

Conformity with IEC 61547 may be declared by the manufacturer and need not form part of third party approval to this standard.

### 4 Marking

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

- a) Ballast lumen factor.
- b) Rated output frequency (at the design voltage, with and without the lamp operating).
- c) Limits of the ambient temperature range within which the ballast will operate suitably at the declared rated voltage range.

### 5 Starting

It may be expected that ballasts complying with this standard, when associated with lamps which comply with IEC 60081, will provide satisfactory starting (not hot restarting) of the lamp with an air temperature immediately around the lamp of between 10 °C and 35 °C at the minimum of the rated voltage range; and operation between 10 °C and 50 °C at other voltages within the rated voltage range.

The lamp electrical characteristics, on the lamp data sheets in IEC 60081, apply to lamps operated with a reference ballast at its rated voltage, in an ambient temperature of 25 °C.

Ballasts shall provide reliable starting of the appropriate lamps over the limits of the ambient temperature range declared by the manufacturer.

*Compliance is checked by the tests of clauses 6 and 7 unless evidence of satisfactory lamp life can be given by the manufacturer.*

### 6 Open-circuit voltage at terminations of lamp

A ballast when operated at any voltage within its rated voltage range shall provide an open-circuit voltage at the lamp terminations such that:

- a) the minimum r.m.s. voltage across the lamp is at least that shown in the third column of table 1;
- b) the peak voltage across the lamp does not exceed that shown in the fourth or fifth column of table 1;
- c) the minimum peak voltage from one end of the lamp to the starting aid shall be at least that shown in the sixth column of table 1.

**Table 1 – Open circuit voltage for lamps with either high or low resistance cathodes (with cathode preheating)**

Rated lamp wattage	Nominal dimensions of the lamp	Open-circuit voltage at lamp terminations			Voltage to starting aid Minimum peak
		Minimum r.m.s.	Maximum V peak		
			Symmetrical inverter	Asymmetrical inverter	
W	mm	V	V	V	V
4	150 × 15	100	550	700	290
6	224 × 15	100	550	700	290
8	300 × 15	100	550	700	290
13	525 × 15	200	550	700	290
15T8	450 × 25	180	550	700	260
20	590 × 38	180	550	700	260
30T8	900 × 25	205	550	700	300
30T12	900 × 38	200	550	700	290
40	1 200 × 38	205	550	700	300
65	1 500 × 38	a	a	a	a

<sup>a</sup> Values under consideration.

When ballasts are designed to operate lamps in parallel circuits, the relevant requirements shall be met for each separate lamp, independent of the number of lamps inserted. Lamps operated with electronic ballasts complying with this standard require a starting aid as specified in IEC 60081 except in the case of lamps with a diameter of 16 mm maximum where the starting aid shall be positioned 7 mm from the lamp.

During these tests each lamp cathode shall be replaced by a resistor having the same value as the substitution resistor on the relevant lamp data sheet of IEC 60081.

NOTE The maximum values in table 1 are higher than those recommended in IEC 60081 because of the greater voltage range of the supply voltage. This may lead to a decreased useful lamp life.

## 7 Pre-heating conditions

### 7.1 Minimum voltage across lamp cathode

With a resistor of the objective value specified on the relevant lamp data sheet of IEC 60081, substituted for each lamp cathode and when operated at any voltage within the rated voltage range, the ballast shall deliver a voltage at each resistor of at least 3,05 V r.m.s. for low resistance cathode lamps and of at least 6,5 V r.m.s. for high resistance cathode lamps.

### 7.2 Maximum voltage across lamp cathode

#### a) Ballasts for lamps with low resistance cathodes

With a resistor of the objective value specified on the relevant lamp data sheet of IEC 60081 substituted for each lamp cathode and when operated at any voltage within the rated voltage range, the ballast shall deliver a voltage at each resistor not exceeding 6,5 V r.m.s.