

Glow-starters for fluorescent lamps

The European Standard EN 60155:1995, incorporating amendments A1:1995 and A2:2007, has the status of a British Standard

ICS 29.140.30

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 60155:1995, incorporating amendment A1:1995 and A2:2007. It is identical with IEC 60155:1993, incorporating amendment 1:1995 and 2:2006.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee CPL 34/1, *Lamps*.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 July 1995

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The following BSI references relate to the work on this standard:
Committee reference CPL/34/1
Draft for comment 91/28809 DC

ISBN 0 580 24182 3

Amendments issued since publication

Amd. No.	Date	Comments
9126	September 1996	
16940	28 February 2007	See national foreword

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60155

January 1992

+ A1

December 1995

+ A2

January 2007

ICS 29.140.30

Descriptors: Starter, fluorescent lamp, starting test, endurance test, deactivated lamp, type test, marking

English version

Glow-starters for fluorescent lamps

(IEC 155:1993)

Interrupteurs d'amorçage à lueur pour
lampes à fluorescence (starters)
(CEI 155:1993)

Glimmstarter für Leuchtstofflampen
(IEC 155:1993)

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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.

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

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

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Ref. No. EN 60155:1995 E
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Foreword

The text of the International Standard IEC 155:1993, prepared by SC 34A, Lamps, of IEC TC 34, Lamps and related equipment, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60155 on 1994-12-06 without any modification.

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) 1995-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1995-12-01

For products which have complied with EN 60155:1989 and its amendment A2:1993 before 1995-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-12-01.

This standard is to be used in conjunction with EN 60081:1989, EN 60901:1990 and EN 60921:1991.

Annexes designated normative are part of the body of the standard. In this standard, Annex A, Annex B and Annex ZA are normative. Annex ZA has been added by CENELEC.

Foreword of amendment A1:1995

The text of document 34A/586/DIS, future amendment 1 to IEC 155:1993, prepared by SC 34A, Lamps, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60155:1995 on 1995-11-28.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-09-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1996-09-01

For products which have complied with EN 60155:1995 before 1996-0-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-09-01.

Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, Annex ZA is normative and Annex C is informative.

Annex ZA has been added by CENELEC.

Foreword to amendment A2:2007

The text of document 34A/1174/FDIS, future amendment 2 to IEC 60155:1993, prepared by SC 34A, Lamps, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60155:1995 on 2006-12-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2007-09-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2009-12-01

Endorsement notice

The text of amendment 2:2007 to the International Standard IEC 60155:1993 was approved by CENELEC as an amendment to the European Standard without any modification.

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Section 1. General and safety requirements

Introduction

This standard for interchangeable glow-starters for fluorescent lamps comprises two sections: Section 1 describes the general requirements with which glow-starters shall comply in order to ensure safety, and Section 2 covers the requirements for performance.

The additional requirements with which glow-starters for use in class II luminaires shall comply are specified in Annex B.

1 Scope

This standard specifies interchangeable glow-starters used with pre-heat type fluorescent lamps, hereafter called “starters”.

Section 1 specifies the general and safety requirements with which starters shall comply.

Section 2 specifies the performance.

NOTE Starters are generally designed to operate with a range of lamps, depending on supply voltage, single lamp or series pair operation, maximum lamp voltage and lamp starting requirements.

2 Normative references

The following normative documents 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 normative documents 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 normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 81:1984, *Tubular fluorescent lamps for general lighting service*.

IEC 400:1991, *Lampholders for tubular fluorescent lamps and starterholders*.

IEC 598, *Luminaires*.

IEC 695-2-1:1991, *Fire hazard testing. Part 2: Test methods — Section 1: Glow-wire test and guidance*.

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

IEC 921:1988, *Ballasts for tubular fluorescent lamps. Performance requirements*.

[A₁] ISO 4046:1978, *Paper, board, pulp and related items — Vocabulary*. [A₁]

[A₂] ISO 1456:2003, *Metallic coatings — Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium*. [A₂]

[A₂] ISO 2081:1986, *Metallic coatings —*

Electroplated coatings of zinc on iron or steel.

ISO 2093:1986, *Electroplated coatings of tin — Specification and test methods*. [A₂]

3 Definitions

3.1 starter

a device, other than a main switch, which closes or opens the pre-heating circuit of a fluorescent lamp for the purpose of starting the lamp

3.2 glow-starter

a starter which depends for its operation on a glow discharge in a gaseous atmosphere

3.3 non-reclosure voltage

a reduced voltage at which the starter contacts must not reclose after operation at the test voltage specified for testing the speed of operation

3.4 deactivated lamp

a lamp in which one or both filaments are deprived of emitting material, but neither of which is broken

3.5 glow-starters with operating time limitation

a glow-starter which prevents prolonged attempts to start lamps which refuse to start, e.g. lamps with deactivated electrodes

the following types can be distinguished

- a) starters which are non-resettable (one shot);
- b) starters with a manual reset;
- c) starters with an automatic reset, by actuating the main switch or other intended actions.

4 General requirements

Starters shall be so designed and constructed that in normal use their operation is without danger to the user or surroundings. In general, compliance is checked by carrying out all the tests specified.

5 General requirements for tests

5.1 Requirements for type tests only are included.

5.2 Unless otherwise specified, the tests shall be made at an ambient temperature of 25 °C ± 5 °C.

5.3 The tests shall be carried out in the order of the clauses.

6 Marking

6.1 Starters shall be provided with durable and legible marking as follows:

a) manufacturer's or responsible vendor's name, or trade mark;

b) type or catalogue reference;

c) lamp(s) for which the starter is intended.

If this requirement is marked in the form of a lamp wattage range, the marking shall:

i) either include all the standardized wattages within that range in IEC 81 or 901;

or

ii) indicate departures from that range either on the packaging material or in catalogues published by the manufacturer;

d) temperature range for which the starter is intended to be used, if applicable.

6.2 Other useful indications, for example the circuit for which the starter is intended and, in some cases, the rated voltage of the starter, shall either be marked on the starter, or be referred to in the manufacturer's publications.

If applicable, the information shall be given that the starter is equipped with means of operating time limitation.

6.3 Marking shall be indelible and easily legible. It shall comply with the requirements of 7.11.

7 Requirements and tests for safety

7.1 Type test quantity

The type test quantity shall consist of five starters to be submitted to the tests specified in 7.3 to 7.11 and 7.12.1, and 10 capacitors to be submitted to the test specified in 7.12.2 and 7.12.3. In addition, for starters with operating time limitations, five starters shall be submitted to the test specified in 7.13.

7.2 Conditions of acceptance

The type shall be considered as satisfying the requirements of this subclause if all five starters comply with the tests specified in 7.3 to 7.11 and in 7.12.1 and if applicable, 7.13, and if all 10 capacitors comply with the tests specified in 7.12.2 and 7.12.3.

If any failures occur during a test, that test and the preceding ones, which may have influenced the results of that test, are repeated on a further five starters, all of which shall then comply with the repeated tests.

All 10 starter capacitors submitted to the tests specified in 7.12.2 and 7.12.3 shall pass the tests. If any failure occurs during these tests, they shall be repeated on a further 10 starter capacitors, all of which shall comply with the repeated tests.

7.3 Protection against accidental electric shocks

Enclosures for interchangeable starters shall ensure protection against electric shocks. Protection may be ensured either by an insulating enclosure, by an appropriate non-metallic lining, or other means which prevent accidental contact between live parts and the enclosure.

Compliance is checked by inspection.

7.4 Insulation resistance under humidity conditions

Immediately after a humidity treatment of 24 h $\times$ 2 in an atmosphere of 91 % to 95 % relative humidity, and an ambient temperature between 20 °C and 27 °C maintained within limits of ± 1 °C, the insulation resistance between live parts and the metal canister of the starter shall be not less than 2 M Ω measured after 1 min at 500 V d.c. In the case of canisters of insulating material, they shall be covered by tinfoil and the preceding requirements shall be satisfied, the test being carried out between the foil and live parts.

Before starting the humidity treatment, the starters shall be kept in an ambient temperature which does not differ from the temperature within the humidity test enclosure by more than $^{+4}_{0}$ °C, for at least 4 h.

7.5 Dielectric strength

Immediately after the insulation resistance test, the starter shall be subjected to and satisfactorily withstand for 1 min without breakdown a sinusoidal a.c. voltage of 1 500 V r.m.s. applied between the same parts as those referred to in 7.4.

7.6 Dimensions

7.6.1 The dimensions shall comply with the requirements of Figure 1. Compliance shall be checked by the gauges of Figure 6, Figure 7 and Figure 8.

7.6.2 The external creepage distance and clearance shall be not less than 3 mm between live parts of different polarity, or between live parts and accessible metal parts.

The internal creepage distance between live parts and accessible metal parts shall be not less than 2 mm.

7.7 Torsion test

The starter shall withstand a torque of 0,6 Nm about the axis and applied at the top of the canister by holding the pins in a fixed support. The torque shall not be applied suddenly but increased gradually from zero to the value specified.

7.8 Mechanical strength

The starter shall withstand without damage affecting safety, 20 falls of 500 mm onto a 3 mm thick steel plate in a tumbling barrel turning at 5 rev/min (that is 10 falls per minute). Suitable equipment for this test is shown in Figure 2.

7.9 Connections

Electrical connections shall be so designed that the contact pressure is not transmitted through insulating material other than ceramic material.

A₂ Starter contacts shall consist of a material suitable for current-carrying parts. Examples of suitable metals for current-carrying parts with regard to mechanical strength, electrical conductivity and resistance to corrosion, when used within their permissible temperature range and under normal conditions of chemical pollution, are given in Annex D. **A₂**

Compliance is checked by inspection.

This requirement does not apply to contacts between detachable parts, such as starters and their holders, for which adequate spring action is required.

7.10 Resistance to heat and fire

7.10.1 Enclosures and other external parts of insulating material shall be sufficiently resistant to heat.

Compliance is checked by the following tests.

Five samples are tested in a heating cabinet at a temperature of 125 °C during 168 h.

During the test, the samples shall not undergo any change impairing their safety, especially in the following respects:

- reduction of the protection against electric shock;
- loosening of electrical contacts;
- cracks, swelling or shrinking.

At the end of the test, the dimensions shall comply with the requirements of **7.6.1**.

7.10.2 Enclosures and other external parts of insulating material shall be subjected to a ball-pressure test by means of the apparatus shown in Figure 10.

The surface of the part under test is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against this surface by a force of 20 N. If the surface under test bends, the part where the ball presses should be supported.

The test shall be made in a heating cabinet at a temperature of 125 °C ± 5 °C.

After 1 h the ball shall be removed and the diameter of the impression measured. This diameter shall not exceed 2 mm.

The test shall not be made on parts of ceramic, urea or alkyd plastics. For enclosures made from these materials, a test is under consideration.

7.10.3 Enclosures and other external parts of insulating material shall be resistant to abnormal heat and fire.

Compliance is checked by the following test.

Parts are subjected to a test using a nickel-chromium glow-wire heated to 650 °C. The test apparatus shall be that described in IEC 695-2-1.

The sample to be tested is mounted vertically on the carriage and pressed against the glow-wire tip with a force of 1 N, preferably 15 mm, or more, from the upper edge of the sample. The penetration of the glow-wire into the sample is mechanically limited to 7 mm. After 30 s, the sample is withdrawn from contact with the glow-wire tip.

Any flame or glowing of the sample shall extinguish within 30 s of withdrawing the glow-wire, and any burning or molten drop shall not ignite a piece of tissue paper, consisting of five layers, spread out horizontally 200 mm ± 5 mm below the sample.

The glow-wire temperature and heating current shall be constant for 1 min prior to commencing the test. Care shall be taken to ensure that heat radiation does not influence the sample during this period. The glow-wire tip temperature is measured by means of a sheathed fine-wire thermocouple constructed and calibrated as described in IEC 695-2-1.

Precautions shall be taken to safeguard the health of personnel conducting tests against:

- risks of explosion or fire;
- inhalation of smoke and/or toxic products;
- toxic residues.

7.11 Quality of marking

Compliance with the requirements shall be checked by inspection after rubbing the marking lightly for 15 s with a piece of cloth soaked with water.

The test shall be repeated using a further piece of cloth soaked with petroleum spirit.

7.12 Radio interference suppression capacitors

7.12.1 The starter shall incorporate a radio interference suppression capacitor value between 0,005 µF and 0,02 µF, unless otherwise indicated on the appropriate lamp data sheet of IEC 81 or IEC 901. Compliance shall be checked by inspection.

7.12.2 The capacitor shall be resistant to moisture. Compliance shall be checked by the following test.