SRI LANKA STANDARD 1260 : 2003
IEC 60155 : 1993

SPECIFICATION FOR
GLOW STARTERS FOR TUBULAR FLUORESCENT LAMPS

SRI LANKA STANDARDS INSTITUTION

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SLS 1260 : 2003
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Colombo-08
Sri Lanka.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR GLOW STARTERS FOR TUBULAR FLUORESCENT LAMPS

NATIONAL FOREWORD

This standard was approved by the Sectoral Committee on Electrical Appliances and Accessories and was authorized for adoption and publication as a Sri Lanka Standard by the Council of Sri Lanka Standards Institution on 2003-10-22.

This Sri Lanka Standard is identical with IEC 60155 : Glow Starters for Fluorescent lamps including Amd. No. 1 The existing Sri Lanka Standard SLS 882 : 1990 : Specification for Glow starters for tubular fluorescent lamps is superseded by this standard.

Terminology and conventions
The text of the International Standard has been accepted as suitable for publication with the inclusion of definition Class I and Class II luminaries in the National Appendix.

However, certain terminology and conventions are not identical with those used in Sri Lanka Standards. Attention is therefore drawn to the following :

a) Wherever, the words "International Standard" appear referring to this standard they should be interpreted as "Sri Lanka Standard."
b) Wherever, the page numbers are quoted they are page numbers of IEC standard.

Cross references

International standard	Corresponding Sri Lanka Standard
	Performance requirements
IEC 81:1997 Tubular fluorescent lamps for general lightning services.	SLS 566 : 1996: Specification for Tubular fluorescent lamps
IEC 400 : 1991 : Lamp holders for tubular fluorescent lamps and starter holders	----
IEC 598 : Luminaries Part 1 : General requirements and Tests	----
IEC 695-2-1 : 1991: Fire Hazard testing Part 2 : Test methods-Section 1 : Glow wire test and guidance	----
IEC 901 : 1997 : Single capped fluorescent lamps: Performance requirements	SLS 1232 : 2003 : Single capped compact fluorescent lamps
IEC 61199 : 1998 : Safety Requirements	Part 1 : Performance requirements
IEC 921 : 1988 : Ballasts for tubular fluorescent lamps.	----

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GLOW-STARTERS FOR FLUORESCENT LAMPS

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 cooperation 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, 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.

3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

International Standard IEC 155 has been prepared by sub-committee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This fourth edition cancels and replaces the third edition published in 1983 and amendments 1 and 2, and constitutes a technical revision.

The test of this standard is based on the third edition, on the amendments 1 and 2 and on the following documents:

DIS	Report on voting
34A(CO)635	34A(CO)686

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 standard should be used in conjunction with IEC 81, IEC 901 and IEC 921.

Annexes A and B form an integral part of this standard.

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.

GLOW-STARTERS FOR FLUORESCENT LAMPS

Section 1 – General and safety requirements

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*

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 x 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 MΩ 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 figures 6, 7 and 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.

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.

Before the humidity treatment, the capacitors shall be kept at 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.

Immediately after the humidity treatment of 24 h x 2 in an atmosphere of 91 % to 95 % relative humidity and an ambient temperature between 20 °C and 30 °C maintained within limits of ±1 °C, the capacitor shall be subjected to and satisfactorily withstand for 1 min without breakdown a d.c. voltage of 2 000 V.

The test voltage shall be applied across the terminations of the capacitor, and initially shall not be more than half the prescribed voltage. It shall then be raised gradually to the specified full value.

7.12.3 The capacitor shall be resistant to flame and ignition.

Compliance shall be checked by the following test. The capacitors are each subjected to a gradually increasing a.c. voltage until breakdown occurs. The voltage source used to this effect should have a short-circuit power of approximately 1 kVA.

NOTE – Further details of this procedure are under consideration.

Thereafter, each capacitor shall be connected in series with a 40 W inductive ballast complying with the requirements of annex A and operated for 5 min at the rated voltage of the ballast.

During this test, the capacitor shall not induce flame or cause ignition.

7.13 *Heating of starters with operating time limitation*

The enclosure of starters with operating time limitation shall not deform during normal and abnormal operation, so that safety is not impaired.

Compliance is checked by the following test.

Starters are connected as in normal use and associated with a deactivated lamp of the highest wattage rating marked on the starter and a corresponding inductive ballast, except for 100 W and 125 W lamps where a capacitive ballast shall be used.

The ballast shall comply with the requirements of annex A. The test voltage shall be equal to 110 % of the rated voltage of the ballast.

Starters are tested at the highest value of the marked temperature. Only the starter is subject to this temperature. The ballast and the lamp shall remain at room temperature.

The duration of the test shall be 168 h.

NOTE – Starters for which the operating time limitation is performed by means of a mechanical cut-out which fully interrupts the starting current need not be tested according to this subclause.

Section 2 – Performance specification

The general requirements for tests of Section 1 apply.

8 Starting test

8.1 *Starting test quantity*

The starting test quantity shall consist of five new starters which have not been subjected to the tests specified in Section 1.

8.2 *Conditions of acceptance*

The type shall be considered as satisfying the requirements of this subclause of all five starters comply with the tests specified in 8.4 to 8.7. If one failure occurs, a further five starters shall be selected and tested and all these shall comply.

If more than one failure occurs in the first sample, the starters are deemed not to satisfy the requirements of this clause.

8.3 *Conditions of test*

8.3.1 For the duration of the test, the starter shall be in complete darkness, and shall have been kept in complete darkness for at least 15 h immediately prior to the test.

This condition will be satisfied if the starter is enclosed in an opaque container.

8.3.2 The starter shall be tested in the circuit shown in figure 3.

8.3.3 The ballast used shall meet the requirements of IEC 921. It shall have a rated voltage equal to the mains voltage, or falling within the mains voltage range for which the starter is designed. It shall have a rated wattage suitable for the main type of lamp for which the starter is designed. If this rated wattage is 22 W or below, the ballast shall be of an inductive type, and a capacitive type in case this wattage is above 22 W.

In case of doubt, a choice shall be made in mutual agreement between testing authority and manufacturer.

NOTE – Generally, the rated voltage shall be the same as the voltage rating of the ballast prescribed in IEC 81 or in IEC 901 for the lamp starting test.

8.3.4 The lamp used shall meet the requirements of IEC 81 or in IEC 901 for switch-starter operated lamps, and shall have the same rated wattage as the ballast used.

8.3.5 The total harmonic content of the supply voltage shall not exceed 3 %. The harmonic content being defined as the root-mean-square (r.m.s.) summation of the individual harmonic components, using the fundamental as 100 %.

Care shall be taken that this applies under all conditions that occur during the measurement.

NOTE – This implies that the source of supply shall have sufficient power, and that the supply circuit has a sufficiently low impedance compared with the ballast impedance.

8.4 *Speed of operation*

A voltage equal to the test voltage of the lamp starting test for the relevant lamp specified in IEC 81 or in IEC 901 shall be applied to the circuit for 30 s, except in the case of 20 W lamps specified in IEC 81, when the voltage shall be 103,5 V.

During this time, the contacts shall open not less than twice.

8.5 *Closed time*

During the period of 30 s referred to in 8.4 and a further 15 s, the starter contacts shall be closed for a minimum total period of 1,5 s.

NOTE – Details of the time-measuring device are not included in figure 3.

8.6 *Non-reclosure voltage*

The voltage shall quickly and continuously be reduced from the value used in 8.4 to the non-reclosure voltage specified under "Information for starter design" in the relevant lamp data sheet of IEC 81 or of IEC 901, without breaking the supply circuit. In case the starter is designed for a range of lamps, care should be taken that the highest maximum voltage value of all lamps within that range is taken.

The switch contacts shall not reclose within 1 min, at the reduced voltage.

8.7 *Pulse voltage*

The circuit for measuring pulse voltage shall be as shown in figure 9, in combination with the circuit of figure 3. The same voltage as used in 8.4 shall be applied to the test circuit for 30 s. On at least one occasion during this period, the highest pulse voltage (indicated by either of the two voltmeters) shall be not less than the minimum peak voltage under "Information for starter design" in the relevant lamp data sheet of IEC 81 or IEC 901.

In case the starter is designed for a range of lamps, care should be taken that the highest maximum voltage value of all lamps within that range is taken.

9 Endurance test

9.1 *Test quantity*

The test quantity shall consist of five starters which have passed the starting tests, but which have not been subjected to any additional tests.

9.2 *Conditions of acceptance*

The type shall be considered as satisfying the requirements of this subclause if all the five starters pass the tests specified in 8.4 to 8.7 inclusive, after having been subjected to the endurance test specified in 9.3.

In the event of one starter failing to comply, another five starters shall be tested, all of which shall comply. If more than one failure occurs, the starters are deemed not to satisfy the requirements of this clause.

9.3 *Conditions of test*

Starters for lamp ratings up to and including 80 W shall be tested in the circuit shown in figure 4.

A lamp of the highest rating for which the starter is intended, and a corresponding ballast of the inductive type shall be used.

Starters for 100 W and 125 W lamps shall be tested in the circuit shown in figure 5. A 125 W lamp and a 125 W ballast of the capacitive type shall be used.

The ballast shall comply with the requirements of annex A.

The test voltage shall be equal to the rated voltage of the ballast.

In the event of a lamp failing during this test, arrangements shall be made for its immediate replacement.

The test voltage shall be applied to the circuit for 6 000 test cycles, each of 1 min. During each cycle, the voltage shall be applied for 20 s to 30 s.

10 Deactivated lamp test

10.1 *Test quantity*

The test quantity shall consist of five starters which have passed the starting tests, but which have not been subjected to any additional tests.

10.2 *Conditions of acceptance of starters without operating time limitation*

The type shall be considered as satisfying the requirements of this subclause if all five starters pass the tests specified in 8.4 to 8.7 inclusive, after having been subjected to the deactivated lamp test specified in 10.3.

In the event of one starter failing to comply, another five starters shall be tested, all of which shall comply. If more than one failure occurs, the starters are deemed not to satisfy the requirements of this clause.

10.3 *Conditions of test*

Starters for lamp ratings up to and including 80 W shall be tested in the circuit shown in figure 4, and starters for 125 W lamps shall be tested in the circuit shown in figure 5. The lamps used shall be deactivated.

The duration of the test is 3 h.

For practical reasons, a more stringent test without a lamp in the circuit may be used. In case of doubt, the lamp test according to figure 4 and figure 5 shall, however, be decisive.

A lamp of the highest rating for which the starter is intended, and an appropriate inductive ballast shall be used. A 125 W lamp and a 125 W ballast of the capacitive type shall be used for testing 100 W and 125 W starters.

The ballast shall comply with the requirements of annex A. The test voltage shall be equal to the rated voltage of the ballast.

In the event of a lamp failing during this test, arrangements shall be made for its immediate replacement.

10.4 *Conditions of acceptance for starters with operating time limitation*

The type shall be considered as satisfying the requirements of this subclause if five starters pass the test specified in 10.5. After this test, resettable starters shall pass the tests specified in 8.4 to 8.7 inclusive.

In the event of one starter failing to comply, another five starters shall be tested, all of which shall comply. If more than one failure occurs, the starters are deemed not to satisfy the requirements of this subclause.

10.5 *Operating time limitation test*

Within 5 min after switching-on of the supply voltage, the means for preventing to start attempts shall become operative. Self-resetting shall not take place.

Compliance is checked by observation of lamp starting attempts, or by other means indicated by the manufacturer.

In this test the starters are connected as in normal use and associated with a deactivated lamp of the lowest wattage rating marked on the starter and a corresponding ballast. If this rated wattage is 22 W or below, the ballast shall be of an inductive type, and a capacitive type if the wattage is above 22 W.

The ballast shall comply with the requirements of annex A.

The test voltage shall be the rated voltage of the ballast.

Starters are tested at the lowest value of the marked temperature range. Only the starter is subject to this temperature, the lamp and the ballast shall remain at room temperature.

Starters with a manual reset shall be subjected to 25 test cycles of 5 min "ON", and minimum 10 min "OFF".

Starters with an automatic reset shall be subjected to 500 of the above test cycles.

The means for preventing starting attempts shall become operative during every "ON" period.

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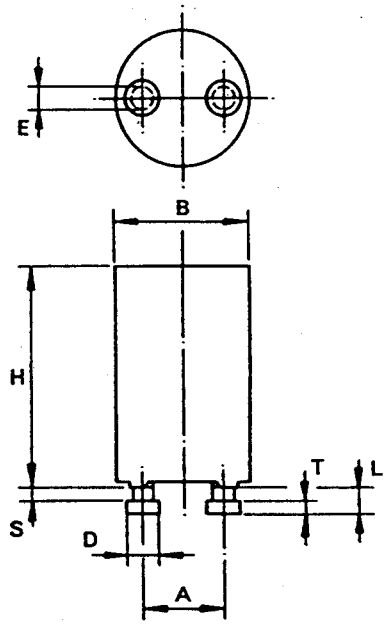
Le dessin a pour seul but d'indiquer les dimensions à contrôler.
The drawing is intended only to indicate the dimensions to be checked.



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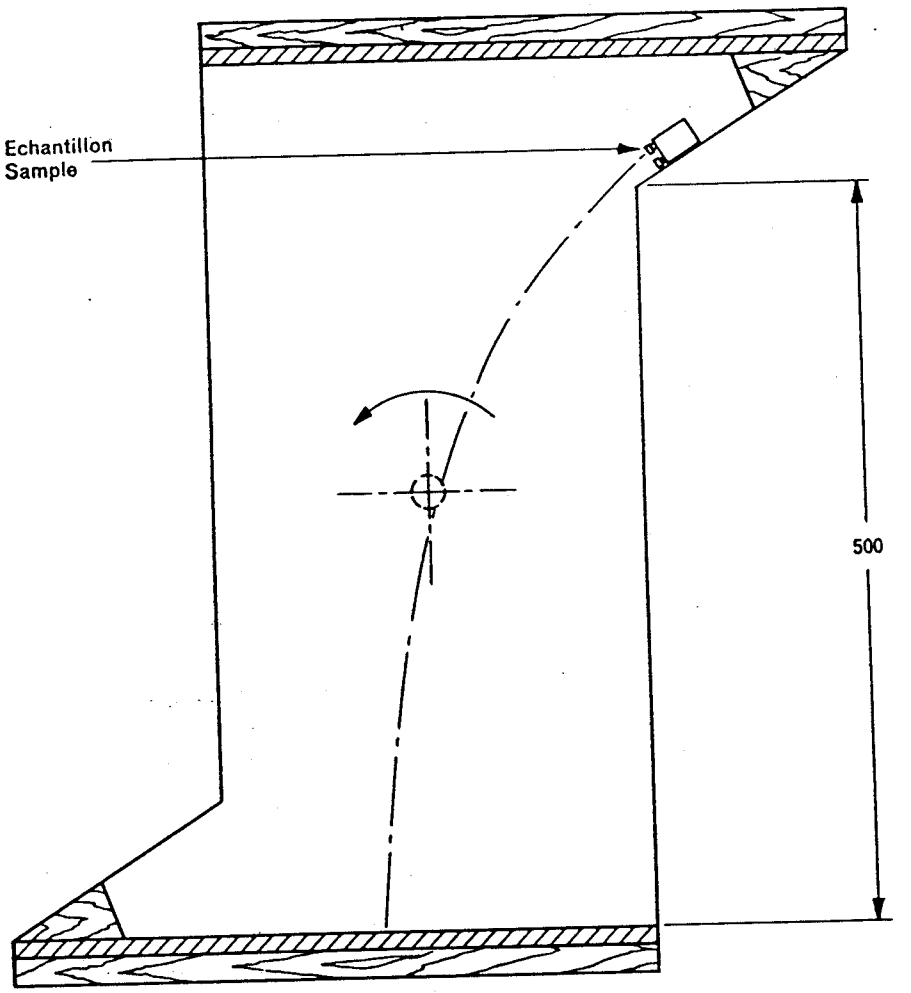
Dimensions en millimètres *Dimensions in millimetres*

Dimension	Min.	Max.
A	12,5	12,9
B	–	21,5
D	4,7	5,0
E	2,8	3,2
H	33,0	36,0
L	–	4,3
S	1,7	–
T	1,9	2,2

Les starters sont contrôlés à l'aide des calibres spécifiés aux figures 6, 7 et 8.
The starters are checked with the gauges shown in figures 6, 7 and 8.

Figure 1 – Dimensions des starters
Dimensions of starters



Dimensions en millimètres

Dimensions in millimetres

Figure 2 – Tambour tournant
Tumbling barrel

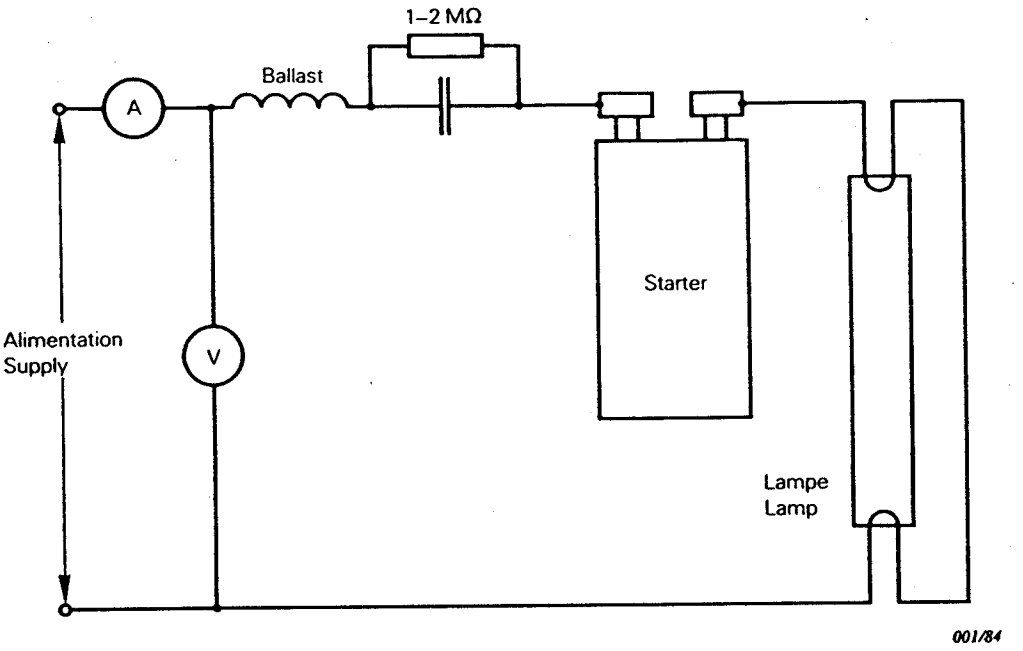


Figure 3 – Circuit pour l'essai d'amorçage
Circuit for starting test

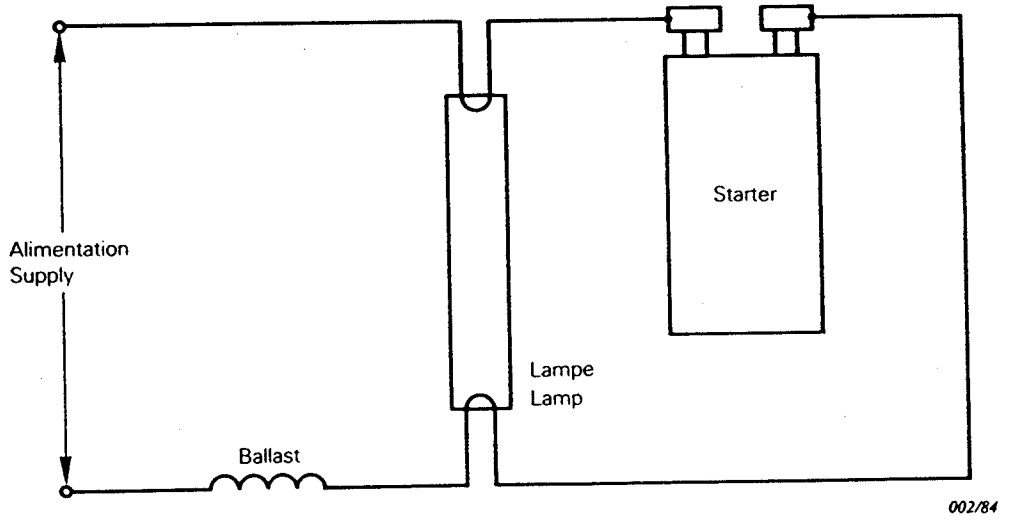


Figure 4 – Circuit pour l'essai d'endurance – Starters pour lampes jusqu'à 80 W inclus
Circuit for endurance test – Starters for lamp ratings up to and including 80 W

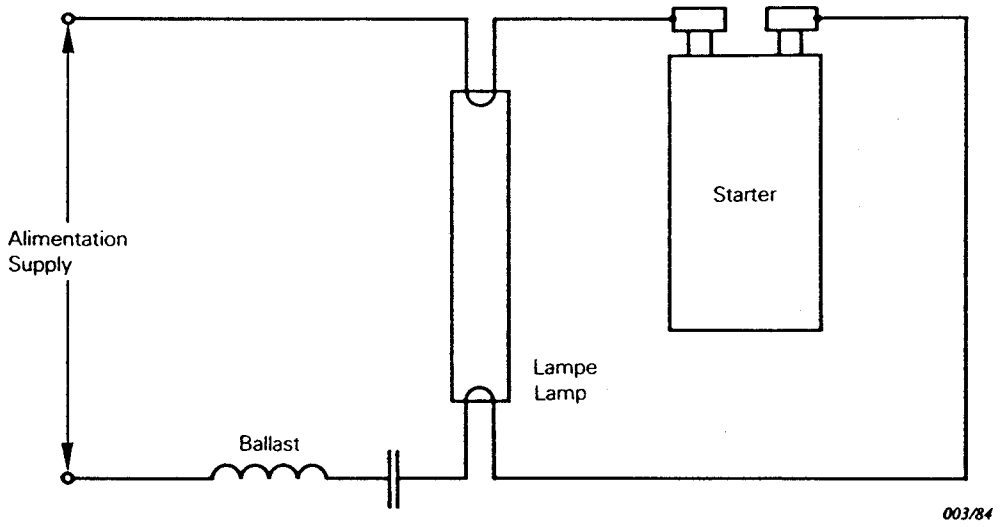
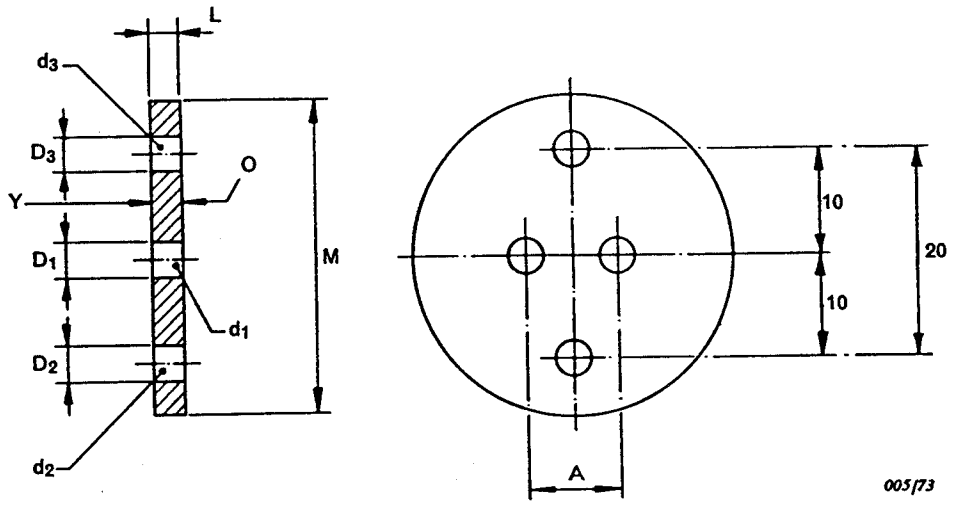


Figure 5 – Circuit pour l'essai d'endurance – Starters pour lampes de 100 W et 125 W
Circuit for endurance test – Starters for lamps rated at 100 W and 125 W

Le dessin a pour seul but d'illustrer les principales dimensions du calibre.
The drawing is intended only to illustrate the essential dimensions of the gauge.



Dimensions en millimètres *Dimensions in millimetres*

But: Pour le contrôle des dimensions D min., D max., L max. et de l'effet combiné du diamètre et de la distance des broches selon la figure 1.

Essai: Les broches doivent pénétrer dans le calibre par la surface O à trou d_1 et, lorsqu'elles sont complètement enfoncées, les surfaces du starter et du calibre doivent être en contact. Dans cette position, les extrémités des broches ne doivent pas dépasser de la surface Y. Individuellement, chaque broche doit entrer dans le trou d_2, mais ne pas pénétrer dans le trou d_3.

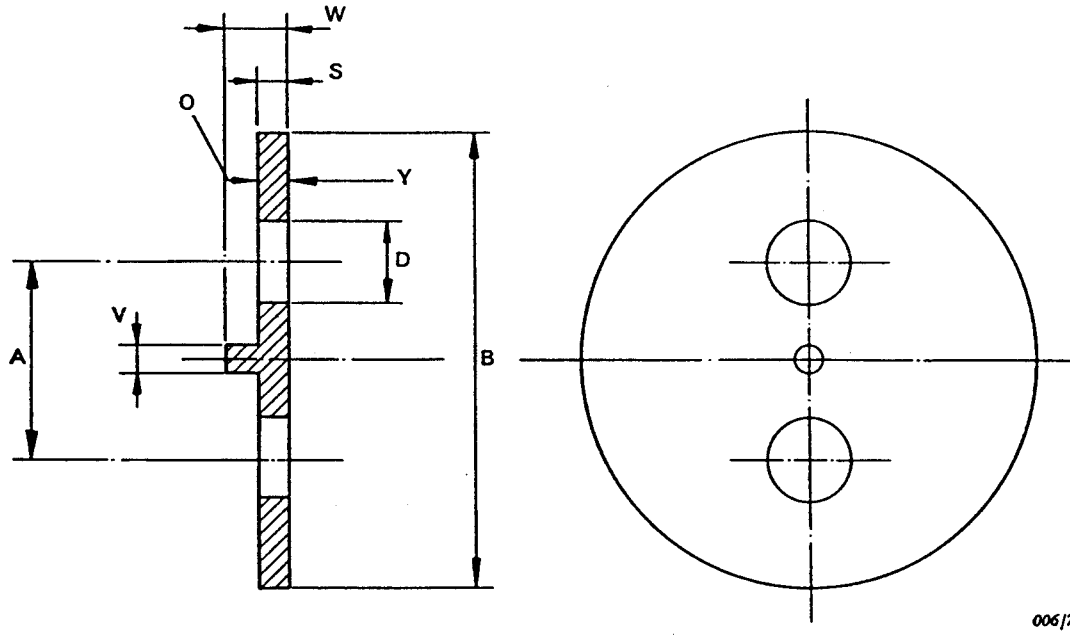
Purpose: For the control of dimensions D min., D max., L max. and the combined pin diameter and displacement of pins of figure 1.

Testing: The pins shall enter the gauge hole d_1, at surface O and, when fully inserted, the surfaces of starter and gauge shall contact. In this position, the ends of the pins shall not project beyond surface Y. The individual pin shall enter the hole d_2, but it shall not enter the hole d_3.

Référence Reference	Dimension	Tolérance Tolerance
A	12,70	±0,005
D1	5,20	+0,01
D2	5,00	+0,01
D3	4,70	–0,01
L	4,30	+0,02
M	35	Approx.

Figure 6 – Calibre «ENTRE» et «N'ENTRE PAS» pour starters
"GO" and "NOT GO" gauge for starters

Le dessin a pour seul but d'illustrer les principales dimensions du calibre*.
The drawing is intended only to illustrate the essential dimensions of the gauge*.



Dimensions en millimètres *Dimensions in millimetres*

* Ce calibre ne s'applique pas aux starters pour appareils d'éclairage de la classe II pour lampes à fluorescence. Un calibre pour ceux-ci est donné à la figure B.2.
* This gauge does not apply to starters for class II fluorescent lamp luminaires. A gauge for these is given in figure B.2.

Référence Reference	Dimension	Tolérance Tolerance
A	12,70	±0,01
B	30	±0,5
D	5,20	+0,05
S	1,60	–0,05
V	2,20	+0,01
W	3,60	+0,01

But: Vérifier que le starter ne peut pas être introduit dans une douille spéciale munie d'une broche de diamètre V.

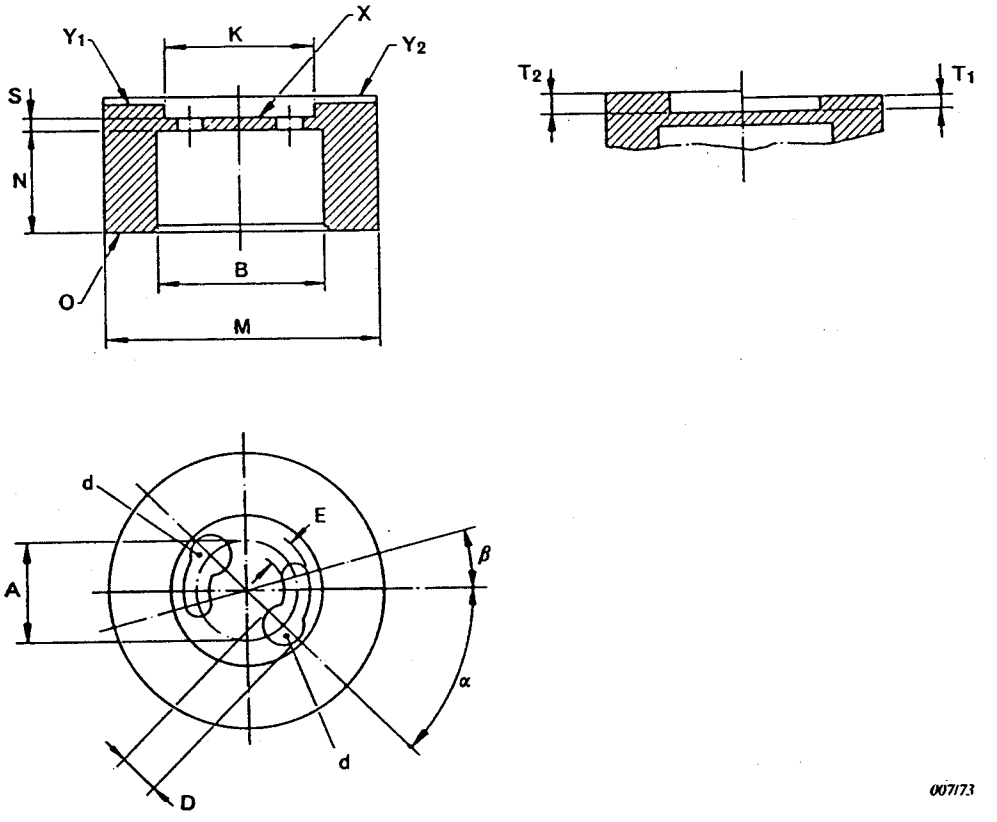
Essai: Le starter est introduit dans le calibre du côté O, mais les parties les plus larges des broches ne doivent pas pénétrer si loin qu'elles puissent être engagées en deçà de la surface Y.

Purpose: For checking that the starter cannot be inserted in a special holder provided with a pin having a diameter V.

Testing: The starter shall enter the gauge from side O, but the heads of the pins shall not pass so far that they can be turned beyond surface Y.

Figure 7 – Calibre «N'ENTRE PAS» pour starters
"NOT GO" gauge for starters

Le dessin a pour seul but d'illustrer les principales dimensions du calibre.
The drawing is intended only to illustrate the essential dimensions of the gauge.



Dimensions en millimètres

Dimensions in millimetres

Référence Reference	Dimension	Tolérance Tolerance
A	12,70	±0,005
B	21,50	+0,01
D	5,20	+0,01
E	3,40	+0,01
K	19,0	+0,2
M	35	Approx.
N	13	Approx.
S	1,70	–0,01
T_1	1,90	–0,01
T_2	2,20	+0,01
α	45°	Approx.
β	15°	Approx.

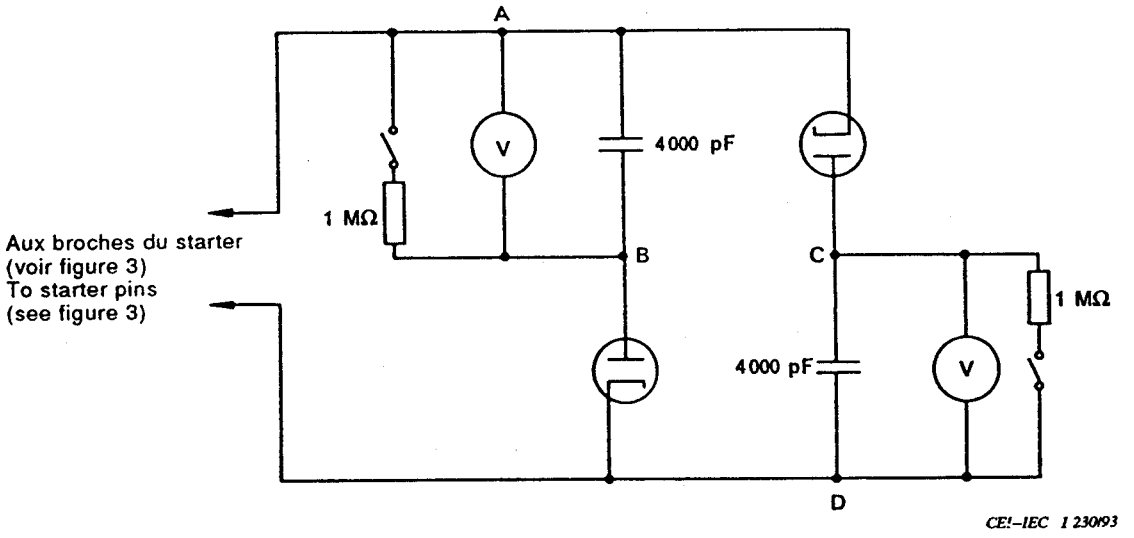
But: Pour le contrôle des dimensions B max., S min., T min., T max. et de la position des broches relatives aux dimensions A, D et E selon la figure 1.

Essai: Le starter est introduit dans le calibre par la surface O jusqu'à ce que les parties les plus larges des broches aient traversé les trous d. Le starter est alors tourné d'environ 45° et placé de façon que les parties les plus larges des broches viennent en contact avec la surface X. Dans cette position, les extrémités des broches ne doivent pas être en dessous de la surface Y_1, ni dépasser de la surface Y_2.

Purpose: For the control of dimensions B max., S min., T min., T max., and the position of the pins with respect to the dimensions A, D and E of figure 1.

Testing: The starter shall enter the gauge at surface O until the heads of the pins have passed through the holes d. The starter is then turned through approx. 45° and is positioned so that the heads of the pins are in close contact with surface X. In this position, the extremities on the heads of the pins shall not be below surface Y_1 nor shall they project beyond surface Y_2.

Figure 8 – Calibre «ENTRE» pour starters
"GO" gauge for starters



La résistance de fuite entre A-B et C-D ne doit pas être inférieure à 10^{10} Ω.

Les lampes diodes appropriées sont celles indiquées ci-dessous ou d'un type équivalent.

DY86	EY86	6S2A
DY87	EY87	1S2A

Les lampes équivalentes doivent avoir les caractéristiques suivantes:

a) capacité entre anode et filament, cathode et écran reliés – 2 pF max.;

b) tension de crête inverse – 22 kV min.;

c) courant de fuite inverse mesuré à 22 kV – 5 µA max.

The leakage resistance between A-B and C-D shall be not less than 10^{10} Ω.

Suitable diode valves are the following or an equivalent type:

DY86	EY86	6S2A
DY87	EY87	1S2A

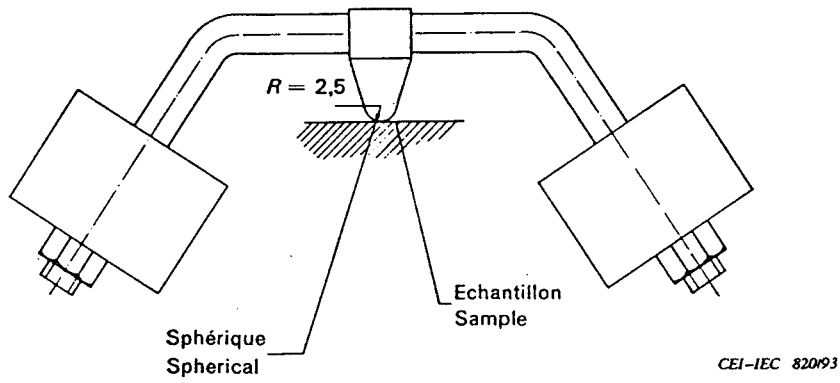
Equivalent valves shall have the following characteristics:

a) capacitance between anode and heater, cathode and screen connected together – 2 pF max.;

b) peak inverse voltage – 22 kV min.;

c) reverse leakage current measured at 22 kV – 5 µA max.

Figure 9 – Circuit pour la mesure de la tension d'impulsion
Circuit for measurement of pulse voltage



Dimensions en millimètres *Dimensions in millimetres*

Figure 10 – Appareil pour l'essai à la bille
Ball-pressure test apparatus

Annex A
(normative)

Ballasts to be used for life testing

A ballast used for the life testing of starters shall comply with the following four requirements.

1) It shall be of a type complying with IEC 921, and corresponding with the starting conditions of the lamp as indicated on the appropriate lamp data sheet of IEC 81 or of IEC 901.

2) The rated voltage of the ballast shall lie within one of the following ranges:

Starting test voltage of clause 8	Ballast rated voltage
Less than 110 V	110 V – 130 V
180 V and higher	220 V – 230 V

3) When, at its rated voltage, it is associated with a lamp whose voltage at lamp terminals does not deviate by more than ±2 % from the objective value specified in the lamp data sheets of IEC 81 or of IEC 901, the lamp shall absorb a power which does not differ from its rated value by more than ±4 %.

4) For pre-heated lamps operating with starter, the pre-heating current (short-circuit current) at rated voltage shall not differ by more than ±10 % from the nominal value specified in the lamp data sheets of IEC 81 or of IEC 901.

Annex B
(normative)

Starters for class II fluorescent lamp luminaires

INTRODUCTION

For starters for use in class II fluorescent lamp luminaires, the clauses and subclauses of this standard apply with the following amendments.

Section 1 – General and safety requirements

1 Scope

Replace this clause by the following text:

This annex B is intended to cover a special type of interchangeable glow-starter, used with pre-heat type fluorescent lamps, for application in class II fluorescent lamp luminaires with accessible starters. Corresponding publications for the fluorescent lamp luminaires and for starter-holders are, respectively, IEC 598 and IEC 400.

7 Requirements and tests for safety

7.3 *Protection against accidental electric shocks*

Replace this subclause by the following text:

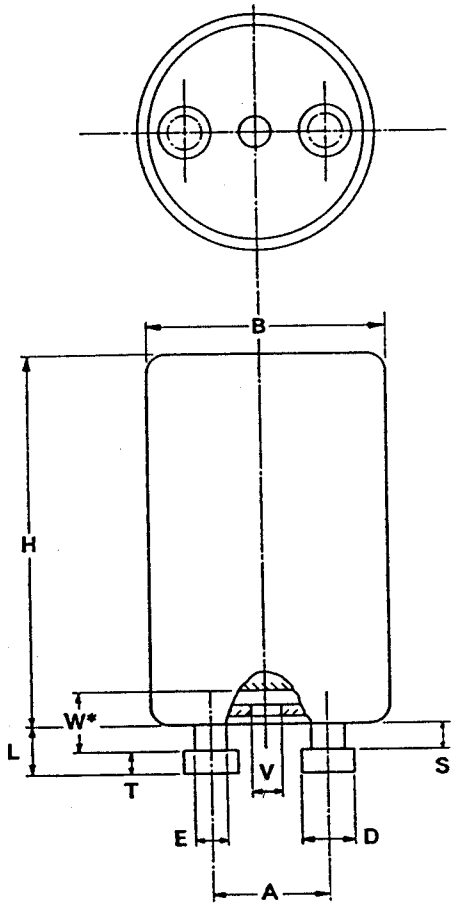
The enclosures of accessible starters shall consist of insulating material. Compliance is checked by inspection.

7.6 *Dimensions*

Replace subclause 7.6.1 by the following text:

7.6.1 The dimensions shall comply with the requirements of figure B.1 of this annex. Compliance shall be checked by the gauges of figure B.2 of this annex and also figure 6 of this standard.

Le dessin a pour seul but d'indiquer les dimensions à contrôler.
The drawing is intended only to indicate the dimensions to be checked.



Dimensions en millimètres

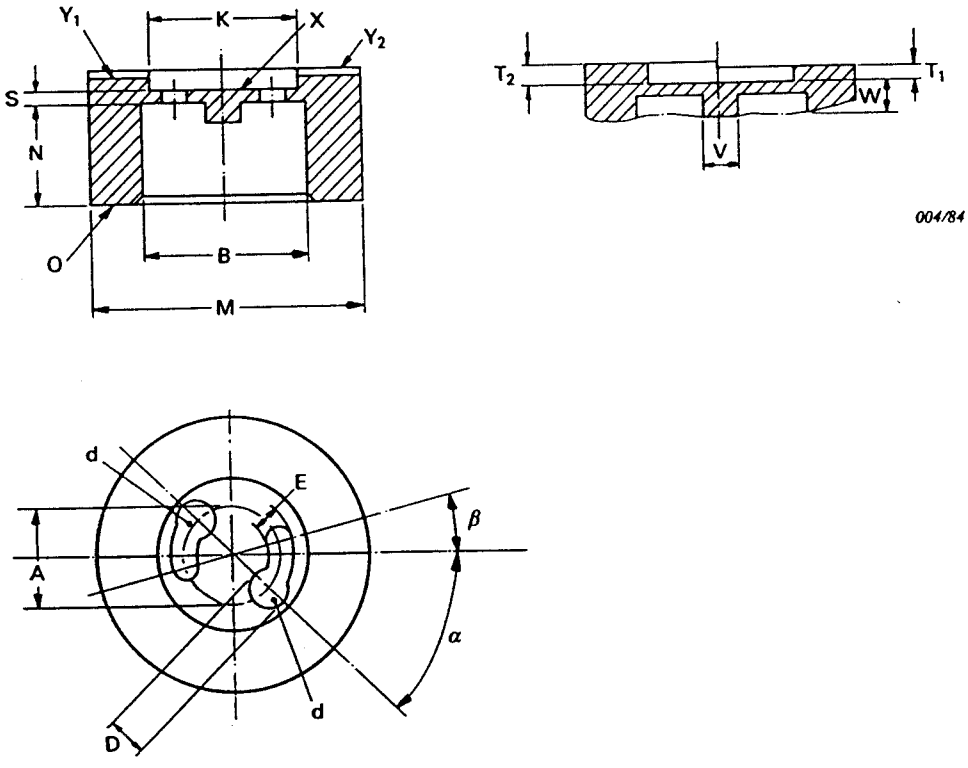
Dimensions in millimetres

Dimension	Min.	Max.
A	12,5	12,9
B	–	21,5
D	4,7	5,0
E	2,8	3,2
H	33,0	36,0
L	–	4,3
S	1,7	–
T	1,9	2,2
V	2,7	–
W*	4,2	–

* Distance sur laquelle s'applique la dimension V.
Distance over which dimension V applies.

Figure B.1 – Dimensions des starters pour appareils d'éclairage de la classe II pour lampes à fluorescence
Dimensions of starters for class II fluorescent lamp luminaires

Le dessin a pour seul but d'illustrer les principales dimensions du calibre.
The drawing is intended only to illustrate the essential dimensions of the gauge.



Dimensions en millimètres *Dimensions in millimetres*

Référence Reference	Dimension	Tolérance Tolerance
A	12,70	±0,005
B	21,50	+0,01
D	5,20	+0,01
E	3,40	+0,01
K	19,0	+0,2
M	35	Approx.
N	13	Approx.
S	1,70	–0,01
T_1	1,90	–0,01
T_2	2,20	+0,01
α	45°	Approx.
β	15°	Approx.
V	2,60	–0,01
W	4,15	–0,01

But: Pour le contrôle des dimensions B max., S min., T min., T max. et de la position des broches relatives aux dimensions A, D et E selon la figure 1.

Essai: Le starter est introduit dans le calibre par la surface O jusqu'à ce que les parties les plus larges des broches aient traversé les trous d. Le starter est alors tourné d'environ 45° et placé de façon que les parties les plus larges des broches viennent en contact avec la surface X. Dans cette position, les extrémités des broches ne doivent pas être en dessous de la surface Y_1, ni dépasser de la surface Y_2.
L'ergot central défini par les dimensions V-W peut toucher ou déplacer les éléments intérieurs du starter durant le test

Purpose: For the control of dimensions B max., S min., T min., T max., and the position of the pins with respect to the dimensions A, D and E of figure 1.

Testing: The starter shall enter the gauge at surface O until the heads of the pins have passed through the holes d. The starter is then turned through approx. 45° and is positioned so that the heads of the pins are in close contact with surface X. In this position, the extremities on the heads of the pins shall not be below surface Y_1 nor shall they project beyond surface Y_2.
The centre pin as defined by the dimensions V-W may touch or move internal parts of the starter during the test.

Figure B.2 – Calibre «ENTRE» pour starters pour appareils d'éclairage de la classe II
"GO" gauge for starters for class II luminaires

NORME INTERNATIONALE
INTERNATIONAL STANDARD

CEI
IEC
155

1993

AMENDEMENT 1
AMENDMENT 1

1995-10

Amendement 1

Interrupteurs d'amorçage à lueur pour lampes à fluorescence (starters)

Amendment 1

Glow-starters for fluorescent lamps

Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembé Genève, Suisse

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE D

Pour prix, voir catalogue en vigueur
For price, see current catalogue

FOREWORD

This amendment has been prepared by sub-committee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

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

DIS	Report on voting
34A/586/DIS	34A/623/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

Page 3

Contents

Add the title of the new clause 11 and the new annex C as follows:

11 Information for luminaire design

Annex C – Information for luminaire design

Page 9

2 Normative references

Add the following normative reference:

ISO 4046: 1978, *Paper, board, pulp and related items – Vocabulary*

Page 19

Subclause 7.12.3

Delete the text of this subclause and replace it by the following:

7.12.3 The capacitor shall be resistant to flame and ignition.

Compliance shall be checked by the following test. The capacitors are each subjected to a gradually increasing a.c. voltage until breakdown occurs. The voltage source used to this effect should have a short-circuit power of approximately 1 kVA.

Thereafter, each capacitor shall be completely wrapped with tissue paper as specified in 6.86 of ISO 4046 and shall be connected in series with a 40 W inductive ballast complying with the requirements of annex A and operated for 5 min at the rated voltage of the ballast.

During this test, the capacitor shall not inflame the tissue paper.

Page 23

8.4 *Speed of operation*

Delete the existing text and replace it by the following new text:

With the exception of 20 W lamps as specified in IEC 81 for which the voltage shall be 103,5 V, a voltage equal to the test voltage of the lamp starting test for the relevant lamp specified in IEC 81 or in IEC 901 shall be applied to the circuit for 25 s.

During this time, the contacts shall open not less than seven times.

8.5 *Closed time*

Delete the text of this subclause and replace it by the following:

During the period of 25 s referred to in 8.4, the starter contacts shall be closed for a minimum total period of 10 s.

Page 25

8.7 *Pulse voltage*

Replace the second sentence of this subclause by the following:

The same voltage as specified in 8.4 shall be applied to the test circuit for 25 s.

Add the following note:

NOTE – As an alternative to the electrostatic voltmeter prescribed in figure 9, a memory oscilloscope may be used in the circuit together with a high voltage probe having the following properties:

- input resistance ..... ≥100 Ω
- input capacitance ..... ≤15 pF
- cut-off frequency ..... ≥1 MHz

In case of dispute, the measurement with the electrostatic voltmeter is the reference method.

Page 29

Add the following new clause:

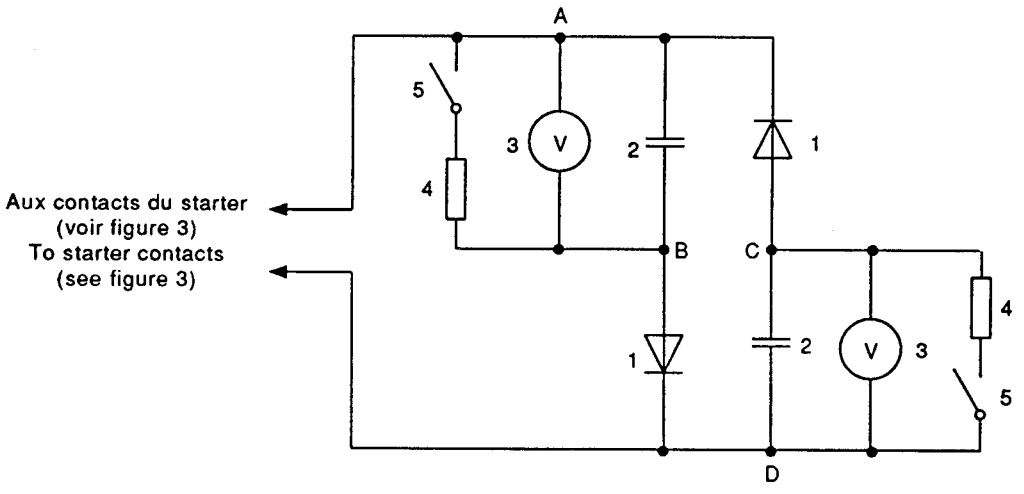
11 Information for luminaire design

See annex C.

Page 38

Remplacer la figure 9 existante par la nouvelle figure 9 suivante:

Replace existing figure 9 by the following new figure 9:



NOTE – Le circuit précédent, qui utilise des lampes diodes, reste approprié. En cas de doute, le circuit représenté ci-dessus sera le circuit de référence.

NOTE – The previous circuit using vacuum tubes is still adequate. In case of doubt, the above circuit is the reference circuit.

La résistance de fuite entre A-B et C-D ne doit pas être inférieure à $10^{11}\Omega$.

1. Diode haute tension (HV)

Tension de blocage	U_{RM}	≥ 6 kV
Courant nominal (moyen)	I_{FAVM}	≥ 1,5 mA
Courant périodique (crête)	I_{RFM}	≥ 0,1 A
Tension directe	V_F	≤ 20 V

NOTE – Les diodes haute tension de type BYX90G sont, par exemple des composants appropriés.

2. Condensateur HV

Capacité	C	= 4 000 pF
Tension nominale	U	≥ 6,3 kV
Angle de phase (à 10 kHz)	tan δ	$= 20 \cdot 10^{-3}$

3. Instrument de mesure HV
Voltmètre électrostatique

Capacité à pleine déviation	C	< 15 pF
Tension de claquage	U	> 10 kV
Précision	Classe 1 ou meilleure	

4. Résistance de décharge R = 1 MΩ

5. Dispositif de court-circuit pour la décharge des condensateurs HV

The leakage resistance between A-B and C-D shall be not less than $10^{11}\Omega$.

1. HV diode(HV)

Blocking voltage	U_{RM}	≥ 6 kV
Rated current (average)	I_{FAVM}	≥ 1,5 mA
Periodic current (peak)	I_{RFM}	≥ 0,1 A
Forward voltage	V_F	≤ 20 V

NOTE – Suitable parts are, HV diodes type BYX90G, for example.

2. HV capacitor

Capacitance	C	= 4 000 pF
Rated voltage	U	≥ 6,3 kV
Phase-angle (at 10 kHz)	tan δ	$= 20 \cdot 10^{-3}$

3. HV measuring instrument
Electrostatic voltmeter

Capacitance at full deflection	C	< 15 pF
Breakdown voltage	U	> 10 kV
Precision	Class 1 or better	

4. Discharge resistance R = 1 MΩ

5. Short-circuit device for discharging HV capacitors

Figure 9 – Circuit pour la mesure de la tension d'impulsion
Circuit for measurement of pulse voltage

Page 44

Après l'annexe B, ajouter la nouvelle annexe C suivante:

Annexe C
(informative)

Renseignements pour la conception du luminaire

Il convient que la température maximale de tout point de la boîte du starter n'excède pas 80 °C.

Page 45

After annex B, add the following new annex C:

Annex C
(informative)

Information for luminaire design

The maximum temperature of any part of the starter canister should not exceed 80 °C.

AMENDMENT NO. 1 APPROVED ON 2007-10-24
TO SLS 1260 : 2003

SRI LANKA STANDARD
SPECIFICATION FOR GLOW STARTERS FOR TUBULAR FLUORESCENT LAMPS

CONTENTS

Add the titles of the new Annexes immediately after the Annex D and Annex E, at the end of the contents.:

Annex D - Starter contacts -Suitable metals
Annex E - Guide to good practice in selection of plastic materials for starter enclosures

Clause 2

Add the following new normative references at the end of the clause 2.

ISO 1456 : 2003 Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium

ISO 2081: 1986, Metallic coatings - Electroplated coatings of zinc on iron or steel

ISO 2093 : 1986, Electroplated coatings of tin - Specification and test methods

Clause 7.9

Add the following paragraph immediately after the first paragraph of the clause 7.9

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.

Annex D and Annex E

Add the Annex D and Annex E at the end of Annex C.

ANNEX D
(Normative)

STARTER CONTACTS - SUITABLE METALS

Examples of suitable metals for current-carrying parts, referred in Clause **7.9**, when used within the permissible temperature range and under normal conditions of chemical pollution are:

- copper or an alloy containing at least 58 per cent copper for parts made from rolled sheet (in cold condition) or at least 50 per cent copper for other parts;

- stainless steel containing at least 13 per cent chromium and not more than 0.09 per cent carbon;

- steel provided with an electroplated coating of zinc, according to ISO 2081, with coating having a thickness of at least 5 µm ISO service condition No. 1 (for ordinary equipment);

- steel provided with an electroplated coating of nickel and chromium according to ISO 1456, the coating having a thickness of at least 20 µm ISO service condition No. 2. (for ordinary equipment).

- steel provided with an electroplated coating of tin, according to ISO 2093, the coating having a thickness of at least 12 µm ISO service condition No.2 (for ordinary equipment);

- pure nickel (at least 99 per cent)

  aluminium or an alloy having a hardness of at least HB 100.

ANNEX E
(Informative)

GUIDE TO GOOD PRACTICE IN SELECTION OF PLASTIC MATERIALS FOR STARTER ENCLOSURES

E.1 SCOPE

This guide to good practice is intended to advise starter manufacturers on the behaviour of plastic materials under the influence of temperature, UV radiation and mechanical stress.

E.2 PLASTICS FOR STARTER ENCLOSURES

The selection of suitable plastic materials for starter enclosures should take into account established applications for starter use, damaging influences that affect plastic materials, deterioration of materials during service life, and mechanical stresses that the enclosure can be subject to during life. Environmental issues may also affect material selection considerations.

E.2.1 Applications for starter use

Special attention should be given to

- use in enclosed luminaries with an increased micro ambient temperature;
- use in close proximity to lamps, including compact fluorescent types having more concentrated power and light intensity characteristics;
- use in combined lamp holder and starter holder assemblies that place the starter in very close proximity to the lamps wall.

E.2.2 Damaging influences

Special attention should be given to

- continuous service temperature
- temporary rises in service temperature that could occur as a result of ambient temperature variations, supply voltage variation, end of life conditions for both lamp and starter;
- UV and visible radiation;
- mechanical stress and impact.

Some combinations of these influences have particular importance and may make a material unsuitable for this application. For example, the combination of heat and UV radiation may lead to embrittlement and disintegration of some polypropylene materials leading to safety hazards.

The properties published in respect of particular materials of given generic names can differ depending on the fillers, flame retardants and inhibitors used, the manufacturing procedure, and the design.

.....

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