IEC 61347-2-1

Edition 2.0 2024-05
REDLINE VERSION

INTERNATIONAL STANDARD

~~Lamp controlgear –~~

Controlgear for electric light sources – Safety –
Part 2-1: Particular requirements – Starting devices (other than glow starters)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC 61347-2-1

Edition 2.0 2024-05
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

~~Lamp controlgear –~~
Controlgear for electric light sources – Safety –
Part 2-1: Particular requirements – Starting devices (other than glow starters)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.140.99

ISBN 978-2-8322-8906-8

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

~~LAMP CONTROLGEAR –~~
CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –

Part 2-1: Particular requirements – Starting devices (other than glow starters)

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61347-2-1:2000+AMD1:2005+AMD2:2013 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 61347-2-1 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lighting. It is an International Standard.

This second edition cancels and replaces the first edition published in 2000, Amendment 1:2005 and Amendment 2:2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) update of normative references, introducing dated references where appropriate;
b) clarification of sample item numbers;
c) alignment of clause numbers with those of IEC 61347-1;
d) renumbering of Clause 15 and Clause 16.

The text of this International Standard is based on the following documents:

Draft	Report on voting
34C/1582/CDV	34C/1590/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This document is intended to be used in conjunction with IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017. Where the requirements of any of the clauses of IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017 are referred to in this document by the phrase "IEC 61347-1:2015, Clause n and IEC 61347-1:2015/AMD1:2017, Clause n apply", this phrase is interpreted as meaning that all the requirements of the clause in question of IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017 apply, except any which are clearly inapplicable to the specific type of controlgear covered by this document.

NOTE In this document, the following print type is used:

– *compliance statements: in italic type.*

A list of all parts in the IEC 61347 series, published under the general title *Controlgear for electric light sources – Safety,* can be found on the IEC website.

Future documents in this series will carry the new general title as cited above. Titles of existing documents in this series will be updated at the time of the next edition.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

~~This first edition of IEC 61347-2-1, published in conjunction with IEC 61347-1, represents an editorial review of IEC 60926. The formatting into separately published parts provides for ease of future amendments and revisions. Additional requirements will be added as and when a need for them is recognized.~~

~~This standard, and the parts which make up IEC 61347-2, in referring to any of the clauses of IEC 61347-1, specify the extent to which such a clause is applicable and the order in which the tests are to be performed; they also include additional requirements, as necessary. All parts which make up IEC 61347-2 are self-contained and, therefore, do not include references to each other.~~

~~Where the requirements of any of the clauses of IEC 61347-1 are referred to in this standard by the phrase "The requirements of clause n of IEC 61347-1 apply", this phrase is interpreted as meaning that all requirements of the clause in question of part 1 apply, except any which are clearly inapplicable to the specific type of lamp controlgear covered by this particular part of IEC 61347-2.~~

The technical requirements in this document compared to IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013 are essentially unchanged. Nevertheless, a new edition of this document could not be avoided, as without the introduction of dated references to IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017, the fourth edition of IEC 61347-1:—[1] would have been implicitly applicable due to the undated nature of the references to IEC 61347-1 in IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013.

This document, in referring to any of the clauses of IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017, specifies the extent to which such a clause is applicable. Additional requirements are also included, as necessary.

[1] Fourth edition under preparation. Stage at the time of publication IEC FDIS 61347-1:2024.

~~LAMP CONTROLGEAR –~~
CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –

Part 2-1: Particular requirements – Starting devices (other than glow starters)

1 Scope

This part of IEC 61347 specifies safety requirements for starting devices (starters other than glow starters and ignitors) for fluorescent and other discharge lamps for use on AC supplies up to 1 000 V at 50 Hz or 60 Hz which produce starting pulses not greater than 100 kV and which are used in combination with lamps and ~~ballasts~~ controlgear covered in IEC 60081, IEC 60188, IEC 60192, IEC 60662, IEC 60901, IEC 61167, IEC 61195, IEC 61199, IEC 61347-2-8 and IEC 61347-2-9.

This document does not apply to glow starters or starting devices which are incorporated in discharge lamps or which are manually operated. ~~Preheat transformers for fluorescent lamps are covered by IEC 61347-2-8.~~

NOTE 1 Glow starters are dealt with in IEC 60155.

NOTE 2 Performance requirements are given in IEC 60927.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60052:2002, *Voltage measurement by means of standard air gaps*

IEC 60068-2-75:~~1997~~2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60081, *Double-capped fluorescent lamps – Performance specifications*

IEC 60155:1993, *Glow-starters for fluorescent lamps*
IEC 60155:1993/AMD1:1995
IEC 60155:1993/AMD2:2006

~~IEC 60188, *High-pressure mercury vapour lamps*~~

~~IEC 60192, *Low-pressure sodium vapour lamps*~~

IEC 60255-8:1990[2], *Electrical relays – Part 8: Thermal electrical relays*

IEC 60598 (all parts), *Luminaires*

[2] Withdrawn.

IEC 60598-1:2020, *Luminaires – Part 1: General requirements and tests*

~~IEC 60662, *High-pressure sodium vapour lamps*~~

IEC 60901, *Single-capped fluorescent lamps – Performance specifications*

~~IEC 61167, *Metal halide lamps*~~

~~IEC 61195, *Double-capped fluorescent lamps – Safety specifications*~~

~~IEC 61199, *Single-capped fluorescent lamps – Safety specifications*~~

IEC 61347-1:2015, *Lamp controlgear – Part 1: General and safety requirements*
IEC 61347-1:2015/AMD1:2017

ISO 3864 (all parts), *Graphical symbols – Safety colours and safety signs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61347-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
starting device
ignitor
~~apparatus which provides, by itself or in combination with other components in the circuit, the appropriate electrical conditions needed to start a discharge type of lamp~~

device designed to provide the appropriate electrical conditions to start a discharge lamp by itself or in combination with other components in the circuit

[SOURCE: IEC 60500-845:2020, 845-28-041, modified – The admitted term "ignitor" has been added.]

3.2
starter
~~starting device, usually for fluorescent lamps, which provides for the necessary preheating of the electrodes and may, in combination with the series impedance of the ballast, cause a surge in the voltage applied to the lamp~~

device, usually for fluorescent lamps, which is used for the purpose of starting the discharge lamp by providing the necessary preheating of the cathode and, in combination with the series inductance of the ballast, causes a voltage surge applied to the discharge lamp

Note 1 to entry: The starter element that releases the starting voltage pulse ~~may~~ can be either triggered~~, for example, phase-angle synchronized,~~ or non-triggered.

[SOURCE: IEC 60500-845:2020, 845-28-042]

3.3
starting device with operating time limitation
starting device which prevents prolonged attempts to start lamps which refuse to start, for example, lamps with deactivated electrodes

Note 1 to entry: Prevention of starting attempts means that in the case of starters, the starting-current circuit is switched off ~~and/~~or the current in the starting circuit is limited to a value equal to or smaller than the rated lamp current.

In the case of ignitors, prevention of starting attempts means that pulse generation has ceased, or voltage pulses are significantly reduced in amplitude.

3.4
peak voltage
~~U_p~~
highest value of the voltage pulses generated by an ignitor at the output terminals

~~**3.5**~~
~~**short-circuit power** (of a voltage source)~~
~~quotient of the square of the voltage produced at the output terminals of the voltage source, in opencircuit condition, and its internal impedance as seen from the output terminals~~

3.5
spherical spark gap
two metal spheres of the same diameter arranged at a specified distance and used under specified conditions for the measurement of peak voltages in excess of 15 kV

3.6
maximum case temperature under abnormal conditions
(t_c + X)
maximum allowable case temperature of the starting devices and ignitors under abnormal conditions with metal halide lamps

Note 1 to entry: The value of (t_c + X) is declared by the manufacturer.

~~[SOURCE: IEC 60927, 3.7, modified – The term "starting device" is added.]~~

3.7
sample
one or more sampling items intended to provide information on the population or on the material provided by the manufacturer or responsible vendor

[SOURCE: IEC 60050-151:2001, 151-16-19, modified – "provided by the manufacturer or responsible vendor" has been added.]

3.8
sample item
one of the individual items in a population of similar items, or a portion of material forming a cohesive entity and taken from one place and at one time

[SOURCE: IEC 60050-151:2001, 151-16-18]

4 General requirements

IEC 61347-1:2015, Clause 4 applies.

5 General notes on tests

IEC 61347-1:2015, Clause 5 applies, together with the following:

~~**5.1 Starting devices for use with lamps having different electrical characteristics**~~

~~Starting devices intended for use with lamps having different electrical characteristics are tested with the lamp which gives the most unfavourable conditions.~~

~~**5.2 Number of specimens**~~

~~The following number of specimens shall be submitted for testing:~~

~~– one unit for the tests of clauses 6 to 12 and 15 to 22;~~

~~– one unit for the tests of clause 14 (additional units or components, where necessary, may be required in consultation with the manufacturer).~~

– IEC 61347-1:2015, Annex H applies.

– One sample item shall be used for all tests, unless otherwise specified in the corresponding clause.

  To allow for parallel testing and reduced test times, additional sample items may be used except where the outcome of the test can be affected by preceding tests, for example the tests of Clause 11 and Clause 12.

– Specially prepared sample items may be used where required.

– Starting devices intended for use with lamps having different electrical characteristics are tested with the lamp which gives the most unfavourable conditions.

For information on requalification of products compliant with the previous edition of this document, i.e. IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013, refer to Annex C.

6 Classification

IEC 61347-1:2015, Clause 6 applies.

Additionally, starting devices ~~are~~ shall be classified as one of the following:

– output voltage up to and including 5 kV;

– output voltage greater than 5 kV, and up to and including 10 kV;

– output voltage greater than 10 kV, and up to and including 100 kV.

7 Marking

7.1 Marking and information

7.1.1 Mandatory marking

~~In accordance with the requirements of 7.2 of IEC 61347-1,~~ Starting devices shall be ~~clearly and durably~~ marked with the following ~~markings~~:

– items a), b) and c) of IEC 61347-1:2015, 7.1;

– item f) of IEC 61347-1:2015, 7.1, and IEC 61347-1:2015/AMD1:2017, 7.1;

  This marking is not required for ignitors over 5 kV, because these are mandatorily provided with a time limitation;

– a marking to show the peak value of the voltage produced if the peak value exceeds 1 500 V. Connections having this voltage shall be marked; for ignitors with a pulse voltage over 5 kV, this marking shall be a flash symbol (broken arrow) (see the ISO 3864 series);

– ~~the manufacturer shall declare the~~ allowable maximum case temperature under normal conditions (A) and, for ignitors which are intended to be connected in series with discharge lamps which ~~could~~ can, according to the lamp specification cause rectification, the maximum case temperature under abnormal conditions (B). The marking shall be "t_c A/B" (example t_c 60/90 = maximum temperature 60 °C for the normal and maximum temperature 90 °C for the abnormal conditions).

7.1.2 Information to be provided~~, if applicable~~

~~In addition to the above mandatory markings,~~ The following information, if applicable, shall be given either on the starting device, or be made available in the manufacturer's catalogue or similar:

– items d), e), h), i), j), k) and l) of IEC 61347-1:2015, 7.1 and IEC 61347-1:2015/AMD1:2017, 7.1;

– an indication of the time limitation, if this is provided by the starting device;

– the catalogue reference of the ballast which may be associated with the starting device, if the ballast design governs the magnitude of the pulse voltage;

– special conditions relating to the use of the starting device.

7.2 Durability and legibility

IEC 61347-1:2015, 7.2 applies.

8 Terminals

IEC 61347-1:2015, Clause 8 and IEC 61347-1:2015/AMD1:2017, Clause 8 apply.

9 ~~Provisions for~~ Earthing

IEC 61347-1:2015, Clause 9 applies.

10 Protection against accidental contact with live parts

IEC 61347-1:2015, Clause 10 and IEC 61347-1:2015/AMD1:2017, Clause 10 apply.

11 Moisture resistance and insulation

IEC 61347-1:2015, Clause 11 and IEC 61347-1:2015/AMD1:2017, Clause 11 apply, together with the following:

– Electric components, enclosures and other parts which can be removed without the aid of a tool are removed and subjected, if necessary, to the humidity treatment with the main part.

– In order to achieve the specified conditions within the cabinet, it is ~~necessary~~ recommended to ensure constant circulation of the air within and, in general, to use a cabinet which is thermally insulated.

– With double or reinforced insulation, the resistance shall be not less than 7 MΩ.

– Care should be taken to avoid the moisture content of the devices at the end of the moisture treatment changing appreciably before the measurement of the insulation resistance.

To achieve this, it is recommended that the insulation resistance be measured while the devices are still kept in the humidity cabinet or in an adjacent room protected against draught and having similar conditions to those in the humidity cabinet.

12 Electric strength

IEC 61347-1:2015, Clause 12 applies, together with the following:

~~**Pulsing test**~~

For starting devices which incorporate a high-voltage winding, compliance is checked by the following pulsing test. The starting device is operated at 110 % rated supply voltage without a lamp load until 50 pulses have occurred, switching the supply on and off if necessary.

NOTE High-voltage winding denotes a winding incorporated in the starting device which produces the necessary voltage to start the lamp.

During the test, there shall be

a) no visible or audible disruptive discharge (indication of failure of insulation under electrical stress);

b) no sparkover or flashover;

c) no collapse or reduction of the front or the tail of the impulse voltage waveshape when observed on an oscilloscope.

For starting devices without high-voltage winding, compliance is checked by an electric strength test as given in IEC 61347-1:2015, Clause 12.

13 Thermal endurance test for windings of ballasts

There are no requirements.

NOTE The requirements of IEC 61347-1:2015, Clause 13 are not applicable ~~and a separate test is under consideration~~.

14 Fault conditions

IEC 61347-1:2015, Clause 14 and IEC 61347-1:2015/AMD1:2017, Clause 14 apply, together with the following:

– The current in the lamp circuit shall not be increased by a fault in the starting device to such an extent that the ballast becomes overheated, i.e. the winding temperature exceeds the t_w value at abnormal conditions. For starters having external dimensions as specified in IEC 60155:1993, IEC 60155:1993/AMD1:1995 and IEC 60155:1993/AMD2:2006, this requirement is met if the current in the lamp circuit does not exceed the maximum preheat current value as specified in IEC 60081 and IEC 60901 for a period longer than 5 min.

– Independent starting devices shall not exceed the temperature values for abnormal operations given in 16.3.3. This requirement is regarded as complied with when, for preheated lamp electrodes, the preheating current does not increase above its rated value by more than 5 % when the starting device is short-circuited. Mechanical cut-outs in starting devices shall be bridged if, with preheated lamp electrodes at 110 % of rated voltage, the current through the ballast is more than 105 % of the short-circuit value for a period longer than 5 min.

This requirement is regarded as being complied with when the mechanical cut-out meets the relevant conditions of IEC 60255-8:1990[3].

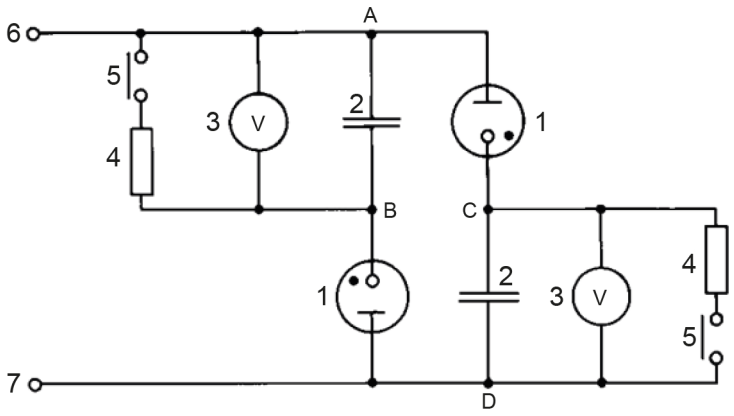
15 Pulse voltage of ignitors

The maximum value of the pulse voltage, of either positive or negative pulses, shall not exceed 5 kV when operated at the rated voltage and with a load capacitance of 20 pF, using the circuit shown in Figure 1. However, the maximum pulse voltage specified in the relevant lamp data sheet shall be taken into account.

~~If not otherwise stated on the relevant lamp data sheets, for ignitors with pulses over 5 kV, the maximum value of the pulse voltage shall not exceed 1,3 × U_p declared by the manufacturer when operated at the rated supply voltage and with a load capacitance of 20 pF.~~

~~Measurements are made by oscilloscope or static voltmeter for peak pulses up to 100 kV. Above 15 kV, a spherical spark gap can be employed, using the procedure based on those given in IEC 60052, and taking note of annex J of this standard.~~

3 Withdrawn.



Key

1 HV diode

blocking voltage	$U_{RM} \geq 25$ kV
rated current (average)	$I_{FAVM} \geq 1{,}5$ mA
periodic current (peak)	$I_{FRM} \geq 0{,}1$ A
anode/cathode capacitance	$C_{a/k} \leq 2$ pF

NOTE Suitable parts are, for example, HV rectifier tubes of type GY 501 for CTV receivers.

2 HV capacitor

capacitance	$C = 500$ pF
rated voltage	$U \geq 6{,}3$ kV
phase-angle (at 10 kHz)	$\tan \delta = 20 \times 10^{-3}$

3 HV measuring instrument

electrostatic voltmeter	0 kV to 6 kV
capacitance at full deflection	< 15 pF
breakdown voltage	> 10 kV
precision	Class 1 or superior

4 discharge resistance 1 MΩ

5 short-circuit device for discharging HV capacitors

6 to high-voltage lead of ignitor

7 to neutral conductor

The leakage resistance between A and B and between C and D shall be not less than 10^{13} Ω.

Figure 1 – Starting voltage measurement for ignitors

NOTE 1 As an alternative to the electrostatic voltmeter specified in Figure 1, a memory oscilloscope can be used in the circuit together with a high-voltage probe having the following properties:

– input resistance ≥ 100 MΩ;
– input capacitance ≤ 15 pF;
– cut-off frequency ≥ 1 MHz.

In case of doubt, the measurement with the electrostatic voltmeter is the reference method to use.

For ignitors with pulses over 5 kV, the maximum value of the pulse voltage shall not exceed 1,3 times the peak voltage (according to 3.4) declared by the manufacturer when operated at the rated supply voltage and with a load capacitance of 20 pF, if not otherwise stated on the relevant lamp data sheets.

Measuring equipment for measuring the peak shall be able to measure the peak pulses with an accuracy of 5 %.

NOTE 2 Typically, measurements are made by oscilloscope or electrostatic voltmeter for peak pulses up to 100 kV. Above 15 kV, a spherical spark gap can be employed, using the procedure based on those given in IEC 60052:2002, and taking note of Annex B.

16 Heating of built-in and independent starting devices

16.1 General

Built-in and independent starting devices shall not exceed the temperature limits during normal operation (t_c) and abnormal operation (t_c + X).

In addition to the requirements of this Clause 16 for built-in starting devices, the normal and the abnormal operating conditions are checked together with the luminaire in accordance with ~~IEC 60598-1~~ the applicable part from the IEC 60598 series (luminaire safety).

16.2 Normal operation

16.2.1 General

Normal conditions are working conditions in which one or more of the following situations apply:

a) the lamps are operating normally;

b) the rated current flows through the starting device;

c) the starting device has been connected to a voltage source, for example, the mains voltage or the lamp voltage arising during normal operation;

d) a combination of b) and c).

16.2.2 Normal operation of built-in starting devices

Compliance of built-in starting devices in normal operation is checked by the following procedure.

The starting devices are connected as for normal use with appropriate lamps.

The built-in starting device shall be placed in a test enclosure as detailed in IEC 61347-1:2015, Annex D, the starting device being supported by two wooden blocks as shown in IEC 61347-1:2015, Figure H.1.

The wooden blocks shall be 75 mm high, 10 mm thick and of a width equal to, or greater than, the width of the starting device. Furthermore, the blocks shall be positioned with the extreme end of the starting device aligned with the outer vertical sides of the block.

The controlgear employed for the components shall meet the requirements of the relevant IEC standard and be compatible with the lamp type to be started by the starting device.

The whole test circuit (controlgear, built-in starting device and the lamp(s)) is connected to the supply voltage. When the lamp is in stable operation, the lamp current is set for rated value by modifying the voltage applied. The ambient temperature of the test enclosure is adjusted to reach t_c on the starting device. In this condition, the starting devices and lamp are operated until they reach steady temperature.

Compliance is checked by the temperature measurement. The measured value shall not exceed the limits specified in IEC 60598-1:2020, Table 12.1 and Table 12.2.

16.2.3 Normal operation of independent starting devices

Compliance of independent starting devices in normal operation is checked by the following procedure.

Independent starting devices are connected as for normal use with appropriate lamps.

Independent starting devices are mounted in a test corner consisting of three dull black painted laminated wood boards 15 mm to 25 mm thick and arranged so as to resemble two walls and the ceiling of a room. The starting device is secured to the ceiling as close as possible to the walls, the ceiling extending at least 250 mm beyond the other sides of the starting device. This assembly is positioned as far as possible from the five internal surfaces of the enclosure.

The tests are carried out in a draught-proof room or enclosure as specified in IEC 61347-1:2015, Annex F. The ambient temperature within the draught-proof enclosure shall be within 5 °C of the t_a rating and should preferably be the same as the t_a rating.

The controlgear employed for the components shall meet the requirements of the relevant IEC standard and be compatible with the lamp type to be started by the starting device.

The whole test circuit (controlgear, independent starting device and the lamp(s)) is connected to the supply voltage. When the lamp is in stable operation, the lamp current is set for the rated value by modifying the voltage applied. In this condition, the starting device and lamps are operated until they reach steady temperature.

Compliance is checked by the temperature measurement. The measured value shall not exceed the limits specified in IEC 60598-1:2020, Table 12.1 and Table 12.2.

16.3 Abnormal operation

16.3.1 Abnormal operation of built-in ignitors

Compliance of built-in starting devices in abnormal operation is checked by the following test procedure.

The test is required for built-in starting devices (built-in ignitors) intended to be connected in series with discharge lamps which ~~could~~ can, according to the lamp specification, cause rectification and are tested additionally with the rectifying test circuit in accordance with IEC 60598-1:2020, 12.5 and Annex C.

The built-in starting device shall be placed in a test enclosure as detailed in IEC 61347-1:2015, Annex D, the starting device being supported by two wooden blocks as shown in IEC 61347-1:2015, Figure H.1.

The wooden blocks shall be 75 mm high, 10 mm thick and of a width equal to, or greater than, the width of the starting device. Furthermore, the blocks shall be positioned with the extreme end of the starting device aligned with the outer vertical sides of the block.

For the test, the built-in starting device is operated in the test enclosure described above for 30 min during which the double value of the rated current flows through the built-in starting device. For built-in starting devices, which are intended for the use of different lamps, the highest value of the current shall be used.

The ambient temperature in the test enclosure is set to achieve at the end of the test $(t_c + X)$ *°C for which the built-in starting device is specified. If during the test, the value of* $(t_c + X)$ *°C is not reached, then the test shall be repeated on another sample at an increased ambient temperature at which* $(t_c + X)$ *°C is achieved.*

Compliance is checked by the following parameters:

After the test, the temperature of the components is determined:

a) temperatures shall not exceed the values specified in IEC 60598-1:2020, Table 12.3.

b) After cooling down to the ambient temperature of 10 °C to 30 °C, the starting device shall comply with the following conditions:

- *the starting device marking shall still be legible;*
- *the pulse voltage ~~must~~ shall not differ by more than ±10 % from the initially measured value;*
- *the starting device shall withstand without damage an electric strength test according to Clause 12 of this document, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Table 1, but not less than 500 V.*

A period of 30 min is the medium time required for a controlgear incorporated into a luminaire to heat up and cause the operation of the thermal control device during the rectifying effect.

16.3.2 Abnormal operation of built-in starters

Compliance of built-in starters in abnormal operation is checked by the following test procedure:

The built-in starting device shall be placed in a test enclosure as detailed in IEC 61347-1:2015, Annex D, the starting device being supported by two wooden blocks as shown in IEC 61347-1:2015, Figure H.1.

The wooden blocks shall be 75 mm high, 10 mm thick and of a width equal to, or greater than, the width of the starting device. Furthermore, the blocks shall be positioned with the extreme end of the starting device aligned with the outer vertical sides of the block.

Built-in starters are connected as for normal use with appropriate lamps as indicated in 16.2.1. The test is performed with lamps having deactivated cathodes or substitution resistors specified in IEC 60081 and IEC 60901 on the lamp data sheets.

Upon completion of this test, and after cooling down, the starting device shall comply with the following conditions:

a) the starting device marking shall still be legible;

b) the starting device shall withstand without damage an electric strength test according to Clause 12 of this document, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Table 1, but not less than 500 V.

16.3.3 Abnormal operation of independent starting devices

Compliance of independent starting devices in abnormal operation is checked by the following test procedure.

The test is required for independent starting devices (independent ignitors) intended to be connected in series with discharge lamps which ~~could~~ can, according to the lamp specification, lead to overheating of controlgear or starting devices, or both, and are tested additionally with the rectifying test circuit in accordance with IEC 60598-1:2020, 12.5 and Annex C.

Independent starting devices are mounted in a test corner consisting of three dull black painted laminated wood boards 15 mm to 25 mm thick and arranged so as to resemble two walls and the ceiling of a room. The starting device is secured to the ceiling as close as possible to the walls, the ceiling extending at least 250 mm beyond the other sides of the starting device. This assembly is positioned as far as possible from the five internal surfaces of the enclosure.

The tests are carried out in a draught-proof room or enclosure as specified in IEC 61347-1:2015, Annex F.

The controlgear employed for the components shall meet the requirements of the relevant IEC standard and be compatible with the lamp type to be started by the starting device.

Starting devices are connected as for appropriate use but without lamps. In the case of abnormal conditions, the starting devices are operated at 110 % of the rated voltage until they reach the steady temperature, or, for starting devices with operating time limitation, until they cut out at or before the required time limit.

The test is performed after loading the starting device for 30 min with the double value of the rated current of the product. For starting devices, which are intended for the use of different lamps, the highest value of the current shall be used.

The ambient temperature within the draught-proof enclosure shall be within 5 °C of the t_a rating and should preferably be the same as the t_a rating.

Compliance is checked by the following parameters.

After the test, the temperature of the components is determined:

Temperatures shall not exceed the values specified in IEC 60598-1:2020, Table 12.3.

After cooling down, the starting device shall comply with the following conditions:

b) the starting device marking shall still be legible;

c) the pulse voltage ~~must~~ shall not differ by more than ±10 % from the initially measured value;

d) the starting device shall withstand without damage an electric strength test according to Clause 12 of this document, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Table 1, but not less than 500 V.

A period of 30 min is the medium time required for a controlgear incorporated into a luminaire to heat up and cause the operation of the thermal control device during the rectifying effect.

17 Mechanical strength

17.1 Replaceable starting devices and accessible components of starting devices which can be replaced without tools shall have sufficient mechanical strength. See Annex A.

– Starting devices and components up to 100 g and all starters having external dimensions specified in IEC 60155:1993, IEC 60155:1993/AMD1:1995 and IEC 60155:1993/AMD2:2006 shall be subjected to the tumbling barrel test in accordance with Clause ~~I~~A.2. Each sample shall withstand 20 falls without incurring any damage which ~~might~~ can affect safety.

– Starting devices and components over 100 g shall be subjected to the spring hammer test in accordance with Clause ~~I~~A.1. The impact energy and spring compression of the testing apparatus shall be 0,35 Nm and 17 mm, respectively.

After the test, the sample shall show no damage likely to impair safety.

17.2 Replaceable starting devices and accessible components of starting devices which can be replaced without tools, but which are subject to a turning moment during normal insertion, shall withstand a torque test of 0,6 Nm about the axes.

The torque is applied at the canister top. The contact pins are clamped tight and the torque is gradually increased from zero to the value required.

After the test, the sample shall show no damage likely to impair safety.

18 Construction

18.1 IEC 61347-1:2015, Clause 15 applies, together with the following.

18.2 All replaceable starting devices and accessible components of starting devices which can be replaced without the aid of a tool shall have double insulation or reinforced insulation to be compatible with the insulation requirements of all classes of equipment, including class II.

18.3 Starting devices equipped with cut-outs shall be so constructed that, in the case of non-igniting lamps, the cut-out interrupts the starting-current circuit or the production of the starting voltage, or both.

An alternative to a cut-out can be a device limiting the starting current and the production of starting voltage to such an extent that no current greater than 10 % of the rated lamp current flows through the lamp. Further components in the overall lamp-current circuit are not subjected to loads higher than the rated lamp current.

Compliance is checked according to Clause 14 or Clause 15.

Ignitors with pulse voltages over 10 kV shall be provided with a device for time limitation of the starting operation. This device shall, in case of non-ignition of lamps, interrupt the generation of starting pulses within 3 s. This time limitation may be extended to 30 s where this information is provided on the label of the device. After the time limitation device has interrupted the circuit, generation of starting pulses is only allowed after disconnection and reconnection of the ignitors to the supply.

Ignitors with pulse voltages over 5 kV and up to 10 kV shall be provided with a time-limiting device which shall interrupt the generation of pulses within 60 s. After the time-limiting device has interrupted the circuit, generation of starting pulses is only allowed after disconnection and reconnection of the ignitors to the supply.

Compliance is checked by inspection and by the test of Clause 15.

18.4 Starters which are interchangeable with glow starters in accordance with IEC 60155:1993, IEC 60155:1993/AMD1:1995 and IEC 60155:1993/AMD2:2006 shall contain means for radio interference suppression, the effect of which is equivalent to that of the radio interference suppression capacitor ~~prescribed~~ specified in IEC 60155:1993, 7.12 and IEC 60155:1993/AMD1:1995, 7.12.

19 Creepage distances and clearances

IEC 61347-1:2015, Clause 16 and IEC 61347-1:2015/AMD1:2017, Clause 16 apply.

20 Screws, current-carrying parts and connections

IEC 61347-1:2015, Clause 17 applies.

21 Resistance to heat, fire and tracking

IEC 61347-1:2015, Clause 18 applies.

22 Resistance to corrosion

IEC 61347-1:2015, Clause 19 applies.

23 Applicable annexes of IEC 61347-1

The following annexes of IEC 61347-1:2015 apply:

– Annex A (normative) Test to establish whether a conductive part is a live part which may cause an electric shock;
– Annex F (normative) Draught-proof enclosure;
– Annex H (normative) Tests.

~~**Annex A**~~
~~(normative)~~

~~**Test to establish whether a conductive part is a live part which may cause an electric shock**~~

~~The requirements of annex A of IEC 61347-1 apply.~~

~~**Annex B**~~
~~(normative)~~

~~**Particular requirements for thermally protected lamp controlgear**~~

~~The requirements of annex B of IEC 61347-1 are not applicable.~~

~~**Annex C**~~
~~(normative)~~

~~**Particular requirements for electronic lamp controlgear with means of protection against overheating**~~

~~The requirements of annex C of IEC 61347-1 are not applicable.~~

~~**Annex D**~~
~~(normative)~~

~~**Requirements for carrying out the heating tests of thermally protected lamp controlgear**~~

~~The requirements of annex D of IEC 61347-1 are not applicable.~~

~~Annex E~~
~~(normative)~~

~~Use of constant S other than 4 500 in t_w tests~~

~~The requirements of annex E of IEC 61347-1 are not applicable.~~

~~Annex F~~
~~(normative)~~

~~Draught-proof enclosure~~

~~The requirements of annex F of IEC 61347-1 apply.~~

~~Annex G~~
~~(informative)~~

~~Explanation of the derivation of the values of pulse voltages~~

~~The requirements of annex G of IEC 61347-1 are not applicable.~~

~~Annex H~~
~~(normative)~~

~~Tests~~

~~The requirements of annex H of IEC 61347-1 apply.~~

Annex A~~Annex I~~
(normative)

Mechanical strength testing

~~I~~A.1 Replaceable starting devices and accessible components over 100 g

Replaceable starting devices and accessible components with a mass over 100 g are tested as follows.

Blows are applied to the part under test by means of the spring-operated impact test apparatus specified in IEC 60068-2-75:2014.

An impact test apparatus is used which is adjusted so that when the test apparatus is held in a horizontal position, the kinetic energy of the striking element just before the impact has the value specified in IEC 60068-2-75:2014, Table E.1.

NOTE In order to avoid frequent calibration, ~~it is recommended that~~ a separate test apparatus can be used for each value of impact energy.

The blows are applied by positioning the release cone against the starting device in a direction perpendicular to the surface, at the point to be tested.

The starting device is rigidly supported, cable entries being left open, knock-outs opened and cover fixing and similar screws tightened with a torque equal to two-thirds of that specified in Clause 20.

Three blows are applied to every point that is likely to be weak, paying special regard to insulating material enclosing live parts and to bushings of insulating material, if any. After these tests, the starting device shall show no damage within the meaning of this document.

Damage to paint and small dents which do not influence creepage distances or clearances are neglected. There shall not be any decrease in the resistance to the ingress of moisture.

~~I~~A.2 Replaceable starting devices and accessible components up to 100 g

Replaceable starting devices and accessible components with a mass up to 100 g are tested as follows.

The parts to be tested are subjected to 20 falls from a height of 500 mm on to a 3 mm thick steel plate in a tumbling barrel turning at 5 r/min (that is, 10 falls per minute).

Suitable equipment for this test is shown in Figure ~~I~~A.1.

Dimensions in millimetres

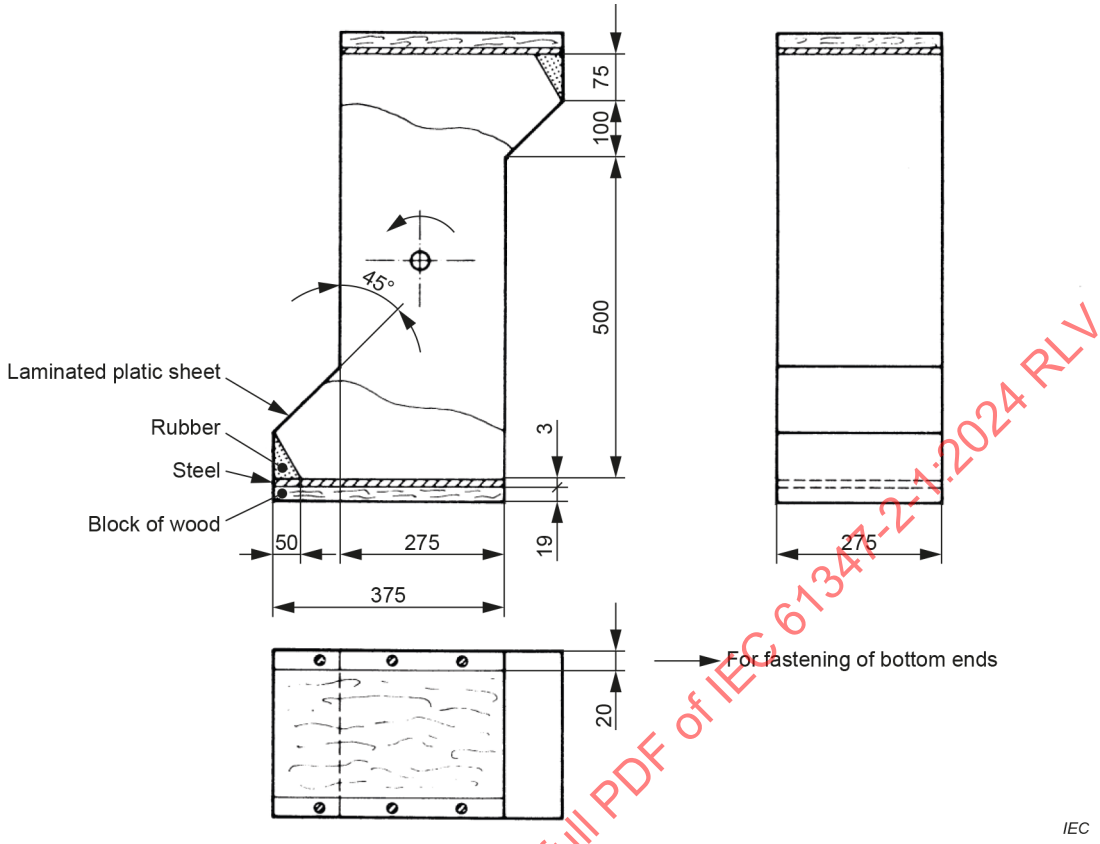


Figure ~~I~~A.1 – Tumbling barrel

Annex B~~Annex J~~
(~~normative~~informative)

Precautions to be observed when measuring with sphere-gaps

B.1 General

Because many ignitors do not have outputs where one pole is at earth potential, the direct application of IEC 60052 cannot apply. However, Clause B.2, Clause B.3, Clause B.4 and Clause B.5 shall be observed, together with those requirements of IEC 60052 which are applicable.

~~J.1~~B.2 Sphere-gap

The sphere-gap shall be greater than the anticipated breakdown distance and shall be progressively reduced until breakdown occurs (i.e. too small a gap opening up to a non-sparking distance is not a valid method of determining the correct voltage value).

~~J.2~~B.3 Breakdown gap distance

The breakdown gap distance shall be recorded and the 50 % peak voltage value determined from IEC 60052:2002, Table 2.

~~J.3~~B.4 Duty cycle of the ignitor

The duty cycle of the ignitor shall be observed to ensure that overheating~~/~~ or failure of the components does not occur.

~~J.4~~B.5 End of test

All safety precautions shall be observed and all voltages shall be discharged at the end of the test.

Annex C
(informative)

Schedule of more onerous requirements

Products found compliant with the previous edition of this document do not necessarily require complete requalification for demonstrating compliance with this document. Depending on the nature of the changes introduced, partial retesting or even no retesting may be appropriate, as the case may be.

For this document, no more onerous requirements have been introduced with respect to the previous edition, i.e. IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013.

Bibliography

IEC 60050-151, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices,* available at https://www.electropedia.org

IEC 60050-845, *International Electrotechnical Vocabulary (IEV) – Part 845: Lighting,* available at https://www.electropedia.org

IEC 60188, *High-pressure mercury vapour lamps – Performance specifications*

IEC 60192, *Low-pressure sodium vapour lamps – Performance specifications*

~~IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*~~

IEC 60662, *High-pressure sodium vapour lamps – Performance specifications*

IEC 60927, *Auxiliaries for lamps – Starting devices (other than glow starters) – Performance requirements*

IEC 61167, *Metal halide lamps – Performance specification*

IEC 61195, *Double-capped fluorescent lamps – Safety specifications*

IEC 61199, *Single-capped fluorescent lamps – Safety specifications*

IEC 61347-2-1:2000, *Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)*
IEC 61347-2-1:2000/AMD1:2005
IEC 61347-2-1:2000/AMD2:2013

IEC 61347-2-8, *Controlgear for electric light sources – Safety – Part 2-8: Particular requirements – Ballasts for fluorescent lamps*

IEC 61347-2-9, *Lamp controlgear – Part 2-9: Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps)*

IEC 61347-2-1

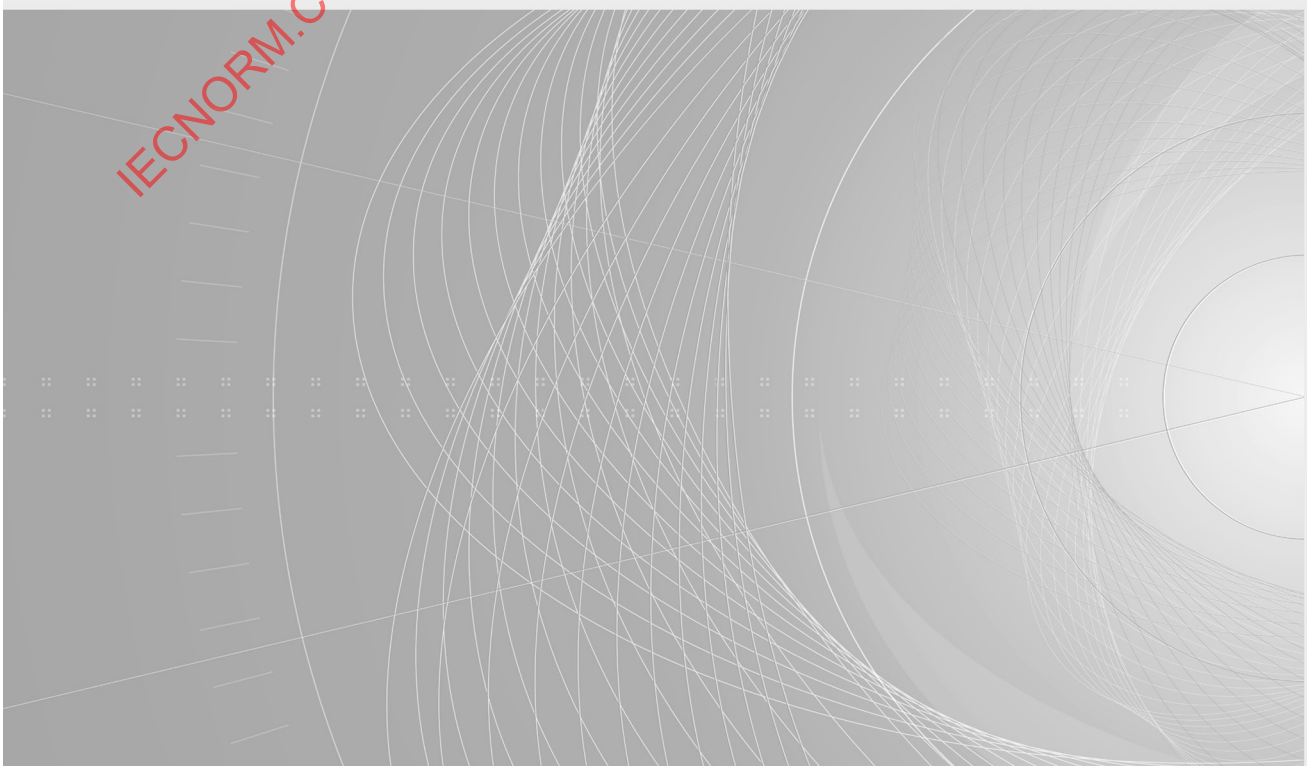
Edition 2.0 2024-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Controlgear for electric light sources – Safety – Part 2-1: Particular requirements – Starting devices (other than glow starters)

Appareillages de commande pour les sources de lumière électriques – Sécurité – Partie 2-1: Exigences particulières – Dispositifs d'amorçage (autres que starters à lueur)



IEC 61347-2-1:2024-05(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –

Part 2-1: Particular requirements – Starting devices (other than glow starters)

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61347-2-1 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lighting. It is an International Standard.

This second edition cancels and replaces the first edition published in 2000, Amendment 1:2005 and Amendment 2:2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) update of normative references, introducing dated references where appropriate;
b) clarification of sample item numbers;
c) alignment of clause numbers with those of IEC 61347-1;
d) renumbering of Clause 15 and Clause 16.

The text of this International Standard is based on the following documents:

Draft	Report on voting
34C/1582/CDV	34C/1590/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This document is intended to be used in conjunction with IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017. Where the requirements of any of the clauses of IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017 are referred to in this document by the phrase "IEC 61347-1:2015, Clause n and IEC 61347-1:2015/AMD1:2017, Clause n apply", this phrase is interpreted as meaning that all the requirements of the clause in question of IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017 apply, except any which are clearly inapplicable to the specific type of controlgear covered by this document.

NOTE In this document, the following print type is used:

– *compliance statements: in italic type*.

A list of all parts in the IEC 61347 series, published under the general title *Controlgear for electric light sources – Safety,* can be found on the IEC website.

Future documents in this series will carry the new general title as cited above. Titles of existing documents in this series will be updated at the time of the next edition.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The technical requirements in this document compared to IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013 are essentially unchanged. Nevertheless, a new edition of this document could not be avoided, as without the introduction of dated references to IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017, the fourth edition of IEC 61347-1:—[1] would have been implicitly applicable due to the undated nature of the references to IEC 61347-1 in IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013.

This document, in referring to any of the clauses of IEC 61347-1:2015 and IEC 61347-1:2015/AMD1:2017, specifies the extent to which such a clause is applicable. Additional requirements are also included, as necessary.

[1] Fourth edition under preparation. Stage at the time of publication IEC FDIS 61347-1:2024.

CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –

Part 2-1: Particular requirements – Starting devices (other than glow starters)

1 Scope

This part of IEC 61347 specifies safety requirements for starting devices (starters other than glow starters and ignitors) for fluorescent and other discharge lamps for use on AC supplies up to 1 000 V at 50 Hz or 60 Hz which produce starting pulses not greater than 100 kV and which are used in combination with lamps and controlgear covered in IEC 60081, IEC 60188, IEC 60192, IEC 60662, IEC 60901, IEC 61167, IEC 61195, IEC 61199, IEC 61347-2-8 and IEC 61347-2-9.

This document does not apply to glow starters or starting devices which are incorporated in discharge lamps or which are manually operated.

NOTE 1 Glow starters are dealt with in IEC 60155.

NOTE 2 Performance requirements are given in IEC 60927.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60052:2002, *Voltage measurement by means of standard air gaps*

IEC 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60081, *Double-capped fluorescent lamps – Performance specifications*

IEC 60155:1993, *Glow-starters for fluorescent lamps*
IEC 60155:1993/AMD1:1995
IEC 60155:1993/AMD2:2006

IEC 60255-8:1990[2], *Electrical relays – Part 8: Thermal electrical relays*

IEC 60598 (all parts), *Luminaires*

IEC 60598-1:2020, *Luminaires – Part 1: General requirements and tests*

IEC 60901, *Single-capped fluorescent lamps – Performance specifications*

IEC 61347-1:2015, *Lamp controlgear – Part 1: General and safety requirements*
IEC 61347-1:2015/AMD1:2017

2 Withdrawn.

ISO 3864 (all parts), *Graphical symbols – Safety colours and safety signs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61347-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
starting device
ignitor
device designed to provide the appropriate electrical conditions to start a discharge lamp by itself or in combination with other components in the circuit

[SOURCE: IEC 60500-845:2020, 845-28-041, modified – The admitted term "ignitor" has been added.]

3.2
starter
device, usually for fluorescent lamps, which is used for the purpose of starting the discharge lamp by providing the necessary preheating of the cathode and, in combination with the series inductance of the ballast, causes a voltage surge applied to the discharge lamp

Note 1 to entry: The starter element that releases the starting voltage pulse can be either triggered or non-triggered.

[SOURCE: IEC 60500-845:2020, 845-28-042]

3.3
starting device with operating time limitation
starting device which prevents prolonged attempts to start lamps which refuse to start, for example, lamps with deactivated electrodes

Note 1 to entry: Prevention of starting attempts means that in the case of starters, the starting-current circuit is switched off or the current in the starting circuit is limited to a value equal to or smaller than the rated lamp current.

In the case of ignitors, prevention of starting attempts means that pulse generation has ceased, or voltage pulses are significantly reduced in amplitude.

3.4
peak voltage
highest value of the voltage pulses generated by an ignitor at the output terminals

3.5
spherical spark gap
two metal spheres of the same diameter arranged at a specified distance and used under specified conditions for the measurement of peak voltages in excess of 15 kV

3.6
maximum case temperature under abnormal conditions
(t_c + X)
maximum allowable case temperature of the starting devices and ignitors under abnormal conditions with metal halide lamps

Note 1 to entry: The value of (t_c + X) is declared by the manufacturer.

3.7
sample
one or more sampling items intended to provide information on the population or on the material provided by the manufacturer or responsible vendor

[SOURCE: IEC 60050-151:2001, 151-16-19, modified – "provided by the manufacturer or responsible vendor" has been added.]

3.8
sample item
one of the individual items in a population of similar items, or a portion of material forming a cohesive entity and taken from one place and at one time

[SOURCE: IEC 60050-151:2001, 151-16-18]

4 General requirements

IEC 61347-1:2015, Clause 4 applies.

5 General notes on tests

IEC 61347-1:2015, Clause 5 applies, together with the following:

– IEC 61347-1:2015, Annex H applies.
– One sample item shall be used for all tests, unless otherwise specified in the corresponding clause.

  To allow for parallel testing and reduced test times, additional sample items may be used except where the outcome of the test can be affected by preceding tests, for example the tests of Clause 11 and Clause 12.
– Specially prepared sample items may be used where required.
– Starting devices intended for use with lamps having different electrical characteristics are tested with the lamp which gives the most unfavourable conditions.

For information on requalification of products compliant with the previous edition of this document, i.e. IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013, refer to Annex C.

6 Classification

IEC 61347-1:2015, Clause 6 applies.

Additionally, starting devices shall be classified as one of the following:

– output voltage up to and including 5 kV;
– output voltage greater than 5 kV, and up to and including 10 kV;
– output voltage greater than 10 kV, and up to and including 100 kV.

7 Marking

7.1 Marking and information

7.1.1 Mandatory marking

Starting devices shall be marked with the following:

– items a), b) and c) of IEC 61347-1:2015, 7.1;

– item f) of IEC 61347-1:2015, 7.1, and IEC 61347-1:2015/AMD1:2017, 7.1;

This marking is not required for ignitors over 5 kV, because these are mandatorily provided with a time limitation;

– a marking to show the peak value of the voltage produced if the peak value exceeds 1 500 V. Connections having this voltage shall be marked; for ignitors with a pulse voltage over 5 kV, this marking shall be a flash symbol (broken arrow) (see the ISO 3864 series);

– allowable maximum case temperature under normal conditions (A) and, for ignitors which are intended to be connected in series with discharge lamps which can, according to the lamp specification cause rectification, the maximum case temperature under abnormal conditions (B). The marking shall be "t_c A/B" (example t_c 60/90 = maximum temperature 60 °C for the normal and maximum temperature 90 °C for the abnormal conditions).

7.1.2 Information to be provided

The following information, if applicable, shall be given either on the starting device, or be made available in the manufacturer's catalogue or similar:

– items d), e), h), i), j), k) and l) of IEC 61347-1:2015, 7.1 and IEC 61347-1:2015/AMD1:2017, 7.1;

– an indication of the time limitation, if this is provided by the starting device;

– the catalogue reference of the ballast which may be associated with the starting device, if the ballast design governs the magnitude of the pulse voltage;

– special conditions relating to the use of the starting device.

7.2 Durability and legibility

IEC 61347-1:2015, 7.2 applies.

8 Terminals

IEC 61347-1:2015, Clause 8 and IEC 61347-1:2015/AMD1:2017, Clause 8 apply.

9 Earthing

IEC 61347-1:2015, Clause 9 applies.

10 Protection against accidental contact with live parts

IEC 61347-1:2015, Clause 10 and IEC 61347-1:2015/AMD1:2017, Clause 10 apply.

11 Moisture resistance and insulation

IEC 61347-1:2015, Clause 11 and IEC 61347-1:2015/AMD1:2017, Clause 11 apply, together with the following:

– Electric components, enclosures and other parts which can be removed without the aid of a tool are removed and subjected, if necessary, to the humidity treatment with the main part.

– In order to achieve the specified conditions within the cabinet, it is recommended to ensure constant circulation of the air within and, in general, to use a cabinet which is thermally insulated.

– With double or reinforced insulation, the resistance shall be not less than 7 MΩ.

– Care should be taken to avoid the moisture content of the devices at the end of the moisture treatment changing appreciably before the measurement of the insulation resistance.

  To achieve this, it is recommended that the insulation resistance be measured while the devices are still kept in the humidity cabinet or in an adjacent room protected against draught and having similar conditions to those in the humidity cabinet.

12 Electric strength

IEC 61347-1:2015, Clause 12 applies, together with the following:

For starting devices which incorporate a high-voltage winding, compliance is checked by the following pulsing test. The starting device is operated at 110 % rated supply voltage without a lamp load until 50 pulses have occurred, switching the supply on and off if necessary.

NOTE High-voltage winding denotes a winding incorporated in the starting device which produces the necessary voltage to start the lamp.

During the test, there shall be

a) no visible or audible disruptive discharge (indication of failure of insulation under electrical stress);

b) no sparkover or flashover;

c) no collapse or reduction of the front or the tail of the impulse voltage waveshape when observed on an oscilloscope.

For starting devices without high-voltage winding, compliance is checked by an electric strength test as given in IEC 61347-1:2015, Clause 12.

13 Thermal endurance test for windings of ballasts

There are no requirements.

NOTE The requirements of IEC 61347-1:2015, Clause 13 are not applicable.

14 Fault conditions

IEC 61347-1:2015, Clause 14 and IEC 61347-1:2015/AMD1:2017, Clause 14 apply, together with the following:

– The current in the lamp circuit shall not be increased by a fault in the starting device to such an extent that the ballast becomes overheated, i.e. the winding temperature exceeds the t_w value at abnormal conditions. For starters having external dimensions as specified in IEC 60155:1993, IEC 60155:1993/AMD1:1995 and IEC 60155:1993/AMD2:2006, this requirement is met if the current in the lamp circuit does not exceed the maximum preheat current value as specified in IEC 60081 and IEC 60901 for a period longer than 5 min.

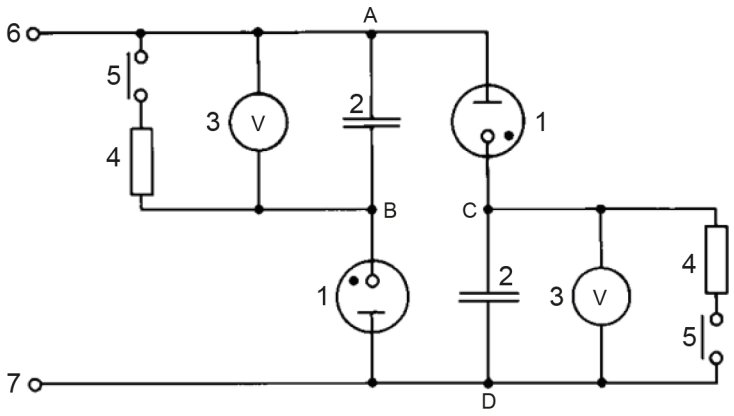
– Independent starting devices shall not exceed the temperature values for abnormal operations given in 16.3.3. This requirement is regarded as complied with when, for preheated lamp electrodes, the preheating current does not increase above its rated value by more than 5 % when the starting device is short-circuited. Mechanical cut-outs in starting devices shall be bridged if, with preheated lamp electrodes at 110 % of rated voltage, the current through the ballast is more than 105 % of the short-circuit value for a period longer than 5 min.

  This requirement is regarded as being complied with when the mechanical cut-out meets the relevant conditions of IEC 60255-8:1990[3].

15 Pulse voltage of ignitors

The maximum value of the pulse voltage, of either positive or negative pulses, shall not exceed 5 kV when operated at the rated voltage and with a load capacitance of 20 pF, using the circuit shown in Figure 1. However, the maximum pulse voltage specified in the relevant lamp data sheet shall be taken into account.

3 Withdrawn.



Key

1 HV diode

blocking voltage	$U_{RM} \geq 25$ kV
rated current (average)	$I_{FAVM} \geq 1{,}5$ mA
periodic current (peak)	$I_{FRM} \geq 0{,}1$ A
anode/cathode capacitance	$C_{a/k} \leq 2$ pF

NOTE Suitable parts are, for example, HV rectifier tubes of type GY 501 for CTV receivers.

2 HV capacitor

capacitance	$C = 500$ pF
rated voltage	$U \geq 6{,}3$ kV
phase-angle (at 10 kHz)	$\tan \delta = 20 \times 10^{-3}$

3 HV measuring instrument

electrostatic voltmeter	0 kV to 6 kV
capacitance at full deflection	< 15 pF
breakdown voltage	> 10 kV
precision	Class 1 or superior

4 discharge resistance 1 MΩ

5 short-circuit device for discharging HV capacitors

6 to high-voltage lead of ignitor

7 to neutral conductor

The leakage resistance between A and B and between C and D shall be not less than 10^{13} Ω.

Figure 1 – Starting voltage measurement for ignitors

NOTE 1 As an alternative to the electrostatic voltmeter specified in Figure 1, a memory oscilloscope can be used in the circuit together with a high-voltage probe having the following properties:

– input resistance ≥ 100 MΩ;
– input capacitance ≤ 15 pF;
– cut-off frequency ≥ 1 MHz.

In case of doubt, the measurement with the electrostatic voltmeter is the reference method to use.

For ignitors with pulses over 5 kV, the maximum value of the pulse voltage shall not exceed 1,3 times the peak voltage (according to 3.4) declared by the manufacturer when operated at the rated supply voltage and with a load capacitance of 20 pF, if not otherwise stated on the relevant lamp data sheets.

Measuring equipment for measuring the peak shall be able to measure the peak pulses with an accuracy of 5 %.

NOTE 2 Typically, measurements are made by oscilloscope or electrostatic voltmeter for peak pulses up to 100 kV. Above 15 kV, a spherical spark gap can be employed, using the procedure based on those given in IEC 60052:2002, and taking note of Annex B.

16 Heating of built-in and independent starting devices

16.1 General

Built-in and independent starting devices shall not exceed the temperature limits during normal operation (t_c) and abnormal operation (t_c + X).

In addition to the requirements of this Clause 16 for built-in starting devices, the normal and the abnormal operating conditions are checked together with the luminaire in accordance with the applicable part from the IEC 60598 series (luminaire safety).

16.2 Normal operation

16.2.1 General

Normal conditions are working conditions in which one or more of the following situations apply:

a) the lamps are operating normally;

b) the rated current flows through the starting device;

c) the starting device has been connected to a voltage source, for example, the mains voltage or the lamp voltage arising during normal operation;

d) a combination of b) and c).

16.2.2 Normal operation of built-in starting devices

Compliance of built-in starting devices in normal operation is checked by the following procedure.

The starting devices are connected as for normal use with appropriate lamps.

The built-in starting device shall be placed in a test enclosure as detailed in IEC 61347-1:2015, Annex D, the starting device being supported by two wooden blocks as shown in IEC 61347-1:2015, Figure H.1.

The wooden blocks shall be 75 mm high, 10 mm thick and of a width equal to, or greater than, the width of the starting device. Furthermore, the blocks shall be positioned with the extreme end of the starting device aligned with the outer vertical sides of the block.

The controlgear employed for the components shall meet the requirements of the relevant IEC standard and be compatible with the lamp type to be started by the starting device.

The whole test circuit (controlgear, built-in starting device and the lamp(s)) is connected to the supply voltage. When the lamp is in stable operation, the lamp current is set for rated value by modifying the voltage applied. The ambient temperature of the test enclosure is adjusted to reach t_c on the starting device. In this condition, the starting devices and lamp are operated until they reach steady temperature.

Compliance is checked by the temperature measurement. The measured value shall not exceed the limits specified in IEC 60598-1:2020, Table 12.1 and Table 12.2.

16.2.3 Normal operation of independent starting devices

Compliance of independent starting devices in normal operation is checked by the following procedure.

Independent starting devices are connected as for normal use with appropriate lamps.

Independent starting devices are mounted in a test corner consisting of three dull black painted laminated wood boards 15 mm to 25 mm thick and arranged so as to resemble two walls and the ceiling of a room. The starting device is secured to the ceiling as close as possible to the walls, the ceiling extending at least 250 mm beyond the other sides of the starting device. This assembly is positioned as far as possible from the five internal surfaces of the enclosure.

The tests are carried out in a draught-proof room or enclosure as specified in IEC 61347-1:2015, Annex F. The ambient temperature within the draught-proof enclosure shall be within 5 °C of the t_a rating and should preferably be the same as the t_a rating.

The controlgear employed for the components shall meet the requirements of the relevant IEC standard and be compatible with the lamp type to be started by the starting device.

The whole test circuit (controlgear, independent starting device and the lamp(s)) is connected to the supply voltage. When the lamp is in stable operation, the lamp current is set for the rated value by modifying the voltage applied. In this condition, the starting device and lamps are operated until they reach steady temperature.

Compliance is checked by the temperature measurement. The measured value shall not exceed the limits specified in IEC 60598-1:2020, Table 12.1 and Table 12.2.

16.3 Abnormal operation

16.3.1 Abnormal operation of built-in ignitors

Compliance of built-in starting devices in abnormal operation is checked by the following test procedure.

The test is required for built-in starting devices (built-in ignitors) intended to be connected in series with discharge lamps which can, according to the lamp specification, cause rectification and are tested additionally with the rectifying test circuit in accordance with IEC 60598-1:2020, 12.5 and Annex C.

The built-in starting device shall be placed in a test enclosure as detailed in IEC 61347-1:2015, Annex D, the starting device being supported by two wooden blocks as shown in IEC 61347-1:2015, Figure H.1.

The wooden blocks shall be 75 mm high, 10 mm thick and of a width equal to, or greater than, the width of the starting device. Furthermore, the blocks shall be positioned with the extreme end of the starting device aligned with the outer vertical sides of the block.

For the test, the built-in starting device is operated in the test enclosure described above for 30 min during which the double value of the rated current flows through the built-in starting device. For built-in starting devices, which are intended for the use of different lamps, the highest value of the current shall be used.

The ambient temperature in the test enclosure is set to achieve at the end of the test $(t_c + X)$ *°C for which the built-in starting device is specified. If during the test, the value of* $(t_c + X)$ *°C is not reached, then the test shall be repeated on another sample at an increased ambient temperature at which* $(t_c + X)$ *°C is achieved.*

Compliance is checked by the following parameters:

After the test, the temperature of the components is determined:

a) temperatures shall not exceed the values specified in IEC 60598-1:2020, Table 12.3.

b) After cooling down to the ambient temperature of 10 °C to 30 °C, the starting device shall comply with the following conditions:

- *the starting device marking shall still be legible;*
- *the pulse voltage shall not differ by more than ±10 % from the initially measured value;*
- *the starting device shall withstand without damage an electric strength test according to Clause 12 of this document, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Table 1, but not less than 500 V.*

A period of 30 min is the medium time required for a controlgear incorporated into a luminaire to heat up and cause the operation of the thermal control device during the rectifying effect.

16.3.2 Abnormal operation of built-in starters

Compliance of built-in starters in abnormal operation is checked by the following test procedure:

The built-in starting device shall be placed in a test enclosure as detailed in IEC 61347-1:2015, Annex D, the starting device being supported by two wooden blocks as shown in IEC 61347-1:2015, Figure H.1.

The wooden blocks shall be 75 mm high, 10 mm thick and of a width equal to, or greater than, the width of the starting device. Furthermore, the blocks shall be positioned with the extreme end of the starting device aligned with the outer vertical sides of the block.

Built-in starters are connected as for normal use with appropriate lamps as indicated in 16.2.1. The test is performed with lamps having deactivated cathodes or substitution resistors specified in IEC 60081 and IEC 60901 on the lamp data sheets.

Upon completion of this test, and after cooling down, the starting device shall comply with the following conditions:

a) the starting device marking shall still be legible;

b) the starting device shall withstand without damage an electric strength test according to Clause 12 of this document, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Table 1, but not less than 500 V.

16.3.3 Abnormal operation of independent starting devices

Compliance of independent starting devices in abnormal operation is checked by the following test procedure.

The test is required for independent starting devices (independent ignitors) intended to be connected in series with discharge lamps which can, according to the lamp specification, lead to overheating of controlgear or starting devices, or both, and are tested additionally with the rectifying test circuit in accordance with IEC 60598-1:2020, 12.5 and Annex C.

Independent starting devices are mounted in a test corner consisting of three dull black painted laminated wood boards 15 mm to 25 mm thick and arranged so as to resemble two walls and the ceiling of a room. The starting device is secured to the ceiling as close as possible to the walls, the ceiling extending at least 250 mm beyond the other sides of the starting device. This assembly is positioned as far as possible from the five internal surfaces of the enclosure.

The tests are carried out in a draught-proof room or enclosure as specified in IEC 61347-1:2015, Annex F.

The controlgear employed for the components shall meet the requirements of the relevant IEC standard and be compatible with the lamp type to be started by the starting device.

Starting devices are connected as for appropriate use but without lamps. In the case of abnormal conditions, the starting devices are operated at 110 % of the rated voltage until they reach the steady temperature, or, for starting devices with operating time limitation, until they cut out at or before the required time limit.

The test is performed after loading the starting device for 30 min with the double value of the rated current of the product. For starting devices, which are intended for the use of different lamps, the highest value of the current shall be used.

The ambient temperature within the draught-proof enclosure shall be within 5 °C of the t_a rating and should preferably be the same as the t_a rating.

Compliance is checked by the following parameters.

After the test, the temperature of the components is determined:

Temperatures shall not exceed the values specified in IEC 60598-1:2020, Table 12.3.

After cooling down, the starting device shall comply with the following conditions:

a) the starting device marking shall still be legible;

b) the pulse voltage shall not differ by more than ±10 % from the initially measured value;

c) the starting device shall withstand without damage an electric strength test according to Clause 12 of this document, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Table 1, but not less than 500 V.

A period of 30 min is the medium time required for a controlgear incorporated into a luminaire to heat up and cause the operation of the thermal control device during the rectifying effect.

17 Mechanical strength

17.1 Replaceable starting devices and accessible components of starting devices which can be replaced without tools shall have sufficient mechanical strength. See Annex A.

– Starting devices and components up to 100 g and all starters having external dimensions specified in IEC 60155:1993, IEC 60155:1993/AMD1:1995 and IEC 60155:1993/AMD2:2006 shall be subjected to the tumbling barrel test in accordance with Clause A.2. Each sample shall withstand 20 falls without incurring any damage which can affect safety.

– Starting devices and components over 100 g shall be subjected to the spring hammer test in accordance with Clause A.1. The impact energy and spring compression of the testing apparatus shall be 0,35 Nm and 17 mm, respectively.

After the test, the sample shall show no damage likely to impair safety.

17.2 Replaceable starting devices and accessible components of starting devices which can be replaced without tools, but which are subject to a turning moment during normal insertion, shall withstand a torque test of 0,6 Nm about the axes.

The torque is applied at the canister top. The contact pins are clamped tight and the torque is gradually increased from zero to the value required.

After the test, the sample shall show no damage likely to impair safety.

18 Construction

18.1 IEC 61347-1:2015, Clause 15 applies, together with the following.

18.2 All replaceable starting devices and accessible components of starting devices which can be replaced without the aid of a tool shall have double insulation or reinforced insulation to be compatible with the insulation requirements of all classes of equipment, including class II.

18.3 Starting devices equipped with cut-outs shall be so constructed that, in the case of non-igniting lamps, the cut-out interrupts the starting-current circuit or the production of the starting voltage, or both.

An alternative to a cut-out can be a device limiting the starting current and the production of starting voltage to such an extent that no current greater than 10 % of the rated lamp current flows through the lamp. Further components in the overall lamp-current circuit are not subjected to loads higher than the rated lamp current.

Compliance is checked according to Clause 14 or Clause 15.

Ignitors with pulse voltages over 10 kV shall be provided with a device for time limitation of the starting operation. This device shall, in case of non-ignition of lamps, interrupt the generation of starting pulses within 3 s. This time limitation may be extended to 30 s where this information is provided on the label of the device. After the time limitation device has interrupted the circuit, generation of starting pulses is only allowed after disconnection and reconnection of the ignitors to the supply.

Ignitors with pulse voltages over 5 kV and up to 10 kV shall be provided with a time-limiting device which shall interrupt the generation of pulses within 60 s. After the time-limiting device has interrupted the circuit, generation of starting pulses is only allowed after disconnection and reconnection of the ignitors to the supply.

Compliance is checked by inspection and by the test of Clause 15.

18.4 Starters which are interchangeable with glow starters in accordance with IEC 60155:1993, IEC 60155:1993/AMD1:1995 and IEC 60155:1993/AMD2:2006 shall contain means for radio interference suppression, the effect of which is equivalent to that of the radio interference suppression capacitor specified in IEC 60155:1993, 7.12 and IEC 60155:1993/AMD1:1995, 7.12.

19 Creepage distances and clearances

IEC 61347-1:2015, Clause 16 and IEC 61347-1:2015/AMD1:2017, Clause 16 apply.

20 Screws, current-carrying parts and connections

IEC 61347-1:2015, Clause 17 applies.

21 Resistance to heat, fire and tracking

IEC 61347-1:2015, Clause 18 applies.

22 Resistance to corrosion

IEC 61347-1:2015, Clause 19 applies.

23 Applicable annexes of IEC 61347-1

The following annexes of IEC 61347-1:2015 apply:

– Annex A (normative) Test to establish whether a conductive part is a live part which may cause an electric shock;
– Annex F (normative) Draught-proof enclosure;
– Annex H (normative) Tests.

Annex A
(normative)

Mechanical strength testing

A.1 Replaceable starting devices and accessible components over 100 g

Replaceable starting devices and accessible components with a mass over 100 g are tested as follows.

Blows are applied to the part under test by means of the spring-operated impact test apparatus specified in IEC 60068-2-75:2014.

An impact test apparatus is used which is adjusted so that when the test apparatus is held in a horizontal position, the kinetic energy of the striking element just before the impact has the value specified in IEC 60068-2-75:2014, Table E.1.

NOTE In order to avoid frequent calibration, a separate test apparatus can be used for each value of impact energy.

The blows are applied by positioning the release cone against the starting device in a direction perpendicular to the surface, at the point to be tested.

The starting device is rigidly supported, cable entries being left open, knock-outs opened and cover fixing and similar screws tightened with a torque equal to two-thirds of that specified in Clause 20.

Three blows are applied to every point that is likely to be weak, paying special regard to insulating material enclosing live parts and to bushings of insulating material, if any. After these tests, the starting device shall show no damage within the meaning of this document.

Damage to paint and small dents which do not influence creepage distances or clearances are neglected. There shall not be any decrease in the resistance to the ingress of moisture.

A.2 Replaceable starting devices and accessible components up to 100 g

Replaceable starting devices and accessible components with a mass up to 100 g are tested as follows.

The parts to be tested are subjected to 20 falls from a height of 500 mm on to a 3 mm thick steel plate in a tumbling barrel turning at 5 r/min (that is, 10 falls per minute).

Suitable equipment for this test is shown in Figure A.1.

Dimensions in millimetres

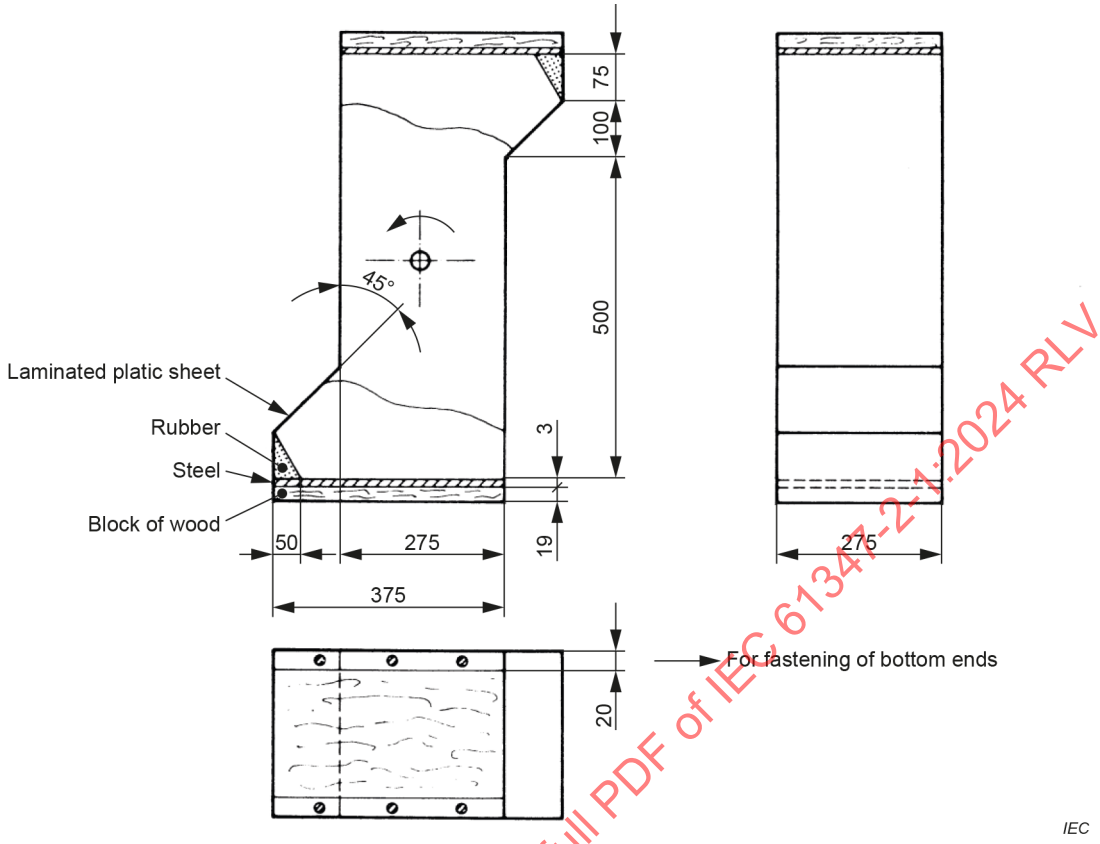


Figure A.1 – Tumbling barrel

Annex B
(informative)

Precautions to be observed when measuring with sphere-gaps

B.1 General

Because many ignitors do not have outputs where one pole is at earth potential, the direct application of IEC 60052 cannot apply. However, Clause B.2, Clause B.3, Clause B.4 and Clause B.5 shall be observed, together with those requirements of IEC 60052 which are applicable.

B.2 Sphere-gap

The sphere-gap shall be greater than the anticipated breakdown distance and shall be progressively reduced until breakdown occurs (i.e. too small a gap opening up to a non-sparking distance is not a valid method of determining the correct voltage value).

B.3 Breakdown gap distance

The breakdown gap distance shall be recorded and the 50 % peak voltage value determined from IEC 60052:2002, Table 2.

B.4 Duty cycle of the ignitor

The duty cycle of the ignitor shall be observed to ensure that overheating or failure of the components does not occur.

B.5 End of test

All safety precautions shall be observed and all voltages shall be discharged at the end of the test.

Annex C
(informative)

Schedule of more onerous requirements

Products found compliant with the previous edition of this document do not necessarily require complete requalification for demonstrating compliance with this document. Depending on the nature of the changes introduced, partial retesting or even no retesting may be appropriate, as the case may be.

For this document, no more onerous requirements have been introduced with respect to the previous edition, i.e. IEC 61347-2-1:2000, IEC 61347-2-1:2000/AMD1:2005 and IEC 61347-2-1:2000/AMD2:2013.

Bibliography

IEC 60050-151, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices,* available at https://www.electropedia.org

IEC 60050-845, *International Electrotechnical Vocabulary (IEV) – Part 845: Lighting,* available at https://www.electropedia.org

IEC 60188, *High-pressure mercury vapour lamps – Performance specifications*

IEC 60192, *Low-pressure sodium vapour lamps – Performance specifications*

IEC 60662, *High-pressure sodium vapour lamps – Performance specifications*

IEC 60927, *Auxiliaries for lamps – Starting devices (other than glow starters) – Performance requirements*

IEC 61167, *Metal halide lamps – Performance specification*

IEC 61195, *Double-capped fluorescent lamps – Safety specifications*

IEC 61199, *Single-capped fluorescent lamps – Safety specifications*

IEC 61347-2-1:2000, *Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)*
IEC 61347-2-1:2000/AMD1:2005
IEC 61347-2-1:2000/AMD2:2013

IEC 61347-2-8, *Controlgear for electric light sources – Safety – Part 2-8: Particular requirements – Ballasts for fluorescent lamps*

IEC 61347-2-9, *Lamp controlgear – Part 2-9: Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps)*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

_____

APPAREILLAGES DE COMMANDE POUR LES SOURCES DE LUMIÈRE ÉLECTRIQUES – SÉCURITÉ –

Partie 2-1: Exigences particulières – Dispositifs d'amorçage (autres que starters à lueur)

AVANT-PROPOS

1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
9) L'IEC attire l'attention sur le fait que la mise en application du présent document peut entraîner l'utilisation d'un ou de plusieurs brevets. L'IEC ne prend pas position quant à la preuve, à la validité et à l'applicabilité de tout droit de brevet revendiqué à cet égard. À la date de publication du présent document, l'IEC n'a pas reçu notification qu'un ou plusieurs brevets pouvaient être nécessaires à sa mise en application. Toutefois, il y a lieu d'avertir les responsables de la mise en application du présent document que des informations plus récentes sont susceptibles de figurer dans la base de données de brevets, disponible à l'adresse https://patents.iec.ch. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié tout ou partie de tels droits de propriété.

L'IEC 61347-2-1 a été établie par le sous-comité 34C: Appareils auxiliaires pour lampes, du comité d'études 34 de l'IEC: Éclairage. Il s'agit d'une Norme internationale.

Cette seconde édition annule et remplace la première édition parue en 2000, l'Amendement 1:2005 et l'Amendement 2:2013. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) mise à jour des références normatives, avec ajout de références datées le cas échéant;
b) clarification des numéros d'entités d'échantillonnage;
c) alignement des numéros d'articles sur ceux de l'IEC 61347-1;
d) renumérotation de l'Article 15 et de l'Article 16.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
34C/1582/CDV	34C/1590/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications/.

Le présent document est destiné à être utilisé conjointement avec l'IEC 61347-1:2015 et l'IEC 61347-1:2015/AMD1:2017. Lorsque les exigences de l'un des articles de l'IEC 61347-1:2015 et de l'IEC 61347-1:2015/AMD1:2017 sont citées en référence dans le présent document par la phrase "L'IEC 61347-1:2015, Article n et l'IEC 61347-1:2015/AMD1:2017, Article n s'appliquent", cette phrase signifie que l'ensemble des exigences de cet article de l'IEC 61347-1:2015 et de l'IEC 61347-1:2015/AMD1:2017 s'appliquent, excepté les exigences qui ne s'appliquent explicitement pas au type particulier d'appareillage couvert par le présent document.

NOTE Dans le présent document, les caractères d'imprimerie suivants sont utilisés:

– *déclarations de conformité: caractères italiques.*

Une liste de toutes les parties de la série IEC 61347, publiées sous le titre général *Appareillages de commande pour les sources de lumière électriques – Sécurité*, se trouve sur le site web de l'IEC.

Les futurs documents de cette série porteront le nouveau titre général cité ci-dessus. Le titre des documents qui existent déjà dans cette série sera mis à jour lors de leur prochaine édition.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé, ou
- révisé.

INTRODUCTION

Les exigences techniques spécifiées dans le présent document par rapport à l'IEC 61347-2-1:2000, à l'IEC 61347-2-1:2000/AMD1:2005 et à l'IEC 61347-2-1:2000/AMD2:2013 n'ont pratiquement pas évolué. Néanmoins, l'élaboration d'une nouvelle édition du présent document était inévitable, car sans l'ajout de références datées à l'IEC 61347-1:2015 et l'IEC 61347-1:2015/AMD1:2017, l'applicabilité de la quatrième édition de l'IEC 61347-1:—[1] aurait été implicite en raison des références à l'IEC 61347-1 non datées dans l'IEC 61347-2-1:2000, l'IEC 61347-2-1:2000/AMD1:2005 et l'IEC 61347-2-1:2000/AMD2:2013.

Lorsque le présent document fait référence à l'un des articles de l'IEC 61347-1:2015 et l'IEC 61347-1:2015/AMD1:2017, celui-ci spécifie le degré d'applicabilité de cet article. Des exigences supplémentaires sont également fournies, lorsque cela est nécessaire.

[1] Quatrième édition en cours d'élaboration. Stade à la date de publication IEC FDIS 61347-1:2024.

APPAREILLAGES DE COMMANDE POUR LES SOURCES DE LUMIÈRE ÉLECTRIQUES – SÉCURITÉ –

Partie 2-1: Exigences particulières – Dispositifs d'amorçage (autres que starters à lueur)

1 Domaine d'application

La présente partie de l'IEC 61347 spécifie les exigences de sécurité des dispositifs d'amorçage (starters autres que starters à lueur et amorceurs) pour lampes fluorescentes et autres lampes à décharge qui sont destinés à être utilisés avec des alimentations jusqu'à 1 000 V en courant alternatif à 50 Hz ou 60 Hz qui produisent des impulsions d'amorçage inférieures ou égales à 100 kV et qui sont associés aux lampes et appareillages spécifiés dans l'IEC 60081, l'IEC 60188, l'IEC 60192, l'IEC 60662, l'IEC 60901, l'IEC 61167, l'IEC 61195, l'IEC 61199, l'IEC 61347-2-8 et l'IEC 61347-2-9.

Le présent document ne s'applique pas aux starters à lueur ni aux dispositifs d'amorçage incorporés dans les lampes à décharge ou à commande manuelle.

NOTE 1 Les starters à lueur sont traités dans l'IEC 60155.

NOTE 2 Les exigences de performance sont traitées dans l'IEC 60927.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60052:2002, *Mesure de tension au moyen des éclateurs à sphères normalisés*

IEC 60068-2-75:2014, *Essais d'environnement – Partie 2-75: Essais – Test Eh: Essais au marteau*

IEC 60081, *Lampes à fluorescence à deux culots – Prescriptions de performance*

IEC 60155:1993, *Interrupteurs d'amorçage à lueur pour lampes à fluorescence (starters)*
IEC 60155:1993/AMD1:1995
IEC 60155:1993/AMD2:2006

IEC 60255-8:1990[2], *Relais électriques – Huitième partie: Relais électriques thermiques*

IEC 60598 (toutes les parties), *Luminaires*

IEC 60598-1:2020, *Luminaires – Partie 1: Exigences générales et essais*

IEC 60901, *Lampes à fluorescence à culot unique – Prescriptions de performances*

[2] Supprimée.

IEC 61347-1:2015, *Appareillages de lampes – Partie 1: Exigences générales et exigences de sécurité*
IEC 61347-1:2015/AMD1:2017

ISO 3864 (toutes les parties), *Symboles graphiques – Couleurs de sécurité et signaux de sécurité*

3 Termes et définitions

Pour les besoins du présent document, les termes et les définitions de l'IEC 61347-1 ainsi que les suivants s'appliquent.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse https://www.electropedia.org/
- ISO Online browsing platform: disponible à l'adresse https://www.iso.org/obp

3.1
dispositif d'amorçage
amorceur
dispositif conçu pour assurer, seul ou en combinaison avec d'autres composants du circuit, les conditions électriques appropriées pour l'amorçage d'une lampe à décharge

[SOURCE: IEC 60500-845:2020, 845-28-041, modifié – Le terme toléré "amorceur" a été ajouté.]

3.2
starter
dispositif, généralement pour les lampes fluorescentes, utilisé pour l'amorçage de la lampe à décharge en assurant le préchauffage nécessaire de la cathode et, en combinaison avec l'inductance série du ballast, provoque une tension de choc appliquée sur la lampe à décharge

Note 1 à l'article: L'élément de starter qui libère l'impulsion de tension d'amorçage peut être déclenché ou non déclenché.

[SOURCE: IEC 60500-845:2020, 845-28-042]

3.3
dispositif d'amorçage à mise au repos automatique
dispositif d'amorçage qui prévient les tentatives prolongées d'amorçage des lampes qui ne s'amorcent pas, par exemple du fait de la désactivation des électrodes

Note 1 à l'article: Dans le cas des starters, la prévention des tentatives d'amorçage signifie l'ouverture du circuit d'amorçage ou la limitation du courant dans le circuit d'amorçage à une valeur inférieure ou égale au courant assigné de la lampe.

Dans le cas des amorceurs, la prévention des tentatives d'amorçage signifie l'arrêt de la génération d'impulsions de tension ou la réduction sensible de leur amplitude.

3.4
tension de crête
valeur la plus élevée des impulsions de tension générées par un amorceur aux bornes de sortie

3.5
éclateur sphérique
deux sphères métalliques de même diamètre disposées à une distance spécifiée et utilisées dans des conditions spécifiées pour le mesurage des tensions de crête supérieures à 15 kV

3.6
température maximale de boîtier dans des conditions anormales
$(t_c + X)$
température maximale admissible de boîtier des dispositifs d'amorçage et des amorceurs en conditions anormales avec des lampes aux halogénures métalliques

Note 1 à l'article: La valeur de $(t_c + X)$ est indiquée par le fabricant.

3.7
échantillon
une ou plusieurs entités d'échantillonnage destinées à fournir des informations sur la population ou la matière, fournies par le fabricant ou le fournisseur responsable

[SOURCE: IEC 60050-151:2001, 151-16-19, modifié – "fournies par le fabricant ou le fournisseur responsable" a été ajouté.]

3.8
entité d'échantillonnage
l'une des entités individuelles dans une population d'entités semblables, ou une portion de matière formant une entité cohérente et prélevée en un lieu et en un moment

[SOURCE: IEC 60050-151:2001, 151-16-18]

4 Exigences générales

L'IEC 61347-1:2015, Article 4 s'applique.

5 Généralités sur les essais

L'IEC 61347-1:2015, Article 5 s'applique, ainsi que ce qui suit:

– L'IEC 61347-1:2015, Annexe H s'applique.
– Une entité d'échantillonnage doit être utilisée pour l'ensemble des essais, sauf spécification contraire dans l'article correspondant.

  Pour permettre la réalisation des essais en parallèle et réduire la durée des essais, des entités d'échantillonnage supplémentaires peuvent être utilisées, sauf lorsque le résultat de l'essai peut être influencé par les essais précédents, par exemple les essais de l'Article 11 et de l'Article 12.

  Des entités d'échantillonnage spécialement confectionnées peuvent être utilisées, si cela est exigé.
– Les dispositifs d'amorçage destinés à être utilisés avec des lampes possédant des caractéristiques électriques différentes sont soumis à l'essai avec la lampe qui donne les conditions les plus défavorables.

Pour plus d'informations sur la requalification des produits conformes à l'édition précédente du présent document, c'est-à-dire l'IEC 61347-2-1:2000, l'IEC 61347-2-1:2000/AMD1:2005 et l'IEC 61347-2-1:2000/AMD2:2013, voir l'Annexe C.

6 Classification

L'IEC 61347-1:2015, Article 6 s'applique.

En outre, les dispositifs d'amorçage doivent être classés dans l'une des catégories suivantes:

– tension de sortie jusqu'à 5 kV inclus;
– tension de sortie supérieure à 5 kV et jusqu'à 10 kV inclus;
– tension de sortie supérieure à 10 kV et jusqu'à 100 kV inclus.

7 Marquage

7.1 Marquages et informations

7.1.1 Marquages obligatoires

Les dispositifs d'amorçage doivent porter les marquages suivants:

– les marquages a), b) et c) indiqués dans l'IEC 61347-1:2015, 7.1;
– le marquage f) indiqué dans l'IEC 61347-1:2015, 7.1 et l'IEC 61347-1:2015/AMD1:2017, 7.1;

  ce marquage n'est pas exigé pour les amorceurs de plus de 5 kV, car ceux-ci sont obligatoirement équipés d'une temporisation;
– un marquage de la valeur de crête de la tension générée si cette valeur dépasse 1 500 V. Les connexions soumises à cette tension doivent être marquées; pour les amorceurs dont la tension d'impulsion est supérieure à 5 kV, ce marquage doit être un symbole éclair (flèche brisée) (voir la série ISO 3864);
– la température maximale de boîtier admissible dans des conditions normales (A) et, pour les amorceurs destinés à être raccordés en série à des lampes à décharge qui peuvent, d'après la spécification de la lampe, causer un redressement du courant, la température maximale de boîtier admissible dans des conditions anormales (B). Le marquage doit être "t_c A/B" (par exemple, t_c 60/90 = température maximale 60 °C pour les conditions normales et température maximale 90 °C pour les conditions anormales).

7.1.2 Informations à fournir

Les informations suivantes, si elles s'appliquent, doivent figurer sur le dispositif d'amorçage ou dans le catalogue du fabricant ou un document équivalent:

– les marquages d), e), h), i), j), k) et l) indiqués dans l'IEC 61347-1:2015, 7.1 et l'IEC 61347-1:2015/AMD1:2017, 7.1;
– une indication de la temporisation, si le dispositif d'amorçage est équipé d'une telle fonction;
– la référence du catalogue du ballast qui peut être associé au dispositif d'amorçage, si la construction du ballast détermine l'amplitude de la tension d'impulsion;
– les conditions d'utilisation particulières du dispositif d'amorçage.

7.2 Durabilité et lisibilité

L'IEC 61347-1:2015, 7.2 s'applique.

8 Bornes

L'IEC 61347-1:2015, Article 8 et l'IEC 61347-1:2015/AMD1:2017, Article 8 s'appliquent.

9 Mise à la terre

L'IEC 61347-1:2015, Article 9 s'applique.

10 Protection contre le contact accidentel avec des parties actives

L'IEC 61347-1:2015, Article 10 et l'IEC 61347-1:2015/AMD1:2017, Article 10 s'appliquent.

11 Résistance à l'humidité et isolement

L'IEC 61347-1:2015, Article 11 et l'IEC 61347-1:2015/AMD1:2017, Article 11 s'appliquent, ainsi que ce qui suit:

– Les composants électriques, les enveloppes et les autres parties qui peuvent être retirées sans l'aide d'un outil sont déposés et, si nécessaire, soumis à l'épreuve d'humidité avec la partie principale.

– Pour réaliser les conditions spécifiées à l'intérieur de l'enceinte, il est recommandé d'assurer une circulation constante de l'air dans celle-ci et généralement d'utiliser une enceinte thermiquement isolée.

– Avec une isolation double ou renforcée, la résistance ne doit pas être inférieure à 7 MΩ.

– Il convient de veiller à ce que la teneur en humidité des dispositifs ne varie pas de manière significative entre la fin de l'épreuve d'humidité et le mesurage de la résistance d'isolement.

  Pour ce faire, il est recommandé de mesurer la résistance d'isolement lorsque les dispositifs se trouvent encore dans l'enceinte humide ou dans une salle contiguë protégée contre les courants d'air et où règnent des conditions similaires à celles présentes à l'intérieur de l'enceinte humide.

12 Rigidité diélectrique

L'IEC 61347-1:2015, Article 12 s'applique, ainsi que ce qui suit:

Pour les dispositifs d'amorçage qui comportent un enroulement haute tension, la conformité est vérifiée par l'essai d'impulsions suivant. Le dispositif d'amorçage est mis en fonctionnement à 110 % de sa tension d'alimentation assignée sans lampe jusqu'à ce que 50 impulsions aient été appliquées en coupant et en rétablissant l'alimentation, si nécessaire.

NOTE Un enroulement haute tension désigne un enroulement incorporé au dispositif d'amorçage et qui génère la tension nécessaire pour l'amorçage de la lampe.

Pendant l'essai, il ne doit se produire:

a) aucune décharge disruptive visible ou audible (ce qui indiquerait une défaillance de l'isolement sous contrainte électrique);

b) aucune étincelle ni contournement;

c) aucun écroulement ni réduction du front ou de la queue de la forme d'onde de tension d'impulsion lors de l'observation sur un oscilloscope.

Pour les dispositifs d'amorçage sans enroulement haute tension, la conformité est vérifiée par un essai de rigidité diélectrique, conformément à l'Article 12 de l'IEC 61347-1:2015.

13 Essai d'endurance thermique des enroulements des ballasts

Il n'y a pas d'exigences.

NOTE Les exigences spécifiées à l'Article 13 de l'IEC 61347-1:2015 ne s'appliquent pas.