

INTERNATIONAL STANDARD



~~Lamp control gear –~~

Controlgear for electric light sources – Safety –

Part 2-8: Particular requirements – Ballasts for fluorescent lamps

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INTERNATIONAL STANDARD



~~Lamp control gear –~~

Controlgear for electric light sources – Safety –

Part 2-8: Particular requirements – Ballasts for fluorescent lamps

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

~~LAMP CONTROLGEAR –~~
CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –**Part 2-8: Particular requirements – Ballasts for fluorescent lamps**

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.
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- 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 61347-2-8:2000+AMD1:2006 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 61347-2-8 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 and Amendment 1:2006. This edition constitutes a technical revision.

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

- a) introduction of dated references where appropriate;
- b) alignment of clause numbers with those of IEC 61347-1.

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

Draft	Report on voting
34C/1583/CDV	34C/1591/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.

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INTRODUCTION

~~This first edition of IEC 61347-2-8, published in conjunction with IEC 61347-1, represents an editorial review of IEC 60920. 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 61347-2-8:2000 and IEC 61347-2-8:2000/AMD1:2006 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 61347-2-8:2000 and IEC 61347-2-12:2000/AMD1:2006.

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 2-8: Particular requirements– Ballasts for fluorescent lamps

1 Scope

This part of IEC 61347 specifies safety requirements for ballasts, excluding resistance types, for use on AC supplies up to 1 000 V at 50 Hz or 60 Hz, associated with fluorescent lamps with or without pre-heated cathodes operated with or without a starter or starting device and having rated ~~wattages~~ powers, dimensions and characteristics as specified in IEC 60081 and IEC 60901.

This document applies to complete ballasts and to their component parts such as reactors, transformers and capacitors. ~~Particular requirements for thermally protected ballasts are given in annex B.~~ Ballasts for conventional operation of lamps at mains frequency are covered, while AC supplied electronic ballasts for high-frequency operation are excluded.

~~Ballasts for conventional operation of lamps at mains frequency are covered, while a.c. supplied electronic ballasts for highfrequency operation are excluded. These are specified in IEC 61347-2-3.~~

~~Capacitors having a capacitance greater than 0,1 μ F are covered by IEC 61048 and IEC 61049. Capacitors having a capacitance less than or equal to 0,1 μ F are specified in IEC 60384-14.~~

NOTE 1 AC supplied electronic ballasts for high-frequency operation are specified in IEC 61347-2-3.

NOTE 2 Performance requirements are the subject of IEC 60921.

2 Normative references

~~For the purpose of this part of IEC 61347, the normative references given in clause 2 of IEC 61374-1 which are mentioned in this standard apply, together with the following 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 60317-0-1:2013, *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*
IEC 60317-0-1:2013/AMD1:2019

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

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

rated temperature rise of the ballast winding

Δt

temperature rise assigned by the manufacturer under the conditions specified in IEC 61347-2-8

Note 1 to entry: The specifications for the supply and mounting conditions of the ballast are given in IEC 61347-1:2015, Annex H.

3.2

~~short-circuit power (of a voltage source)~~

~~quotient of the square of the voltage produced at its output terminals (in open circuit conditions) and the internal impedance of the source (as seen from the same terminals)~~

4 General requirements

IEC 61347-1:2015, Clause 4 applies, together with the following:

- For thermally protected ballasts IEC 61347-1:2015, Annex B applies.
- For capacitors and other components incorporated in ballasts, the appropriate IEC standard applies.

NOTE Capacitors having a capacitance greater than 0,1 μF are covered by IEC 61048 and IEC 61049. Capacitors having a capacitance less than or equal to 0,1 μF are specified in IEC 60384-14.

4.1 ~~Capacitors and other components~~

~~Capacitors and other components incorporated in ballasts shall comply with the requirements of the appropriate IEC standard.~~

4.2 ~~Thermally protected ballasts~~

~~Thermally protected ballasts shall comply with the requirements of annex B.~~

5 General notes on tests

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

- The type test is carried out on one sample consisting of eight ballasts ~~submitted~~ used for the purpose of the type test. Seven ballasts are for the endurance test and one for all other tests. For conditions of compliance for the endurance test, see Clause 13.
In addition, six ballasts are required for the high-voltage impulse testing according to Clause 15 below, for ballasts intended for circuits in which high-voltage impulse occurs within the ballast. There shall be no failure during the test.
- ~~The tests are made under the conditions specified in annex H of IEC 61347-1.~~ IEC 61347-1:2015, Annex H applies.
- In general, all the tests are carried out on each type of ballast or, where a range of similar ballasts is involved, on each rated ~~wattage~~ power in the range, or on a representative selection from the range, as agreed with the manufacturer. A reduction in the number of samples for the endurance test, according to Clause 13 and including the use of constant S other than 4 500, as shown in IEC 61347-1:2015, Annex E, or even the omission of these tests, is allowed when ballasts of the same construction but with different characteristics are submitted together for approval, or when test reports from the manufacturer or other authority are accepted by the testing station.

For information on requalification of products compliant with the previous edition of this document, i.e. IEC 61347-2-8:2000 and IEC 61347-2-8:2000/AMD1:2006, refer to Annex C.

6 Classification

IEC 61347-1:2015, Clause 6 applies.

7 Marking

~~Ballasts which form an integral part of the luminaire need not be marked.~~

7.1 Marking and information

7.1.1 Mandatory marking

Ballasts, other than integral ballasts, shall be ~~clearly and durably marked, in accordance with 7.2 of IEC 61347-1,~~ marked with the following ~~mandatory markings:~~

- items a), b), e), f), g) and r) of IEC 61347-1:2015, 7.1 and IEC 61347-1:2015/AMD1:2017, 7.1;
- the peak value of the voltage produced, if the peak value exceeds 1 500 V, with connections subjected to this voltage marked as such.

Pulse generated by a glow starter and ballast combination are exempt from this requirement.

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 ballast, or be made available in the manufacturer's catalogue or similar:

- items c), h), i), j), k), o), p) and q) of IEC 61347-1:2015, 7.1;
- in the case of a ballast consisting of more than one separate unit, the current controlling inductive element(s), marked with the essential details of the other unit(s) ~~and/~~ or essential capacitors;
- in the case of an inductive ballast used with a separate series capacitor other than a radio interference suppression capacitor, repetition of the marking of rated voltage, capacitance and tolerance.

~~7.3 Other information~~

Manufacturers may provide the ~~following non-mandatory information,~~ rated temperature rise of the ballast winding following the symbol Δt , values increasing in multiples of 5 K, if available.

7.2 Durability and legibility of marking

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.

12 Electric strength

IEC 61347-1:2015, Clause 12 applies.

13 Thermal endurance test for windings of ballasts

IEC 61347-1:2015, Clause 13 applies.

14 Ballast heating

14.1 General

Ballasts, including their mounting surfaces, shall not attain a temperature which would impair safety which is checked by the following tests.

~~Compliance is checked by the tests of 14.1 to 14.4.~~

14.2 Pre-test, checks and measures

Before the test, the following is checked and measured:

- a) the ballast starts and operates the lamp(s) normally;
- b) the resistance of each ballast winding is measured at the ambient temperature, if required.

14.3 Voltage across capacitors

At rated frequency, the voltage across a capacitor incorporated in a ballast shall comply with the requirements given in items a) and b) below. Such requirements do not apply to the capacitors in starters or starting devices or to those having a capacitance less than or equal to 0,1 μF (nominal). Neither do the requirements of item b) apply to self-healing capacitors.

- a) Under normal conditions, when the ballast is tested at its rated supply voltage, the voltage across the capacitor shall not exceed the rated voltage of the latter.
- b) Under abnormal conditions (see 14.4) when the ballast is tested at 110 % of its rated supply voltage, the voltage across the capacitor shall not be greater than the appropriate test voltage of the capacitor given in Table 1.

Table 1 – Abnormal conditions – Capacitor test voltages

Designation	Rated voltage U_n	Limiting voltage
Any	Rated voltage of 240 V or less, 50 Hz or 60 Hz and maximum rated temperature less than or equal to 50 °C	1,25 U_n
Non-self-healing	Other ratings, 50 Hz or 60 Hz	1,50 U_n
Self-healing	Other ratings, 50 Hz or 60 Hz	1,25 U_n

14.4 Ballast heating test

When the ballast is tested in accordance with the conditions of IEC 61347-1:2015, Annex H and the information given in Annex B, the temperature shall not exceed the appropriate values given in Table 2 for the tests under normal and abnormal conditions, if applicable.

NOTE Abnormal circuit conditions are detailed in IEC 60598-1:2020, Annex C.

Table 2 – Maximum temperatures

Parts	Maximum temperature °C		
	Normal operation at 100 % of rated voltage	Normal operation at 106 % of rated voltage	Abnormal operation at 110 % of rated voltage
Ballast windings with declared temperature rise Δt if Δt is provided	a		
Ballast windings with declared temperature under abnormal conditions			b
Ballast case adjacent to capacitor, if any (incorporated in ballast enclosure)			
– without temperature declaration		50	
– with indication of t_c		t_c	
Parts made of			
– wood-filled phenolic mouldings		110	
– mineral-filled phenolic mouldings		145	
– urea mouldings		90	
– melamine mouldings		100	
– laminated, resin bonded paper		110	
– rubber		70	
– thermoplastic materials		c	
a The measurement of the temperature rise of the ballast windings under normal conditions at 100 % of rated voltage – i.e. verification of a declared value so as to provide information for luminaire design – is non-mandatory and its measurement is only performed when marked on the ballast or otherwise required in the catalogue. b This measurement is only mandatory for circuits which may can produce abnormal conditions. The declared limiting temperature of the ballast windings under abnormal conditions shall not be higher than the value which corresponds to a number of days equal to at least two-thirds of the theoretical endurance test period (see Table 3). c The temperature of thermoplastic material, other than that used for the insulation of the wiring, which provides protection against contact with live parts or supporting such parts, is also measured. Values thus obtained serve to establish the conditions of the test of IEC 61347-1:2015, 18.1.			

If materials or manufacturing methods are used other than those indicated in Table 2, they ~~must~~ shall not be operated at temperatures higher than those which are proved to be permissible for those materials.

The temperature in Table 2 ~~must~~ shall not be exceeded when the ballast is operated at its maximum declared ambient temperature, if any. Maximum ambient temperature for a ballast, if not declared, ~~must~~ shall be considered as the difference between the marked t_w and the measured ballast winding temperature rise ~~Δt~~ at 100 % rated voltage.

Table 3 – Limiting temperatures of ballast windings under abnormal operating conditions and at 110 % of rated voltage for ballasts subjected to an endurance test duration of 30 days

Constant S		Limiting temperature °C					
		S4,5	S5	S6	S8	S11	S16
For $t_w =$	90	171	161	147	131	119	110
	95	178	168	154	138	125	115
	100	186	176	161	144	131	121
	105	194	183	168	150	137	126
	110	201	190	175	156	143	132
	115	209	198	181	163	149	137
	120	217	205	188	169	154	143
	125	224	212	195	175	160	149
	130	232	220	202	182	166	154
	135	240	227	209	188	172	160
	140	248	235	216	195	178	166
	145	256	242	223	201	184	171
	150	264	250	230	207	190	177
NOTE The limiting temperatures specified in column S4,5 apply, unless otherwise indicated on the ballast.							

For ballasts which are subjected to an endurance test duration of longer than 30 days, the limiting temperatures shall be calculated using IEC 61347-1:2015, Clause 13, Equation (2), but for an objective test life (in days) equal to two-thirds of the theoretical endurance test period. Table 2 shall be read together with Table 3 where necessary.

14.5 Marking legibility and electric strength after test

After these heating tests, the ballast shall be allowed to cool to room temperature and shall comply with the following conditions:

- the ballast marking shall still be legible;
- the ballast shall withstand without damage a voltage test according to Clause 12, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Clause 12 but not less than 500 V.

15 High-voltage impulse testing

15.1 General

~~Ballasts marked in accordance with 7.1 additional requirement shall be subjected to the test either in 15.1 or 15.2 below.~~

~~Simple reactor type ballasts shall be subjected to the test in 15.1.~~

~~Ballasts other than simple reactor type ballasts shall be subjected to the test in 15.2. The manufacturer shall declare to which test his product has been subjected.~~

Ballasts marked in accordance with 7.1.2 with a rated temperature rise of the ballast winding shall be subjected to the test either in 15.2 or 15.3 below according to their type.

The manufacturer shall declare to which test their product has been subjected.

15.2 Simple reactor type ballasts

From the six ballasts specified in Clause 5, three are subjected to the moisture resistance and insulation test and the electric strength test specified in Clause 11 and Clause 12.

The remaining three ballasts are heated in an oven until they attain the temperature t_w marked on the ballast.

Immediately following these pre-conditioning tests, all six samples shall withstand the high-voltage impulse test.

The ballast under test, together with a variable resistor and a suitable circuit breaker with a closing time (bounce time excluded) between 3 ms and 15 ms – for example, a vacuum switch type H16 or VR312/412 – is connected to a DC current in such a way that, by adjusting the current and operating the circuit breaker, voltage pulses will be induced in the ballast. The current is then adjusted slowly, increasing so that the peak voltage marked on the ballast is reached. The measurement of the voltage pulses is made directly at the ballast terminations and in accordance with Annex A ~~Annex I~~ and Figure A.1 ~~Figure I.1~~.

NOTE 1 – If electronic circuit breakers with a very short closing time are used, care must be taken against producing a very high induced pulse voltage.

WARNING – If electronic circuit breakers with a very short closing time are used, very high induced pulse voltages can be generated. Measures shall be taken to avoid an electric shock.

The value of the DC current at which the starting voltage is reached is noted. The ballasts are then operated with this current for 1 h and the current is interrupted during this time, 10 times for 3 s within every minute.

Immediately after the test all six ballasts shall withstand the moisture resistance and insulation test and the electric strength test specified in Clause 11 and Clause 12.

NOTE 2 – For testing circuits with series capacitors, the capacitor ~~must~~ shall be short-circuited.

15.3 Ballasts other than simple reactor type ballasts

Without connection of the lamp on the output side of the ballast, the supply voltage is adjusted in order to obtain the pulse voltage, generated by the starter and the ballast, of the marked value on the ballast. Cathode heating windings of the ballast are loaded with dummy resistors.

Then, the ballast is operated under these conditions without a lamp for a period of 30 days.

The number of ballasts, before-test treatment and conditions after the test are the same as those ~~prescribed~~ specified in 15.2.

Ballasts which are marked for exclusive use with an ignitor having a time delay device are subjected to the same test, but for a period consisting of 250 on/off cycles, keeping an off period of at least 2 min.

16 Fault conditions

~~The requirements of clause 14 of IEC 61347-1 are not applicable.~~

16 Construction

IEC 61347-1:2015, Clause 15 applies.

17 Creepage distances and clearances

IEC 61347-1:2015, Clause 16 and IEC 61347-1:2015/AMD1:2017, Clause 16 apply, together with the following:

In open-core ballasts, enamel, or similar material which forms the insulation for a wire and withstands the voltage test for grade 1 or grade 2 of IEC 60317-0-1:2013, Clause 13 is judged to contribute 1 mm to the values given in IEC 61347-1:2015, Table 3 and Table 4 between enamelled wires of different ballast windings or from enamelled wire to covers, iron cores, etc. However, this applies only in the situation where creepage distances and clearances are not less than 2 mm in addition to the enamelled layers.

18 Screws, current-carrying parts and connections

IEC 61347-1:2015, Clause 17 applies.

19 Resistance to heat, fire and tracking

IEC 61347-1:2015, Clause 18, with the exception of 18.5, applies.

20 Resistance to corrosion

IEC 61347-1:2015, Clause 19 applies.

21 No-load output voltage

IEC 61347-1:2015, Clause 20 applies.

22 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 B (normative) Particular requirements for thermally protected lamp controlgear;
- Annex D (normative) Requirements for carrying out the heating tests of thermally protected lamp controlgear;
- Annex E (normative) Use of constant S other than 4 500 in t_w tests;
- 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 apply.

Annex C
(normative)

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

The requirements of annex C of IEC 61347-1 do not apply.

Annex D
(normative)

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

The requirements of annex D of IEC 61347-1 apply.

Annex E
(normative)

Use of constant S other than 4 500 in t_w tests

The requirements of annex E of IEC 61347-1 apply.

Annex F
(normative)

Draught-proof enclosure

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

Annex G
(normative)

Explanation of the derivation of the values of pulse voltages

~~The requirements of annex G of IEC 61347-1 do not apply.~~

Annex H
(normative)

Tests

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

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Annex A ~~Annex I~~ (normative)

Method for selection of varistors

A.1 General

In order to avoid voltage variations during measurement of voltage pulses, a number of varistors in series is connected in parallel to the ballast under test.

Given the energy involved, the smallest types of varistors are sufficient for this purpose.

The voltage built up within the ballast depends not only on its inductance, the DC current and the capacitance C_2 , but also on the quality of the vacuum switch, as part of the energy stored in the ballast will be discharged via the spark occurring at the switch.

Therefore, it is necessary to select the varistors together with the switch used for the circuit.

Because of the fact that the varistors have tolerances which may add or compensate themselves, an individual selection is necessary for each type of ballast to be tested.

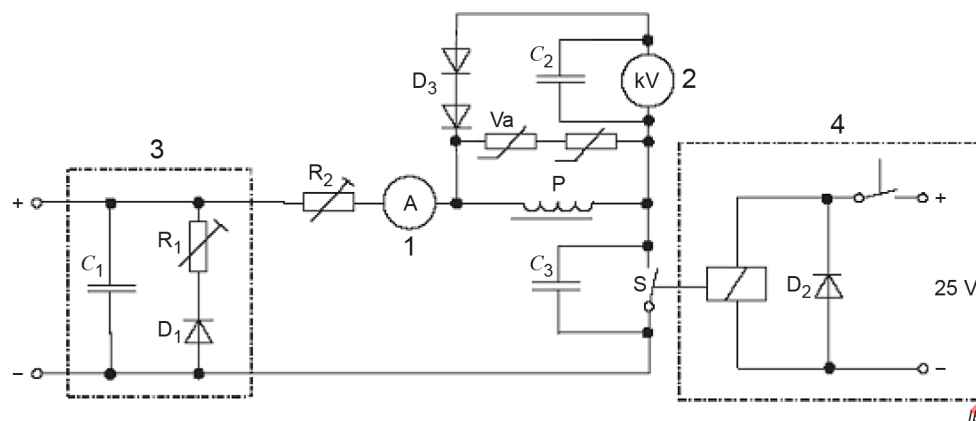
A.2 Selection of the varistors

The ballast current is first adjusted so that the voltage across C_2 is approximately 15 % to 20 % higher than the foreseen test voltage.

The voltage is then reduced to the intended value by means of varistors connected in series.

It is advisable to take two or three high-voltage varistors to cover the greatest part of the test voltage and to use one or two varistors of lower voltage to cover the rest of the test voltage. The fine adjustment of the test voltage can then be made by varying the current through the ballast.

Approximate values for the voltage of the single varistors can be chosen from the voltage current characteristics given in the relevant varistor data sheets (e.g. voltage value at $I = 10 \text{ mA}$).

**Key**

- 1 ammeter for measuring the DC current
- 2 electrostatic voltmeter with a self-capacitance not exceeding 30 pF for measuring the pulse voltage
- 3 protection device for power supply
- 4 supply for switch control: optional
- $C_1 = 0,66 \mu\text{F}$
- $C_2 = 5\,000 \text{ pF}$
- $C_3 = 50 \text{ pF}$
- $D_1 =$ Diode ZD22
- $D_2 =$ Diode IN4004
- $D_3 =$ Diode (6 pieces) BYV96E
- P test sample
- R_1 adjustable resistor (resistance of approximately 100Ω)
- R_2 adjustable resistor: $R_2 \geq \text{ballast resistance} \times 20$
- S vacuum switch
- Va varistors ~~(for selection see Annex I)~~

**Figure A.1 – Test circuit for electromagnetic controlgear,
for lamps with integral starting devices**

Annex B ~~Annex J~~ (informative)

Explanation of ballast temperatures

B.1 General

NOTE This Annex B does not introduce any new proposal but reflects the current state of the requirements.

The object of ballast temperature requirements is to verify that the ballast functions safely during its intended life.

Ballast life is determined by the quality of the wire insulation connected with the ballast construction.

The thermal behaviour of a ballast is thus characterized by the following aspects:

- a) endurance;
- b) ballast heating;
- c) test arrangement.

The following explanation applies to coil type ballasts.

~~J.1~~ B.2 Endurance

The starting point is the claimed ballast winding temperature t_w , denoting the temperature which gives a life expectancy of at least 10 years continuous operation at that temperature. The relation between ballast winding temperature and ballast life can be calculated from the following equation:

$$\log L = \log L_o + S \left(\frac{1}{T} - \frac{1}{T_w} \right) \quad (\text{B.1})$$

where

L is the objective test life in days, 30 days being the standard but the manufacturer may ask for a longer testing time at a related lower temperature;

$L_o = 3\,652$ days (10 years);

T is the theoretical test temperature ($t/^\circ\text{C} + 273$) K; t being the theoretical ballast winding test temperature in $^\circ\text{C}$;

T_w is the rated maximum operating temperature ($t_w/^\circ\text{C} + 273$) K;

S is the constant depending on the design of the ballast and the ballast winding insulation used. If no claim is made to the contrary, S is taken to be 4 500 but a manufacturer may claim the use of other values if this is justified by the relevant tests.

Consequently, the endurance test can be carried out in a much shorter time than 10 years at a related higher ballast winding temperature. The standard endurance test period is 30 days, but longer test durations, up to 120 days, are permitted.

J.2B.3 Ballast heating

For ballasts designed to be built into a luminaire, it should be checked that the assigned ballast winding temperature (t_w) in the luminaire is not exceeded under normal operating conditions, in accordance with the luminaire standard.

Moreover, under abnormal operating conditions, such as a short-circuited starter in a fluorescent lamp circuit, the luminaire is checked to see that the relevant limit which ~~has to~~ shall be marked on the ballast is not exceeded. This limit is specified as the temperature corresponding to a life of two-thirds of the test time for the ballast endurance test. This requirement is based on and derived from the tables with limiting temperatures and theoretical test temperatures for a ballast subject to an endurance test duration of 30 days and based on the assumption that a t_w 90 ballast is comparable in requirements to a ballast without temperature marking, and with layers separated by paper.

The above information means that the limiting temperature under abnormal conditions is for example the temperature corresponding to a 20-day life span for a ballast subjected to a 30-day endurance test. This relation is based on the traditional limits for the limiting temperature of ballast windings and the objective test temperature for the endurance test. However, the manufacturer is free to mark a lower temperature if the manufacturer so wishes.

Verification in the luminaire is based on the limiting values marked on the ballast. This implies that if a manufacturer has elected to use a longer endurance test, at a correspondingly lower temperature, then the maximum permissible temperature under abnormal conditions is correspondingly reduced.

J.3B.4 Test arrangement

Originally, ballast temperatures were checked on a ballast in a test arrangement which was a simulation of a batten luminaire (see Figure B.1), modified several times to improve reproducibility. The latest test arrangement is with the ballast lying on wooden supports (see IEC 61347-1:2015, Figure H.1). Practice has shown, however, little or no correlation between the temperatures measured on the ballast in that test arrangement and the actual temperatures when the ballast was built into a particular luminaire. For this reason, measurement of ballast heating in this test arrangement has been dropped and replaced by a much more realistic measurement based on the maximum permitted ballast winding temperature t_w .

The ballast heating test has thus been modified to represent the worst conditions in the luminaire permitted by the ballast manufacturer through the claimed value of t_w . Ballast parts are then checked with the ballast operating in an oven until the marked ballast winding temperature is reached.

Consequently, verification that the ballast winding temperature is not exceeded takes place in the luminaire. Ballast winding temperatures are then measured under normal as well as abnormal conditions of operation and compared against the marked values.

Built-in ballasts designed to be built into enclosures other than luminaires, such as a pole, box or the like, are also tested in the test arrangement of IEC 61347-1:2015, Figure H.1, as specified for built-in ballasts. Since these ballasts are not built into a luminaire, compliance with the temperature limits as specified in the luminaire standard is also checked in this test arrangement.

Independent ballasts are tested in a test corner. The test corner consists of three wooden boards arranged so as to simulate two walls and the ceiling of a room (see ~~figure J.2~~ Figure B.2).

All measurements are carried out in a draught-proof enclosure, as described in IEC 61347-1:2015, Annex F.

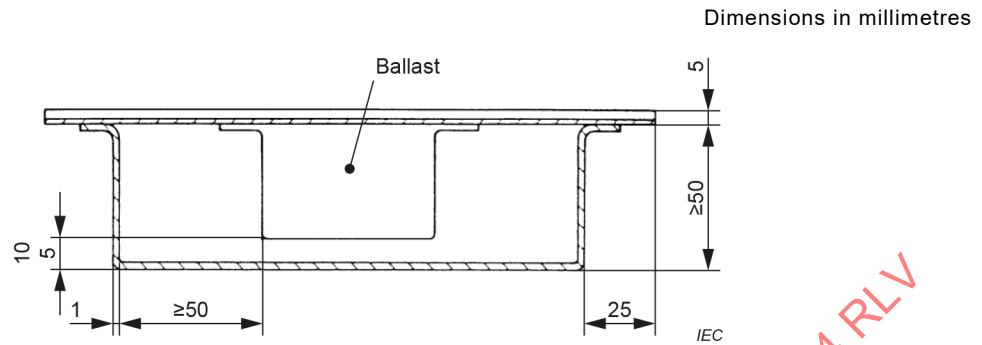


Figure J.1B.1 – Test hood for ballast heating test

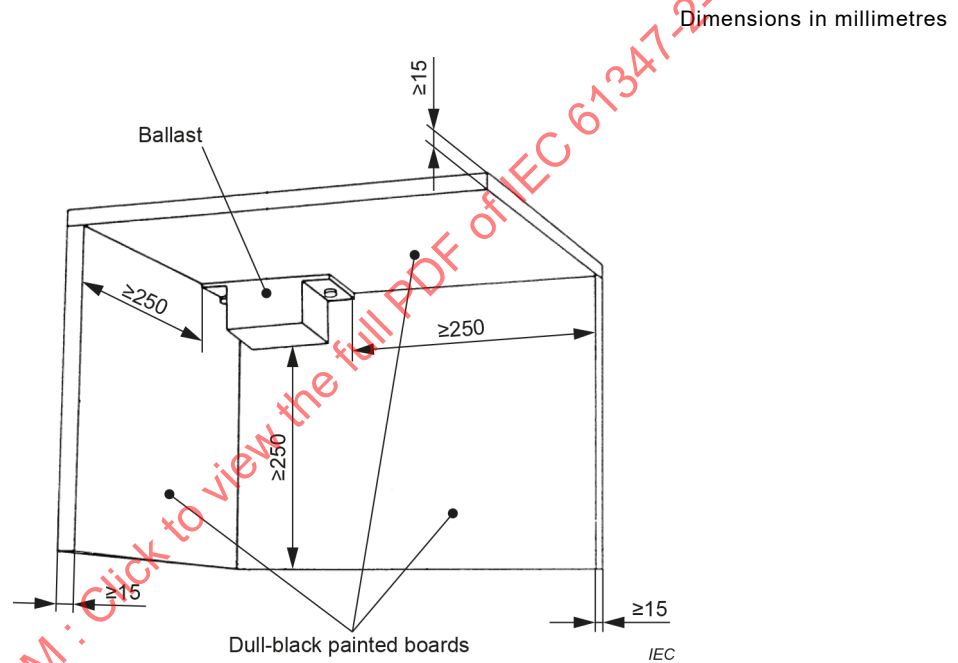


Figure J.2B.2 – Test corner for ballast heating

Annex K
(normative)

**Additional requirements for built-in magnetic ballasts
with double or reinforced insulation**

The requirements of Annex I of IEC 61347-1 apply.

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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 61347-2-8:2000 and IEC 61347-2-8:2000/AMD1:2006.

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IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

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

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

IEC 60921, *Ballasts for tubular fluorescent lamps – Performance requirements*

IEC 61048, *Auxiliaries for lamps – Capacitors for use in tubular fluorescent and other discharge lamp circuits – General and safety requirements*

IEC 61049, *Capacitors for use in tubular fluorescent and other discharge lamp circuits – Performance requirements*

IEC 61347-2-3, ~~Lamp controlgear – Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps⁴⁾~~ *Controlgear for electric light sources – Safety – Part 2-3: Particular requirements – AC or DC supplied electronic controlgear for fluorescent lamps*

IEC 61347-2-8:2000, *Lamp controlgear – Part 2-8: Particular requirements for ballasts for fluorescent lamps*

IEC 61347-2-8:2000/AMD1:2006

⁴⁾ ~~To be published.~~

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Appareillages de commande pour les sources de lumière électriques – Sécurité –
Partie 2-8: Exigences particulières – Ballasts pour lampes fluorescentes**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –**Part 2-8: Particular requirements – Ballasts for fluorescent lamps**

FOREWORD

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IEC 61347-2-8 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 and Amendment 1:2006. This edition constitutes a technical revision.

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

- a) introduction of dated references where appropriate;
- b) alignment of clause numbers with those of IEC 61347-1.

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

Draft	Report on voting
34C/1583/CDV	34C/1591/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 61347-2-8:2000 and IEC 61347-2-8:2000/AMD1:2006 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 61347-2-8:2000 and IEC 61347-2-12:2000/AMD1:2006.

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 2-8: Particular requirements – Ballasts for fluorescent lamps

1 Scope

This part of IEC 61347 specifies safety requirements for ballasts, excluding resistance types, for use on AC supplies up to 1 000 V at 50 Hz or 60 Hz, associated with fluorescent lamps with or without pre-heated cathodes operated with or without a starter or starting device and having rated powers, dimensions and characteristics as specified in IEC 60081 and IEC 60901.

This document applies to complete ballasts and to their component parts such as reactors, transformers and capacitors. Ballasts for conventional operation of lamps at mains frequency are covered, while AC supplied electronic ballasts for high-frequency operation are excluded.

NOTE 1 AC supplied electronic ballasts for high-frequency operation are specified in IEC 61347-2-3.

NOTE 2 Performance requirements are the subject of IEC 60921.

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 60317-0-1:2013, *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*
IEC 60317-0-1:2013/AMD1:2019

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

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

rated temperature rise of the ballast winding

Δt

temperature rise assigned by the manufacturer under the conditions specified in IEC 61347-2-8

Note 1 to entry: The specifications for the supply and mounting conditions of the ballast are given in IEC 61347-1:2015, Annex H.

4 General requirements

IEC 61347-1:2015, Clause 4 applies, together with the following:

- For thermally protected ballasts IEC 61347-1:2015, Annex B applies.
- For capacitors and other components incorporated in ballasts, the appropriate IEC standard applies.

NOTE Capacitors having a capacitance greater than 0,1 μF are covered by IEC 61048 and IEC 61049. Capacitors having a capacitance less than or equal to 0,1 μF are specified in IEC 60384-14.

5 General notes on tests

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

- The type test is carried out on one sample consisting of eight ballasts used for the purpose of the type test. Seven ballasts are for the endurance test and one for all other tests. For conditions of compliance for the endurance test, see Clause 13.
In addition, six ballasts are required for the high-voltage impulse testing according to Clause 15 below, for ballasts intended for circuits in which high-voltage impulse occurs within the ballast. There shall be no failure during the test.
- IEC 61347-1:2015, Annex H applies.
- In general, all the tests are carried out on each type of ballast or, where a range of similar ballasts is involved, on each rated power in the range, or on a representative selection from the range, as agreed with the manufacturer. A reduction in the number of samples for the endurance test, according to Clause 13 and including the use of constant S other than 4 500, as shown in IEC 61347-1:2015, Annex E, or even the omission of these tests, is allowed when ballasts of the same construction but with different characteristics are submitted together for approval, or when test reports from the manufacturer or other authority are accepted by the testing station.

For information on requalification of products compliant with the previous edition of this document, i.e. IEC 61347-2-8:2000 and IEC 61347-2-8:2000/AMD1:2006, refer to Annex C.

6 Classification

IEC 61347-1:2015, Clause 6 applies.

7 Marking

7.1 Marking and information

7.1.1 Mandatory marking

Ballasts, other than integral ballasts, shall be marked with the following:

- items a), b), e), f), g) and r) of IEC 61347-1:2015, 7.1 and IEC 61347-1:2015/AMD1:2017, 7.1;
- the peak value of the voltage produced, if the peak value exceeds 1 500 V, with connections subjected to this voltage marked as such.

Pulse generated by a glow starter and ballast combination are exempt from this requirement.

7.1.2 Information to be provided

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

- items c), h), i), j), k), o), p) and q) of IEC 61347-1:2015, 7.1;
- in the case of a ballast consisting of more than one separate unit, the current controlling inductive element(s), marked with the essential details of the other unit(s) or essential capacitors;
- in the case of an inductive ballast used with a separate series capacitor other than a radio interference suppression capacitor, repetition of the marking of rated voltage, capacitance and tolerance.

Manufacturers may provide the rated temperature rise of the ballast winding following the symbol Δt , values increasing in multiples of 5 K, if available.

7.2 Durability and legibility of marking

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.

12 Electric strength

IEC 61347-1:2015, Clause 12 applies.

13 Thermal endurance test for windings of ballasts

IEC 61347-1:2015, Clause 13 applies.

14 Ballast heating

14.1 General

Ballasts, including their mounting surfaces, shall not attain a temperature which would impair safety which is checked by the following tests.

14.2 Pre-test, checks and measures

Before the test, the following is checked and measured:

- a) the ballast starts and operates the lamp(s) normally;
- b) the resistance of each ballast winding is measured at the ambient temperature, if required.

14.3 Voltage across capacitors

At rated frequency, the voltage across a capacitor incorporated in a ballast shall comply with the requirements given in items a) and b) below. Such requirements do not apply to the capacitors in starters or starting devices or to those having a capacitance less than or equal to 0,1 μF (nominal). Neither do the requirements of item b) apply to self-healing capacitors.

- a) Under normal conditions, when the ballast is tested at its rated supply voltage, the voltage across the capacitor shall not exceed the rated voltage of the latter.
- b) Under abnormal conditions (see 14.4) when the ballast is tested at 110 % of its rated supply voltage, the voltage across the capacitor shall not be greater than the appropriate test voltage of the capacitor given in Table 1.

Table 1 – Abnormal conditions – Capacitor test voltages

Designation	Rated voltage U_n	Limiting voltage
Any	Rated voltage of 240 V or less, 50 Hz or 60 Hz and maximum rated temperature less than or equal to 50 °C	1,25 U_n
Non-self-healing	Other ratings, 50 Hz or 60 Hz	1,50 U_n
Self-healing	Other ratings, 50 Hz or 60 Hz	1,25 U_n

14.4 Ballast heating test

When the ballast is tested in accordance with the conditions of IEC 61347-1:2015, Annex H and the information given in Annex B, the temperature shall not exceed the appropriate values given in Table 2 for the tests under normal and abnormal conditions, if applicable.

NOTE Abnormal circuit conditions are detailed in IEC 60598-1:2020, Annex C.

Table 2 – Maximum temperatures

Parts	Maximum temperature		
	°C		
	Normal operation at 100 % of rated voltage	Normal operation at 106 % of rated voltage	Abnormal operation at 110 % of rated voltage
Ballast windings if Δt is provided	a		
Ballast windings with declared temperature under abnormal conditions			b
Ballast case adjacent to capacitor, if any (incorporated in ballast enclosure)			
– without temperature declaration		50	
– with indication of t_c		t_c	
Parts made of			
– wood-filled phenolic mouldings		110	
– mineral-filled phenolic mouldings		145	
– urea mouldings		90	
– melamine mouldings		100	
– laminated, resin bonded paper		110	
– rubber		70	
– thermoplastic materials		c	
^a The measurement of the temperature rise of the ballast windings under normal conditions at 100 % of rated voltage – i.e. verification of a declared value so as to provide information for luminaire design – is non-mandatory and its measurement is only performed when marked on the ballast or otherwise required in the catalogue. ^b This measurement is only mandatory for circuits which can produce abnormal conditions. The declared limiting temperature of the ballast windings under abnormal conditions shall not be higher than the value which corresponds to a number of days equal to at least two-thirds of the theoretical endurance test period (see Table 3). ^c The temperature of thermoplastic material, other than that used for the insulation of the wiring, which provides protection against contact with live parts or supporting such parts, is also measured. Values thus obtained serve to establish the conditions of the test of IEC 61347-1:2015, 18.1.			

If materials or manufacturing methods are used other than those indicated in Table 2, they shall not be operated at temperatures higher than those which are proved to be permissible for those materials.

The temperature in Table 2 shall not be exceeded when the ballast is operated at its maximum declared ambient temperature, if any. Maximum ambient temperature for a ballast, if not declared, shall be considered as the difference between the marked t_w and the measured ballast winding temperature rise at 100 % rated voltage.

Table 3 – Limiting temperatures of ballast windings under abnormal operating conditions and at 110 % of rated voltage for ballasts subjected to an endurance test duration of 30 days

Constant S		Limiting temperature °C					
		S4,5	S5	S6	S8	S11	S16
For $t_w =$	90	171	161	147	131	119	110
	95	178	168	154	138	125	115
	100	186	176	161	144	131	121
	105	194	183	168	150	137	126
	110	201	190	175	156	143	132
	115	209	198	181	163	149	137
	120	217	205	188	169	154	143
	125	224	212	195	175	160	149
	130	232	220	202	182	166	154
	135	240	227	209	188	172	160
	140	248	235	216	195	178	166
	145	256	242	223	201	184	171
	150	264	250	230	207	190	177
The limiting temperatures specified in column S4,5 apply, unless otherwise indicated on the ballast.							

For ballasts which are subjected to an endurance test duration of longer than 30 days, the limiting temperatures shall be calculated using IEC 61347-1:2015, Clause 13, Equation (2), but for an objective test life (in days) equal to two-thirds of the theoretical endurance test period. Table 2 shall be read together with Table 3 where necessary.

14.5 Marking legibility and electric strength after test

After these heating tests, the ballast shall be allowed to cool to room temperature and shall comply with the following conditions:

- the ballast marking shall still be legible;
- the ballast shall withstand without damage a voltage test according to Clause 12, the test voltage, however, being reduced to 75 % of the values given in IEC 61347-1:2015, Clause 12, but not less than 500 V.

15 High-voltage impulse testing

15.1 General

Ballasts marked in accordance with 7.1.2 with a rated temperature rise of the ballast winding shall be subjected to the test either in 15.2 or 15.3 below according to their type.

The manufacturer shall declare to which test their product has been subjected.

15.2 Simple reactor type ballasts

From the six ballasts specified in Clause 5, three are subjected to the moisture resistance and insulation test and the electric strength test specified in Clause 11 and Clause 12.

The remaining three ballasts are heated in an oven until they attain the temperature t_w marked on the ballast.

Immediately following these pre-conditioning tests, all six samples shall withstand the high-voltage impulse test.

The ballast under test, together with a variable resistor and a suitable circuit breaker with a closing time (bounce time excluded) between 3 ms and 15 ms – for example, a vacuum switch type H16 or VR312/412 – is connected to a DC current in such a way that, by adjusting the current and operating the circuit breaker, voltage pulses will be induced in the ballast. The current is then adjusted slowly, increasing so that the peak voltage marked on the ballast is reached. The measurement of the voltage pulses is made directly at the ballast terminations and in accordance with Annex A and Figure A.1.

WARNING – *If electronic circuit breakers with a very short closing time are used, very high induced pulse voltages can be generated. Measures shall be taken to avoid an electric shock.*

The value of the DC current at which the starting voltage is reached is noted. The ballasts are then operated with this current for 1 h and the current is interrupted during this time, 10 times for 3 s within every minute.

Immediately after the test all six ballasts shall withstand the moisture resistance and insulation test and the electric strength test specified in Clause 11 and Clause 12.

For testing circuits with series capacitors, the capacitor shall be short-circuited.

15.3 Ballasts other than simple reactor type ballasts

Without connection of the lamp on the output side of the ballast, the supply voltage is adjusted in order to obtain the pulse voltage, generated by the starter and the ballast, of the marked value on the ballast. Cathode heating windings of the ballast are loaded with dummy resistors.

Then, the ballast is operated under these conditions without a lamp for a period of 30 days.

The number of ballasts, before-test treatment and conditions after the test are the same as those specified in 15.2.

Ballasts which are marked for exclusive use with an ignitor having a time delay device are subjected to the same test, but for a period consisting of 250 on/off cycles, keeping an off period of at least 2 min.

16 Construction

IEC 61347-1:2015, Clause 15 applies.

17 Creepage distances and clearances

IEC 61347-1:2015, Clause 16 and IEC 61347-1:2015/AMD1:2017, Clause 16 apply, together with the following:

In open-core ballasts, enamel, or similar material which forms the insulation for a wire and withstands the voltage test for grade 1 or grade 2 of IEC 60317-0-1:2013, Clause 13 is judged to contribute 1 mm to the values given in IEC 61347-1:2015, Table 3 and Table 4 between enamelled wires of different ballast windings or from enamelled wire to covers, iron cores, etc. However, this applies only in the situation where creepage distances and clearances are not less than 2 mm in addition to the enamelled layers.

18 Screws, current-carrying parts and connections

IEC 61347-1:2015, Clause 17 applies.

19 Resistance to heat, fire and tracking

IEC 61347-1:2015, Clause 18, with the exception of 18.5, applies.

20 Resistance to corrosion

IEC 61347-1:2015, Clause 19 applies.

21 No-load output voltage

IEC 61347-1:2015, Clause 20 applies.

22 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 B (normative) Particular requirements for thermally protected lamp controlgear;
- Annex D (normative) Requirements for carrying out the heating tests of thermally protected lamp controlgear;
- Annex E (normative) Use of constant S other than 4 500 in t_w tests;
- Annex F (normative) Draught-proof enclosure;
- Annex H (normative) Tests.

Annex A (normative)

Method for selection of varistors

A.1 General

In order to avoid voltage variations during measurement of voltage pulses, a number of varistors in series is connected in parallel to the ballast under test.

Given the energy involved, the smallest types of varistors are sufficient for this purpose.

The voltage built up within the ballast depends not only on its inductance, the DC current and the capacitance C_2 , but also on the quality of the vacuum switch, as part of the energy stored in the ballast will be discharged via the spark occurring at the switch.

Therefore, it is necessary to select the varistors together with the switch used for the circuit.

Because of the fact that the varistors have tolerances which may add or compensate themselves, an individual selection is necessary for each type of ballast to be tested.

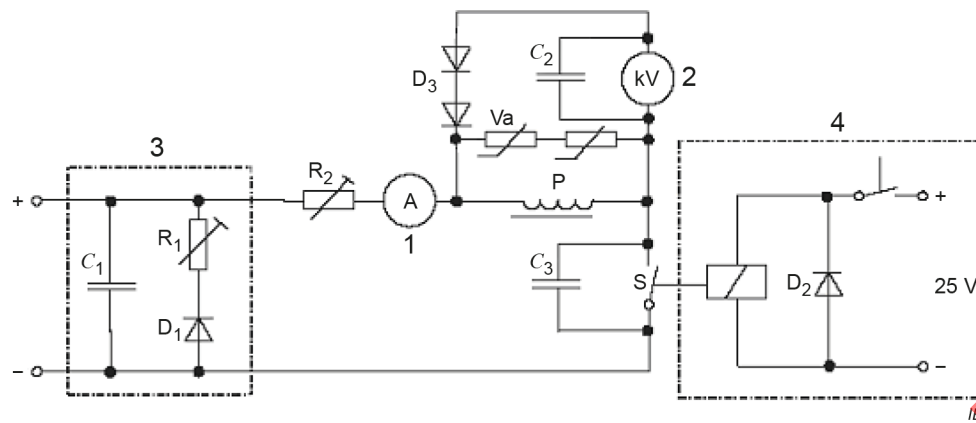
A.2 Selection of the varistors

The ballast current is first adjusted so that the voltage across C_2 is approximately 15 % to 20 % higher than the foreseen test voltage.

The voltage is then reduced to the intended value by means of varistors connected in series.

It is advisable to take two or three high-voltage varistors to cover the greatest part of the test voltage and to use one or two varistors of lower voltage to cover the rest of the test voltage. The fine adjustment of the test voltage can then be made by varying the current through the ballast.

Approximate values for the voltage of the single varistors can be chosen from the voltage current characteristics given in the relevant varistor data sheets (e.g. voltage value at $I = 10 \text{ mA}$).



Key

- 1 ammeter for measuring the DC current
- 2 electrostatic voltmeter with a self-capacitance not exceeding 30 pF for measuring the pulse voltage
- 3 protection device for power supply
- 4 supply for switch control: optional
- $C_1 = 0,66 \mu\text{F}$
- $C_2 = 5\,000 \text{ pF}$
- $C_3 = 50 \text{ pF}$
- $D_1 =$ Diode ZD22
- $D_2 =$ Diode IN4004
- $D_3 =$ Diode (6 pieces) BYV96E
- P test sample
- R_1 adjustable resistor (resistance of approximately 100Ω)
- R_2 adjustable resistor: $R_2 \geq \text{ballast resistance} \times 20$
- S vacuum switch
- Va varistors

Figure A.1 – Test circuit for electromagnetic controlgear, for lamps with integral starting devices

Annex B (informative)

Explanation of ballast temperatures

B.1 General

NOTE This Annex B does not introduce any new proposal but reflects the current state of the requirements.

The object of ballast temperature requirements is to verify that the ballast functions safely during its intended life.

Ballast life is determined by the quality of the wire insulation connected with the ballast construction.

The thermal behaviour of a ballast is thus characterized by the following aspects:

- a) endurance;
- b) ballast heating;
- c) test arrangement.

The following explanation applies to coil type ballasts.

B.2 Endurance

The starting point is the claimed ballast winding temperature t_w , denoting the temperature which gives a life expectancy of at least 10 years continuous operation at that temperature. The relation between ballast winding temperature and ballast life can be calculated from the following equation:

$$\log L = \log L_o + S \left(\frac{1}{T} - \frac{1}{T_w} \right) \quad (\text{B.1})$$

where

L is the objective test life in days, 30 days being the standard but the manufacturer may ask for a longer testing time at a related lower temperature;

$L_o = 3\,652$ days (10 years);

T is the theoretical test temperature ($t/^\circ\text{C} + 273$) K; t being the theoretical ballast winding test temperature in $^\circ\text{C}$;

T_w is the rated maximum operating temperature ($t_w/^\circ\text{C} + 273$) K;

S is the constant depending on the design of the ballast and the ballast winding insulation used. If no claim is made to the contrary, S is taken to be 4 500 but a manufacturer may claim the use of other values if this is justified by the relevant tests.

Consequently, the endurance test can be carried out in a much shorter time than 10 years at a related higher ballast winding temperature. The standard endurance test period is 30 days, but longer test durations, up to 120 days, are permitted.

B.3 Ballast heating

For ballasts designed to be built into a luminaire, it should be checked that the assigned ballast winding temperature (t_w) in the luminaire is not exceeded under normal operating conditions, in accordance with the luminaire standard.

Moreover, under abnormal operating conditions, such as a short-circuited starter in a fluorescent lamp circuit, the luminaire is checked to see that the relevant limit which shall be marked on the ballast is not exceeded. This limit is specified as the temperature corresponding to a life of two-thirds of the test time for the ballast endurance test. This requirement is based on and derived from the tables with limiting temperatures and theoretical test temperatures for a ballast subject to an endurance test duration of 30 days and based on the assumption that a t_w 90 ballast is comparable in requirements to a ballast without temperature marking, and with layers separated by paper.

The above information means that the limiting temperature under abnormal conditions is for example the temperature corresponding to a 20-day life span for a ballast subjected to a 30-day endurance test. This relation is based on the traditional limits for the limiting temperature of ballast windings and the objective test temperature for the endurance test. However, the manufacturer is free to mark a lower temperature if the manufacturer so wishes.

Verification in the luminaire is based on the limiting values marked on the ballast. This implies that if a manufacturer has elected to use a longer endurance test, at a correspondingly lower temperature, then the maximum permissible temperature under abnormal conditions is correspondingly reduced.

B.4 Test arrangement

Originally, ballast temperatures were checked on a ballast in a test arrangement which was a simulation of a batten luminaire (see Figure B.1), modified several times to improve reproducibility. The latest test arrangement is with the ballast lying on wooden supports (see IEC 61347-1:2015, Figure H.1). Practice has shown, however, little or no correlation between the temperatures measured on the ballast in that test arrangement and the actual temperatures when the ballast was built into a particular luminaire. For this reason, measurement of ballast heating in this test arrangement has been dropped and replaced by a much more realistic measurement based on the maximum permitted ballast winding temperature t_w .

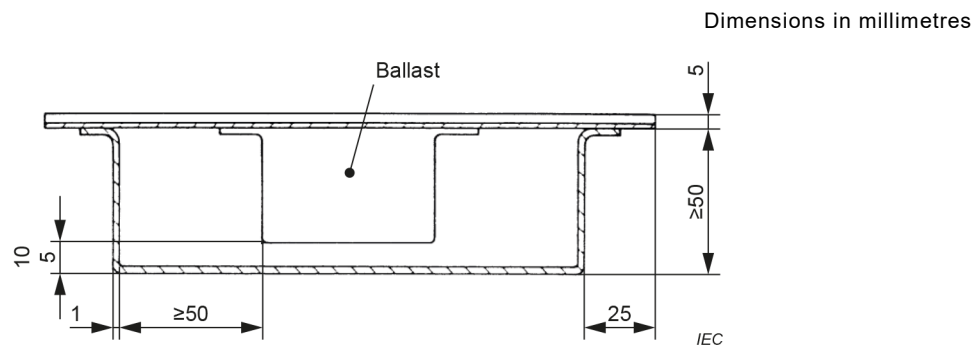
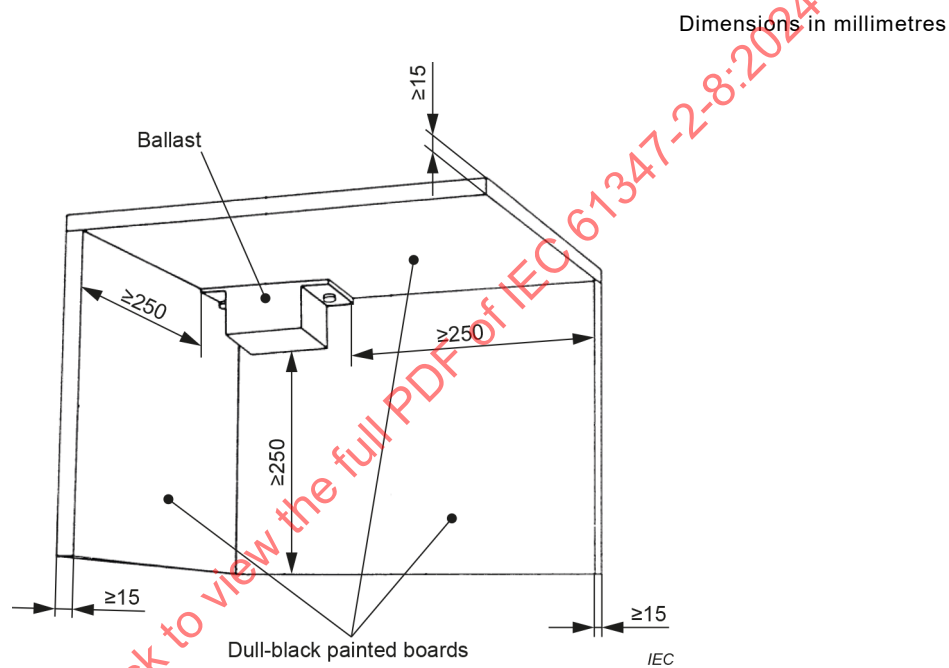
The ballast heating test has thus been modified to represent the worst conditions in the luminaire permitted by the ballast manufacturer through the claimed value of t_w . Ballast parts are then checked with the ballast operating in an oven until the marked ballast winding temperature is reached.

Consequently, verification that the ballast winding temperature is not exceeded takes place in the luminaire. Ballast winding temperatures are then measured under normal as well as abnormal conditions of operation and compared against the marked values.

Built-in ballasts designed to be built into enclosures other than luminaires, such as a pole, box or the like, are also tested in the test arrangement of IEC 61347-1:2015, Figure H.1, as specified for built-in ballasts. Since these ballasts are not built into a luminaire, compliance with the temperature limits as specified in the luminaire standard is also checked in this test arrangement.

Independent ballasts are tested in a test corner. The test corner consists of three wooden boards arranged so as to simulate two walls and the ceiling of a room (see Figure B.2).

All measurements are carried out in a draught-proof enclosure, as described in IEC 61347-1:2015, Annex F.

**Figure B.1 – Test hood for ballast heating test****Figure B.2 – Test corner for ballast heating**

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 61347-2-8:2000 and IEC 61347-2-8:2000/AMD1:2006.

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IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

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

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

IEC 60921, *Ballasts for tubular fluorescent lamps – Performance requirements*

IEC 61048, *Auxiliaries for lamps – Capacitors for use in tubular fluorescent and other discharge lamp circuits – General and safety requirements*

IEC 61049, *Capacitors for use in tubular fluorescent and other discharge lamp circuits – Performance requirements*

IEC 61347-2-3, *Controlgear for electric light sources – Safety – Part 2-3: Particular requirements – AC or DC supplied electronic controlgear for fluorescent lamps*

IEC 61347-2-8:2000, *Lamp controlgear – Part 2-8: Particular requirements for ballasts for fluorescent lamps*

IEC 61347-2-8:2000/AMD1:2006

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**APPAREILLAGES DE COMMANDE POUR LES SOURCES
DE LUMIÈRE ÉLECTRIQUES – SÉCURITÉ –****Partie 2-8: Exigences particulières – Ballasts pour lampes fluorescentes****AVANT-PROPOS**

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L'IEC 61347-2-8 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 et l'Amendement 1:2006. Cette édition constitue une révision technique.

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

- a) ajout de références datées le cas échéant;

b) alignement des numéros d'articles sur ceux de l'IEC 61347-1.

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

Projet	Rapport de vote
34C/1583/CDV	34C/1591/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.

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- reconduit,
- supprimé, ou
- révisé.

INTRODUCTION

Les exigences techniques spécifiées dans le présent document par rapport à l'IEC 61347-2-8:2000 et à l'IEC 61347-2-8:2000/AMD1:2006 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 61347-2-8:2000 et l'IEC 61347-2-12:2000/AMD1:2006.

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 2-8: Exigences particulières – Ballasts pour lampes fluorescentes

1 Domaine d'application

La présente partie de l'IEC 61347 spécifie les exigences de sécurité des ballasts autres que ceux du type à résistance, destinés à être utilisés avec des alimentations jusqu'à 1 000 V en courant alternatif à 50 Hz ou 60 Hz, associés à des lampes fluorescentes avec ou sans cathodes préchauffées fonctionnant avec ou sans starter ou dispositif d'amorçage et dont les puissances assignées, les dimensions et les caractéristiques sont spécifiées dans l'IEC 60081 et l'IEC 60901.

Le présent document s'applique aux ballasts complets ainsi qu'à leurs composants, comme les réactances, les transformateurs et les condensateurs. Les ballasts destinés à l'alimentation conventionnelle des lampes à la fréquence du réseau sont couverts, mais les ballasts électroniques alimentés en courant alternatif pour l'alimentation en haute fréquence sont exclus.

NOTE 1 Les ballasts électroniques alimentés en courant alternatif pour l'alimentation en haute fréquence sont spécifiés dans l'IEC 61347-2-3.

NOTE 2 Les exigences de performance sont traitées dans l'IEC 60921.

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 60317-0-1:2013, *Spécifications pour types particuliers de fils de bobinage – Partie 0-1: Exigences générales – Fil de section circulaire en cuivre émaillé*
IEC 60317-0-1:2013/AMD1:2019

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

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 échauffement assigné de l'enroulement du ballast

Δt

échauffement assigné par le fabricant dans les conditions spécifiées dans l'IEC 61347-2-8

Note 1 à l'article: Les spécifications pour les conditions d'alimentation et de montage du ballast sont fournies à l'Annexe H de l'IEC 61347-1:2015.

4 Exigences générales

L'IEC 61347-1:2015, Article 4 s'applique, ainsi que ce qui suit:

- Pour les ballasts à protection thermique, l'IEC 61347-1:2015, Annexe B s'applique.
- Pour les condensateurs et autres composants incorporés dans des ballasts, la norme IEC appropriée s'applique.

NOTE Les condensateurs de capacité supérieure à 0,1 μF sont traités dans l'IEC 61048 et l'IEC 61049. Les condensateurs de capacité inférieure ou égale à 0,1 μF sont spécifiés dans l'IEC 60384-14.

5 Généralités sur les essais

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

- L'essai de type est effectué sur un échantillon comprenant huit ballasts utilisés à cet effet. Sept ballasts sont soumis à l'essai d'endurance, et un seul ballast est soumis à tous les autres essais. Pour les conditions de conformité de l'essai d'endurance, voir l'Article 13.

En outre, six ballasts sont exigés pour l'essai aux impulsions de haute tension conformément à l'Article 15 ci-dessous, pour les ballasts destinés à des circuits dans lesquels des impulsions de haute tension se produisent à l'intérieur du ballast. Aucune défaillance ne doit être observée pendant l'essai.

- L'IEC 61347-1:2015, Annexe H s'applique.
- En général, tous les essais sont effectués sur chaque type de ballast ou, lorsqu'une gamme de ballasts similaires est concernée, pour chaque puissance assignée de la gamme ou sur une sélection représentative de la gamme, en accord avec le fabricant. Une réduction du nombre de ballasts soumis à l'essai d'endurance selon l'Article 13 y compris l'utilisation de constantes S différentes de 4 500 comme cela est expliqué dans l'IEC 61347-1:2015, Annexe E voire l'omission de ces essais est admise lorsque des ballasts de même conception mais de caractéristiques différentes sont soumis en même temps à l'homologation, ou lorsque les rapports d'essai fournis par le fabricant ou une autre instance sont acceptés par le laboratoire d'essai.

Pour plus d'informations sur la requalification des produits conformes à l'édition précédente du présent document, c'est-à-dire l'IEC 61347-2-8:2000 et l'IEC 61347-2-8:2000/AMD1:2006, voir l'Annexe C.

6 Classification

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

7 Marquage

7.1 Marquages et informations

7.1.1 Marquages obligatoires

Les ballasts, autres que les ballasts intégrés, doivent porter les marquages suivants:

- les marquages a), b), e), f), g) et r) indiqués dans l'IEC 61347-1:2015, 7.1 et l'IEC 61347-1:2015/AMD1:2017, 7.1;
- la valeur de crête de la tension générée, si cette valeur dépasse 1 500 V, les connexions soumises à cette tension étant marquées en conséquence.

Les impulsions générées par l'ensemble constitué d'un starter à lueur et d'un ballast ne sont pas soumises à cette exigence.

7.1.2 Informations à fournir

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

- les marquages c), h), i), j), k), o), p) et q) indiqués dans l'IEC 61347-1:2015, 7.1;
- si le ballast comporte plus d'une unité séparée, les informations essentielles relatives à l'autre unité ou aux autres unités ou aux condensateurs essentiels apposées par marquage sur l'élément inductif ou les éléments inductifs de commande de courant;
- si un ballast inductif est utilisé avec un condensateur en série séparé (autre qu'un condensateur d'antiparasitage), répétition du marquage de la tension assignée, de la capacité et de la tolérance.

Les fabricants peuvent indiquer l'échauffement assigné de l'enroulement du ballast, après le symbole Δt , les valeurs croissant par multiples de 5 K.

7.2 Durabilité et lisibilité du marquage

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.

12 Rigidité diélectrique

L'IEC 61347-1:2015, Article 12 s'applique.