IEC 61347-2-9

Edition 2.0 2012-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Appareillages de lampes –
Partie 2-9: Exigences particulières pour les appareillages électromagnétiques pour lampes à décharge (à l'exclusion des lampes fluorescentes)

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FOREWORD

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International Standard IEC 61347-2-9 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

This second edition cancels and replaces the first edition published in 2000, Amendment 1:2003 and Amendment 2:2006. This edition constitutes a technical revision.

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

a) the addition of a new Clause 14;

b) the word "ballast" is changed to "electromagnetic controlgear".

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

FDIS	Report on voting
34C/1022/FDIS	34C/1028/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This standard shall be used in conjunction with IEC 61347-1.

This Part 2-9 supplements or modifies the corresponding clauses in IEC 61347-1, so as to convert that publication into the IEC Standard: Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps).

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.

NOTE In this standard, the following print types are used:

– Requirements proper: in roman type.
– *Test specifications: in italic type*.
– Explanatory matter: in smaller roman type.

A list of all parts of the IEC 61347 series, published under the general title *Lamp controlgear,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

INTRODUCTION

This second edition of IEC 61347-2-9 is published in conjunction with IEC 61347-1. 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.

LAMP CONTROLGEAR –

Part 2-9: Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps)

1 Scope

This part of the IEC 61347 series specifies particular safety requirements for electromagnetic controlgear for discharge lamps such as high-pressure mercury vapour, low-pressure sodium vapour, high-pressure sodium vapour and metal halide lamps. The standard covers inductive-type electromagnetic controlgear for use on a.c. supplies up to 1 000 V at 50 Hz or 60 Hz, associated with discharge lamps, having rated wattages, dimensions and characteristics as specified in IEC 60188, IEC 60192 and IEC 60662.

This standard applies to complete electromagnetic controlgear and to their component parts such as reactors, transformers and capacitors. Particular requirements for thermally protected electromagnetic controlgear are given in Annex B.

For certain types of discharge lamps, an ignitor is required.

NOTE Electromagnetic controlgear for fluorescent lamps are covered by IEC 61347-2-8.

Performance requirements are the subject of IEC 60923.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

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

IEC 61347-1:2007, *Lamp controlgear – Part 1: General and safety requirements Amendment 1:2010*

IEC 61347-2-1, *Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)*

IEC 62035, *Discharge lamps (excluding fluorescent lamps) – Safety specifications*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 61347-1:2007, together with the following apply:

3.1
rated temperature rise of an electromagnetic controlgear winding
Δt
temperature rise assigned by the manufacturer under the conditions specified in this standard

Note 1 to entry: The specifications for the supply and mounting conditions of the electromagnetic controlgear are given in Annex H.

3.2
high-voltage impulse
intentionally applied periodic transient voltage which rises rapidly to a peak value and then falls, usually less rapidly, to zero

Note 1 to entry: The term "impulse" is to be distinguished from the term "surge", which refers to transients occurring in electrical equipment or networks in service.

Note 2 to entry: Such an impulse is, in general, well represented by the sum of two exponentials.

4 General requirements

4.1 General

The requirements of Clause 4 of IEC 61347-1:2007 apply, together with the following additional requirements:

4.2 Capacitors and other components

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

4.3 Thermally protected electromagnetic controlgear

Thermally protected electromagnetic controlgear shall comply with the requirements of Annex B.

5 General notes on tests

The requirements of Clause 5 of IEC 61347-1:2007 apply, together with the following additional requirements:

The type test is carried out on one sample consisting of eight electromagnetic controlgear submitted for the purpose of the type test. Seven electromagnetic controlgear 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 electromagnetic controlgear are required for the high-voltage impulse testing according to Clause 15 below, for electromagnetic controlgear for metal halide and high-pressure sodium lamps. There shall be no failure during the test.

The tests are made under the conditions specified in Annex H of IEC 61347-1:2007. In general, all the tests are carried out on each type of electromagnetic controlgear or, where a range of similar electromagnetic controlgear 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 Annex E, or even the omission of these tests, is allowed when electromagnetic controlgear 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.

6 Classification

The requirements of Clause 6 of IEC 61347-1:2007 apply.

7 Marking

7.1 General

Electromagnetic controlgear which form an integral part of the luminaire need not be marked. For electromagnetic controlgear intended to be mounted in the base compartment of a column, all necessary markings according to 7.2 and 7.3 shall be on the electromagnetic controlgear. The requirements of 7.2 of IEC 61347-1:2007 apply.

7.2 Mandatory markings

Electromagnetic controlgear, other than integral electromagnetic controlgear, shall be clearly and durably marked with the following mandatory markings:

– items a), b), e), f), g) and r) of 7.1 of IEC 61347-1:2007, together with:

– in the case of electromagnetic controlgear intended to be used with ignitors (IEC 61347-2-1), the terminals/terminations subjected to the pulse voltage shall be marked on the electromagnetic controlgear.

This marking may be in the form of a wiring diagram. Simple reactor electromagnetic controlgear which have several uses, for example, for controlling high-pressure mercury vapour lamps, certain metal halide lamps, etc., need not be marked in this way.

7.3 Information to be provided, if applicable

In addition to the above mandatory markings, the following information, if applicable, shall be given either on the electromagnetic controlgear, or be made available in the manufacturer's catalogue or similar.

– Items c), h), i), j), k), o), p) and q) of 7.1 of IEC 61347-1:2007, together with:
  – for electromagnetic controlgear for use with high-pressure sodium vapour or metal halide lamps:
    1) the maximum peak value of the pulse voltage to which the electromagnetic controlgear can be subjected if this value exceeds 1 500 V;
    2) the catalogue reference of the ignitor(s) which may be used with the electromagnetic controlgear.

– In the case of an electromagnetic controlgear 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 electromagnetic controlgear used with a separate series capacitor other than a radio interference suppression capacitor, repetition of the marking of rated voltage, capacitance and tolerance.

– Advice to the installer to prevent overheating of electromagnetic controlgear and associated components in a multi-electromagnetic controlgear installation mounted in poles, boxes, etc.

7.4 Other information

Manufacturers may provide the following non-mandatory information, if available:

– the rated temperature rise of the winding following the symbol Δt, values increasing in multiples of 5 K.

8 Protection against accidental contact with live parts

The requirements of Clause 10 of IEC 61347-1:2007 apply.

9 Terminals

The requirements of Clause 8 of IEC 61347-1:2007 apply.

10 Provisions for earthing

The requirements of Clause 9 of IEC 61347-1:2007, Amendment 1:2010 apply.

11 Moisture resistance and insulation

The requirements of Clause 11 of IEC 61347-1:2007, Amendment 1:2010 apply.

12 Electric strength

The requirements of Clause 12 of IEC 61347-1:2007 apply.

Additionally for electromagnetic controlgear using ignitors where the pulse voltage is generated within the electromagnetic controlgear an electric strength test shall be conducted across insulation barriers subject to the ignition voltage. The test voltages are specified in Table 1.

Table 1 – Test voltages for electromagnetic controlgear generating pulse voltages

	Pulse voltage ≤ 4 U × 1,414	**Pulse voltage > 4 U × 1,414**
Double or reinforced insulation	4 U + 2 750 V	U_{pmax}/1,414 + 2 750 V
Basic or supplementary insulation	2 U + 1 000 V	U_{pmax}/2 × 1,414 + 1 000 V

13 Thermal endurance test for windings

The requirements of Clause 13 of IEC 61347-1:2007 apply.

14 Electromagnetic controlgear heating

14.1 General

Electromagnetic controlgear, or their mounting surfaces, shall not attain a temperature which would impair safety.

Compliance is checked by the tests of 14.1 to 14.3 and H.12 of IEC 61347-1:2007.

14.2 Test requirements

When the electromagnetic controlgear is tested in accordance with the requirements of 14.2 and 14.3, the temperature shall not exceed the appropriate values given in Table 2 for the test under normal and abnormal conditions.

Before the test, the following shall be checked and measured:

a) the electromagnetic controlgear shall start and operate the lamp(s) normally;

b) the resistance of each winding shall be measured, if required, at the ambient temperature.

After this heating test, the electromagnetic controlgear shall be allowed to cool to room temperature and then shall comply with the following conditions:

c) the electromagnetic controlgear marking shall still be legible;

d) the electromagnetic controlgear shall withstand without damage a dielectric strength test according to Clause 12, the test voltage, however, being reduced to 75 % of the value given in Table 1 of IEC 61347-1:2007, but not less than 500 V.

14.3 Normal operating condition

For the test under normal conditions, electromagnetic controlgear are operated with appropriate lamps which are placed in such a way that the heat generated does not contribute to the heating of the electromagnetic controlgear. Lamps are deemed to be appropriate if they pass, under the prescribed test conditions, a current within the tolerances of the current a reference lamp would pass.

The winding temperature t_w with declared temperature rise Δt of the winding, the temperature of capacitors and other parts listed in Table 2 if used with the electromagnetic controlgear shall not exceed the values according to Table 2.

Electromagnetic controlgear windings with temperature rise Δt are tested under normal conditions with the following details:

– 100 % of rated voltage and at rated frequency,

– until steady temperature is attained.

Capacitors and parts listed in Table 2 are tested under normal conditions with the following details:

– 106 % of rated voltage and at rated frequency,

– until steady temperature is attained.

14.4 Abnormal operating condition

The abnormal operating conditions test is only required for electromagnetic controlgear for some metal halide lamps and some high pressure sodium vapour lamps which, according to the lamp safety standard IEC 62035, can lead to electromagnetic controlgear overloading.

For electromagnetic controlgear designed in accordance to Annex B of IEC 61347-1:2007, Amendment 1:2010 the abnormal test is not required.

The abnormal operating tests for electromagnetic controlgear are only required in the built-in situation in the luminaires and they are a part of the luminaires verifications. The tests for abnormal circuit conditions are described in IEC 60598-1, Annex C.

Table 3 and Table 4 represent the context between the constants S and the limiting temperature for different winding temperatures t_w. Table 3 stands for the endurance test duration of 30 days and Table 4 for the endurance test duration of 60 days.

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
Electromagnetic controlgear winding	t_w	-	-
with declared temperature rise Δt	Δt [a]	-	-
Electromagnetic controlgear winding	-	-	limiting temperature t_w according to Table 3
with declared temperature rise Δt under abnormal conditions	-	-	Δt_{ab} [b]
Electromagnetic controlgear case adjacent to capacitor, if any (incorporated in electromagnetic controlgear 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]	-

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

The temperatures in this table shall not be exceeded when the electromagnetic controlgear is operated at its maximum declared ambient temperature. The values in the table are based on an ambient temperature of 25 °C.

[a] The measurement of the temperature rise of the 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 electromagnetic controlgear or otherwise claimed in the catalogue.

[b] This measurement is only mandatory for circuits which may produce abnormal conditions. The declared limiting temperature of the windings under abnormal conditions (if any) is not measured but should correspond to a number of days at least equal to two-thirds of the theoretical endurance test period so as to provide information for luminaire design (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 18.1 of IEC 61347-1:2007.

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

Constant *S*		Limiting temperature °C					
		***S*4,5**	***S*5**	***S*6**	***S*8**	***S*11**	***S*16**
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

Table 4 – Limiting temperatures of windings under abnormal operating conditions and at 110 % of rated voltage for electromagnetic controlgear marked D6 which are subjected to an endurance test duration of 60 days

Constant *S*		Limiting temperature °C					
		***S*4,5**	***S*5**	***S*6**	***S*8**	***S*11**	***S*16**
For t_w =	90	158	150	139	125	115	107
	95	165	157	145	131	121	112
	100	172	164	152	137	127	118
	105	179	171	158	144	132	123
	110	187	178	165	150	138	129
	115	194	185	171	156	144	134
	120	201	192	178	162	150	140
	125	208	199	184	168	155	145
	130	216	206	191	174	161	151
	135	223	213	198	180	167	156
	140	231	220	204	186	173	162
	145	238	227	211	193	179	168
	150	246	234	218	199	184	173