IEC 61347-1

Edition 4.0 2024-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Controlgear for electric light sources – Safety – Part 1: General requirements

Appareillages de commande pour les sources de lumière électriques – Sécurité – Partie 1: Exigences générales

IEC 61347-1:2024-06(en-fr)

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

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

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

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

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 It also gives information on projects, replaced and withdrawn publications.

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

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

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

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

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 61347-1

Edition 4.0 2024-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Controlgear for electric light sources – Safety – Part 1: General requirements

Appareillages de commande pour les sources de lumière électriques – Sécurité – Partie 1: Exigences générales

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.140.99

ISBN 978-2-8322-9057-6

CONTENTS

FOREWORD 8
INTRODUCTION 11
1 Scope 12
2 Normative references 12
3 Terms and definitions 14
4 General requirements 25
4.1 General 25
4.2 Transformers 25
4.3 Information for controlgear design in light sources standards 26
5 General notes on tests 26
5.1 General 26
5.2 Sample size 26
5.3 Test sequence 26
5.4 DC supplied controlgear 27
6 Information and marking 27
6.1 General 27
6.2 Information and marking items 27
6.3 Durability and legibility of marking 31
6.4 Built-in controlgear without an enclosure and integral controlgear 31
7 Terminals 32
8 Earthing 32
8.1 General 32
8.2 Protective earthing 32
8.2.1 Constructional requirements 32
8.2.2 Earthing via printed circuit board tracks 33
8.2.3 Earthing via independent controlgear 33
8.2.4 Conditioning and compliance 33
8.3 Functional earthing 34
9 Protection against accidental contact with hazardous live parts 34
9.1 General 34
9.2 Capacitors 34
9.3 ELV limits 35
9.4 SELV and PELV touch currents 35
9.5 Safety isolating controlgear which does not rely upon the luminaire enclosure for protection against electric shock 36
9.5.1 General 36
9.5.2 Touch voltage limits 36
9.5.3 Touch current limits 37
10 Insulation resistance and electric strength 37
10.1 General 37
10.2 Insulation resistance 38
10.2.1 Moisture treatment and testing 38
10.2.2 Compliance 38
10.3 Electric strength 38
10.3.1 General 38
10.3.2 AC test 39

10.3.3 DC test ... 39
10.3.4 General test conditions and compliance ... 39
11 Fault conditions ... 40
11.1 General ... 40
11.2 Applicable fault conditions ... 40
11.2.1 PCB tracks ... 40
11.2.2 Electronic components ... 40
11.2.3 Insulation layers ... 40
11.3 Test power supply requirements ... 40
11.4 Test procedure and compliance ... 42
11.4.1 Test procedure ... 42
11.4.2 Compliance ... 43
12 Construction ... 43
12.1 Use of fibrous materials ... 43
12.2 Insulation between circuits and accessible parts ... 44
12.2.1 General ... 44
12.2.2 SELV or PELV circuits ... 44
12.2.3 FELV circuits ... 45
12.2.4 Other circuits ... 45
12.3 Metal core printed circuits boards (MCPCBs) ... 45
12.4 Interrupted DC output ... 45
12.5 Control circuits ... 45
12.6 Bridging of insulation ... 46
12.6.1 Resistors ... 46
12.6.2 Capacitors ... 46
12.7 Built-in controlgear with basic insulation and built-in controlgear with double insulation ... 47
12.8 Transformers ... 47
12.8.1 General ... 47
12.8.2 Components ... 48
12.9 Independent controlgear ... 48
13 Creepage distances, clearances and distances through insulation ... 48
13.1 General ... 48
13.2 Creepage distances ... 49
13.2.1 General ... 49
13.2.2 Creepage distances for working frequencies not exceeding 30 kHz ... 49
13.2.3 Creepage distances for working frequencies above 30 kHz ... 50
13.2.4 Compliance with the required creepage distances ... 51
13.3 Clearances ... 52
13.3.1 General ... 52
13.3.2 Clearances considering mains supply transient overvoltages ... 53
13.3.3 Clearances not considering mains supply transient overvoltages ... 54
13.3.4 Compliance with the required clearances ... 57
13.4 Distances through insulation (DTI) ... 57
13.5 Specific requirements for PCB ... 57
13.5.1 General ... 57
13.5.2 Reduction of creepage distances ... 57
13.5.3 No minimum requirements for creepage distances and clearances ... 58
13.6 Specific requirements for insulation layers ... 58

14 Screws, current-carrying parts and connections 58
14.1 General 58
14.2 Electrical connections 58
14.3 Self-tapping and thread-cutting screws 59
14.4 Locking against loosening 59
14.5 Current-carrying parts 59
14.6 Mechanical stress resistance 60
15 Resistance to heat, fire and tracking 61
15.1 Resistance to heat 61
15.2 Resistance to flames and fire 62
15.2.1 General 62
15.2.2 Glow-wire test 62
15.2.3 Needle-flame test 62
15.2.4 Printed circuit boards 63
15.3 Resistance to tracking 63
16 Thermal requirements 63
16.1 General 63
16.1.1 Test specifications 63
16.1.2 Built-in controlgear 63
16.1.3 Integral controlgear 64
16.1.4 Independent controlgear 64
16.2 Normal operation 65
16.3 Abnormal operation 65
Annex A (normative) Test to establish whether a conductive part is a hazardous live part 69
A.1 General 69
A.2 Touch voltage limits 69
A.3 Touch current limits 69
A.4 Compliance 69
Annex B (normative) Temperature declared thermally protected controlgear 70
B.1 General requirements 70
B.1.1 Thermal protection means 70
B.1.2 Circuit breaking of the thermal protection means 70
B.2 General notes on tests 70
B.3 Classification 70
B.4 Limitation of heating 70
B.4.1 Pre-selection test 70
B.4.2 Functioning of the thermal protection means 71
Annex C (normative) Thermal tests of thermally protected controlgear 72
C.1 General 72
C.2 Test chamber 72
C.3 Controlgear operating temperatures 72
C.4 Controlgear position in the test chamber 72
C.5 Temperature measurements 73
Annex D (normative) Draught-proof test chambers 74
Annex E (normative) Tests requirements 75
E.1 Ambient temperature and test room 75
E.2 Test voltage and test frequency 75

E.3 Magnetic effects 75
E.4 Instrument characteristics 75
E.4.1 Potential circuits 75
E.4.2 Current circuits 75
E.4.3 RMS measurements 75
E.5 Test conditions 76
E.5.1 Resistance measurement delays 76
E.5.2 Electrical resistance of contacts and leads 76
Annex F (informative) Schedule of more onerous requirements 77
Annex G (informative) Conformity testing during manufacture 78
G.1 General 78
G.2 Routine testing 78
G.3 Additional electric strength routine tests for controlgear with protection against pollution using coating or potting material 78
Annex H (normative) Requirements for insulation materials used for double or reinforced insulation 80
H.1 General requirements 80
H.2 Insulating barrier test 80
Annex I (normative) Reduction of creepage distances and clearances for coated or potted controlgear 81
I.1 General 81
I.2 Reduction of creepage distances 81
I.2.1 Creepage distances for working frequencies not exceeding 30 kHz 81
I.2.2 Creepage distances for working frequencies above 30 kHz 81
I.3 Conditioning and compliance 83
I.3.1 Compliance 83
I.3.2 Conditioning of the controlgear 83
I.3.3 Moisture resistance and electric strength 83
I.3.4 Impulse voltage dielectric test 83
Annex J (informative) Example for U_p calculation 85
Annex K (informative) Concept of creepage distances and clearances 86
K.1 Basic concept considerations 86
K.1.1 Creepage distances 86
K.1.2 Clearances 86
K.2 Reasons for setting up tables 87
Annex L (informative) Overvoltage category III controlgear 88
L.1 General 88
L.2 Electric strength test voltages 88
L.3 Clearances for controlgear not protected against pollution by coating or potting materials 88
L.4 Clearances for controlgear protected against pollution by coating or potting 89
L.5 Distances through insulation 89
L.6 Bridging by Y capacitors 89
Annex M (informative) Information for luminaire design 91
M.1 Controlgear to be tested together with the luminaire 91
M.2 Earthing of built-in controlgear 91
M.3 Insulation between controlgear circuits and accessible conductive parts of luminaires 91
M.4 Thermally protected controlgear 91

Annex N (normative) Touch current measurements 94
N.1 General conditions 94
N.2 Perception weighted measuring network 95
N.3 Set-up and test sequence 95
N.3.1 Touch currents between accessible parts and earth 95
N.3.2 Touch currents between (different) accessible parts 96
N.3.3 Touch currents between output and earth 97
Annex O (informative) Information on document reorganization 100
O.1 General 100
O.2 Renumbering of clauses and annexes 100
O.3 Renumbering of figures 102
O.4 Renumbering of tables 103
O.5 Rearrangement of marking and information items 103
Bibliography 105

Figure 1 – Test circuit (default) 41
Figure 2 – Test circuit (for controlgear provided with internal protection that supports selectivity) 41
Figure 3 – Determination of creepage distances 49
Figure 4 – Determination of clearances (general) 52
Figure 5 – Determination of clearances (guidance on Table 15 and Table 16) 53
Figure 6 – Screw type examples 59
Figure 7 – Ball-pressure apparatus 62
Figure 8 – Test arrangement for heating test 64
Figure C.1 – Example of a heating test chamber for thermally protected controlgear 73
Figure H.1 – Test electrode 80
Figure J.1 – Example for the calculation of U_p 85
Figure M.1 – Example of a controlgear insulation 92
Figure N.1 – Measuring network (perception weighted) 95
Figure N.2 – Test configuration for touch currents between accessible parts and earth 96
Figure N.3 – Test configuration for touch currents between different accessible parts 97
Figure N.4 – Test configuration for touch currents between output and earth 98

Table 1 – Required rated impulse withstand voltage of equipment 23
Table 2 – Marking according to installation type 27
Table 3 – Symbols according to output isolation type 28
Table 4 – Voltage steps 30
Table 5 – Further markings 31
Table 6 – ELV limits 35
Table 7 – Touch current limits 36
Table 8 – SELV touch voltage limits 36
Table 9 – PELV touch voltage limits 37
Table 10 – Electric strength test voltages 39
Table 11 – Required number and type of Y capacitors 47
Table 12 – Creepage distances – Working frequencies not exceeding 30 kHz 50

Table 13 – Creepage distances – Working frequencies above 30 kHz 51
Table 14 – Clearances considering mains supply transient overvoltages 53
Table 15 – Clearances without considering mains supply transient overvoltages – Basic or supplementary insulation 55
Table 16 – Clearances without considering mains supply transient overvoltages – Reinforced insulation 56
Table 17 – Minimum creepage distances on printed circuit boards (PCBs) 58
Table 18 – Torque tests on screws 60
Table 19 – Values of maximum temperatures in normal use 65
Table 20 – Maximum temperatures under abnormal operation 66
Table 21 – Values of T and k for fuses 67
Table G.1 – Minimum values for electrical routine tests 79
Table I.1 – Creepage distances – Working frequencies not exceeding 30 kHz (coated or potted controlgear) 81
Table I.2 – Creepage distances – Working frequencies above 30 kHz (coated or potted controlgear) 82
Table I.3 – Impulse withstand test voltages 84
Table L.1 – Electric strength test voltages for overvoltage category III controlgear 88
Table L.2 – Impulse withstand test voltages for overvoltage category III coated or potted controlgear 89
Table L.3 – Overview of required Y capacitors 90
Table M.1 – Insulation requirements between live parts and accessible conductive parts for different luminaire constructions 93
Table N.1 – Test sequence according to Figure N.2, Figure N.3 and Figure N.4 99
Table O.1 – Renumbering of clauses 101
Table O.2 – Renumbering of annexes 102
Table O.3 – Renumbering of figures 103
Table O.4 – Renumbering of tables 103
Table O.5 – Rearrangement of marking and information items 104

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –

Part 1: General requirements

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec. IEC shall not be held responsible for identifying any or all such patent rights.

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

This fourth edition cancels and replaces the third edition published in 2015 and Amendment 1:2017. This edition constitutes a technical revision.

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

a) complete review of document structure, including but not limited to what is individually described under items b) to s);
b) removal of requirements for electromagnetic controlgear;

c) addition of more specific requirements for control circuit insulation and corresponding marking;
d) merging of thermal test requirements for transformers into a new Clause 16;
e) clarification of specifications for the moisture resistance test;
f) update of the normative reference to standards of the transformer series IEC 61558;
g) correction of the normative reference for PCB testing with respect to flames and fire;
h) update of further normative references where appropriate;
i) allowance of an alternative DC electric strength test;
j) addition of specific provisions for the use of bridging capacitors;
k) update of fire hazard testing requirements;
l) introduction of requirements for PELV applications;
m) clearance distances now generally based on peak instead of RMS voltage values;
n) introduction of a new type of protected emergency lighting controlgear;
o) review and clarification of touch current and voltage requirements;
p) clarification of the test sequence for independent controlgear with respect to the application of the IEC 60598 series versus the IEC 61347 series;
q) introduction of reduced touch voltages and currents for interrupted DC voltage applications or pulse width modulation (PWM);
r) changes concerning the recommendations for electric strength routine testing;
s) merging of requirements for safety isolating controlgear from former Annex L into the main body of the document;
t) introduction of Annex N intended to address touch current measurement;
u) introduction of Annex O intended to provide information on document reorganization.

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

Draft	Report on voting
34C/1596/FDIS	34C/1604/RVD

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 to be used in conjunction with the appropriate part of the IEC 61347-2 series.

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

– *compliance statements: in italic type*.

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

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

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

- reconfirmed,
- withdrawn, or
- revised.

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

INTRODUCTION

This part of IEC 61347 provides a set of general and safety requirements and tests which are considered to be generally applicable to most types of controlgear for light sources and which can be called up as required by the different parts that make up the IEC 61347-2 series. This document is not a specification in itself for any type of controlgear, and its provisions apply only to particular types of controlgear, to the extent determined by the appropriate part of the IEC 61347-2 series. The various parts of the IEC 61347-2 series refer to the clauses of this document to the extent to which such a clause is applicable and the order in which the tests are performed; they also include additional requirements as necessary. The order in which the clauses of this document are numbered has no particular significance, as the order in which their provisions apply is determined for each type of controlgear by the appropriate part of the IEC 61347-2 series. All such parts of the IEC 61347-2 series do not contain references to each other.

Where the requirements of any of the clauses of this part of IEC 61347 are referred to in the various parts that make up the IEC 61347-2 series by the phrase "IEC 61347-1, Clause N applies", this phrase will be interpreted as meaning that all the requirements of the clause in question of this document apply, except any which are clearly inapplicable to the particular type of controlgear for light sources covered by the part of the IEC 61347-2 series concerned.

Performance requirements for controlgear for electric light sources are the subject of the appropriate performance standard, for example IEC 61047 and IEC 62384 as appropriate for the type of controlgear.

Safety requirements ensure that electrical equipment constructed in accordance with these requirements does not endanger the safety of persons, domestic animals or property when properly installed and maintained and used in applications for which it was intended.

CONTROLGEAR FOR ELECTRIC LIGHT SOURCES – SAFETY –

Part 1: General requirements

1 Scope

This part of IEC 61347 specifies general safety requirements for controlgear for electric light sources for use on DC supplies up to 1 500 V or AC supplies up to 1 000 V at 50 Hz or 60 Hz.

NOTE 1 In the remainder of this document "light source" is used instead of "electric light source".

This document is only applicable in conjunction with the relevant part(s) of the IEC 61347-2 series.

NOTE 2 As far as covered in the scope of the relevant part of the IEC 61347-2 series, this document is also applicable to controlgear used for electric sources producing optical radiation with the same technology used for purposes different than illumination and producing radiation other than visible spectrum.

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 60068-2-14:2009[1], *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60127 (all parts), *Miniature fuses*

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 60384-14:2023, *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 (all parts), *Luminaires*

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

IEC 60695-2-10:2021, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

[1] Withdrawn.