IEC 62384

Edition 2.0 2020-05
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

DC or AC supplied electronic controlgear for LED modules – Performance requirements

IEC Central Office
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 It also gives information on projects, replaced and withdrawn publications.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.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC 62384

Edition 2.0 2020-05
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

DC or AC supplied electronic controlgear for LED modules – Performance requirements

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.140.99; 31.080.99

ISBN 978-2-8322-8361-5

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

DC OR AC SUPPLIED ELECTRONIC CONTROLGEAR FOR LED MODULES – PERFORMANCE 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. 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. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 62384 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 2006 and Amendment 1:2009. This edition constitutes a technical revision.

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

a) scope extension (direct current from 250 V to 1 000 V);
b) new specifications for measuring the power factor for controlgear with settable/non-constant output (for instance, to allow for constant light output);
c) deletion of audio frequency requirements;
d) selection of current test circuit by module capacitance (instead of selecting by having or not having logic circuitry) plus test circuit setup changes.

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

FDIS	Report on voting
34C/1488/FDIS	34C/1489/RVD

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

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

This document is to be read in conjunction with IEC 61347-2-13.

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

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

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

DC OR AC SUPPLIED ELECTRONIC CONTROLGEAR FOR LED MODULES – PERFORMANCE REQUIREMENTS

1 Scope

This document specifies performance requirements for electronic controlgear for use on ~~d.c. supplies up to 250 V and a.c.~~ DC or AC supplies up to 1 000 V (alternating current at 50 Hz or 60 Hz) and with an output frequency which can deviate from the supply frequency, associated with LED modules according to IEC 62031. Controlgear for LED modules specified in this document are designed to provide constant voltage or current. Deviations from the pure voltage and current types do not exclude the gear from this document.

NOTE 1 The tests in this document are type tests. Requirements for testing individual controlgear during production are not included.

NOTE 2 Requirements for controlgear which incorporate means for varying the output power are under consideration.

NOTE 3 It ~~may~~ can be expected that controlgear complying with this document will ensure satisfactory operation between 92 % and 106 % of the rated supply voltage, taking into account the specifications of the LED module manufacturer.

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 61347-1, *Lamp controlgear – Part 1: General and safety requirements*

IEC 61347-2-13, *Lamp controlgear – Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules*

~~IEC 62031, *LED modules for general lighting – Safety requirements* [1]~~

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 terminological databases for use in standardization at the following addresses:

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

3.1
total circuit power
total power dissipated by controlgear and LED module(s) in combination, at rated supply voltage of the controlgear and at the highest rated output load

3.2
circuit power factor
λ
ratio of the measured circuit power to the product of the supply voltage (RMS) and the supply current (RMS)

~~**3.3**~~
~~**high audio-frequency impedance control gear**~~
~~control gear the impedance of which in the frequency range 250 Hz to 2 000 Hz exceeds the values specified in Clause 11 of this standard.~~

3.3
controlgear for LED module circuitry with high input capacitance
controlgear suitable for LED modules which present high capacitance connected directly or indirectly to the input terminals

Note 1 to entry: Examples are LED modules with switch mode power supply conversion circuits, like buck or boost regulators.

Note 2 to entry: Typically, capacitances above 100 nF are considered high capacitance.

3.4
controlgear for LED module circuitry with low input capacitance
controlgear suitable for LED modules which present low capacitance or no capacitance connected directly or indirectly to the input terminals

Note 1 to entry: Examples are LED modules with only LEDs or with logic circuits intended for thermal protection, but not directly modifying the power supplied by the controlgear or linear voltage regulators.

Note 2 to entry: Typically, capacitances of 100 nF and below are considered low capacitance.

4 General notes on tests

4.1 The tests given in this document are type tests.

~~NOTE~~ The requirements and tolerances permitted by this document are based on testing of a type test sample submitted by the manufacturer for that purpose. In principle this type test sample should consist of units having characteristics typical of the manufacturer's production and be as close to the production centre point values as possible.

NOTE It ~~may~~ can be expected with the tolerances given in this document that products manufactured in accordance with the type test sample will comply with this document for the majority of the production. Due to the production spread however, it is inevitable that there will sometimes be products outside the specified tolerances. For guidance on sampling plans and procedures for inspection by attributes, see IEC 60410.

4.2 For tests which are carried out with a LED module or LED modules, this (these) LED module(s) shall fulfil the following requirements:

The ~~wattage~~ power of the LED module(s) when measured at its (their) rated voltage or rated current (direct current and/or alternating current) shall not differ from the rated ~~wattage~~ power by more than +6 % and –0 %.

4.3 The tests shall be carried out in the order of the clauses, unless otherwise specified.

4.4 One specimen shall be ~~submitted~~ subjected to all the tests.

4.5 In general all the tests are made on each type of controlgear or, where a range of similar controlgear is involved for each rated ~~wattage~~ power in the range or on a representative selection from the range as agreed with the manufacturer.

4.6 The tests shall be made under the conditions specified in Clause A.1. Since up to now data ~~of~~ with regard to LED modules ~~are~~ have not been published in an IEC standard, they shall be made available by the LED module manufacturer.

4.7 All controlgear covered by this document shall comply with the requirements of IEC 61347-2-13.

4.8 The tests shall be carried out with the length of the output cable of both 20 cm and 200 cm unless otherwise declared by the manufacturer.

5 Classification

5.1 Classification according to the load

a) Single value load controlgear

This type of controlgear is designed for use with one specific output ~~wattage~~ power only, which may be dissipated by one or more LED modules.

b) Multiple value load controlgear

This type of controlgear is designed for use with one or more LED modules with a total load within the declared ~~wattage~~ power range.

5.2 Classification according to the output voltage

a) Controlgear having a stabilized output voltage.

b) Controlgear without a stabilized output voltage.

5.3 Classification according to the output current

a) Controlgear having a stabilized output current.

b) Controlgear without a stabilized output current.

6 Marking

6.1 Mandatory marking

6.1.1 Controlgear shall be clearly marked as follows:

Circuit power factor, for example λ = 0,9.

For controlgear where the power factor is not constant all over the rated output range and/or controlgear with a supply voltage range, the power factor may be different for different combinations of supply voltage and output power. In this case the controlgear shall be marked with a range of power factor values, for example λ = 0,8 – 0,9.

If the power factor is less than 0,95 leading, it shall be followed by the letter "C", for example λ = 0,9 C.

6.1.2 In addition to the above mandatory marking, the following information shall either be given on the controlgear or made available in the manufacturer's catalogue or the like:

a) if applicable: limits of the permissible temperature range;

b) if applicable: an indication that the controlgear has a stabilized output voltage;

c) if applicable: an indication that the controlgear has a stabilized output current;

d) if applicable: an indication that the controlgear is suitable for operation with a mains supply dimmer;

e) if applicable: an indication of the operation mode, for example phase control;

f) if applicable: P_{rated_min}, the rated minimum output power for the proper operation of the controlgear.

NOTE P_{rated_min} can be combined with P_{rated} in only one marking. e.g. P_{rated} = 20 W…60 W.

6.2 Optional marking

The following information may either be given on the controlgear or made available in the manufacturer's catalogue or the like:

a) total circuit power;

~~b) if applicable: the symbol which indicates that the control gear is designed to comply with conditions for audio-frequency impedance;~~

b) If applicable: a symbol which indicates that the controlgear is a short-circuit proof type (the symbol is under consideration).

7 Output voltage and current

7.1 Starting and connecting requirements

After starting or connecting a LED module, the output should be within 110 % of its rated value within 2 s. Maximum current or maximum voltage shall not exceed the values given by the manufacturer. This performance is tested with the minimum rated power.

NOTE If the output voltage is AC, 110 % is the percentage of the RMS value, if DC, 110 % is the percentage of the DC value.

7.2 Voltage and current during operation

For controlgear having a non-stabilized output voltage, when supplied with the rated supply voltage, the output voltage shall not differ by more than ±10 % from the rated voltage of the LED modules. For controlgear having a stabilized output voltage, when supplied at any supply voltage between 92 % and 106 % of the rated supply voltage, the output voltage shall not differ by more than ±10 % from the rated voltage of the LED modules.

For controlgear having a non-stabilized output current, when supplied with the rated supply voltage, the output current shall not differ by more than ±10 % from the rated current of the LED modules. For controlgear having a stabilized output current, when supplied at any supply voltage between 92 % and 106 % of the rated supply voltage, the output current shall not differ by more than ±10 % from the rated current of the LED modules.

Multiple load controlgear shall be tested with both the minimum and maximum load.

7.3 Capacitive load requirement

~~If~~ The LED module or any additional control unit connected to the ~~convertor~~ controlgear may contain capacitors for control and/or driving circuitry on the modules~~,~~ and current pulses may be generated when connecting the LED module to the controlgear. ~~This shall not disturb the control gear.~~ Controlgear overcurrent detection ~~nor~~ shall not be disturbed during the starting process of the controlgear.

For test conditions, see Clause A.2. Figure A.1a) describes a test circuit during the starting process of the controlgear and Figure A.1b) describes a test circuit for connecting the load during steady state operation.

The test according to Figure A.1b) may be waived under the condition that it is specified by the manufacturer in the product information of the controlgear that the LED module must be connected prior to starting the controlgear in order to ensure proper starting of the LED module.

If the load detection circuit of the controlgear does not allow operation with pure resistive load, the resistor R is to be substituted with equivalent LED load.

~~*Compliance: when connecting the measurement circuit to the control gear, the detection device shall not trip.*~~

Compliance: The controlgear overvoltage detection shall not act during the starting phase or when connecting the load in the steady state phase.

~~**7.4 Voltage surges during switching and operation**~~

~~Voltage surges superimposed on the output voltage shall not exceed the values specified below (values under consideration).~~

8 Total circuit power

At rated voltage, the total circuit power shall not be more than 110 % of the value declared by the manufacturer, when the controlgear is operated with LED module(s).

9 Circuit power factor

The measured circuit power factor shall not be less than the marked value by more than 0,05 when the controlgear is operated ~~on its rated wattage~~ at the rated output power range with LED module(s) and the whole combination is supplied with rated voltage and frequency.

For controllable controlgear, the power factor is measured with the controlgear adjusted to provide the maximum output power.

Controlgear designed to provide, in combination with a LED module, constant luminous flux, are measured with a load not using the rated output power at 0 h, but with the controlgear providing the maximum output power.

The DUT may be specially prepared in a way that the output power is set to the maximum value compensating the luminous flux depreciation of the load at the end of life.

For controlgear with a supply voltage range, the test shall be performed with the combination of supply voltage range and output power range which gives the lowest and highest power factor (e.g. minimum supply voltage, maximum rated output power and maximum supply voltage, minimum rated output power). The measured power factors shall not be less than the lowest and highest marked values by more than 0,05 respectively.

10 Supply current

At rated voltage, the supply current shall not differ by more than +10 % from the value marked on the controlgear or declared in the manufacturer's literature, when that controlgear is operated on its rated ~~wattage~~ power with LED module(s).

~~**11 Impedance at audio-frequencies**~~

~~Control gear marked with the audio-frequency symbol (see subclause 6.2b)) shall be tested in accordance with Clause A.3, using the circuit in Figure A.2.~~

~~For every signal frequency between 400 Hz and 2 000 Hz, the impedance of the control gear when operated with the rated LED module load at rated voltage and frequency shall be inductive in characteristic. Its impedance in ohms shall be at least equal to the resistance of~~

~~the resistor which would dissipate the same power as the LED module-control gear combination when operating at its rated voltage and frequency. The control gear impedance is measured with a signal voltage equal to 3,5 % of the rated supply voltage of the control gear.~~

~~Between 250 Hz and 400 Hz, the impedance shall be at least equal to half the minimum value required for frequencies between 400 Hz and 2 000 Hz.~~

~~NOTE Radio interference suppressors consisting of capacitors of less than 0,2 µF (total value) which may be incorporated in the control gear may be disconnected for this test.~~

11 Operational tests for abnormal conditions

The controlgear shall not be damaged under the following conditions.

a) Test without LED module(s) inserted

The controlgear shall be supplied with rated voltage for 1 h without LED module(s) inserted. At the end of this test, the LED module(s) shall be connected and shall operate normally.

b) Test for reduced LED module resistance

Under consideration.

c) Tests for short-circuit proof controlgear

The controlgear is short-circuited for 1 h ~~or until a protecting device opens the circuit~~.

The 1 h test shall be completed also in the case of a thermal protection acting.

After these tests and after restoration of a possible protecting device, the controlgear shall function normally.

12 Endurance

12.1 The controlgear shall be subjected to a temperature cycling shock test and a supply voltage switching test as follows:

a) Temperature cycling shock test

The non-energized controlgear shall be stored firstly at –10°C or if the controlgear is marked with a lower value, at that value for 1 h. The controlgear is then moved into a cabinet having a temperature of t_c and stored for 1 h. Five such temperature cycles shall be carried out.

b) Supply voltage switching test

At rated supply voltage the controlgear shall be switched on and off for 30 s. The cycling shall be repeated 200 times with no load and 800 times under maximum load conditions.

LED modules failing during this test shall be replaced immediately.

At the end of these tests the controlgear shall operate an appropriate LED module or LED modules correctly for 15 min.

12.2 The controlgear shall then be operated with an appropriate LED module(s) ~~/with appropriate LED modules~~ at rated supply voltage and at the ambient temperature which produces t_c, until a test period of 200 h has passed. At the end of this time, and after cooling down to room temperature, the controlgear shall operate an appropriate LED module(s) ~~/appropriate LED modules~~ correctly for 15 min. During this test the LED module(s) is (are) placed outside the test enclosure at an ambient temperature of (25 ± 5) °C.

Annex A
(normative)

Tests

A.1 General requirements

A.1.1 General

The tests are type tests. One sample shall be ~~submitted~~ subjected to all the tests.

A.1.2 Ambient temperature

The tests shall be made in a draught-free room and at an ambient temperature within the range of 20 °C to 27 °C.

A.1.3 Supply voltage and frequency

a) Test voltage and frequency

Unless otherwise specified, the controlgear to be tested shall be operated at its rated supply voltage and frequency.

When a controlgear is marked for use on a range of supply voltages, or has different separate rated supply voltages, any voltage for which it is intended may be chosen as the rated voltage.

b) Stability of supply voltage and frequency

During the tests, the supply voltage and the frequency shall be maintained constant within ±0,5 %. However, during the actual measurement, the voltage shall be adjusted to within ±0,2 % of the specified testing value.

c) Supply voltage waveform

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

A.1.4 Magnetic effects

Unless otherwise specified, no magnetic object shall be allowed within 25 mm of any outer surface of the controlgear under test.

A.1.5 Instrument characteristics

a) Potential circuits

Potential circuits of instruments connected across the LED module shall not pass more than 3 % of the nominal running current of the LED module.

b) Current circuits

Instruments connected in series with the LED module shall have a sufficiently low impedance such that the voltage drop shall not exceed 2 % of the objective LED module voltage.

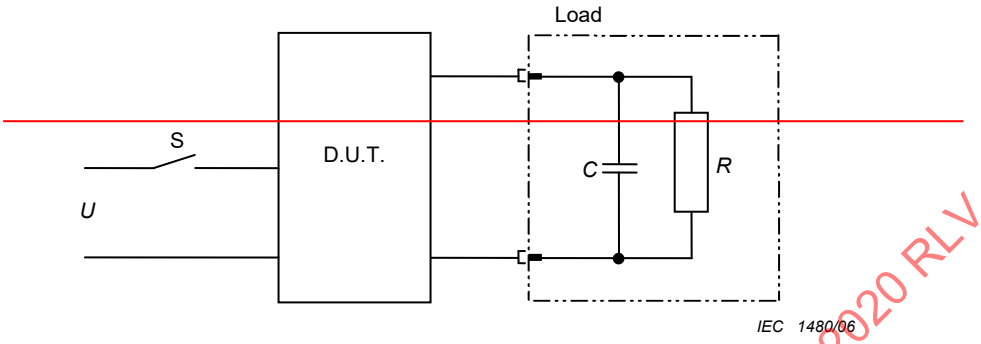
c) RMS measurements

Instruments shall be essentially free from errors due to waveform distortion and shall be suitable for the operating frequencies.

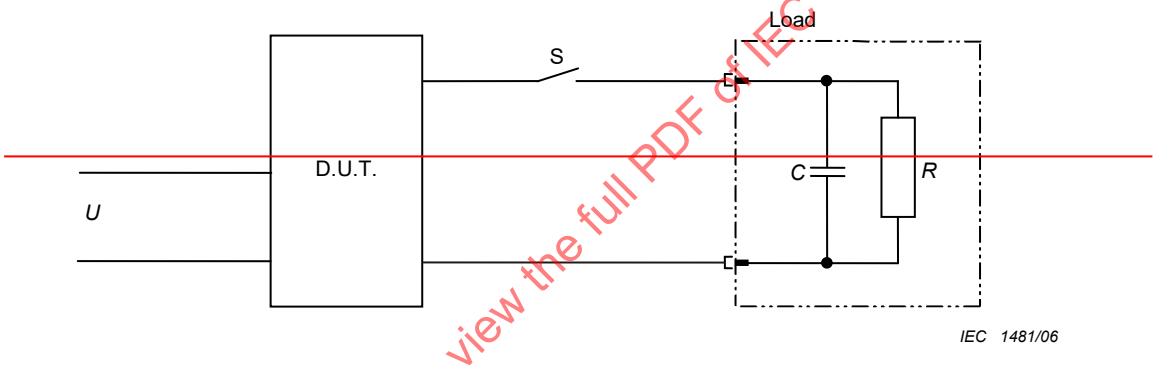
~~Care shall be taken to ensure~~ It shall be ensured that the earth capacitance of the instruments does not disturb the operation of the unit under test. It may be necessary to ensure that the measuring point of the circuit under test is at earth potential.

A.2 Measurement of capacitive load current ~~(Figures A.1a and A.1b)~~

Figure A.1 illustrates the test circuit for the current when connecting a load.



~~**Figure A.1a – Test circuit for current during the starting process**~~



~~**Figure A.1b – Test circuit for current when connecting the load during the steady state operation**~~

~~**Key to figures A.1a and A.1b**~~

~~*U* : Supply 50 Hz (60 Hz)~~

~~S : Switch~~

~~D.U.T. : Control gear under test~~

~~*R* : Resistor which gives the nominal output current of the D.U.T.~~

~~For voltage sources: $R = U^2/P_{max}$~~

~~For current sources: $R = P_{max}/I^2$~~

~~*C* : Suitable capacitor~~

~~For control gear intended to drive the LED module which includes a logic circuitry~~

~~a) for voltage sources: C = 20 µF/A~~

~~b) for current sources: C = 400 µF~~

~~For control gear intended to drive the LED module which does not include a logic circuitry~~

~~c) for voltage sources: C = 1 µF/A~~

~~d) for current sources: C = 1 µF~~

~~LOAD : Equivalent load for the LED module~~

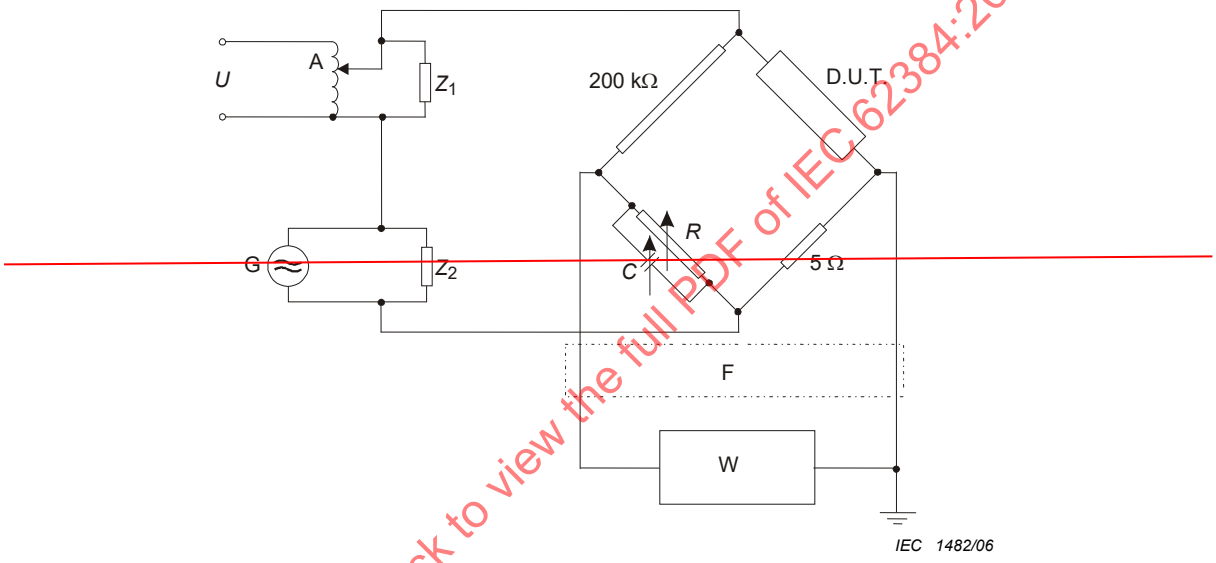
~~**Figure A.1 – Test circuit for the current when connecting a load**~~

A.3 Measurement of impedance at audio-frequencies (Figure A.2)

The circuit of Figure A.2 illustrates a complete bridge which permits a full determination of the audio-frequency impedance $\underline{Z}$ of the LED module-control gear assembly that is not only its absolute value (modulus) but its variation as well.

Let R' and R'' represent the values of the resistors shown in Figure A.2 by the values of 5 Ω and 200 kΩ respectively (the latter at least not being critical). When by adjustments of R and C a balance is obtained for a given audio-frequency selected on the wave analyser (or any other suitable selective detector), we have in general:

$$\underline{Z} = R'R''(1/R + j\omega C)$$



U : supply 50 Hz (60 Hz)

G : Generator 250 Hz...2 000 Hz

A : supply transformer 50 Hz (60 Hz)

D.U.T. : Control gear – LED-module-combination under test

Z_1 : impedance of value sufficiently high for 50 Hz (60 Hz), sufficiently low for 250 Hz to 2 000 Hz (e.g. resistance 15 Ω and capacitance 16 µF

Z_2 : impedance of value sufficiently low for 50 Hz (60 Hz), sufficiently high for 250 Hz to 2 000 Hz (e.g. inductance 20 mH)

F : Filter 50 Hz (60 Hz)

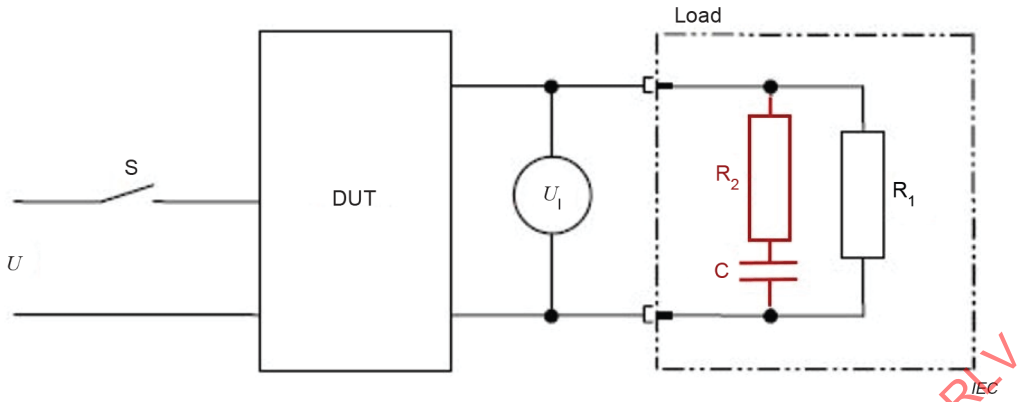
W : Selective voltmeter or wave analyser

NOTE 1 The value of 200 kΩ for one branch of the bridge is not critical.

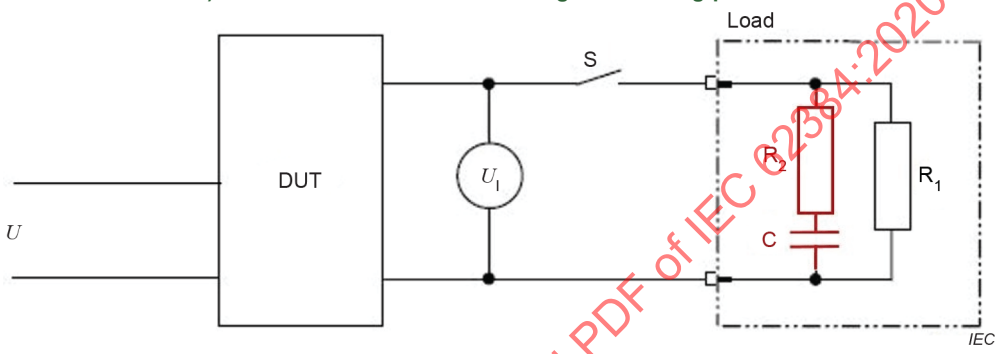
NOTE 2 The impedance Z_1 and/or Z_2 are/is not necessary if the corresponding source has a low impedance for the currents of the other.

Figure A.2 – Measurement of impedance at audio-frequencies

NOTE The interoperability requirements between controlgear and LED modules are under further consideration.



a) Test circuit for current during the starting process



b) Test circuit for current when connecting the load during the steady state operation

Key

U: supply voltage
U_l: load voltage
DUT: controlgear under test
S: switch
R_1: resistor which gives the rated output current of the DUT (resistance: R_1)
for voltage sources: $R_1 = U_l^2/P_{max}$
for current sources: $R_1 = P_{max}/I^2$
C: capacitor
for controlgear for LED module circuitry with high input capacitance (C)
a) for voltage sources: $C = I \cdot 20$ µF/A
b) for current sources: C = 400 µF
for controlgear for LED module circuitry with low input capacitance
c) for voltage sources: $C = I \cdot 1$ µF/A
d) for current sources: C = 1 µF
R_2: equivalent series resistor (resistance: R_2)
for controlgear for LED module circuitry with high input capacitance
R_2 = 0 Ω
for controlgear for LED module circuitry with low input capacitance
$R_2 = I \cdot 4{,}7$ Ω/A

NOTE For controlgear for LED module circuitry with low input capacitance, capacitor C and resistor R_2 are representing the residual capacitance of the load circuit and the conductor equivalent series resistance (ESR) of the circuit.

Figure A.1 – Test circuit for measurement of capacitive load current

Annex B
(informative)

Guidance on quoting product life and failure rate

To allow the lifetime and failure rate of different electronic products to be meaningfully compared by a user, it is recommended that the following data be provided by the manufacturer in a product catalogue:

a) the maximum surface temperature, symbol t_l (t-lifetime) of the electronic product or the maximum part temperature which affects product life, measured under normal operating conditions and at the nominal voltage or at the maximum of the rated voltage range, that allows a life of 50 000 h to be achieved;

NOTE In some countries, such as Japan, a life of 40 000 h should be applied.

b) the failure rate, if the electronic product is operated continuously at the maximum temperature t_l (defined in a)). Failure rate should be quoted in units of failure in time (fit).

For the method used to obtain the information given in a) and b) above (mathematical analysis, reliability test, etc.), the manufacturer should, on request, provide a comprehensive data file containing the details of the method.

Bibliography

IEC 60410:1973[1], *Sampling plans and procedures for inspection by attributes*

~~IEC 61000-3-2:2000, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase)*~~

~~IEC 61547, *Equipment for general lighting purposes – EMC immunity requirements*~~

IEC 62031, *LED modules for general lighting – Safety specifications*

[1] Withdrawn.

IEC 62384

Edition 2.0 2020-05

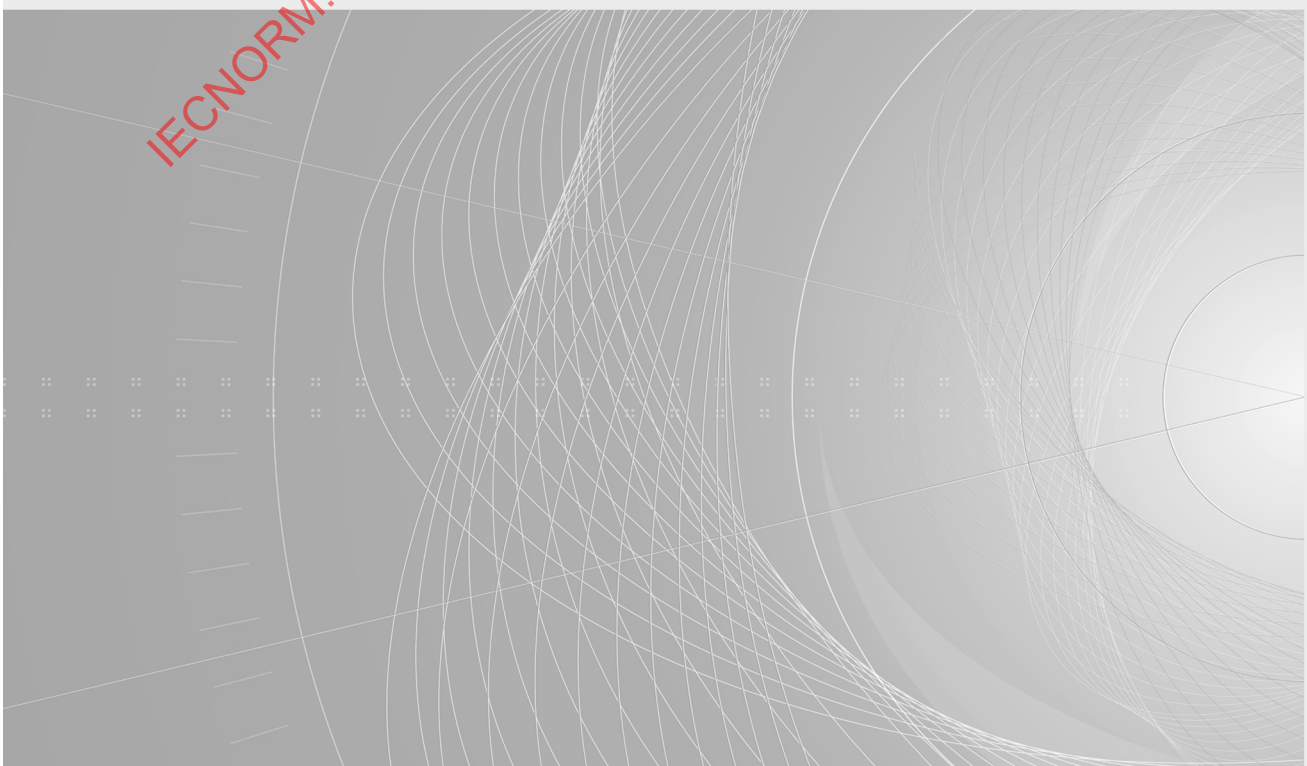
INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

DC or AC supplied electronic controlgear for LED modules – Performance requirements

Appareillages électroniques alimentés en courant continu ou alternatif pour modules de LED – Exigences de performances



IEC 62384:2020-05(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

DC OR AC SUPPLIED ELECTRONIC CONTROLGEAR FOR LED MODULES – PERFORMANCE 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62384 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 2006 and Amendment 1:2009. This edition constitutes a technical revision.

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

a) scope extension (direct current from 250 V to 1 000 V);
b) new specifications for measuring the power factor for controlgear with settable/non-constant output (for instance, to allow for constant light output);
c) deletion of audio frequency requirements;
d) selection of current test circuit by module capacitance (instead of selecting by having or not having logic circuitry) plus test circuit setup changes.

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

FDIS	Report on voting
34C/1488/FDIS	34C/1489/RVD

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

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

This document is to be read in conjunction with IEC 61347-2-13.

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

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

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

DC OR AC SUPPLIED ELECTRONIC CONTROLGEAR FOR LED MODULES – PERFORMANCE REQUIREMENTS

1 Scope

This document specifies performance requirements for electronic controlgear for use on DC or AC supplies up to 1 000 V (alternating current at 50 Hz or 60 Hz) and with an output frequency which can deviate from the supply frequency, associated with LED modules according to IEC 62031. Controlgear for LED modules specified in this document are designed to provide constant voltage or current. Deviations from the pure voltage and current types do not exclude the gear from this document.

NOTE 1 The tests in this document are type tests. Requirements for testing individual controlgear during production are not included.

NOTE 2 Requirements for controlgear which incorporate means for varying the output power are under consideration.

NOTE 3 It can be expected that controlgear complying with this document will ensure satisfactory operation between 92 % and 106 % of the rated supply voltage, taking into account the specifications of the LED module manufacturer.

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 61347-1, *Lamp controlgear – Part 1: General and safety requirements*

IEC 61347-2-13, *Lamp controlgear – Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules*

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 terminological databases for use in standardization at the following addresses:

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

3.1
total circuit power
total power dissipated by controlgear and LED module(s) in combination, at rated supply voltage of the controlgear and at the highest rated output load

3.2
circuit power factor
λ
ratio of the measured circuit power to the product of the supply voltage (RMS) and the supply current (RMS)

3.3
controlgear for LED module circuitry with high input capacitance
controlgear suitable for LED modules which present high capacitance connected directly or indirectly to the input terminals

Note 1 to entry: Examples are LED modules with switch mode power supply conversion circuits, like buck or boost regulators.

Note 2 to entry: Typically, capacitances above 100 nF are considered high capacitance.

3.4
controlgear for LED module circuitry with low input capacitance
controlgear suitable for LED modules which present low capacitance or no capacitance connected directly or indirectly to the input terminals

Note 1 to entry: Examples are LED modules with only LEDs or with logic circuits intended for thermal protection, but not directly modifying the power supplied by the controlgear, or linear voltage regulators.

Note 2 to entry: Typically, capacitances of 100 nF and below are considered low capacitance.

4 General notes on tests

4.1 The tests given in this document are type tests.

The requirements and tolerances permitted by this document are based on testing of a type test sample submitted by the manufacturer for that purpose. In principle this type test sample should consist of units having characteristics typical of the manufacturer's production and be as close to the production centre point values as possible.

NOTE It can be expected with the tolerances given in this document that products manufactured in accordance with the type test sample will comply with this document for the majority of the production. Due to the production spread however, it is inevitable that there will sometimes be products outside the specified tolerances. For guidance on sampling plans and procedures for inspection by attributes, see IEC 60410.

4.2 For tests which are carried out with a LED module or LED modules, this (these) LED module(s) shall fulfil the following requirements:

The power of the LED module(s) when measured at its (their) rated voltage or rated current (direct current and/or alternating current) shall not differ from the rated power by more than +6 % and –0 %.

4.3 The tests shall be carried out in the order of the clauses, unless otherwise specified.

4.4 One specimen shall be subjected to all the tests.

4.5 In general all the tests are made on each type of controlgear or, where a range of similar controlgear is involved for each rated power in the range or on a representative selection from the range as agreed with the manufacturer.

4.6 The tests shall be made under the conditions specified in Clause A.1. Since up to now data with regard to LED modules have not been published in an IEC standard, they shall be made available by the LED module manufacturer.

4.7 All controlgear covered by this document shall comply with the requirements of IEC 61347-2-13.

4.8 The tests shall be carried out with the length of the output cable of both 20 cm and 200 cm unless otherwise declared by the manufacturer.

5 Classification

5.1 Classification according to the load

a) Single value load controlgear

This type of controlgear is designed for use with one specific output power only, which may be dissipated by one or more LED modules.

b) Multiple value load controlgear

This type of controlgear is designed for use with one or more LED modules with a total load within the declared power range.

5.2 Classification according to the output voltage

a) Controlgear having a stabilized output voltage.

b) Controlgear without a stabilized output voltage.

5.3 Classification according to the output current

a) Controlgear having a stabilized output current.

b) Controlgear without a stabilized output current.

6 Marking

6.1 Mandatory marking

6.1.1 Controlgear shall be clearly marked as follows:

Circuit power factor, for example λ = 0,9.

For controlgear where the power factor is not constant all over the rated output range and/or controlgear with a supply voltage range, the power factor may be different for different combinations of supply voltage and output power. In this case the controlgear shall be marked with a range of power factor values, for example λ = 0,8 – 0,9.

If the power factor is less than 0,95 leading, it shall be followed by the letter "C", for example λ = 0,9 C.

6.1.2 In addition to the above mandatory marking, the following information shall either be given on the controlgear or made available in the manufacturer's catalogue or the like:

a) if applicable: limits of the permissible temperature range;

b) if applicable: an indication that the controlgear has a stabilized output voltage;

c) if applicable: an indication that the controlgear has a stabilized output current;

d) if applicable: an indication that the controlgear is suitable for operation with a mains supply dimmer;

e) if applicable: an indication of the operation mode, for example phase control;

f) if applicable: $P_{\text{rated\_min}}$, the rated minimum output power for the proper operation of the controlgear.

NOTE $P_{\text{rated\_min}}$ can be combined with P_{rated} in only one marking. e.g. P_{rated} = 20 W…60 W.

6.2 Optional marking

The following information may either be given on the controlgear or made available in the manufacturer's catalogue or the like:

a) total circuit power;

b) if applicable: a symbol which indicates that the controlgear is a short-circuit proof type (the symbol is under consideration).

7 Output voltage and current

7.1 Starting and connecting requirements

After starting or connecting a LED module, the output should be within 110 % of its rated value within 2 s. Maximum current or maximum voltage shall not exceed the values given by the manufacturer. This performance is tested with the minimum rated power.

NOTE If the output voltage is AC, 110 % is the percentage of the RMS value, if DC, 110 % is the percentage of the DC value.

7.2 Voltage and current during operation

For controlgear having a non-stabilized output voltage, when supplied with the rated supply voltage, the output voltage shall not differ by more than ±10 % from the rated voltage of the LED modules. For controlgear having a stabilized output voltage, when supplied at any supply voltage between 92 % and 106 % of the rated supply voltage, the output voltage shall not differ by more than ±10 % from the rated voltage of the LED modules.

For controlgear having a non-stabilized output current, when supplied with the rated supply voltage, the output current shall not differ by more than ±10 % from the rated current of the LED modules. For controlgear having a stabilized output current, when supplied at any supply voltage between 92 % and 106 % of the rated supply voltage, the output current shall not differ by more than ±10 % from the rated current of the LED modules.

Multiple load controlgear shall be tested with both the minimum and maximum load.

7.3 Capacitive load requirement

The LED module or any additional control unit connected to the controlgear may contain capacitors for control and/or driving circuitry on the modules and current pulses may be generated when connecting the LED module to the controlgear. Controlgear overcurrent detection shall not be disturbed during the starting process of the controlgear.

For test conditions, see clause A.2. Figure A.1a) describes a test circuit during the starting process of the controlgear and Figure A.1b) describes a test circuit for connecting the load during steady state operation.

The test according to Figure A.1b) may be waived under the condition that it is specified by the manufacturer in the product information of the controlgear that the LED module must be connected prior to starting the controlgear in order to ensure proper starting of the LED module.

If the load detection circuit of the controlgear does not allow operation with pure resistive load, the resistor R is to be substituted with equivalent LED load.

Compliance: The controlgear overvoltage detection shall not act during the starting phase or when connecting the load in the steady state phase.

8 Total circuit power

At rated voltage, the total circuit power shall not be more than 110 % of the value declared by the manufacturer, when the controlgear is operated with LED module(s).

9 Circuit power factor

The measured circuit power factor shall not be less than the marked value by more than 0,05 when the controlgear is operated at the rated output power range with LED module(s) and the whole combination is supplied with rated voltage and frequency.

For controllable controlgear, the power factor is measured with the controlgear adjusted to provide the maximum output power.

Controlgear designed to provide, in combination with a LED module, constant luminous flux, are measured with a load not using the rated output power at 0 h, but with the controlgear providing the maximum output power.

The DUT may be specially prepared in a way that the output power is set to the maximum value compensating the luminous flux depreciation of the load at the end of life.

For controlgear with a supply voltage range, the test shall be performed with the combination of supply voltage range and output power range which gives the lowest and highest power factor (e.g. minimum supply voltage, maximum rated output power and maximum supply voltage, minimum rated output power). The measured power factors shall not be less than the lowest and highest marked values by more than 0,05 respectively.

10 Supply current

At rated voltage, the supply current shall not differ by more than +10 % from the value marked on the controlgear or declared in the manufacturer's literature, when that controlgear is operated on its rated power with LED module(s).

11 Operational tests for abnormal conditions

The controlgear shall not be damaged under the following conditions.

a) Test without LED module(s) inserted

   The controlgear shall be supplied with rated voltage for 1 h without LED module(s) inserted. At the end of this test, the LED module(s) shall be connected and shall operate normally.

b) Test for reduced LED module resistance

   Under consideration.

c) Tests for short-circuit proof controlgear

   The controlgear is short-circuited for 1 h.

The 1 h test shall be completed also in the case of a thermal protection acting.

After these tests and after restoration of a possible protecting device, the controlgear shall function normally.

12 Endurance

12.1 The controlgear shall be subjected to a temperature cycling shock test and a supply voltage switching test as follows:

a) Temperature cycling shock test

The non-energized controlgear shall be stored firstly at –10°C or if the controlgear is marked with a lower value, at that value for 1 h. The controlgear is then moved into a cabinet having a temperature of t_c and stored for 1 h. Five such temperature cycles shall be carried out.

b) Supply voltage switching test

At rated supply voltage the controlgear shall be switched on and off for 30 s. The cycling shall be repeated 200 times with no load and 800 times under maximum load conditions.

LED modules failing during this test shall be replaced immediately.

At the end of these tests the controlgear shall operate an appropriate LED module or LED modules correctly for 15 min.

12.2 The controlgear shall then be operated with an appropriate LED module(s) at rated supply voltage and at the ambient temperature which produces t_c, until a test period of 200 h has passed. At the end of this time, and after cooling down to room temperature, the controlgear shall operate an appropriate LED module(s) correctly for 15 min. During this test the LED module(s) is (are) placed outside the test enclosure at an ambient temperature of (25 ± 5) °C.

Annex A
(normative)

Tests

A.1 General requirements

A.1.1 General

The tests are type tests. One sample shall be subjected to all the tests.

A.1.2 Ambient temperature

The tests shall be made in a draught-free room and at an ambient temperature within the range of 20 °C to 27 °C.

A.1.3 Supply voltage and frequency

a) Test voltage and frequency

Unless otherwise specified, the controlgear to be tested shall be operated at its rated supply voltage and frequency.

When a controlgear is marked for use on a range of supply voltages, or has different separate rated supply voltages, any voltage for which it is intended may be chosen as the rated voltage.

b) Stability of supply voltage and frequency

During the tests, the supply voltage and the frequency shall be maintained constant within ±0,5 %. However, during the actual measurement, the voltage shall be adjusted to within ±0,2 % of the specified testing value.

c) Supply voltage waveform

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

A.1.4 Magnetic effects

Unless otherwise specified, no magnetic object shall be allowed within 25 mm of any outer surface of the controlgear under test.

A.1.5 Instrument characteristics

a) Potential circuits

Potential circuits of instruments connected across the LED module shall not pass more than 3 % of the nominal running current of the LED module.

b) Current circuits

Instruments connected in series with the LED module shall have a sufficiently low impedance such that the voltage drop shall not exceed 2 % of the objective LED module voltage.

c) RMS measurements

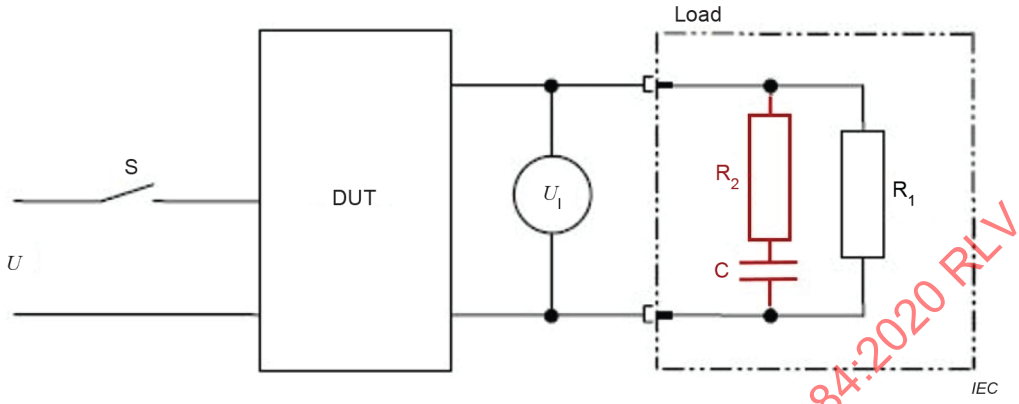
Instruments shall be essentially free from errors due to waveform distortion and shall be suitable for the operating frequencies.

It shall be ensured that the earth capacitance of the instruments does not disturb the operation of the unit under test. It may be necessary to ensure that the measuring point of the circuit under test is at earth potential.

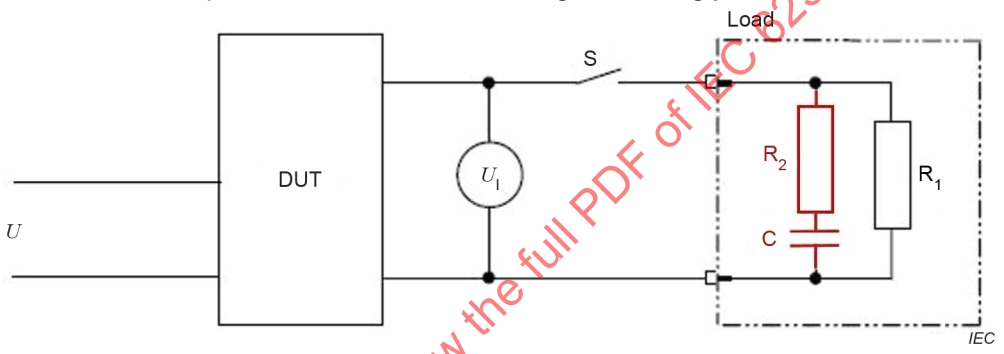
A.2 Measurement of capacitive load current

Figure A.1 illustrates the test circuit for the current when connecting a load.

NOTE The interoperability requirements between controlgear and LED modules are under further consideration.



a) Test circuit for current during the starting process



b) Test circuit for current when connecting the load during the steady state operation

Key

U: supply voltage
U_l: load voltage
DUT: controlgear under test
S: switch
R_1: resistor which gives the rated output current of the DUT (resistance: R_1)
for voltage sources: $R_1 = U_l^2/P_{max}$
for current sources: $R_1 = P_{max}/I^2$
C: capacitor
for controlgear for LED module circuitry with high input capacitance (C)
a) for voltage sources: $C = I \cdot 20$ µF/A
b) for current sources: C = 400 µF
for controlgear for LED module circuitry with low input capacitance
c) for voltage sources: $C = I \cdot 1$ µF/A
d) for current sources: C = 1 µF
R_2: equivalent series resistor (resistance: R_2)
for controlgear for LED module circuitry with high input capacitance
R_2 = 0 Ω
for controlgear for LED module circuitry with low input capacitance
$R_2 = I \cdot 4{,}7$ Ω/A

NOTE For controlgear for LED module circuitry with low input capacitance, capacitor C and resistor R_2 are representing the residual capacitance of the load circuit and the conductor equivalent series resistance (ESR) of the circuit.

Figure A.1 – Test circuit for measurement of capacitive load current

Annex B
(informative)

Guidance on quoting product life and failure rate

To allow the lifetime and failure rate of different electronic products to be meaningfully compared by a user, it is recommended that the following data be provided by the manufacturer in a product catalogue:

a) the maximum surface temperature, symbol t_l (t-lifetime) of the electronic product or the maximum part temperature which affects product life, measured under normal operating conditions and at the nominal voltage or at the maximum of the rated voltage range, that allows a life of 50 000 h to be achieved;

NOTE In some countries, such as Japan, a life of 40 000 h should be applied.

b) the failure rate, if the electronic product is operated continuously at the maximum temperature t_l (defined in a)). Failure rate should be quoted in units of failure in time (fit).

For the method used to obtain the information given in a) and b) above (mathematical analysis, reliability test, etc.), the manufacturer should, on request, provide a comprehensive data file containing the details of the method.

Bibliography

IEC 60410:1973[1], *Sampling plans and procedures for inspection by attributes*

IEC 62031, *LED modules for general lighting – Safety specifications*

[1] Withdrawn.

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

_____

APPAREILLAGES ÉLECTRONIQUES ALIMENTÉS EN COURANT CONTINU OU ALTERNATIF POUR MODULES DE LED – EXIGENCES DE PERFORMANCES

AVANT-PROPOS

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

La Norme internationale IEC 62384 a été établie par le sous-comité 34C: Appareils auxiliaires pour lampes, du comité d'études 34 de l'IEC: Lampes et équipements associés.

Cette deuxième édition annule et remplace la première édition parue en 2006 et son Amendement 1:2009. Cette édition constitue une révision technique.

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

a) extension du domaine d'application (courant continu de 250 V à 1 000 V);
b) nouvelles spécifications pour le mesurage du facteur de puissance des appareillages avec sortie réglable/non constante (par exemple, pour permettre un flux lumineux constant);
c) suppression des exigences en matière de fréquence audio;

d) choix du circuit d'essai actuel en fonction de la capacité du module (en lieu et place d'un choix en fonction de la présence ou de l'absence de circuits logiques) et modification de la configuration du circuit d'essai.

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

FDIS	Rapport de vote
34C/1488/FDIS	34C/1489/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Ce document doit être lu conjointement avec l'IEC 61347-2-13.

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

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.

APPAREILLAGES ÉLECTRONIQUES ALIMENTÉS EN COURANT CONTINU OU ALTERNATIF POUR MODULES DE LED – EXIGENCES DE PERFORMANCES

1 Domaine d'application

Le présent document spécifie les exigences de performances relatives aux appareillages électroniques pour utilisation sur des alimentations en courant continu ou courant alternatif jusqu'à 1 000 V (courant alternatif à 50 Hz ou 60 Hz) et avec une fréquence de sortie qui peut différer de la fréquence d'alimentation, associés à des modules de LED conformes à l'IEC 62031. Les appareillages pour modules de LED spécifiés dans le présent document sont conçus pour délivrer une tension ou un courant constant. Le présent document couvre aussi les appareillages qui ne sont pas des générateurs purs de courant ou de tension.

NOTE 1 Les essais spécifiés dans le présent document sont des essais de type. Les exigences pour les essais individuels des appareillages pendant la production ne sont pas incluses.

NOTE 2 Les exigences pour les appareillages qui incluent des dispositifs pour la variation de la puissance de sortie sont à l'étude.

NOTE 3 Il est probable que les appareillages conformes au présent document assurent un fonctionnement satisfaisant entre 92 % et 106 % de la tension d'alimentation assignée, en prenant en compte les spécifications du fabricant du module de LED.

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 61347-1, *Appareillages de lampes – Partie 1: Exigences générales et exigences de sécurité*

IEC 61347-2-13, *Appareillages de lampes – Partie 2-13: Exigences particulières pour les appareillages électroniques alimentés en courant continu ou alternatif pour les modules de DEL*

3 Termes et définitions

Pour les besoins du présent document, les termes et 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 http://www.electropedia.org/
- ISO Online browsing platform: disponible à l'adresse http://www.iso.org/obp

3.1
puissance totale du circuit
puissance totale dissipée par l'appareillage en combinaison avec le ou les modules de LED, à la tension d'alimentation assignée de l'appareillage et à la charge assignée de sortie la plus élevée

3.2
facteur de puissance du circuit
λ
rapport entre la puissance du circuit mesurée et le produit de la tension d'alimentation (efficace) par le courant d'alimentation (efficace)

3.3
appareillage pour circuits de modules de LED à haute capacité d'entrée
appareillage convenant à des modules de LED à haute capacité connectés directement ou indirectement aux bornes d'entrée

Note 1 à l'article: Des exemples sont les modules de LED à circuits de conversion d'alimentation à découpage, comme des régulateurs de survoltage/dévoltage.

Note 2 à l'article: En général, les capacités supérieures à 100 nF sont considérées comme des hautes capacités.

3.4
appareillage pour circuits de modules de LED à faible capacité d'entrée
appareillage convenant à des modules de LED à faible capacité ou sans capacité connectés directement ou indirectement aux bornes d'entrée

Note 1 à l'article: Des exemples sont les modules de LED formés uniquement de LED ou avec des circuits logiques destinés à la protection thermique mais qui ne modifient pas directement la puissance fournie par l'appareillage, ou encore les régulateurs de tension linéaires.

Note 2 à l'article: En général, les capacités de 100 nF et moins sont considérées comme des faibles capacités.

4 Remarques générales sur les essais

4.1 Les essais selon le présent document sont des essais de type.

Les exigences et tolérances autorisées dans le présent document sont fondées sur les essais de type d'un échantillon soumis par le fabricant à cet effet. En principe, il convient que cet échantillon soumis aux essais de type se compose d'éléments présentant des caractéristiques typiques de la production du fabricant et qu'il soit aussi proche que possible des valeurs centrales de production.

NOTE Il est probable que, s'ils respectent les tolérances indiquées dans le présent document, les produits fabriqués conformément à l'échantillon soumis aux essais de type soient conformes au présent document, et ce pour la majorité de la production. Cependant, pour des raisons liées à la dispersion de la production, il est inévitable que, parfois, certains produits ne respectent pas les tolérances indiquées. Pour de plus amples recommandations concernant les plans d'échantillonnage et les procédures à suivre pour les contrôles par attributs, voir l'IEC 60410.

4.2 Pour les essais qui sont effectués avec un ou plusieurs modules de LED, ce ou ces modules doivent satisfaire aux exigences suivantes:

La puissance du ou des modules de LED, lorsque le mesurage est effectué à leur tension assignée ou à leur courant assigné (courant continu et/ou courant alternatif), ne doit pas s'écarter de la puissance assignée de plus de +6 % et –0 %.

4.3 Les essais doivent être effectués dans l'ordre des articles, sauf spécification contraire.

4.4 Un spécimen doit être soumis à tous les essais.

4.5 En règle générale, tous les essais sont effectués sur chaque type d'appareillage ou, quand une plage d'appareillages similaires est concernée, pour chaque puissance assignée dans la plage ou sur une sélection représentative de la plage comme convenu avec le fabricant.