

INTERNATIONAL STANDARD



**Energy performance of lamp controlgear –
Part 3: Controlgear for tungsten-halogen lamps and LED light sources – Method
of measurement to determine the efficiency of controlgear**

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

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

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CONTENTS

FOREWORD	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 General	10
4.1 Applicability	10
4.1 General notes on tests	10
4.2 Controllable controlgear	10
4.3 Measurement uncertainty	10
4.4 Sampling of controlgear for testing	10
4.5 Size of the test sample	11
4.6 Power supply	11
4.7 Supply voltage waveform	11
4.8 Substitution load	11
4.9 Thermocouple and temperature indicator	12
4.10 Instrument accuracy	12
4.11 Measuring circuits	12
4.12 Multi-rated voltage controlgear	13
4.13 Multi-power controlgear	13
4.14 Sensor and network connections	13
5 Method of measurement and calculation of the efficiency of controlgear (transformer, convertor) for tungsten-halogen lamps and for LED light sources	13
5.1 Measurement set-up: input and output power	13
5.2 Efficiency calculation for electromagnetic (transformer) and electronic (convertor) controlgear	14
5.3 Measurement set-up: input power in no-load mode	15
5.4 Standby power measurement of convertor electronic controlgear	16
5.5 Networked standby power measurement	17
5.6 Reporting of power measurements	17
Bibliography	18
Figure 1 – Power losses measurement set-up for electromagnetic controlgear (transformer) and input and output power measurement set-up for convertor (electronic controlgear)	14
Figure 2 – Input power in no-load mode measurement setup for electromagnetic controlgear (transformer) and for convertor (electronic controlgear)	15
Figure 3 – Measurement setup of the standby power of convertor electronic controlgear	16
Table 1 – Typical nominal electricity supply details for some regions	11

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENERGY PERFORMANCE OF LAMP CONTROLGEAR –

**Part 3: Controlgear for tungsten-halogen lamps and LED light sources –
Method of measurement to determine the efficiency of controlgear**

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62442-3:2018. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 62442-3 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lighting. It is an International Standard.

This third edition cancels and replaces the second edition published in 2018. This edition constitutes a technical revision.

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

- a) this edition has been harmonized with IEC 62442-1 and IEC 62442-2;
- b) the reference to and use of the measurement methods for non-active power consumption in accordance with IEC 63103 have been added.

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

Draft	Report on voting
34C/1547/FDIS	34C/1550/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/standardsdev/publications.

A list of all parts in the IEC 62442 series, published under the general title *Energy performance of lamp controlgear*, can be found on the IEC website.

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

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ENERGY PERFORMANCE OF LAMP CONTROLGEAR –

Part 3: Controlgear for tungsten-halogen lamps and LED light sources – Method of measurement to determine the efficiency of controlgear

1 Scope

~~This part of IEC 62442 defines a measurement method for the power losses of electromagnetic transformers as well as the power losses and the standby power of electronic convertors for tungsten-halogen lamps and for LED light source(s).~~

This part of IEC 62442 defines measurement and calculation methods for specifying the efficiency and the standby power of controlgear for tungsten-halogen lamps and LED light sources.

NOTE 1 This includes electromagnetic transformers and electronic convertors for tungsten-halogen lamps, as well as electronic controlgear for LED light source(s).

NOTE 2 The term "LED light sources" includes LED modules and LED lamps.

This document is applicable for controlgear designed for use on DC supplies up to 1 000 V and/or AC supplies up to 1 000 V at 50 Hz or 60 Hz.

~~A calculation method of the efficiency of the mentioned controlgear for tungsten-halogen lamps and LED light source(s) is also defined.~~

~~This document applies to electrical controlgear lamp circuits comprised solely of the controlgear and of the lamp(s) (LED light sources).~~

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<http://www.electropedia.org/standards/iec/62442-3-2022> For multipurpose power supplies only the lighting part will be considered.

NOTE 3 Requirements for testing individual controlgear during production are not included.

~~This document specifies the measurement method for the total input power, the standby power and the calculation method of the controlgear efficiency for all controlgear sold for domestic and normal commercial purposes operating with tungsten-halogen lamps and LED light source(s). The term "LED light sources" includes LED modules and LED lamps.~~

This document does not apply to:

- controlgear which form an integral part of lamps (LED light sources);
- controlgear circuits with capacitors connected in series;
- controllable electromagnetic controlgear.

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

IEC 61047:2004, *DC or AC supplied electronic step-down convertors for filament lamps – Performance requirements*

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

~~IEC 61347-2-2, *Lamp controlgear – Part 2-2: Particular requirements for DC or AC supplied electronic step-down convertors for filament lamps*~~

~~IEC 61347-2-13, *Lamp controlgear – Part 2-13: Particular requirements for DC or AC supplied electronic controlgear for LED modules*~~

~~IEC 61558-1, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*~~

~~IEC 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*~~

~~IEC 62301:2011, *Household electrical appliances – Measurement of standby power*~~

IEC 63103:2020, *Lighting equipment – Non-active mode power measurement*

IEC TS 63105:2021, *Lighting systems and related equipment – Vocabulary*

IEC Guide 115:2007/2021, *Application of uncertainty of measurement to conformity assessment activities in the electrotechnical sector*

3 Terms and definitions

For the purposes of this document the terms and definitions given in IEC 60050-845 and IEC TS 63105 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

nominal value

suitable approximate quantity value used to designate or identify a component, device or equipment

Note 1 to entry: To express the "nominal value" of a particular quantity, the term "value" is replaced by the quantity name; for example, nominal power, nominal voltage, and nominal current.

[SOURCE: IEC 62442-1:2018/2022, 3.1]

3.2

rated value

~~quantity value for specified operating conditions of a component, device or equipment~~

~~Note 1 to entry: The value and conditions are specified in the relevant standard or assigned by the manufacturer or responsible vendor.~~

~~[SOURCE: IEC 62442-1:2018, 3.3, modified – Note 2 has been deleted.]~~

value of a quantity, used for specification purposes, declared by the manufacturer or responsible vendor and established under standard test conditions

Note 1 to entry: To express the "rated value" of a particular quantity, the term "value" is replaced by the quantity name; for example, rated power, rated voltage, rated current, and rated temperature.

[SOURCE: IEC 60050-845:2020, 845-27-100, modified – Note 2 to entry has been deleted.]

3.3

controlgear

~~one or more components between supply and one or more lamps (LED light source(s)) which may serve to transform the supply voltage, limit the current of the lamp(s) (LED light source(s)) to the required value, the correct power factor or reduce radio interference~~

~~[SOURCE: IEC 62442-1:2018, 3.4 modified – "provide starting voltage and preheating current, prevent cold starting" has been deleted and "(LED light source(s))" has been added.]~~

<for an electric light source> unit inserted between the power supply and at least one light source, which serves to supply the light source(s) with its (their) rated voltage or rated current, and which can consist of one or more separate components

Note 1 to entry: A controlgear can include means for igniting, dimming, correcting the power factor and suppressing radio interference, and further control functions.

Note 2 to entry: A controlgear can consist of a power supply and a control unit.

Note 3 to entry: A controlgear can be partly or totally integrated in the light source.

[SOURCE: IEC 60050-845:2020, 845-28-048, modified – Note 4 to entry has been deleted.]

3.4

electromagnetic controlgear magnetic controlgear

~~controlgear which, by means of inductance, or a combination of inductance and capacitance, serves mainly to limit the current of lamp(s) (LED light source(s)) to the required value and operates the lamp(s) at the same frequency as the supply frequency~~

~~[SOURCE: IEC 62442-1:2018, 3.5, modified – "(LED light source(s))" has been added.]~~

3.4

electromagnetic transformer magnetic transformer transformer

electromagnetic controlgear which transforms the supply voltage to operate lamp(s) (LED light source(s)) with the same frequency as the supply frequency at the lamps (light sources) rated voltage

3.5

electronic controlgear

~~<filament lamp(s) or LED light sources> AC and/or DC supplied electronic circuit including stabilizing elements for operating one or more filament lamp(s) or one or more LED light sources~~

controlgear comprised of semiconductors and other electronic components

3.7

electronic step-down converter converter

~~unit inserted between the supply and one or more tungsten-halogen or other filament lamps which serves to supply the lamp(s) with its (their) rated voltage, generally at high frequency~~

~~Note 1 to entry:—The unit may consist of one or more separate components and may include means for dimming, correcting the power factor and suppressing radio interference.~~

~~[SOURCE: IEC 61347-2-2:2011, 3.1, modified—Additional information has been transferred to a note to entry.]~~

~~3.8 controlgear for LED light sources~~

~~3.8.1 electronic controlgear for LED light sources converter~~

~~unit inserted between the supply and one or more LED light sources which serves to supply the LED light source(s) with its (their) rated voltage or rated current~~

~~Note 1 to entry:—The unit may consist of one or more separate components and may include means for dimming, correcting the power factor and suppressing radio interference, and further control functions~~

~~Note 2 to entry:—The controlgear consists of a power supply and a control unit.~~

~~Note 3 to entry:—The controlgear may be partly or totally integrated in the LED module.~~

~~Note 4 to entry:—When there is no risk of confusion, as in a LED standard for example, “controlgear” may also be used. Both terms “controlgear” or “control gear” are acceptable.~~

~~[SOURCE: IEC 61347-2-13:2014, 3.1, modified—“LED modules” has been replaced with “LED light sources” and Note 4 has been added.]~~

~~3.8.2 power supply of the controlgear~~

~~electronic device, being part of the controlgear, capable of controlling current, voltage or power within design limits and containing no additional LED control capabilities~~

~~Note 1 to entry:—For LEDsi modules, the power supply of the controlgear is separate from the LED module on a distant location.~~

~~Note 2 to entry:—The energy source of a power supply can be either a battery or the electrical supply system.~~

~~3.8.3 control unit of the controlgear~~

~~electronic device, being part of the controlgear, responsible for controlling the electrical energy to the LED light sources as well as colour mixing, response to depreciating luminous flux and further performance features~~

~~Note 1 to entry:—In LEDsi modules, the control unit of the controlgear is on board the LED module and separate from the power supply of the controlgear.~~

~~3.6 controlgear-light source circuit~~

~~electrical circuit, or part thereof, normally built in a luminaire, consisting of the controlgear and light source(s)~~

~~[SOURCE: IEC 62442-1:20182022, 3.8 3.7, modified – “lamp” has been replaced with “light source”.]~~

~~3.7 standby mode~~

~~mode of the controlgear, in which the light source is switched off by a control signal, while the controlgear remains connected to the mains supply not including failed lamp(s) or light source(s)~~

~~Note 1 to entry:—Failed light source(s) could lead to incorrect measurements.~~

<of controlgear> mode when the equipment is connected to a supply voltage with the illumination function off, while capable of being activated by an external trigger not being a trigger from a network

Note 1 to entry: Examples of external triggers are sensing or timing.

[SOURCE: IEC 63103:2020, 3.10, modified – The domain "<of lighting equipment>" has been replaced with "<of controlgear>".]

3.8

networked standby mode

<of controlgear> mode when the equipment is connected to a supply voltage with the illumination function off, while capable of being activated by an external trigger being a trigger from a network

[SOURCE: IEC 63103:2020, 3.11, modified – The domain "<of lighting equipment>" has been replaced with "<of controlgear>".]

3.9

standby power

<of controlgear> average power consumption in the standby mode

~~Note 1 to entry: Power supplied by controlgear to sensors, network connections and other auxiliaries is not included in the standby power.~~

~~Note 2 to entry: Standby power is expressed in W.~~

3.10

networked standby power

<of controlgear> average power consumption in the networked standby mode

3.11

no-load mode

~~mode relevant for those controlgear which are permanently connected to the mains, where the lamp(s) or light source(s) are switched off via a switch on the output circuit of the controlgear~~

<of controlgear> mode when the equipment is connected to a supply voltage where all loads are disconnected from the controlgear

3.12

total input power

total power consumed by the ~~controlgear lamp (light source)~~ controlgear-light source circuit measured at rated input voltage

~~[SOURCE: IEC 62442-1:2018, 3.13, modified – "supplied to" has been replaced with "consumed by", "(light source)" has been added and the note has been deleted.]~~

3.13

controlgear efficiency

η_{CG}

<filament lamp(s) or LED light source(s)> ratio of the output power to lamp(s) (light source) and the input power of the controlgear

~~Note 1 to entry: Detailed measurement method and conditions are given in Clause 5.~~

Note 2 1 to entry: Loads from sensors, network connections or other auxiliaries are disconnected or, if not possible, otherwise, eliminated from the result.

3.14

controllable controlgear

controlgear whose light sources operating characteristics can be changed by means of a signal via mains or extra control input(s)

Note 1 to entry: Signal control is either wired or wireless.

4 General

~~4.1 Applicability~~

~~The measurement and calculation methods in this document shall only be used for magnetic transformers which conform to IEC 61558-1 and IEC 61558-2-6 or for electronic converters which conform to IEC 61347-2-2 or for electronic controlgear for LED modules which conforms to IEC 61347-2-13.~~

4.1 General notes on tests

The measurement conditions specified in IEC 61347-1:2015, Clauses H.1, H.2, H.4, H.8 and H.11 shall be applied unless otherwise specified in this document. The device under test (DUT) shall be placed according to IEC 61347-1:2015, Figure H.1.

An AC or DC voltage source shall be used to provide input voltage to the DUT. During the tests, the supply voltage and the frequency shall be maintained constant within $\pm 0,5\%$ during the warm-up period. However, during the actual measurement, the voltage shall be adjusted to within $\pm 0,2\%$ of the specified testing value.

The input voltage source should be capable of delivering at least three times the input power of the DUT.

Unless otherwise specified in IEC 63103, stability of the measurement values (V, A or W) is given if the data does not deviate by more than 1 % in a time frame of 15 min. However, if any of these values vary with time, the power is determined as the arithmetic mean value over a sufficient period.

4.2 Controllable controlgear

In the case of controllable controlgear the test shall be carried out with the maximum output power.

In case a controlgear has multiple channels, each channel shall be set at the same power level. The sum of the power per channel shall be equal to the maximum allowed output power of the controlgear.

Requirements relevant for the efficiency during the dimming condition of controllable controlgear are under consideration.

4.3 Measurement uncertainty

Measurement uncertainty shall be managed in accordance with the accuracy method in IEC Guide 115:2007/2021, 4.4.3.

4.4 Sampling of controlgear for testing

The requirements and tolerances specified in this document are based on the testing of a type test sample submitted by the manufacturer for that purpose. This 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.