IEC 62442-3

Edition 3.0 2022-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Performance énergétique des appareillages de lampes –
Partie 3: Appareillages des lampes tungstène-halogène et des sources lumineuses à LED – Méthode de mesurage pour la détermination du rendement des appareillages

IEC 62442-3:2022-02(en-fr)

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FOREWORD

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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- withdrawn,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.

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 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.

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

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

IEC Guide 115:2021, *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 62442-1:2022, 3.1]

3.2
rated value
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
<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 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
controlgear comprised of semiconductors and other electronic components

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 62442-1:2022, 3.7, modified – "lamp" has been replaced with "light source".]

3.7
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 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

3.10
networked standby power
<of controlgear> average power consumption in the networked standby mode

3.11
no-load mode
<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-light source circuit measured at rated input voltage

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: 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 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 ±0,5 % during the warm-up period. However, during the actual measurement, the voltage shall be adjusted to within ±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 115:2021, 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.

4.5 Size of the test sample

Tests are carried out with one test specimen.

4.6 Power supply

Test voltage(s) and test frequency(ies) shall be the nominal voltage and the nominal frequency of the country or region for which the measurement is being determined (refer to Table 1).

Where the test voltage and frequency are not defined by national or regional requirements, the controlgear manufacturer shall declare the nominal voltage(s) at which the given efficiency is valid.

Table 1 – Typical nominal electricity supply details for some regions

Country or region	Nominal voltage and frequency [a]
Europe	230 V; 50 Hz
North America	120 V, 277 V; 60 Hz
Japan [b]	100 V, 200 V; 50/60 Hz
China	220 V; 50 Hz
Australia and New Zealand	230 V; 50 Hz
South Africa	230 V; 50 Hz

[a] Values are for single phase only. Some single phase supply voltages can be double the nominal voltage above (centre transformer tap). The voltage between two phases of a three-phase system is 1,73 times single phase values. (e.g. 400 V for Europe).

[b] 50 Hz is applicable for the Eastern part and 60 Hz for the Western part.

The above table can require test voltages additional to those required in IEC 63103.

4.7 Supply voltage waveform

The total harmonic content of the supply voltage when supplying the DUT shall not exceed 3 %; harmonic content is defined as the root-mean-square (RMS) summation of the individual components up to the 40th harmonic using the fundamental as 100 %.

The ratio of peak value to RMS value of the test voltage (i.e. crest factor) shall be between 1,34 and 1,49.

4.8 Substitution load

For the specification of substitution loads, IEC 63103:2020, 5.3.2 applies.

NOTE Although the scope of IEC 63103 is limited to non-active mode power, the principle is also suitable for other power measurements.

In the case of controlgear with an output frequency higher than 70 Hz for tungsten-halogen lamps, the load shall always be a lamp as indicated in IEC 61047:2004, 4.2.

4.9 Thermocouple and temperature indicator

The resolution of the temperature indicator shall be at least 0,1 °C, when used with the appropriate thermocouple.

4.10 Instrument accuracy

For electromagnetic transformers, calibrated and traceable AC power meters, power analysers or digital power meters shall be used. For measurement uncertainty and traceability see ISO/IEC Guide 98-3 and IEC Guide 115.

For electronic step-down convertors, all output power measurements shall be made with a calibrated and traceable wideband power analyser or digital power meter.

The power measuring instrument shall be capable of measuring DC and AC from 10 Hz to a frequency that is at least equal to the 40th harmonic of the test supply frequency.

For measurements made under the scope of this document, measurement instruments with the following minimum accuracies shall be used.

a) For frequencies up to and including 1 kHz:
   - voltage: 0,5 %
   - current: 0,5 %
   - power: 1,0 %
   - frequency: 0,1 %

b) For frequencies above 1 kHz:
   - voltage: 1,0 %
   - current: 1,0 %
   - power: 2,0 %

Measurement shall be done in such a way that the line losses are limited (for example with a four-wire measurement system).

4.11 Measuring circuits

When the controlgear has supplementary connections to the output circuit or sensors (e.g. to detect fault or temperatures for example to ensure a safe function of the controlgear), all these sensors and circuits shall be connected as in normal use.

4.12 Multi-rated voltage controlgear

If a controlgear is designed for more than one rated voltage, the controlgear manufacturer shall declare the rated voltage(s) at which the given efficiency and the standby power are valid.

4.13 Multi-power controlgear

If a controlgear is designed for more than one output power, the test shall be carried out with the maximum output power.

4.14 Sensor and network connections

For the measurement of all kinds of controlgear power (also standby) the power consumed by all circuits (internal or external) shall be considered as indicated in IEC 63103.

NOTE although the scope of IEC 63103:2020 is limited to non-active mode power, the principle is also suitable for other power measurements.

5 Method of measurement and calculation of the efficiency

5.1 Measurement set-up: input and output power

Figure 1 shows the set-up for the measurement of the power losses of electromagnetic controlgear and the input and output power of convertor-electronic controlgear.