IEC 62442-2

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Energy performance of lamp controlgear – Part 2: Controlgear for discharge lamps (excluding low-pressure mercury fluorescent lamps) – Method of measurement to determine the efficiency of controlgear

Performance énergétique des appareillages de lampes – Partie 2: Appareillages des lampes à décharge (à l'exclusion des lampes à fluorescence à vapeur de mercure à basse pression) – Méthode de mesurage pour la détermination du rendement des appareillages

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IEC Secretariat
3, rue de Varembé
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 8
4.1 General notes on tests 8
4.2 Controllable controlgear 8
4.3 Multi-lamp type controlgear 8
4.4 Measurement uncertainty 8
4.5 Sampling of controlgear for testing 8
4.6 Size of the test sample 8
4.7 Power supply 8
4.8 Supply voltage waveform 9
4.9 Instrument accuracy 9
4.10 Multi-rated voltage controlgear 10
4.11 Sensor and network connections 10
5 Method of measurement of the input power and calculation of the efficiency 10
5.1 Measurement set-up: electromagnetic controlgear 10
5.2 Efficiency calculation: electromagnetic controlgear 11
5.3 Measurement set-up: electronic controlgear 11
5.4 Efficiency calculation: electronic controlgear 12
5.5 Standby power measurement of electronic controlgear 12
5.6 Networked standby power measurement of electronic controlgear 12
5.7 Reporting of power measurements 12
Bibliography 13

Figure 1 – Measurement set-up for electromagnetic controlgear 10
Figure 2 – Measurement set-up for electronic controlgear 11

Table 1 – Typical nominal electricity supply details for some regions 9

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ENERGY PERFORMANCE OF LAMP CONTROLGEAR –

Part 2: Controlgear for discharge lamps (excluding low-pressure mercury fluorescent lamps) – Method of measurement to determine the efficiency of controlgear

FOREWORD

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IEC 62442-2 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) the title of Part 2 has been modified;
b) this edition has been harmonized with IEC 62442-1 and IEC 62442-3;
c) 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/1546/FDIS	34C/1549/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 2: Controlgear for discharge lamps (excluding low-pressure mercury fluorescent lamps) – Method of measurement to determine the efficiency of controlgear

1 Scope

This part of IEC 62442 defines a measurement method of the power losses of electromagnetic controlgear, the total input power and the standby power of electronic controlgear for discharge lamps (excluding low-pressure mercury fluorescent lamps). A calculation method of the efficiency of controlgear for discharge lamp(s) is also defined.

It is assumed that the controlgear are 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.

This document applies to electrical controlgear-lamp circuits comprised solely of the controlgear and of the lamp(s).

NOTE 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 lamp controlgear efficiency for all controlgear sold for domestic and normal commercial purposes operating with discharge lamps.

This document does not apply to:

– controlgear which form an integral part of lamps;
– 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 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
one or more components between the supply and one or more lamps which can serve to transform the supply voltage, limit the current of the lamp(s) to the required value, provide starting voltage and preheating current, prevent cold starting, correct power factor or reduce radio interference

[SOURCE: IEC 62442-1:2022, 3.3]

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 the electric lamp(s)

[SOURCE: IEC 60050-845:2020, 845-28-052, modified – The second preferred term has been added.]

3.5
electronic controlgear
<of discharge lamp> AC and/or DC supplied electronic circuit including stabilizing elements for starting and operating one or more lamp(s)

3.6
discharge lamp
lamp in which the light is produced, directly or indirectly, by an electric discharge through a gas, a metal vapour or a mixture of several gases and vapours

3.7
controlgear-lamp circuit
electrical circuit, or part thereof, normally built in a luminaire, consisting of the controlgear and lamp(s)

[SOURCE: IEC 62442-1:2022, 3.7]

3.8
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>".]

3.9
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>".]

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

3.11
networked standby power
<of controlgear> average power consumption in the networked standby mode

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}
ratio of the output power to the lamp(s) 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
multi-lamp type controlgear
single-lamp controlgear designed for the operation of more than one type of lamp with different electrical characteristics, for example power

3.15
controllable controlgear
controlgear whose light sources operating characteristics can be changed by means of a signal via mains or 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, H.9 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.

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. 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.

Requirements for other than 100 % light output operation of controllable controlgear and multi-tapped electromagnetic controlgear are under consideration.

4.3 Multi-lamp type controlgear

If a single-lamp controlgear is designed for different lamp powers then the test shall be carried out for each lamp.

The test for multi-lamp controlgear shall be carried out with all possible combinations.

4.4 Measurement uncertainty

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

4.5 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.

4.6 Size of the test sample

Tests are carried out with one test specimen.

4.7 Power supply

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.

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).

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.

4.8 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 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.

4.9 Instrument accuracy

For measurement uncertainty and traceability see ISO/IEC Guide 98-3 and IEC Guide 115.

For electromagnetic controlgear, calibrated and traceable AC power meters, power analysers or digital power meters shall be used.

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

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

a) for frequencies ≤ 1 kHz
   - voltage: 0,5 %
   - current: 0,5 %
   - power: 1,0 %
   - frequency: 0,1 %

b) for frequencies > 1 kHz
   - voltage: 1,5 %
   - current: 1,0 %
   - power: 2,0 %
   - frequency: 0,1 %

4.10 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 standby power is valid.

4.11 Sensor and network connections

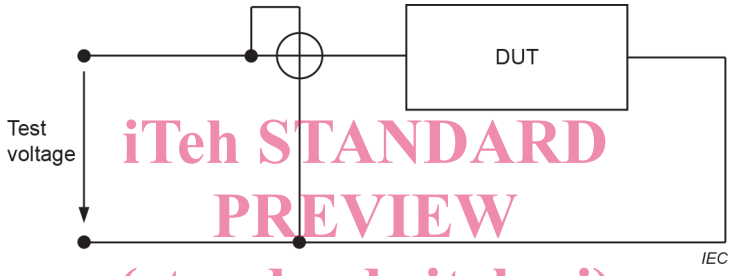
For the measurement of all kinds of controlgear power, the power consumed by all circuits (internal or external) shall be considered as indicated in IEC 63103.

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

5 Method of measurement of the input power and calculation of the efficiency

5.1 Measurement set-up: electromagnetic controlgear

Figure 1 shows the measurement set-up of the power losses of electromagnetic controlgear.



Key

DUT device under test

Figure 1 – Measurement set-up for electromagnetic controlgear

The power losses (P_{losses}) of the electromagnetic controlgear will be measured based on the rated lamp current through the electromagnetic controlgear. Therefore the current through the electromagnetic controlgear will be adjusted by the test voltage to the current defined in the data sheet of the lamp(s). Tolerance for the current is ±0,5 %.

The measurements are carried out with a power meter connected to measure the power losses into the electromagnetic controlgear.

The value of the power losses (P_{losses}) is recorded when a steady state has been reached (temperature of the electromagnetic controlgear).

The measurement sequence is as follows:

1) Connect the DUT according to Figure 1.
2) Switch on the test voltage and adjust the test voltage until the rated lamp current is obtained.
3) Await the thermal equilibrium and if necessary adjust the test voltage again to match the rated lamp current.
4) Measure the power losses.

NOTE In the case of independent electromagnetic controlgear which incorporate an ignitor in the same enclosure, the test is only applicable to the electromagnetic controlgear.

The measurement set-up circuit for constant power controlgear shall also be used in a suitable way with the current defined in the data sheets of the lamp(s).