IEC 62442-2

Edition 2.0 2018-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Energy performance of lamp controlgear – Part 2: Controlgear for high intensity discharge lamps (excluding 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 haute intensité (à l'exclusion des lampes à fluorescence) – Méthode de mesure pour la détermination du rendement des appareillages

IEC 62442-2:2018-05(en-fr)

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CONTENTS

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ENERGY PERFORMANCE OF LAMP CONTROLGEAR –

Part 2: Controlgear for high intensity discharge lamps (excluding fluorescent lamps) – Method of measurement to determine the efficiency of controlgear

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International Standard IEC 62442-2 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 2014. This edition constitutes a technical revision and has been harmonized with IEC 62442-1 and IEC 62442-3.

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

CDV	Report on voting
34C/1336A/CDV	34C/1377/RVC

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.

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 "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- withdrawn,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.

ENERGY PERFORMANCE OF LAMP CONTROLGEAR –

Part 2: Controlgear for high intensity discharge lamps (excluding 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 high intensity discharged lamps (excluding fluorescent lamps). A calculation method of the efficiency of controlgear for high intensity discharged 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 high intensity 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 61347-1:2015, *Lamp controlgear – Part 1: General and safety requirements*

IEC 61347-2-9, *Lamp controlgear – Part 2-9: Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps)*

IEC 61347-2-12, *Lamp controlgear – Part 2-12: Particular requirements for d.c. or a.c. supplied electronic ballasts for discharge lamps (excluding fluorescent lamps)*

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

[SOURCE: IEC 62442-1:2018, 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.]

3.3
controlgear
one or more components between the supply and one or more lamps which may 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 62442-1:2018, 3.4]

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 lamp(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]

3.5
electronic controlgear
<high intensity discharge lamps> 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 62442-1:2018, 3.8]

3.8
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

3.9
standby power
average power consumption of a controlgear in the standby mode

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

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

3.10
total input power
total power consumed by the controlgear-lamp (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.]

3.11
efficiency of lamp controlgear
η_{MCG}
η_{ECG}
<high intensity discharge lamps> ratio of the output power to lamp(s) and input power of the controlgear

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

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

3.12
multi-lamp type controlgear
controlgear designed for the operation of more than one type of lamp with different electrical characteristics, for example power

4 General

4.1 Applicability

The measurement and calculation methods in this document shall only be used for lamp controlgear which conforms to IEC 61347-2-9 or IEC 61347-2-12.

4.2 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.

4.3 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.

4.4 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.

4.5 Measurement uncertainty

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

4.6 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.

4.7 Size of the test sample

Tests are carried out with one test specimen.

4.8 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

[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.

4.9 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 fundament 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.

4.10 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 are to 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 %

Stability of the measurement values (V, A or W) is given if the data does not deviate from 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.

4.11 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.

4.12 Sensor and network connections

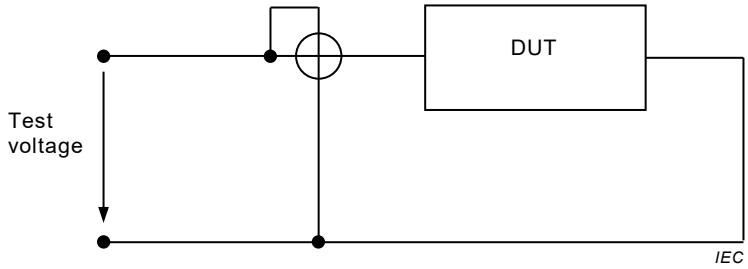
For the measurement of all kinds of controlgear power (also standby) the power consumed by all circuits (internal or external) which are not involved in power conversion for the controlgear operation (e.g. communication devices, external sensors, auxiliary load, battery charging circuits) shall be excluded from the measurements. If the auxiliary cannot be disconnected, its effect shall be otherwise eliminated from the result.

NOTE Power consumed by circuits necessary for the proper operation of power conversion is considered in the measurement (e.g. cooling fan, signalling lighting).

5 Method of measurement of the input power and calculation of the efficiency of controlgear for high intensity discharge lamps

5.1 Measurement setup: electromagnetic controlgear

Figure 1 shows the measurement setup of the power losses of electromagnetic controlgear.



Key

DUT device under test

Figure 1 – Measurement setup 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 setup 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).

5.2 Efficiency calculation: electromagnetic controlgear

For the calculation of the efficiency of electromagnetic controlgear (η_{MCG}), Equation (1) should be used:

$$\eta_{MCG} = \frac{P_{lamp\ rated}}{P_{lamp\ rated} + P_{losses}} \quad (1)$$

where

$P_{lamp\ rated}$ is the lamp power given in the lamp datasheet (in W).