

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Metal halide lamps – Performance specification

Lampes aux halogénures métalliques – Spécifications de performances

IEC 61167:2018

<https://standards.iteh.ai/catalog/standards/sist/3875c17e-74f2-4c87-b505-aff4cce8a498/iec-61167-2018>



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INTERNATIONAL STANDARD

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

METAL HALIDE LAMPS – PERFORMANCE SPECIFICATION

FOREWORD

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International Standard IEC 61167 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This fourth edition cancels and replaces the third edition published in 2015. This edition constitutes a technical revision.

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

- a) A set of new lamp data sheets has been introduced for lamp types designed for replacing high pressure sodium lamps.
- b) A set of new lamp data sheets has been introduced for 4 200 K versions of 3 000 K lamp types already in the standard.
- c) A set of new lamp data sheets has been introduced for new lamp types where high frequency ignition data is important.
- d) Annex G has been revised to incorporate high frequency ignition. As a consequence of this change, all data sheets in the standard have been revised to a new format.
- e) A new informative Annex K has been introduced, giving recommended methods of making lamp temperature measurements.

The text of this standard is based on the following documents:

FDIS	Report on voting
34A/2051/FDIS	34A/2058/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.

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- withdrawn,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.

The contents of the corrigendum of April 2019 have been included in this copy.

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INTRODUCTION

A big step forward when standardising metal halide lamps and their operation was made with the second edition which was published in 2011. Meanwhile, agreements were reached for the introduction of new lamp types and in aspects of operation which led to the third edition.

Major changes in the second edition were as follows. Since IEC 62035 was published in 1999, the related lamp specific performance standards such as IEC 61167 needed to be reviewed in an editorial action, splitting performance and safety requirements, but also to include all items in abeyance, stored for this occasion. The separation had already been carried out with other HID lamps. So, in some instances, the “pilot” text of IEC 60188 was used. Moreover, the measurement part was introduced with the assistance of IEC 60188 and IEC 60081.

It may also be noted that the colour coordinates for CCT 3 000 K and 4 200 K were adjusted to a point two units below Planck in order to take account of the life time shift to higher y-values.

Apart from these basic changes which had been needed for a long time, the new technique of low frequency square wave (LFSW) operation was implemented. This led to additional pages to the existing lamp data sheets and several annexes describing and specifying the requirements. Further, detailed requirements and measurement methods for the ignition (break down/take-over/run-up) were introduced. Intense discussions took place on measurement and specification of the peak-current ratio during ignition and steady state. Workshops were held in order to come to a broad worldwide acceptance of the concepts. The workshops were open to experts from the lamp and control gear side in order to accommodate the interface between control gear and lamp to these requirements.

Further lamp types which were considered to have market relevance and needing normative support were also added.

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Major changes in the third edition were as follows. Compared to the second edition, a set of new lamp data sheets (20 W, 35 W, 50 W, 100 W) was introduced. Reference to ILCOS (International lamp coding system) was removed from the lamp data sheets and located in a new annex. Information on outer bulb temperature (and in some cases also on pin temperature and temperature adjacent to cap) was replaced with an explanation on differences in manufacturers' construction; this explanation was given in detail in a new annex.

Major changes of this fourth edition are as follows. A total of 28 new data sheets have been introduced to specify lamp types designed for replacing high pressure sodium lamps, 4 200 K versions of 3 000 K lamp types already in the standard and lamp types where high frequency ignition is important. Annex G has been revised to incorporate high frequency ignition. As a consequence of this change, all data sheets in the standard have been revised to a new format. A new informative Annex K has been introduced, giving recommended methods of making lamp temperature measurements.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning the lamp given in standard sheets 1035E, 1035F, 1070C and 1070D.

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METAL HALIDE LAMPS – PERFORMANCE SPECIFICATION

1 Scope

This document specifies the performance requirements for metal halide lamps for general lighting purposes.

For some of the requirements given in this document, reference is made to “the relevant lamp data sheet”. For some lamps, these data sheets are contained in this document. For other lamps, falling under the scope of this document, the relevant data are supplied by the lamp manufacturer or responsible vendor.

The requirements of this document relate only to type testing.

The requirements and tolerances specified in this document correspond to testing of a type test sample submitted by the manufacturer for that purpose. In principle this type test sample consists of units having characteristics typical of the manufacturer’s production and being as close to the production centre point values as possible.

It can be expected that with the tolerances given in this document, the product manufactured in accordance with the type test sample will comply with this document for the majority of 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 ISO 2859-10.

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2 Normative references

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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 – Part 845: Lighting* (available at <http://www.electropedia.org>)

IEC 60061-1, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps*

IEC 60923, *Auxiliaries for lamps – Ballasts for discharge lamps (excluding tubular fluorescent lamps) – Performance requirements*

IEC 60927, *Auxiliaries for lamps – Starting devices (other than glow starters) – Performance requirements*

IEC TR 61341, *Method of measurement of centre beam intensity and beam angle(s) of reflector lamps*

IEC 62035, *Discharge lamps (excluding fluorescent lamps) – Safety specifications*

IEC 62471, *Photobiological safety of lamp and lamp systems*

CIE 084, *Measurement of luminous flux*

3 Terms and definitions

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

metal halide lamp

high-intensity discharge lamp in which the major portion of the light is produced by the radiation of a mixture of metallic vapour, metal halides and the products issued from the dissociation of metal halides

Note 1 to entry: The definition covers clear and coated lamps.

[SOURCE: IEC 60050-845:1987, 845.07.25, modified — "by the radiation of" and "metal halides" have been added.]

3.2

nominal value

approximate quantity value used to designate or identify a lamp

[SOURCE: IEC 60081:1997, 1.4.3]

3.3

rated value

quantity value for a characteristic of a lamp for specified operating conditions

Note 1 to entry: The value and the conditions are specified in this document, or assigned by the manufacturer or responsible vendor.

[SOURCE: IEC 60081:1997, 1.4.4]

3.4

lumen maintenance

ratio of the luminous flux of a lamp at a given time in its life to the initial reading of its luminous flux, the lamp being operated under specific conditions

Note 1 to entry: The ratio is generally expressed as a percentage.

3.5

initial readings

starting characteristics of a lamp, measured before ageing, and the electrical and photometric characteristics, measured at the end of the 100 h ageing period

3.6

reference ballast

special ballast complying with the requirements of IEC 60923, designed for the purpose of providing comparison standards for use in testing ballasts, for the selection of reference lamps and for testing regular production lamps under standardised conditions

Note 1 to entry: It is essentially characterised by the fact that, at its rated frequency, it has a stable voltage/current ratio which is relatively uninfluenced by variations in current, temperature and electromagnetic surroundings, as outlined in the relevant ballast standard.

[SOURCE: IEC 60662:2011, 3.4, modified — "inductive type" has been deleted and "complying with the requirements of IEC 60923" has been added.]

3.7

type test

test or a series of tests made on a type test sample for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard

[SOURCE: IEC 60081:1997, 1.4.10]

3.8

specific effective radiant UV power

effective power of the UV radiation of a lamp related to its luminous flux

Note 1 to entry: Specific effective radiant UV power is expressed in mW/klm.

Note 2 to entry: The effective power of the UV radiation is obtained by weighting the spectral power distribution of the lamp with the UV hazard function $S_{UV}(\lambda)$. Information about the relevant UV hazard function is given in IEC 62471. It only relates to possible hazards regarding UV exposure of human beings. It does not deal with the possible influence of optical radiation on materials, like mechanical damage or discoloration.

3.9

type test sample

sample consisting of one or more similar units submitted by the manufacturer or the responsible vendor for the purpose of a type test

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3.10

inrush current

short term high lamp current, totally or partially rectified, by the asymmetrical electrode heating for some seconds during lamp ignition

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3.11

warm-up current

increased lamp current after the inrush phase which is due to the low initial lamp voltage

Note 1 to entry: It is in the limits of double rated lamp current down to a value corresponding to the highest allowed lamp voltage.

3.12

run-up time

maximum time allowed to reach 90 % of the declared luminous flux, after switching on a 100 h aged lamp at rated supply voltage

3.13

take-over

time between a lamp being able to conduct current until electrodes are at thermionic emission

Note 1 to entry: At the end of the take-over phase, the lamp power factor is above 0,9 and the lamp voltage stabilises and ramps up from about 20 V RMS.

3.14

PCR

peak current ratio

ratio between the peak currents and the RMS currents

Note 1 to entry: For measurement procedure, see Annex G.

Note 2 to entry: This note only applies to the French language.

3.15**typical lamp voltage**

steady state lamp voltage expected for a lamp operating on a low frequency square wave ballast

3.16**typical lamp current**

steady state lamp current expected for a lamp operating on a low frequency square wave ballast

Note 1 to entry: Typical lamp current is derived from the lamp rated power and typical lamp voltage. In practice, lamps for use on low frequency square wave ballasts may be targeted to a different voltage within the allowed range for best performance, and the lamp current will be different accordingly. Typical lamp voltages and currents have been used as a basis for assigning currents at take-over and run-up.

3.17**commutation time****fall and rise time**

transition time of lamp current at half cycle polarity reversals

Note 1 to entry: It is measured using lamp current waveforms between 90 % of the RMS value of one half cycle to 90 % of the RMS value of the opposite half cycle.

3.18**high frequency breakdown****HF breakdown**

method of ignition where the breakdown is realised by applying high frequency high voltage

Note 1 to entry: In contrast to pulse breakdown, a high frequency voltage is applied for a duration of at least several oscillation periods such that the voltage necessary for igniting the lamp is lower due to cumulative effects.

[IEC 61167:2018](https://standards.iteh.ai/catalog/standards/sist/3875c17e-74f2-4c87-b505-aff4cce8a498/iec-61167-2018)

4 Lamp requirements**4.1 General**

A lamp, according to this document, shall comply with the requirements of IEC 62035.

Some lamps are specified on the data sheet or declared by the manufacturer as suitable for operation on low frequency square wave ballasts only. For these lamps, separate requirements are indicated where appropriate.

A lamp shall be so designed that its performance is reliable in normal and accepted use. In general, this can be achieved by satisfying the requirements of 4.2 to 4.9.

The requirements given apply to 95 % of production.

4.2 Marking**4.2.1 Colour appearance**

A suitable advice on the colour appearance is required. It may preferably take the form of ILCOS (see IEC 61231), or the 3-digit code of IEC TR 62732. Other options are the manufacturer's code or the correlated colour temperature. The information may be given either on the lamp or in the supplier's catalogue.

4.2.2 Lamps for operation on high pressure sodium controlgear

Where specified on the lamp data sheet the symbol



shall be marked on the lamp.