

INTERNATIONAL STANDARD

Discharge lamps (excluding fluorescent lamps) – Safety specifications

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DISCHARGE LAMPS
(EXCLUDING FLUORESCENT LAMPS) –
SAFETY SPECIFICATIONS****FOREWORD**

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International Standard IEC 62035 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This second edition cancels and replaces the first edition published in 1999, AMD1:2003 and AMD2:2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition. Photobiological safety requirements are taken care of on basis of the risk group concept of IEC 62471 and the technical report IEC TR 62778 on blue light hazard. This has consequences for terms, marking, structure of 4.6, and introduction of a new symbol “Caution, do not stare at light source”. Special attention is given to blue light hazard.

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

CDV	Report on voting
34A/1600/CDV	34A/1643/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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DISCHARGE LAMPS (EXCLUDING FLUORESCENT LAMPS) – SAFETY SPECIFICATIONS

1 Scope

This International Standard specifies the safety requirements for discharge lamps (excluding fluorescent lamps) for general lighting purposes.

This International Standard is applicable to low-pressure sodium vapour lamps and to high-intensity discharge (HID) lamps, i.e. high-pressure mercury vapour lamps (including blended lamps), high-pressure sodium vapour lamps and metal halide lamps. It applies to single- and double-capped lamps, having caps as listed in Annex A.

This standard only concerns safety criteria and does not take into account performance. The performance standards IEC 60188, IEC 60192, IEC 60662, IEC 61167 and IEC 61549 should be referred to for such characteristics.

It may be expected that lamps which comply with this standard will operate safely at supply voltages between 90 % and 110 % of rated supply voltage and when operated with a ballast complying with IEC 61347-2-9 and IEC 60923, with a starting device complying with IEC 61347-2-1 and IEC 60927, and in a luminaire complying with IEC 60598-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050, *International Electrotechnical Vocabulary* (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 60061-2, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 2: Lampholders*

IEC 60061-3, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 3: Gauges*

IEC 60061-4, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 4: Guidelines and general information*

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60662, *High-pressure sodium vapour lamps*

IEC 60695-2-10:2000, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

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

IEC 61347-2-1, *Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)*

IEC 61167, *Metal halide lamps - Performance specification*

IEC TR 62778, *Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires*

ISO 4046-4:2002, *Paper, board, pulp and related terms – Vocabulary – Part 4: Paper and board grades and converted products*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-845 and IEC TR 62778, as well as the following apply.

3.1

HID lamp

high intensity discharge lamp

electric discharge lamp in which the light-producing arc is stabilised by wall temperature and the arc has a bulb wall loading in excess of 3 W/cm^2

Note 1 to entry: HID lamps include groups of lamps known as high-pressure mercury, metal halide and high-pressure sodium lamps.

[SOURCE: IEC 60050-845:1987, 845.07.19]

3.2

high pressure mercury vapour lamp

high-intensity discharge lamp in which the major portion of the light is produced, directly or indirectly, by radiation from mercury operating at a partial pressure in excess of 100 kPa

Note 1 to entry: This term covers clear, phosphor coated (mercury fluorescent) and blended lamps. In a fluorescent mercury discharge lamp, the light is produced partly by the mercury vapour and partly by the layer of phosphors excited by the ultraviolet radiation of the discharge.

[SOURCE: IEC 60050-845:1987, 845.07.20]

3.3

blended lamp

self-ballasted mercury lamp, US

lamp containing in the same bulb certain elements of a mercury vapour lamp and an incandescent lamp filament connected in series

Note 1 to entry: The bulb may be diffusing or coated with phosphors.

[SOURCE: IEC 60050-845:1987, 845.07.21, modified — The words "certain elements of" are added.]]

3.4

high pressure sodium vapour lamp

high-intensity discharge lamp in which the light is produced mainly by radiation from sodium vapour operating at a partial pressure of the order of 10 kPa

Note 1 to entry: The term covers lamps with clear or diffusing bulb.

[SOURCE: IEC 60050-845:1987, 845.07.23]

3.5

low pressure sodium vapour lamp

discharge lamp in which the light is produced by radiation from sodium vapour operating at a partial pressure of 0,1 Pa to 1,5 Pa

[SOURCE: IEC 60050-845:1987, 845.07.24]

3.6

metal halide lamp

high-intensity discharge lamp in which the major portion of the light is produced by radiation from a mixture of metallic vapour, metal halides and the products of 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 — The words "radiation" and "metal halides" are added.]

3.7

nominal power

approximate quantity value of lamp power used to designate or identify a lamp

3.8

ultraviolet hazard efficacy of luminous radiation

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

Note 1 to entry: Ultraviolet hazard efficacy of luminous radiation 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 $SUV(\lambda)$. 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

test or 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]

3.10

type test sample

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

[SOURCE: IEC 60081:1997, 1.4.11]

3.11

group

lamps of the same generic type

EXAMPLES: High pressure mercury (vapour) lamp (3.2), blended lamp (3.3), high pressure sodium (vapour) lamp (3.4), low pressure sodium (vapour) lamp (3.5), metal halide lamp (3.6)

3.12

type

lamps of the same group having the same nominal wattage, bulb shape and cap

3.13

family

grouping of lamps characterized by common features such as materials, components and/or method of processing

3.14

design test

test made on a sample for the purpose of checking compliance of the design of a family, group or a number of groups with the requirements of the relevant clause or subclause

3.15

periodic test

test, or series of tests, repeated at intervals in order to check that a product does not deviate in certain respects from the given design

3.16

running test

test repeated at frequent intervals to provide data for assessment

3.17

batch

all lamps in one family and/or group and identified as such and put forward at one time for checking compliance

3.18

whole production

production during a period of 12 months of all types of lamps within the scope of this standard and nominated in a list of the manufacturer for inclusion in the certificate

3.19

self-shielded metal halide lamp

metal halide lamp for which the luminaire needs no protective shield

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4 General safety requirements

4.1 General

Lamps shall be so designed and constructed that in normal use they present no danger to the user or the surroundings.

In general, compliance is checked by carrying out all the tests specified in this standard.

4.2 Marking

4.2.1 Lamp marking

Lamps shall be marked as follows:

- mark of origin, which may take the form of a trademark, the manufacturer's name or the name of the responsible vendor;
- nominal power (marked "W" or "watts") and/or any other indication which identifies the lamp.

In the relevant lamp performance standards, the nominal power may still be indicated as "rated" power (and the rated power as "objective" power). This wording will be corrected in future editions of these standards.

NOTE In the USA, additional product marking is required.

Marking shall be legible and durable.

Compliance is checked on unused lamps as follows:

- a) presence and legibility by visual inspection;
- b) durability by rubbing the area of the marking by hand for a period of 15 s, with a smooth cloth dampened with water. After this test the marking shall still be legible.

4.2.2 Additional information to be provided

In addition to the above lamp marking, all details and provisions which are necessary to ensure safe installation and use shall be given in the lamp manufacturer's instructions. Alternatively, the immediate lamp wrapping or container may be marked with the corresponding symbol as shown in Annex H.

NOTE In North America, a suitable cautionary notice is required. Additional use of symbols is optional.

If applicable, information shall be given about:

- a) the provision that the lamp shall be operated in an enclosed luminaire only (for symbol, see Clause H.2);
- b) the hazard associated with a high level of UV radiation emitted by the lamp (for symbol, see Clause H.3). The value of the specified ultraviolet hazard efficacy of luminous radiation shall be made available for proper luminaire design (see Clause F.5) if it exceeds 6 mW/klm for non-reflector lamps or 6 mW/(m²·klx) for a reflector lamp;
- c) the hazard associated with a high blue light radiance (for symbol see Clause H.6). The threshold illuminance below which the luminaire cannot exceed risk group 1 for blue light shall be made available for luminaire design if the lamp is in risk group 2 (see Clause F.5);
- d) the risk of the occurrence of a rectifying effect at the end of lamp life;
- e) the hazard(s) that exist(s) when the outer envelope is broken (for symbol, see Clause H.4).

4.3 Mechanical requirements

4.3.1 Requirements for caps

4.3.1.1 Dimensions

If lamps use standardized caps, they shall be in accordance with the requirements on the cap data sheets of IEC 60061-1, listed in Table A.1 of this standard. Non-standardized caps shall be in line with the lamp manufacturer's documentation.

Compliance is checked on finished lamps by gauging and/or measurement. For standardized caps, the gauges of IEC 60061-3, listed in Table A.1 of this standard shall be used.

4.3.1.2 Creepage distance

The minimum creepage distance between contact pin(s) or contacts and a touchable metal shell of the cap shall be in accordance with the requirements of IEC 60061-4.

Compliance is checked by measurement.

4.3.1.3 Caps provided with keys

For lamps using cap types incorporating keys which ensure non-interchangeability with similar lamp types, the correct cap/key version shall be used.

Compliance is checked by visual inspection.

4.3.2 Construction and assembly

4.3.2.1 General

Caps shall be so constructed and assembled to the bulbs that the whole assembly remains intact and attached during and after normal operation.

Compliance is checked by carrying out the following tests.

4.3.2.2 Resistance to pull

Where lamps are so constructed that when being withdrawn from the lampholder a pull is exerted and withstood without the cap or any part of the cap or bulb being loosened or pulled apart.

Compliance is checked by the following pull test.

A pull in the direction of the lamp axis shall be applied for 1 min to:

- a) unused lamps,
- b) lamps after storage in a heating cabinet for a period of 2 000 h \pm 50 h.

The pull values and heating cabinet temperatures are given in Table B.1.

Care shall be taken that the means (clamp, etc.) of applying the pull to the lamp does not weaken the structure.

The pull shall be increased progressively from zero to the value given in Table B.1. The pull shall not be applied with a jerk.

4.3.2.3 Resistance to torque

Where lamps are so constructed that, during insertion into or withdrawal from, the lampholder, a torque is applied to the cap or parts of the cap or to the cap/bulb connection, the torque shall be withstood without any loosening of the connections. For mechanically fixed screw caps, an angular displacement between cap and bulb of not more than 10° is allowed.

Compliance is checked by the following torsion test.

A torque shall be applied to:

- a) unused lamps,
- b) lamps after storage in a heating cabinet for a period of 2 000 h \pm 50 h.

The torque values and the heating cabinet temperatures are given in Table B.2. The torsion test holders are specified in Figures C.1 and C.2.

Before each use, the test holder for screw caps shall be checked to ensure that it is clean and completely free of lubricants and grease. The cap of the test lamp shall be placed in the appropriate holder. Either the cap or the bulb may be mechanically clamped.

For some mechanically fixed screw caps, for example those positioned on a screw thread shaped sealing area, it is necessary to clamp the shell and to apply the torque in both directions.