



IEC 62035

Edition 2.0 2014-04

INTERNATIONAL STANDARD

Discharge lamps (excluding fluorescent lamps) – Safety specifications

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE



ICS 29.140.30

ISBN 978-2-8322-1516-6

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 General safety requirements.....	10
4.1 General.....	10
4.2 Marking.....	10
4.2.1 Lamp marking.....	10
4.2.2 Additional information to be provided.....	11
4.3 Mechanical requirements	11
4.3.1 Requirements for caps.....	11
4.3.2 Construction and assembly.....	12
4.4 Electrical requirements	13
4.4.1 Parts which can become accidentally live	13
4.4.2 Insulation resistance.....	13
4.4.3 Electric strength	13
4.5 Thermal requirements	14
4.5.1 General	14
4.5.2 Resistance to heat.....	14
4.5.3 Resistance to abnormal heat and fire.....	15
4.6 Photobiological requirements	15
4.6.1 UV Hazard.....	15
4.6.2 Blue light hazard.....	16
4.6.3 IR hazard.....	16
5 Particular safety requirements	17
5.1 High-pressure sodium vapour lamps	17
5.2 Metal halide lamps.....	17
5.2.1 General	17
5.2.2 Marking	17
5.2.3 Containment	17
6 Information for luminaire design.....	17
7 Assessment.....	17
7.1 General.....	17
7.2 Assessment of whole production by means of manufacturer’s records	18
7.2.1 General	18
7.2.2 Assessment of manufacturer’s records for particular tests	19
7.2.3 Sampling procedures for the whole production testing	19
7.3 Assessment of batches	23
7.3.1 Sampling for batch testing	23
7.3.2 Number of lamps in batch sample	23
7.3.3 Sequence of the tests	23
7.3.4 Rejection conditions for large batches (>500 lamps).....	23
7.3.5 Rejection conditions for small batches (≤500 lamps).....	24
Annex A (normative) List of lamp caps and gauges.....	26
Annex B (normative) Pull and torsion test values	27

Annex C (normative) Torsion test holders	28
Annex D (normative) Information for thermal tests	30
Annex E (normative) Measurement of pulse height for lamps with internal starting device.....	31
E.1 Introduction.....	31
E.2 Test circuit.....	31
E.2.1 Test circuit and key	31
E.2.2 Ballast characteristics.....	31
E.2.3 Power factor capacitor	32
E.2.4 Pulse height measuring circuit	32
E.3 Tests	32
E.3.1 Lamps with an internal glow switch	32
E.3.2 Lamps with an internal thermal switch	32
Annex F (informative) Information for luminaire design	34
F.1 Guidelines for safe lamp operation.....	34
F.2 Maximum lamp cap temperature	34
F.3 Cap/holder – key configuration.....	34
F.4 Protection against lamp shattering	34
F.5 Protection against UV radiation.....	35
F.6 Possible condition at end of lamp life	35
Annex G (normative) Conditions of compliance for design tests	36
G.1 Insulation resistance (see 4.4.2) Electric strength (see 4.4.3)	36
G.2 Cap construction and assembly (see 4.3.2.2 b) and 4.3.2.3 b))	36
G.3 Cap creepage distance (see 4.3.1.2) Resistance to heat (see 4.5.2.1 and 4.5.2.2) Resistance to abnormal heat and fire (see 4.5.3.1) Pulse height (see 5.1.) UV radiation (see 4.6.1.3)	36
Annex H (normative) Symbols.....	37
H.1 General.....	37
H.2 Symbol indicating that the lamp shall be operated only in a luminaire provided with a protective shield	37
H.3 Symbol indicating that the lamp emits a high level of UV radiation	37
H.4 Symbol indicating that the lamp shall not be operated when the outer bulb is broken	37
H.5 Self-shielded lamp symbol indicating that the lamp can be operated in a luminaire without a protective shield	38
H.6 Symbol indicating not to stare at a light source, for example, a lamp, a luminaire, a video projector etc.	38
Annex I (normative) Containment testing procedure for metal halide lamps with quartz arc tubes	39
I.1 General.....	39
I.1.1 Purpose.....	39
I.1.2 Test description.....	39
I.2 Experimental setup	39
I.2.1 Safety precautions.....	39
I.2.2 Electrical circuit.....	39
I.2.3 Enclosure requirements	41
I.3 Test procedures.....	41
I.3.1 Lamp selection and preparation	41
I.3.2 Determination of median rupture energy	41

I.3.3	Rupture test procedure	42
I.4	Self-shielded lamp design	42
I.4.1	Definition of damage to the outer bulb	42
I.4.2	Determination of self-shielded	42
Annex J (normative)	Containment testing procedure for metal halide lamps with ceramic arc tubes	43
J.1	General.....	43
J.1.1	Purpose.....	43
J.1.2	Test description.....	43
J.2	Experimental setup	43
J.2.1	Safety precautions.....	43
J.2.2	Electrical circuit.....	43
J.2.3	Enclosure requirements	44
J.3	Test procedures.....	44
J.3.1	Lamp selection and preparation.....	44
J.3.2	Determination of median rupture energy	44
J.3.3	Rupture test procedure	45
J.4	Self-shielded lamp design	45
J.4.1	Definition of damage to the outer bulb	45
J.4.2	Determination of containment rating	45
Bibliography.....		47
Figure 1	– Edison screw-capped lamp	13
Figure C.1	– Holder for torsion test on lamps with Edison screw caps	28
Figure C.2	– Holder for torsion test on lamps with bayonet caps	29
Figure D.1	– Ball pressure test apparatus	30
Figure E.1	– Test circuit.....	31
Figure I.1	– Basic electrical diagram for quartz metal halide lamp containment test	40
Figure J.1	– Electrical diagram for containment test.....	44
Table 1	– Classification of risk groups.....	15
Table 2	– Grouping of test records – Sampling and acceptable quality levels (AQL)	20
Table 3	– Acceptance numbers AQL = 0,65 %	21
Table 4	– Acceptance numbers AQL = 2,5 %	22
Table 5	– Batch sample size and rejection number (for batches >500 lamps).....	24
Table 6	– Batch sample size and rejection number (for batches ≤500 lamps).....	25
Table A.1	– Data sheet references of IEC 60061	26
Table B.1	– Pull test values	27
Table B.2	– Torsion test values.....	27
Table D.1	– Temperatures	30
Table E.1	– Test ballast resonance characteristics	32
Table E.2	– Power factor capacitor values for tests.....	32
Table F.1	– Maximum lamp cap temperatures.....	34

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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*