

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Discharge lamps (excluding fluorescent lamps) – Safety specifications**

**Lampes à décharge (à l'exclusion des lampes à fluorescence) – Prescriptions de sécurité**

IEC 62035:1999

<https://standards.iteh.ai/en/standards/iec/3116494e-1e59-4cb4-9688-3eb00210b14a/iec-62035-1999>



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2012 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.  
If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.  
Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### Useful links:

IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The advanced search enables you to find IEC publications by a variety of criteria (reference number, text, technical committee,...).

It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available on-line and also once a month by email.

Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).

### A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Liens utiles:

Recherche de publications CEI - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

La recherche avancée vous permet de trouver des publications CEI en utilisant différents critères (numéro de référence, texte, comité d'études,...).

Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

Just Published CEI - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications de la CEI. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (VEI) en ligne.

Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Discharge lamps (excluding fluorescent lamps) – Safety specifications**

**Lampes à décharge (à l'exclusion des lampes à fluorescence) – Prescriptions de sécurité**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

**CP**

ICS 29.140.30

ISBN 978-2-8322-0301-9

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references.....	6
3 Definitions.....	7
4 General safety requirements.....	9
4.1 General.....	9
4.2 Marking.....	9
4.3 Mechanical requirements.....	10
4.4 Electrical requirements.....	12
4.5 Thermal requirements.....	13
5 Particular safety requirements.....	15
5.1 High-pressure sodium vapour lamps.....	15
5.2 Metal halide lamps.....	15
6 Information for luminaire design.....	16
7 Assessment.....	16
7.1 General.....	16
7.2 Assessment of whole production by means of manufacturer's records.....	17
7.3 Assessment of batches.....	22
Annex A (normative) List of lamp caps and gauges.....	25
Annex B (normative) Pull and torsion test values.....	26
Annex C (normative) Torsion test holders.....	27
Annex D (normative) Information for thermal tests.....	29
Annex E (normative) Measurement of pulse height for lamps with internal starting device.....	30
Annex F (informative) Information for luminaire design.....	33
Annex G (normative) Conditions of compliance for design tests.....	36
Annex H (normative) Symbols.....	37
Annex I (normative) Containment testing procedure for metal halide lamps with quartz arc tubes.....	38
Annex J (normative) Containment testing procedure for metal halide lamps with ceramic arc tubes.....	42
Bibliography.....	46
Figure 1 – Edison screw-capped lamp.....	12
Figure C.1 – Holder for torsion test on lamps with Edison screw caps.....	27
Figure C.2 – Holder for torsion test on lamps with bayonet caps.....	28
Figure D.1 – Ball-pressure test apparatus.....	29
Figure E.1 – Test circuit.....	30
Figure I.1 – Basic electrical diagram for quartz metal halide lamp containment test.....	39
Figure J.1 – Electrical diagram for containment test.....	43

Table 1 – Grouping of test records – Sampling and acceptable quality levels (AQL) .....	19
Table 2 – Acceptance numbers AQL = 0,65 % .....	20
Table 3 – Acceptance numbers AQL = 2,5 % .....	21
Table 4 – Batch sample size and rejection number (for batches >500 lamps) .....	23
Table 5 – Batch sample size and rejection number (for batches ≤500 lamps) .....	24
Table A.1 – Data sheet references of IEC 60061 .....	25
Table B.1 – Pull test values .....	26
Table B.2 – Torsion test values .....	26
Table D.1 – Temperatures .....	29
Table E.1 – Test ballast resonance characteristics .....	31
Table E.2 – Power factor capacitor values for tests .....	31
Table F.1 – Maximum lamp cap temperatures .....	33

iTech Standards  
(<https://standards.iteh.ai>)  
Document Preview

IEC 62035:1999

<https://standards.iteh.ai/catalog/standards/iec/3116494e-1e59-4cb4-9688-3eb00210b14a/iec-62035-1999>

# 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 consolidated version of IEC 62035 consists of the first edition (1999) [documents 34A/885/FDIS and 34A/899/RVD], its amendment 1 (2003) [documents 34A/1032/FDIS and 34A/1037/RVD] and its amendment 2 (2012) [documents 34A/1575/FDIS and 34A/1599/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 1.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

Annexes A, B, C, D, E, G and H form an integral part of this standard.

Annex F is for information only.

The committee has decided that the contents of the base publication and its amendments 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.

Withdawn

iTech Standards  
(<https://standards.itih.ai>)  
Document Preview

<https://standards.itih.ai/standards/iec/3116494e-1e59-4cb4-9688-3eb00210b14a/iec-62035-1999>

## 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.

NOTE 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 60922 and IEC 60923, with a starting device complying with IEC 60926 and IEC 60927, and in a luminaire complying with IEC 60598-1.

### 2 Normative references

Les documents de référence suivants sont indispensables pour l'application du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60050(845), *International Electrotechnical Vocabulary (IEV) – Chapter 845: Lighting*

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 60598-1, *Luminaires – Part 1: General requirements and tests*

IEC 60662, *High-pressure sodium vapour lamps*

IEC 60695-2-1/0, *Fire hazard testing – Part 2: Test methods – Section 1/Sheet 0: Glow-wire test methods – General*



IEC 60922, *Auxiliaries for lamps – Ballasts for discharge lamps (excluding tubular fluorescent lamps) – General and safety requirements*

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

IEC 60926, *Auxiliaries for lamps – Starting devices (other than glow starters) – General and safety requirements*

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

IEC 61167, *Metal halide lamps*

ISO 4046, *Paper, board, pulp and related terms – Vocabulary*

### 3 Definitions

For the purposes of this International Standard, the following terms and definitions apply, as well as others given in IEC 60050(845).

#### 3.1

##### **high-intensity discharge lamp; HID lamp**

electric discharge lamp in which the light-producing arc is stabilized by wall temperature and the arc has a bulb wall loading in excess of 3 watts per square centimetre

NOTE HID lamps include groups of lamps known as high-pressure mercury, metal halide and high-pressure sodium lamps.

[IEV 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 kilopascals

NOTE 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.

[IEV 845-07-20]

#### 3.3

##### **blended lamp; self-ballasted mercury lamp (USA)**

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

NOTE The bulb may be diffusing or coated with phosphors.

[IEV 845-07-21, modified]

#### 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 kilopascals

NOTE The term covers lamps with clear or diffusing bulb.

[IEV 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 to 1,5 pascal

[IEV 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 The definition covers clear and coated lamps.

[IEV 845-07-25, modified]

**3.7****nominal wattage**

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

**3.8****specific effective radiant UV power**

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

Unit: mW/klm

NOTE 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 CIE S009. 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

**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

**3.11****group**

lamps of the same generic type (see 3.2 to 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

**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 trade mark, the manufacturer's name or the name of the responsible vendor;
- nominal wattage (marked "W" or "watts") and/or any other indication which identifies the lamp.

NOTE 1 In the relevant lamp performance standards, the nominal wattage may still be indicated as "rated" wattage (and the rated wattage as "objective" wattage). This wording will be corrected in future editions of these standards.

NOTE 2 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 H.1);
- b) the hazard associated with a high level of UV radiation emitted by the lamp (for symbol, see H.2). The value of the specified maximum specific effective radiant UV power shall be made available for proper luminaire design (see Clause F.5) if it exceeds
  - 6 mW/klm for a non-reflector lamp, or
  - 6 mW/(m<sup>2</sup> × klx) for a reflector lamp;

NOTE In CIE S009 exposure limits are given as effective irradiance values (unit W/m<sup>2</sup>) and for risk group classification the values for general lighting lamps are to be reported at an illuminance level of 500 lx. For example, the borderline for risk group exempt is 0,001 W/m<sup>2</sup> at an illuminance level of 500 lx. In other words the specific value, related to the illuminance, is 0,001 divided by 500 in W/(m<sup>2</sup>.lx), which is 2 mW/(m<sup>2</sup>.klx). Since lx=lm/m<sup>2</sup> this equals 2 mW/klm specific effective UV power. The borderline between risk group 1 and 2 is 0,003 W/m<sup>2</sup>, which equals 6 mW/klm specific effective UV power.

- c) the risk of the occurrence of a rectifying effect at the end of lamp life;
- d) the hazard(s) that exist(s) when the outer envelope is broken (for symbol, see H.3).

Compliance is checked by visual inspection.

### 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 annex A. 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 Annex A 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

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.

##### 4.3.2.1 Resistance to pull

Where lamps are so constructed that when withdrawing from the lampholder a pull is exerted, the pull shall be 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  $2\,000\text{ h} \pm 50\text{ h}$ .

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

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 annex B, table B.1. The pull shall not be applied with a jerk.

##### 4.3.2.2 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  $10^\circ$  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  $2\,000\text{ h} \pm 50\text{ h}$ .

The torque values and the heating cabinet temperatures are given in annex B. The torsion test holders are specified in annex C.

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.

NOTE 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.

The torque shall be increased progressively from zero to the value given in annex B, table B.2. The torque shall not be applied with a jerk.

#### 4.4 Electrical requirements

##### 4.4.1 Parts which can become accidentally live

Metal parts intended to be insulated from live parts shall not be or become live. Any movable conductive material shall be placed, without the use of a tool, in the most onerous position before inspection.

On bayonet caps, any projection from the contact plate shall not come within 1 mm of metal parts intended to be insulated.

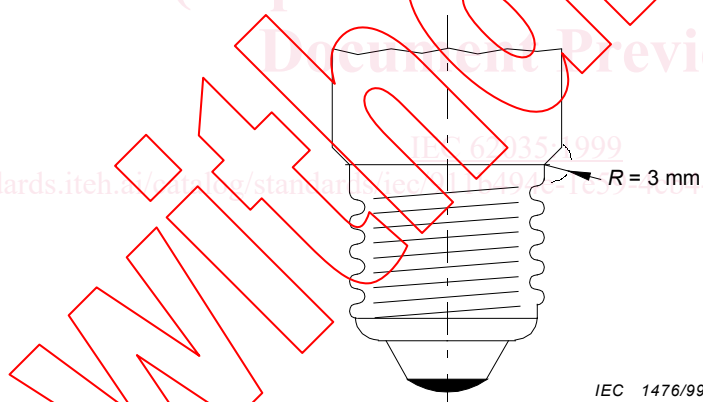


Figure 1 – Edison screw-capped lamp

On Edison screw caps any projection from the cap shell shall not project more than 3 mm from the surface of the cap (see figure 1).

Compliance is checked by either an appropriate automatic system or by visual inspection. In addition, there shall be regular daily checks of the equipment or a verification of the effectiveness of the inspection.