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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Miscellaneous lampholders –
Part 1: General requirements and tests

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MISCELLANEOUS LAMPHOLDERS –

Part 1: General requirements and tests

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.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60838-1 has been prepared by subcommittee 34B: Lamp caps and holders, of IEC technical committee 34: Lamps and related equipment.

This fifth edition cancels and replaces the fourth edition published in 2004, Amendment 1:2008 and Amendment 2:2011. This edition constitutes a technical revision.

The significant technical changes in this edition with respect to the previous edition include the introduction of new or revised requirements for single and dual contact ignition voltages, steel test caps and brass test caps and an Annex E listing amended requirements/clauses which require products to be retested.

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

FDIS	Report on voting
34B/1850A/FDIS	34B/1856/RVD

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.

A list of all parts in the IEC 60838 series, published under the general title *Miscellaneous lampholders*, can be found on the IEC website.

In this standard, the following type is used:

– *compliance statements: in italic type.*

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.

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

MISCELLANEOUS LAMPHOLDERS –

Part 1: General requirements and tests

~~1 General~~

1 Scope

This part of IEC 60838 applies to lampholders of miscellaneous types intended for building-in (to be used with general purpose light sources, projection lamps, floodlighting lamps and street-lighting lamps with caps as listed in Annex A) and the methods of test to be used in determining the safe use of lamps in lampholders.

This part of IEC 60838 also covers lampholders which are integral with a luminaire. It covers the requirements for the lampholder only.

This part of IEC 60838 also covers lampholders integrated in an outer shell and dome similar to Edison screw lampholders. Such lampholders are further tested in accordance with the relevant clauses of IEC 60238.

~~Lampholders designed with a barrel thread for shade holder rings should comply with IEC 60399.~~

Requirements for lampholders for tubular fluorescent lamps, Edison screw lampholders and bayonet lampholders are covered by separate standards.

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.

~~NOTE With regard to IEC 60598-1, the references cited in this document are liable to change.~~

IEC 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety* (available at http://std.iec.ch/iec60061)

~~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 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*~~

IEC 60068-2-75:~~1997~~ 2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60112:~~1979~~ 2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
IEC 60112:2003/AMD1:2009

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60238~~:2004~~, *Edison screw lampholders*

IEC 60245 (all parts), *Rubber insulated cables – Rated voltages up to and including 450/750 V*

IEC 60352-1, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60399, ~~*Standard sheets for Barrel thread for E14 and E2*~~ *Barrel thread for lampholders with shade holder ring*

IEC 60417, *Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*[1]
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60598-1:2014, *Luminaires – Part 1: General requirements and tests*

IEC 60664-1~~:1992~~, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*~~2)~~
~~Amendment 1 (2000)~~
~~Amendment 2 (2002)~~

~~IEC 60695-2-2, *Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test*~~

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end products (GWEPT)*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

ISO 1456~~:2003~~, *Metallic and other inorganic coatings – Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium*

ISO 2081~~:1986~~, *Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel*

ISO 2093~~:1986~~, *Electroplated coatings of tin – Specification and test methods*

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

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[1] A consolidated version of this publication exists, comprising IEC 60529:1989, IEC 60529:1989/AMD1:1999 and IEC 60529:1989/AMD2:2013.

~~2) A consolidated edition 1.2 (2002) exists that includes edition 1.0 (1992), its amendment 1 (2000) and amendment 2 (2002).~~

3 Terms and definitions

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

3.1
rated voltage
voltage declared by the manufacturer to indicate the highest working voltage for which the lampholder is intended

3.2
working voltage
highest r.m.s. voltage that may occur across any insulation, transients being disregarded, both when the lamp is operating under normal conditions and when the lamp is removed

3.3
rated current
current declared by the manufacturer to indicate the highest current for which the lampholder is intended

3.4
lampholder for building-in
lampholder designed to be built into a luminaire, an additional enclosure or the like

3.4.1
unenclosed lampholder
lampholder for building-in so designed that it requires additional means, for example enclosures, to meet the requirements of this standard with regard to protection against electric shock

3.4.2
enclosed lampholder
lampholder for building-in so designed that it fulfils on its own the requirements of this standard with regard to protection against electric shock

3.5
rated operating temperature
highest temperature for which the lampholder is designed

3.6
rated pulse voltage
highest peak value of pulse voltages the holder is able to withstand

3.7
lamp connectors
set of contacts specially designed to provide for electrical contact but not supporting the lamp

3.8
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

3.9
type test sample
sample consisting of one or more similar specimens submitted by the manufacturer or responsible vendor for the purpose of a type test

3.10
live part
conductive part which may cause an electric shock

3.11
impulse withstand category
numeral defining a transient overvoltage condition

Note 1 to entry: Impulse withstand categories I, II, III and IV are used.

a) Purpose of classification of impulse withstand categories

Impulse withstand categories are to distinguish different degrees of availability of equipment with regard to required expectations on continuity of service and on an acceptable risk of failure.

By selection of impulse withstand levels of equipment, insulation co-ordination can be achieved in the whole installation reducing the risk of failure to an acceptable level providing a basis for overvoltage control.

A higher characteristic numeral of an impulse withstand category indicates a higher specific impulse withstand of the equipment and offers a wider choice of methods for overvoltage control.

The concept of impulse withstand categories is used for equipment energized directly from the mains.

b) Description of impulse withstand categories

Equipment of impulse withstand category I is equipment which is intended to be connected to the fixed electrical installations of buildings. Protective means are taken outside the equipment – either in the fixed installation or between the fixed installation and the equipment – to limit transient overvoltages to the specific level.

Equipment of impulse withstand category II is equipment to be connected to the fixed electrical installations of buildings.

Equipment of impulse withstand category III is equipment which is part of the fixed electrical installations and other equipment where a higher degree of availability is expected.

Equipment of impulse withstand category IV is for use at or in the proximity of the origin of the electrical installations of buildings upstream of the main distribution board.

3.12
primary circuit
circuit which is directly connected to the AC mains supply

Note 1 to entry: It includes, for example, the means for connection to the AC mains supply, the primary windings of transformers, motors and other loading devices.

3.13
secondary circuit
circuit which has no direct connection to a primary circuit and derives its power from a transformer, converter or equivalent isolation device, or from a battery

Note 1 to entry: Exception: autotransformers. Although having direct connection to a primary circuit, the tapped part of them is also deemed to be a secondary circuit as defined above.

Note 2 to entry: Mains transients in such a circuit are attenuated by the corresponding primary windings. Also inductive ballasts reduce the mains transient voltage height. Therefore, components located after a primary circuit or after an inductive ballast can be suited for an impulse withstand category of one step lower, i.e. for impulse withstand category II.

3.14
basic insulation
insulation applied to live parts to provide basic protection against electric shock

Note 1 to entry: Basic insulation does not necessarily include insulation used exclusively for functional purposes.

3.15
supplementary insulation
independent insulation applied in addition to basic insulation in order to provide protection against electric shock in the event of a failure of basic insulation

3.16
double insulation
insulation comprising both basic insulation and supplementary insulation

3.17
reinforced insulation
single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation under the conditions specified

Note 1 to entry: The term "insulation system" does not imply that the insulation shall be one homogeneous piece. It may comprise several layers which cannot be tested singly as supplementary or basic insulation.

3.18
enclosed reinforced insulated lampholder
lampholder for building-in so designed that on its own it fulfils the requirements for double or reinforced insulated parts in class II applications

3.19
partly reinforced insulated lampholder
lampholder for building-in, so designed that some parts of the lampholder require additional means to fulfil the requirements with regard to double or reinforced insulation

Note 1 to entry: In some cases, the dimensions might be achieved only after mounting into the luminaire.

3.20
polarized lampholder
lampholder for building-in, specially designed for asymmetric rated pulse voltages, where the rated ignition voltage (higher rated pulse voltage) is designated to a fixed contact

3.21
single contact ignition voltage
ignition voltage which appears on one contact of the lampholder only

3.22
dual contact ignition voltage
ignition voltage which is split between the two contacts of the lampholder

4 General requirement

Lampholders shall be so designed and constructed that in normal use they function reliably and cause no danger to persons or surroundings.

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

5 General conditions for tests

5.1 Tests according to this standard are type tests.

NOTE 1 The requirements and tolerances permitted by the standard are related to testing of type test sample submitted for that purpose. Compliance of type test sample does not ensure compliance of the whole production of a manufacturer with this safety standard. Conformity of production is the responsibility of the manufacturer and ~~should~~ can include routine tests and quality assurance in addition to type testing.

NOTE 2 For further information ~~(inclusion of guidance~~ on conformity testing during manufacture ~~is in preparation)~~ see IEC 60061-4~~3)~~.

~~3) IEC 60061-4: *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 4: Guidelines and general information*~~

5.2 Unless otherwise specified, the tests are made at an ambient temperature of 20 °C ± 5 °C and with the holder in the most unfavourable position for normal use.

If a lampholder is declared to accept different lamp fits, it shall comply with the requirements of each of the fits mentioned.

Compliance is checked with separate sets of specimens according to 5.3.

If the use of different lamp fits in turn is permitted by the manufacturer, only one set of specimens is used to check compliance with all requirements.

For all tests the most critical of the relevant fits and gauges shall be used and in the most onerous sequence.

5.3 The tests and inspections are carried out in the order of the clauses, on a total of

– 10 pairs of matching holders intended for linear double-capped lamps;

~~NOTE~~ If a pair of holders consists of identical holders, it is sufficient that one holder instead of one pair is subjected to all the tests, except for the tests of Clause 8, of 11.2, 11.3, of Clause 13, Clause 16 and of 17.6 where pairs are needed.

– 10 specimens intended for single-capped lamps;

in the order of the clauses, as follows:

– three pairs or three specimens: Clause 4 up to and including Clause 15 (except for 9.2);

NOTE The tests of 9.2 are carried out on the number of separate specimens as required by the relevant standards.

– three pairs or three specimens: Clause 16 and 17.6;
– one pair or one specimen: 17.1;
– one pair or one specimen: 17.3;
– one pair or one specimen: 17.4;
– one pair or one specimen: 17.5 and Clause 18.

Together with these units, the manufacturer's mounting instructions (see 7.3) shall be supplied.

In such cases where according to the mounting instructions the rated pulse voltage of the holder can only be achieved with a cap inserted, suitable caps shall be supplied together with the type test sample. The relevant tests are then carried out with a cap inserted.

5.4 Lampholders are deemed to comply with this standard if no specimen fails in the complete series of tests specified in 5.3.

If one specimen fails in one test, that test and the preceding ones which may have influenced the result of that test are repeated on another set of specimens for the number required by 5.3, all of which shall then comply with the repeated tests and with the subsequent tests. Lampholders are deemed not to comply with this standard if there are more failures than one.

The applicant may submit, together with the first set of specimens, the additional set which may be needed in case of failure of one specimen. The testing station shall then, without further request, test the additional specimens and will reject only if a further failure occurs.

If the additional set of specimens is not submitted at the same time, a failure of one specimen will entail the rejection.

6 Classification

Lampholders are classified as follows.

6.1 According to their installation conditions

– unenclosed lampholders;

– enclosed lampholders;

– partly reinforced insulated lampholders;

– enclosed reinforced insulated lampholders.

NOTE 1 Where a lampholder is used with a working voltage of 50 % or less of its maximum rating, it can be regarded as equivalent to a reinforced insulated lampholder.

6.2 According to their resistance to heat:

– for rated operating temperatures up to and including 80 °C;

– for rated operating temperatures over 80 °C (T-marked lampholders).

The measuring point for the operating temperature is that area of the lampholder which makes electrical contact with the lamp cap/base. If the heat resistance of insulating parts, terminals and leads of the lampholder deviates from this operating temperature, these different values shall be stated in the manufacturer's catalogue and are checked after appropriate installation in a luminaire or other additional enclosure, when that equipment is tested according to its own standard.

6.3 According to polarization

– non-polarized lampholders;

– polarized lampholders.

6.4 According to the application of ignition voltages

– lampholders for single-contact ignition voltages

– lampholders for dual-contact ignition voltages

NOTE 2 By using dual contact ignition voltages advantage can be taken of reduced creepage distance and clearance requirements.

7 Marking

7.1 Lampholders shall be marked with the following mandatory markings:

a) mark of origin (this may take the form of a trade mark, manufacturer's identification mark or the name of the responsible vendor);

b) either a unique catalogue number or an identifying reference.

~~NOTE An identifying reference may include numbers, letters, colour, etc., to identify the lampholder by reference to the manufacturer's catalogue or similar literature.~~

Available technical documentation of the manufacturer such as printed catalogues or online catalogues shall allow a clear identification of a lampholder either by a unique catalogue number or by an identifying reference on the holder, specifying the essential characteristic features and the basic design of the product supplemented by a clear description. Variations of the basic design, for example different cable length, fixing means, colours, which do not affect safety or performance of the lampholder, may be disregarded in the type reference marked on the product. Variations included in the type testing procedure are listed in the corresponding test reports.

If a combination of lampholder components determines the lampholder designation, for example an assembly of a lamp connector and a retaining spring, the combination should be clearly identifiable.

Compliance is checked by inspection.

7.2 In addition to the above mandatory markings, the following information shall be given either on the lampholder or be made available in the manufacturer's catalogue or the like:

a) the rated voltage in volts and rated pulse voltage in kilovolts (kV), if applicable; for polarized lampholders, the rated voltage in volts and the pair of rated pulse voltages;

NOTE 1 Some lampholders still show rated voltages higher than 500 V. This is an earlier way of expressing the permissible pulse voltage via a rated voltage. For such lampholders, the creepage distances and clearances can be found in IEC 60598-1.

b) the rated current in amperes;

c) the rated operating temperature T, if greater than 80 °C, in steps of 10 °C;

d) the conductor sizes for which the terminal is designed;

e) the high voltage arrow (see IEC 60417-5036:2002-10) for polarized lampholders to identify the connection for the higher pulse voltage, if applicable; it shall be visible close to the relevant terminal or wire entry during lampholder installation;

f) information on the application of ignition voltages.

If symbols are used, these shall be as follows.

For electrical rating:

– volt: V;
– ampere: A;
– watt: W;
– pulse voltage: kV;

– high pulse voltage terminal/wire on polarized lampholders: ↯ (see IEC 60417-5036:2002-10)

NOTE 2 Alternatively, for volt and ampere ratings, figures ~~may~~ can be used alone, the figure for the rated current being marked before or above that for the rated voltage and separated from the latter by an oblique stroke or line. Therefore the marking of current and voltage ~~may~~ can be as follows:

$$2\ \text{A}\ 250\ \text{V or } 2/250 \text{ or } \frac{2}{250}$$

For the rated pulse voltage, the symbol shall be preceded by its value (e. g. 5 kV). For polarized lampholders as well as for dual contact ignition voltage lampholders, the two rated pulse voltages shall be separated by an oblique stroke (e. g. 15/2,5 kV or 5/2,5 kV).

~~For rated operating temperature:~~

~~the symbol T shall be followed by its value in °C (e. g. T 300).~~

~~For cross section of conductors:~~

~~the relevant value or values in the case of a range, in square millimetres (mm^2), shall be followed by a small square (e.g. 0,5 □).~~

If a lamp holder is intended to be used for dual contact ignition voltages this information shall be indicated in the manufacturer's catalogue or the like.

For polarized lampholders the figure marked before the oblique stroke represents the higher pulse voltage, the figure behind represents the rated pulse voltage based on the impulse withstand category of the lampholder. For dual contact ignition voltage lampholders the figure marked before the oblique stroke represents the total ignition voltage, the figure behind the oblique stroke represents the ignition voltage from the contacts to the mounting surface or the outer accessible surface.

Compliance is checked by inspection.

For lampholders according to this standard, the distances for impulse withstand category II are usually applicable. For holders in equipment where a higher degree of availability is expected, distances for impulse withstand category III may be applicable. This information has to be indicated in the manufacturer's catalogue or the like.

Enclosed reinforced insulated lampholders offer an adequate level of protection for use in luminaires where they are accessible in normal use. This information shall be indicated in the manufacturer's catalogue or the like.

For partly reinforced insulated lampholders, sufficient creepage distances and clearances to outer accessible surfaces will require additional protection to some parts of the lampholder by the luminaire design or by use of additional attachment(s) or cover(s). This information shall be indicated in the manufacturer's catalogue or the like.

7.3 The instructions supplied by the holder manufacturer or responsible vendor shall contain all the information required to ensure correct mounting and operation of the connectors or holders.

NOTE The information ~~may~~ could be part of the manufacturer's or responsible vendor's catalogue.

Compliance is checked by inspection.

7.4 Marking shall be durable and easily legible.

Compliance is checked by inspection and, after the tests of 17.6 have been completed, by trying to remove the marking by rubbing lightly for 15 s with a piece of cloth soaked with water and for a further 15 s with a piece of cloth soaked with petroleum spirit.

After the test the marking shall still be legible.

NOTE The petroleum spirit used ~~should~~ typically consists of a solvent hexane with a content of aromatics of maximum 0,1 volume percentage, a kauri-butanol value of 29, an initial boiling point of approximately 65 °C, a dry-point of approximately 69 °C and a specific density of approximately 0,68 g/cm^3.

8 Protection against electric shock

8.1 Enclosed lampholders shall be so constructed that, when the holder has been built in or installed and wired as in normal use, their live parts are not accessible

– without a lamp inserted;
– with the appropriate lamp inserted, and
– during insertion or removal of the lamp.

For lampholders which have been in use for a long time, such as B22d-3, BY22d, G22, G38, P28s, P30s and P40, the above requirement applies only with the appropriate lamp inserted.

The insertion of only one pin of the lamp (in case of caps with more than one pin) to the first point of contact with live parts shall be prevented.

Lampholders G22 and G38 are exempted from this requirement.

Compliance is checked by means of the standard test finger specified in IEC 60529.This test finger is applied in every possible position with a force not exceeding 10 N, an electrical indicator being used to show contact with live parts.

It is recommended that a voltage of not less than 40 V be used.

The lampholders are mounted as in normal use, i.e. on a supporting surface or the like with the most unfavourable conductor size fitted for which it is intended before being subjected to the above test.

Unenclosed lampholders are only tested after appropriate installation in a luminaire or other additional enclosure when that equipment is tested according to its own standard.

8.2 Lampholders for double-ended lamps shall be so constructed that, when the two holders have been built in or installed and wired as in normal use, their live parts are not accessible

– without a lamp inserted,
– with the appropriate lamp inserted, and
– during insertion and removal of the lamp.

In case of lampholders R7s/RX7s, a test which simulates insertion or removal of the lamp is not available because in both cases testing has to be done against the spring force of the single contact. This situation does not give the repeatability required for judgement. Therefore, this test is replaced by one with the lamp inserted.

Compliance is checked in accordance with IEC 60061 or unless otherwise specified in IEC 60061, with the standard test finger.

9 Terminals

9.1 Lampholders shall be provided with at least one of the following means of connection:

– screw-type terminals;
– screwless terminals;
– tabs or pins for push-on connections;
– posts for wire wrapping;
– soldering lugs;
– connecting leads (tails).

Terminal screws and nuts shall have a metric ISO thread.

Lampholders with screwless terminals, unless intended for sale to luminaire or equipment manufacturers, shall be provided with terminals which are equally satisfactory with both rigid (solid or stranded) conductors and flexible cables or cords.

Other means of connection than those specified are permitted provided they are equal in performance to the methods listed. An example for such a means of connection is a contact of a lampholder for extra low voltage halogen lamps providing electrical connection to a metal part of the luminaire during lampholder assembly.

Compliance is checked by the tests of 9.2 or 9.3 respectively.

9.2 Terminals shall comply with the following requirements.

– Screw-type terminals shall comply with Section 14 of IEC 60598-1:2014.
– Screwless terminals shall comply with Section 15 of IEC 60598-1:2014.
– Tabs or pins for push-on connections shall comply with Section 15 of IEC 60598-1:2014.
– Posts for wire wrapping shall comply with IEC 60352-1. Wire wrapping applies only to single solid round wire for internal wiring.
– Soldering lugs shall comply with the requirements for good solderability. Suitable requirements can be found in IEC 60068-2-20.
– Connecting leads (tails) shall comply with the requirements prescribed in 9.3.

For T-marked lampholders, the terminals are tested at the rated operating temperature, unless otherwise stated by the manufacturer.

Lampholders for extra low voltage halogen lamps, having a contact providing electrical connection to a metal part of the luminaire during lampholder assembly are for use of luminaire manufacturers only and are not for retail sale.

The conditions for a reliable installation and operation shall be given in the lampholder manufacturer's or responsible vendor's documents, in particular restrictions on the use of materials, essential dimensions and tolerances for lampholder fixation in the luminaire.

Lampholder contacts providing electrical connection to a metal part of the luminaire during lampholder assembly shall comply with the requirements of Section 15 of IEC 60598-1:2014.

Compliance is checked by the relevant tests.

9.3 Connecting leads (tails) shall be connected to the lampholder by soldering, welding, crimping or any other at least equivalent method.

Leads shall consist of insulated conductors. The insulation of the leads shall be at least equal in their mechanical and electrical properties to those specified in the IEC 60227 series or IEC 60245 series or comply with the relevant requirements given in 5.3 of IEC 60598-1:2014.

Insulation of the free end of the leads may be stripped.

Fixing of the leads to the holder shall withstand the mechanical efforts which may occur in normal use.

Compliance is checked by inspection and by the following test which is made after the test of Clause 16 on the same three specimens.

Each connecting lead is subjected to a pull of 20 N. The pull is applied without jerks for 1 min in the most unfavourable direction. During the test, leads should not move from their fixing. If, however, certain pull directions are not allowed according to the mounting instructions this shall be taken into account.

After the test, the lampholders shall show no damage within the meaning of this standard.

10 Provision for earthing

10.1 Lampholders, with provision for earthing other than those provided with connecting leads, shall have at least one earthing terminal.

Compliance is checked by inspection.

NOTE Lampholders intended to be earthed but not provided with an earthing terminal or with connecting leads are not for retail sale.

10.2 Accessible metal parts of lampholders with an earthing terminal which may become live in the event of an insulation fault shall be permanently and reliably connected to the earthing terminal.

Accessible metal parts of lampholders without an earthing terminal which may become live in the event of an insulation fault shall allow reliable earthing.

There shall be earth continuity between external metal parts unless these are screened from live parts by double or reinforced insulation.

Compliance is checked by the following test:

Lampholders provided with an earthing terminal are fitted with a rigid conductor of the smallest cross-sectional area for which the holder is intended.

Immediately after the electric strength test of 12.2.2, the resistance between the means of earthing and the external metal parts, if applicable, is measured. In case of lampholders provided with an earthing terminal, this is done between the point where the conductor leaves the earthing terminal and the external metal parts, if applicable.

In case of lampholders without an earthing terminal this is done between that area of the lampholder where it is earthed in the luminaire and the external metal parts.

A current of at least 10 A, derived from a source with a no-load voltage not exceeding 12 V, shall be passed for 1 min between the earthing terminal or earthing contact and each of the accessible metal parts in turn.

The voltage drop between the earthing terminal or earthing contact and the accessible metal part shall be measured and the resistance calculated from the current and the voltage drop. In no case shall the resistance exceed 0,1 Ω.

~~NOTE~~ For the purpose of this requirement, small isolated metal screws and the like for fixing bases or covers are not deemed to be accessible parts which may become live in the event of an insulation fault.

10.3 Earthing terminals shall comply with the requirements of Clause 9.

Their clamping means shall be adequately locked against accidental loosening, and it shall not be possible to loosen screw terminals by hand and screwless terminals unintentionally by hand.

Compliance is checked by inspection and by the tests of Clause 9.

~~NOTE~~ In general, the designs commonly used for current-carrying terminals (complying with the requirements of this standard) provide sufficient resilience to comply with the latter requirement; for other designs, special provisions such as the use of an adequate resilient part which is not likely to be removed inadvertently may be necessary.

10.4 The metal of earthing terminals shall be such that there is no risk of corrosion resulting from contact with the copper of the earthing conductor.

The screw or the body of the earthing terminal shall be of brass or other metal no less resistant to corrosion and the contact surfaces shall be bare metal.

Compliance is checked by inspection.

NOTE The risk of corrosion is particularly great when copper is in contact with aluminium.

10.5 Metal parts of the cord anchorage, including clamping screws, shall be insulated from the earthing circuit.

Compliance is checked by inspection.

11 Construction

11.1 Wood, cotton, silk, paper and similar hygroscopic materials are not allowed as insulation unless suitably impregnated. Lacquer or enamel are not deemed to provide insulation.

Compliance is checked by inspection.

11.2 Lampholders shall be so designed that a lamp can be easily inserted and removed and cannot work loose due to vibration or temperature variation.

Lampholder dimensions shall comply with IEC standards in so far as they exist.

Compliance for such lampholders is checked in accordance with IEC 60061-2 and by the test of 11.4.

11.3 Lampholders R7s and RX7s having their contacts declared of silver, shall be so designed that the contact area has a thickness of at least 0,25 mm.

Compliance is checked by measurement.

NOTE The thickness ~~may~~ can be measured by means of a magnifying glass (approximately 6x magnification) scaled at tenths of a millimetre (0,1 mm). It ~~may~~ could be necessary to cut the contact and measure the thickness of the silver.

11.4 Contacts and all other current-carrying parts shall be so constructed as to prevent excessive temperature rise.

Compliance is checked by the following test.

The holder contacts are bridged by means of a testcap, having nominal dimensions, inserted in the holder, the terminals of which are fitted with conductors of the maximum cross-sectional area for which the holder is intended.

~~NOTE 1~~ *It is not necessary for the test cap to have keys if they only have keying function.*

NOTE ~~2~~ Nominal values are understood to be the medium values.

In the case of lamp bases, loose contact pins should be used.

In the case of holders for double-ended lamps, a dummy lamp is used having both ends electrically connected. The contacts shall be representative of those of an actual lamp.

For multi-contact holders, the appropriate contacts of the test cap are bridged to carry the rated current.

Care should be taken that the contacts of the test cap have good electrical conductivity, for example, brass. That part of the lamp dummy representing the bulb should be shielded with insulating material.

The contacts shall be carefully cleaned and polished before carrying out the tests.

The lampholder is loaded for 1 h with 1,25 times its rated current.

The temperature rise of the contacts shall not exceed 45 K. This temperature is determined with the aid of melting particles or by thermocouples, not by means of thermometers.

~~NOTE~~ Pellets of beeswax (diameter 3 mm, melting temperature 65 °C) may be used as melting particles provided that the ambient temperature equals 20 °C.

11.5 Lampholders designed with a barrel thread for shade holder rings and shade holder rings shall comply with IEC 60399.

Compliance is checked by means of the gauges given in IEC 60399.

12 Moisture resistance, insulation resistance and electric strength

12.1 Holders shall be moisture-proof.

Compliance is checked as follows.

The humidity treatment is carried out in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air, at all places where specimens can be located, is maintained within 1 °C of any convenient value t between 20 °C and 30 °C. Before being placed in the humidity cabinet, the specimens are brought to a temperature between t and $(t + 4)$ °C.

The specimens are kept in the cabinet for two days (48 h).

After this treatment, the holders shall show no damage within the meaning of this standard.

12.2 The insulation resistance and the electric strength of the holders shall be adequate

– between live parts of different polarity;
– between such live parts and external metal parts, including fixing screws.

Compliance is checked by an insulation resistance measurement according to 12.2.1 and by an electric strength test according to 12.2.2 in the humidity cabinet or the room in which the holder was brought to the prescribed temperature.

NOTE Unenclosed lampholders are tested for insulation resistance and electric strength between live parts and external metal parts only after appropriate installation in a luminaire or other additional enclosure, when that equipment is tested according to its own standard.

12.2.1 Immediately after the moisture treatment, the insulation resistance is measured with a DC voltage of approximately 500 V, the measurement being made 1 min after application of the voltage. The insulation resistance is measured consecutively between the parts mentioned in Table 1 and shall be not less than the value shown.

Table 1 – Minimum values of insulation resistance

Insulation to be tested	Minimum value of insulation resistance MΩ	
	Rated voltage up to and including 50 V	Rated voltage over 50 V
Between live parts of different polarity	1	2
Between live parts connected together and external metal parts intended to be earthed	—	2
Between live parts connected together and external metal parts including fixing screws and metal foil covering external parts of insulating material in lampholders without provision for earthing	1	4

12.2.2 The electric strength test is made immediately after the measurement of the insulation resistance.

The test voltage is applied consecutively between the same parts as indicated for the measurement of the insulation resistance.

The insulation is subjected for 1 min to an AC voltage of substantially sinewave form, with a frequency of 50 Hz or 60 Hz and with an r.m.s. value as follows:

– *for lampholders with a rated voltage up to and including 50 V, the test voltage is 500 V;*

– *between the lamp contacts of lampholders, the electric strength test voltage is twice the working voltage;*

– *for all other cases, the electric strength test voltage is equal to (2U + 1 000) V (where U is the rated voltage);*

– *for enclosed and unenclosed reinforced insulated lampholders, the test voltage shall be determined from Table 10.2 of IEC 60598-1:2014.*

Initially, not more than half the prescribed voltage is applied; it is then raised rapidly to the full value.

No flashover or breakdown shall occur during the test.

NOTE Electric strength test requirements with regard to distances subjected to pulse voltages are under consideration.

13 Mechanical strength

Holders shall have adequate mechanical strength.

The mechanical strength of external parts of insulating material with or without a conductive outer surface is checked by means of the pendulum hammer test specified in IEC 60068-2-75, subject to the following details (see Figure D.1 and D.2 and Clause 4 of IEC 60068-2-75:2014).

a) Method of mounting

Direct, as prescribed in IEC 60068-2-75.

Combined pairs of holders shall be mounted with their relevant bracket.

Connectors shall be held against the support.

NOTE 1 For connectors different from the cylindrical shape, the condition of the axis parallel to the support ~~may~~ can be obtained by adequate pinewood shimmings.

b) Height of fall

The striking element shall fall from one of the heights given in the following Table 2:

Table 2 – Height of fall

Material	Height of fall mm
Ceramic parts	100 ± 1
Parts made of other material	150 ± 1,5

c) Number of impacts

Four blows shall be applied to points equally divided over the surface of the external parts.

d) Preconditioning

Not applicable.

e) Initial measurements

Not applicable.

f) Attitudes and impact locations

See c) above.

g) Operating mode and functional monitoring

The sample shall not operate during impact.

h) Acceptance and rejection criteria

After the test, the sample shall show no serious damage within the meaning of this standard, in particular:

1) live parts shall not have become accessible.

Damage to the lampholder which does not reduce creepage distances or clearances below the values specified in Clause 15 and small chips which do not adversely affect the protection against electric shock or ingress of water shall be ignored;

2) cracks not visible to the naked eye and surface cracks in fibre-reinforced mouldings and the like shall be ignored.

Cracks or holes in the outer surface of any part of the lampholder shall be ignored if the lampholder complies with this standard even if that part is omitted.

i) Recovery

Not applicable.

j) Final measurements

See h) above.

NOTE 2 The mechanical strength of lampholders used in luminaires or other equipment ~~may~~ can be checked by means of the spring hammer specified in IEC 60068-2-75. In IEC 60598-1, the test impact energy used varies from 0,2 Nm to 0,7 Nm depending on component material and luminaire type.

14 Screws, current-carrying parts and connections

Screws, current-carrying parts and mechanical connections, the failure of which might cause the holder to become unsafe, shall withstand the mechanical stresses occurring in normal use.

Compliance is checked by inspection and the tests of 4.11 and 4.12 of IEC 60598-1:2014.

NOTE Examples of suitable metals for current-carrying parts with regard to mechanical strength, electrical conductivity and resistance to corrosion, when used within the permissible temperature range and under normal conditions of chemical pollution, are given in Annex B.

15 Creepage distances and clearances

Live parts and adjacent metal parts shall be adequately spaced. Creepage distances and clearances shall be not less than the values shown in Tables 2a and 2b.

~~NOTE~~ The distances specified in Table 2a apply to impulse withstand category II, the distances specified in Table 2b apply to impulse withstand category III in accordance with IEC 60664-1 and both tables refer to pollution degree 2, where normally only non-conductive pollution occurs but occasionally a temporary conductivity caused by condensation ~~must~~ is to be expected. For information on distances for other impulse withstand categories or higher pollution degrees, IEC 60664-1 should be consulted.

Attention is drawn to the fact that the values for creepage distance and clearance given in Clause 15 are the absolute minimum.

The voltages shown in Tables 2a and 2b are ~~working~~ rated voltages, not ignition voltages.

Table 2a – Minimum distances for AC (50 Hz/60 Hz) sinusoidal voltages – Impulse withstand category II

Distances mm	~~Working~~ Rated voltage V			
	50	150	250	500
1 Between live parts of different polarity, and				
2 Between live parts and external metal parts, or the outer surface of parts of insulating material which are permanently fixed to the holder[a], including screws or devices for fixing covers or fixing the holder to its support:				
Basic insulation				
- Creepage distances insulation PTI ≥ 600 [b]	0,6	0,8	1,5	3
PTI < 600 [b]	1,2	1,6	2,5	5
- Clearances	0,2	0,8	1,5	3
Reinforced insulation				
- *Creepage distances insulation PTI ≥ 600* [b]	-	1,6	3	6
PTI < 600 [b]	-	3,2	5	6
- *Clearances*	-	1,6	3	6
3 Between live parts and the mounting surface or a loose metal cover, if any, if the construction does not ensure that the values under item 2 are maintained under the most unfavourable circumstances:				
- Clearances	0,6	0,8	1,5	3

Values for creepage distances and clearances may be found for intermediate values of rated voltages by linear interpolation between tabulated values. No values are specified for rated voltages below 25 V as the voltage test of 12.2.2 is considered sufficient.

NOTE In Japan, the values given in the table are not applicable. Japan requires larger values than the values given in the table.

[a] The distances between live contacts and the lampholder face (reference plane) shall, however, be in accordance with the relevant standard sheets of IEC 60061-2.

[b] PTI (proof tracking index) in accordance with IEC 60112:2003 and IEC 60112:2003/AMD1:2009.

– In the case of creepage distances to parts not energized or not intended to be earthed, where no tracking can occur, the values specified for material with PTI ≥ 600 apply for all materials (in spite of the real PTI).

– For creepage distances subjected to working voltages of less than 60 s duration, the values specified for material with PTI ≥ 600 apply for all materials.

– For creepage distances not liable to contamination by dust or moisture, the values specified for material with PTI ≥ 600 apply for all materials (independent of the real PTI).

Table 2b – Minimum distances for AC (50 Hz/60 Hz) sinusoidal voltages – Impulse withstand category III

Distances mm	~~Working~~ Rated voltage V			
	50	**150**	**250**	**500**
1 Creepage distances and clearances between live parts of different polarity	0,6	0,8	1,5	3
2 Between live parts and external metal parts, or the outer surface of parts of insulating material which are permanently fixed to the holder[a], including screws or devices for fixing covers or fixing the holder to its support:				
– Creepage distances	0,6	1,5	3	4
insulation PTI [b] ≥ 600	1,2	1,6	3	5
PTI [b] < 600	0,2	1,5	3	4
– Clearances				
3 Between live parts and the mounting surface or a loose metal cover, if any, if the construction does not ensure that the values under item 2 are maintained under the most unfavourable circumstances:				
– Clearances	0,6	1,5	3	4

Values for creepage distances and clearances may be found for intermediate values of rated voltages by linear interpolation between tabulated values. No values are specified for rated voltages below 25 V as the voltage test of 12.2.2 is considered sufficient.

NOTE In Japan, the values given in the table are not applicable. Japan requires larger values than the values given in the table.

[a] The distances between live contacts and the lampholder face (reference plane) shall, however, be in accordance with the relevant standard sheets of IEC 60061-2.

[b] PTI (proof tracking index) in accordance with IEC 60112:2003 and IEC 60112:2003/AMD1:2009.

– In the case of creepage distances to parts not energized or not intended to be earthed, where no tracking can occur, the values specified for material with PTI ≥ 600 apply for all materials (in spite of the real PTI).

– For creepage distances subjected to working voltages of less than 60 s duration, the values specified for material with PTI ≥ 600 apply for all materials

– For creepage distances not liable to contamination by dust or moisture, the values specified for material with PTI ≥ 600 apply for all materials (independent of the real PTI).

However, the distances between live contacts and the lampholder face (reference plane) shall be in accordance with the values given in the relevant holder sheets of IEC 60061-2, if required.

In the case of non-sinusoidal pulse voltages, the clearances shall be not less than the values shown in Table 3.

Table 3 – Minimum distances for non-sinusoidal pulse voltages

Rated pulse peak voltage kV	2	2,5	3	4	5	6	8	10	12	15	20	25	30	40	50	60	80	100
Minimum clearance mm	1	1,5	2	3	4	5,5	8	11	14	18	25	33	40	60	75	90	130	170

The distances specified in Table 3 are derived from IEC 60664-1 (inhomogeneous field conditions). For distances subjected to both sinusoidal voltage as well as non-sinusoidal pulses, the minimum required distance shall be not less than the highest value indicated in either table.

For clearance distances without influence on safety, for example distances between the contacts, advantage might be taken from improved field conditions, but also in this case the values for the homogenous fields (see IEC 60664-1) remain the absolute minimum.

For polarized lampholders, creepage distances and clearances to external metal parts or the outer surface of parts of insulating material may be designed and shall be checked for each pole separately. The distances between the contacts shall be designed according to the high pulse voltage.

Compliance is checked by tests with the rated pulse voltage of the holder. Voltage drops are not permissible.

Creepage distances shall be not less than the required minimum clearances.

16 Endurance

Lampholders shall maintain good electrical contact with the lamp contacts.

Compliance is checked by the following endurance test.

A commercial lamp cap, in accordance with an IEC standard, if applicable, shall be inserted 10 times into and removed 10 times from the holder.

A test cap made of steel having the same dimensions as the test cap mentioned in 11.4 is inserted. In the case of a combined pair of holders, the dummy lamp is replaced by a dummy lamp made of steel without shielding.

For lamp holders where the test leads to excessive contact temperatures and damage of the steel gauge during the testing procedure, the original lamp contact may be used.

The holder is then placed in a heating cabinet with temperature control.

The temperature within the cabinet is adjusted so that, after thermal stabilization, the measuring point for the rated operating temperature attains 90 °C ± 5 °C or (T + 10) °C ± 5 C for T-marked holders, while the holder is loaded with 1,1 times the rated current.

For lampholders which form an integral part of the luminaire, this temperature is replaced by that measured according to the operating conditions given in 12.4.2 of IEC 60598-1:2014, plus 10 K, with a tolerance of ±5 °C.

After reaching and maintaining this temperature, the holder remains for 48 h under these conditions.

After this period, the lampholder is removed from the heating cabinet and allowed to cool down for 24 h without the test cap or the dummy lamp, respectively.

During the test, the holder shall not undergo any change impairing its further use, especially in the following respects:

- *there is no reduction of protection against electric shock;*
- *there is no loosening of electrical contacts;*
- *there are no cracks, swelling or shrinking;*
- *the holder complies with the gauges of IEC 60061-3, as far as they exist.*

After the endurance test, the resistance of the lampholder contacts and connections is measured as follows:

- *a test cap or a dummy lamp as specified in 11.4 is inserted in the lampholder and a current equal to the rated current of the lampholder is allowed to flow for a time just sufficient for the resistance to be measured;*
- *on lampholders equipped with leads, the resistance is measured between the leads 5 mm from where they come out of the holder;*
- *on lampholders without leads, it is necessary to attach leads of the minimum size for which the holder was designed (but not less than 0,5 mm^2 copper wire). The resistance is measured between the leads 5 mm from where they come out of the holder;*
- ~~*the test cap used shall have minimum dimensions of the relevant standard sheet of IEC 60061-1 and its contacts shall be made of brass and shall be carefully cleaned and polished;*~~
- *the test cap shall be fully seated in the holder, irrespective of the position of the plunger, if any;*
- *for double-ended lamps, the combined pair of holders is measured. In this case the dummy lamp mentioned in 11.4 is used.*

The measured resistance shall not exceed the following value:

$0{,}045\ \Omega + (A \times n)$

with

$A = 0{,}01\ \Omega$, *if* $n = 2$;

$A = 0{,}015\ \Omega$, *if* $n > 2$

where n is the number of separate contact points between holder and cap which are included in the measurement.

Care should be taken that oxidation of the cable insulation will not influence the resistance measurement, for example by removing the insulation from the cable.

17 Resistance to heat and fire

17.1 External parts of insulating material providing protection against electric shock and parts of insulating material retaining live parts or ELV parts in position shall be resistant to heat.

Compliance is checked by subjecting the parts to a ball-pressure test by means of the apparatus shown in Figure 1.

All the tests required by Clause 17 of this standard (except 17.6) are not performed on lampholders which are integral with a luminaire, as similar tests are required in Section 13 of IEC 60598-1. However, the operating conditions of these tests will take into account the ones specific to lampholders and defined in Clause 17 of this standard.

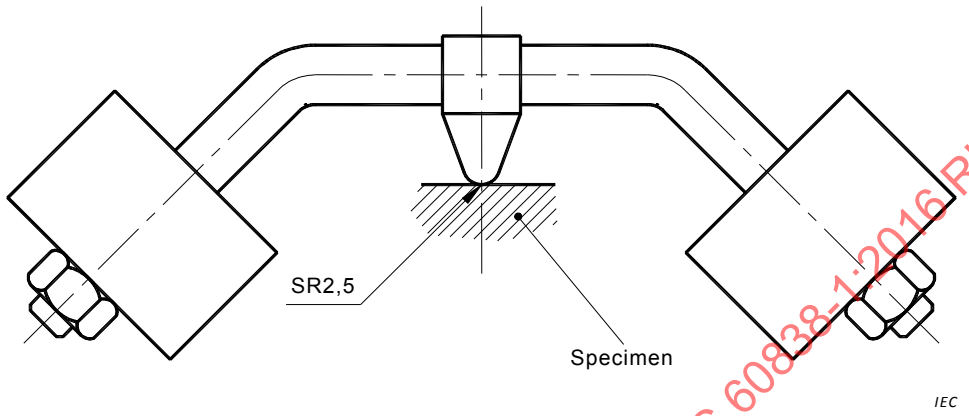


Figure 1 – Ball-pressure test apparatus

The test is not made on parts of ceramic material or on the insulation of wiring.

The surface of the part under test is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against this surface by a force of 20 N.

The test is made in a heating cabinet having a temperature of 25 °C ± 5 °C in excess of the operating temperature (see 6.2) with a minimum temperature of 125 °C when parts retaining live parts in position are tested.

The test load and the supporting means are placed within the heating cabinet for a sufficient time to ensure that they have attained the stabilized testing temperature before the test commences.

The part to be tested is placed in the heating cabinet for a period of 1 h, before the test load is applied.

If the surface under test bends, the part where the ball presses is supported. For this purpose, if the test cannot be made on the complete specimen, a suitable part may be cut from it.

The specimen should be at least 2,5 mm thick, but if such a thickness is not available on the specimen, then two or more pieces are placed together.

After 1 h the ball is removed from the specimen which is then immersed within 10 s in cold water for cooling down to approximately room temperature.

The diameter of the impression caused by the ball is measured and shall not exceed 2 mm.

NOTE In the event of curved surfaces, the shorter axis is measured if the indent is elliptical.

In case of doubt, the depth of the impression is measured and the diameter Φ calculated using the formula: $\phi = 2\sqrt{p\,(5-p)}$ *, where* p *= depth of impression.*

17.2 Parts of insulating material retaining live parts in position and external parts of insulating material providing protection against electric shock shall be resistant to flame and ignition.

Compliance is checked by the tests of 17.3 or 17.4, as appropriate.

These tests are not made on parts of ceramic material.

17.3 External parts of insulating material, including those with a conductive exterior, providing protection against electric shock and parts of insulating material retaining ELV parts in position, are subjected to the glow-wire test in accordance with IEC 60695-2-11, subject to the following details.

– *The test specimen is a complete holder. It may be necessary to take away parts of the holder to perform the test, but care should be taken to ensure that the test conditions are not significantly different from those occurring in normal use.*

– *The test specimen is mounted on the carriage and pressed against the glow-wire tip with a force of 1 N, preferably 15 mm, or more, from the upper edge, into the centre of the surface to be tested. The penetration of the glow-wire into the specimen is mechanically limited to 7 mm.*

  If it is not possible to make the test on a specimen as described above because the specimen is too small, the above test is made on a separate specimen of the same material 30 mm × 30 mm square and with a thickness equal to the smallest thickness of the specimen and manufactured by the similar process.

– *The temperature of the tip of the glow-wire is 650 °C. After 30 s the specimen is withdrawn from contact with the glow-wire tip.*

  The glow-wire temperature and heating current are constant for 1 min prior to commencing the test. Care should be taken to ensure that heat radiation does not influence the specimen during this period.

  The glow-wire tip temperature is measured by means of a sheathed fine-wire thermocouple constructed and calibrated as described in IEC 60695-2-11.

– *Any flame or glowing of the specimen shall extinguish within 30 s of withdrawing the glow-wire and any flaming drops shall not ignite a piece of five-layer tissue paper, specified in definition 4.187 of ISO 4046-4:2002, spread out horizontally 200 mm ± 5 mm below the test specimen.*

17.4 Parts of insulating material retaining live parts or ELV lamp contacts in position, are subjected to the needle-flame test in accordance with IEC ~~60695-2-2~~ 60695-11-5 , subject to the following details.

– *The specimen is a complete lampholder. It may be necessary to take away parts of the holder to perform the test, but care should be taken to ensure that the test conditions are not significantly different from those occurring in normal use.*

– *The test flame is applied to the centre of the surface to be tested.*

– *The duration of application is 10 s.*

– *Any self-sustaining flame shall extinguish within 30 s of removal of the gas flame and any flaming drops shall not ignite a piece of five-layer tissue paper, specified in definition 4.187 of ISO 4046-4:2002 spread out horizontally 200 mm ± 5 mm below the test specimen.*

17.5 Insulating parts retaining live parts or ELV parts in position, or which are in contact with such parts shall be of material resistant to tracking if they are exposed to excessive deposit of moisture or dust.

For materials other than ceramic, compliance is checked by the proof-tracking test in accordance with IEC 60112 subject to the following details.

– *If the specimen has no flat surface of at least 15 mm × 15 mm, the test may be carried out on a flat surface with reduced dimensions provided drops of liquid do not flow off the specimen during the test. No artificial means should, however, be used to retain the liquid on the surface. In case of doubt the test may be made on a separate strip of the same material, having the required dimensions and manufactured by the same process.*

– *If the thickness of the specimen is less then 3 mm, two, or if necessary more, specimens shall be stacked to obtain a thickness of at least 3 mm.*

– *The test shall be made at three places of the specimen or on three specimens.*

– *The electrodes shall be of platinum and test solution A, described in 7.3 of IEC 60112:2003 and IEC 60112:2003/AMD1:2009, shall be used.*

– *The specimen shall withstand 50 drops without failure at a test voltage of PTI 175.*

– *A failure has occurred if a current of 0,5 A or more flows for at least 2 s in a conducting path between the electrodes on the surface of the specimen, thus operating the overcurrent relay or if the specimen burns without releasing the overcurrent relay.*

– *Clause 9 of IEC 60112:2003 regarding determination of erosion, does not apply.*

17.6 *The resistance to heat of insulating material and/or outer parts of the lampholder is tested in a heating cabinet at a temperature of 115 °C ± 5 °C or (T + 35) °C ± 5 °C in the case of T-marked holders.*

If the heat resistance of insulating material and/or outer parts deviates from the temperature marking of the holder, the test temperature is adjusted to 35 K ± 5 K above the heat resistance stated in the manufacturer's catalogue for these parts.

This test is not made on lampholders which are integral with the luminaire as a similar test is already given in IEC 60598-1.

The holder is fitted with a solid steel test cap or a dummy lamp made of steel as mentioned in Clause 16.

The holder is placed in a heating cabinet having approximately half the test temperature. This temperature is raised to the required test temperature within 1 h ± 15 min. Following this, the test is continued for 168 h without interruption. The test temperature is maintained with a tolerance of ±5 K.

During the test, the holder shall not undergo any change impairing its further use, especially in the following respects:

– *no reduction of protection against electric shock;*

– *no loosening of electrical contacts;*

– *no cracks, swelling or shrinking;*

– *the holder complies with the gauges of IEC 60061-3 as far as they exist.*

The use of the gauges is not intended for checking the reality of the contact, but only for checking the possible deformation of moulded materials.

In addition, the holder shall withstand the mechanical strength test made under conditions specified in Clause 13, the height of fall, however, being reduced to 50 mm.

The sealing compound shall not flow to such an extent that live parts are exposed; a mere displacement of the compound is neglected.

18 Resistance to excessive residual stresses (season cracking) and to rusting

18.1 Contacts and other parts of rolled sheet of copper or copper alloy, the failure of which might cause the holder to become unsafe, shall not be damaged due to excessive residual stresses.

Compliance is checked by the following test.

The surfaces of the specimens are carefully cleaned, varnish being removed by acetone, grease and finger prints by petroleum spirit or the like.

The specimens are placed for 24 h in a test cabinet, the bottom of which is covered by an ammonium chloride solution having a pH value of 10 (for details of the test cabinet, the test solution and the test procedure see Annex C).

After this treatment, the specimens are washed in running water; 24 h later they shall show no cracks when inspected at an optical magnification of 8 x.

18.2 Ferrous parts, the rusting of which may endanger the safety of the holder, shall be adequately rust-protected.

Compliance is checked by the following test.

All grease is removed from the parts to be tested by immersion in a suitable degreasing agent for 10 min.

The parts are then immersed for 10 min in a water solution of 10 % ammonium chloride at a temperature of 20 °C ± 5 °C. Without drying, but after shaking off drops of water, the parts are placed for 10 min in a box containing air saturated with moisture at a temperature of 20 °C ± 5 °C.

After the specimens have been dried for 10 min in a heating cabinet at a temperature of 100° C ± 5 °C, any traces of rust on sharp edges and of yellowish film may be removed by rubbing, after which their surfaces shall show no signs of rust.

For small helical springs and the like and for ferrous parts exposed to abrasion, a layer of grease is deemed to provide sufficient rust protection. Such parts are not subjected to the test.

Annex A
(~~normative~~ informative)

~~Examples of~~ Lampholders covered by this standard

Built-in lampholders used with general purpose light sources, projection lamps, floodlighting lamps and street lighting lamps provided with the caps given in Table A.1 are covered by this standard (see Clause 1).

This list is not exhaustive.

Table A.1 – Lampholders covered by this standard

Lampholders	Lampholder sheet (see IEC 60061-2)
B22d-3	7005-10A
BY22d	7005-17
Fa4	7005-..
Fc2	7005-114
G1.27, GX1.27	7005-..
GUX2.5d, GUY2.5d, GUZ2.5d	7005-137
G2.54, GX2.54	7005-..
G3.17	7005-..
G4	7005-72
GU4	7005-108
GZ4	7005-67
G5.3	7005-73
G5.3-4.8	7005-126
GU5.3	7005-109
GX5.3	7005-73A
GY5.3	7005-73B
G6.35, GX6.35, GY6.35	7005-59
GZ6.35	7005-59A
GU7	7005-113
GZX7d-., GZY7d-., GZZ7d	7005-136
G8.5	7005-122
G9	7005-129
G9.5	7005-70
GX9.5	7005-70A
GY9.5, GZ9.5	7005-70B
GU10	7005-121
GZ10	7005-120
G12	7005-63
GY16	7005-..
G17q, GX17q, GY17q	7005-45
G22	7005-75
G38	7005-76
PG12 & PGX12	7005-64
PG22-6.35	7005-..
P28s	7005-42
P30s-10.3	7005-44
P40	7005-43
R7s, RX7s	7005-53/53A

Lampholders	Lampholder sheet (see IEC 60061-2)
SX4s	7005-..
SY4s	7005-..

Annex B
(normative)

~~Examples of~~ Suitable metals

~~Examples of~~ Suitable metals for current-carrying parts, referred to in Clause 14, when used within the permissible temperature range and under normal conditions of chemical pollution are included but are not limited to:

– copper: an alloy containing at least 58 % copper for parts made from rolled sheet (in cold condition) or at least 50 % copper for other parts;

– stainless steel: containing at least 13 % chromium and not more than 0,09 % carbon;

– steel: provided with an electroplated coating of zinc, according to ISO 2081, with coating having a thickness of at least 5 μm ISO service condition No. 1 (for ordinary equipment);

– steel: provided with an electroplated coating of nickel and chromium according to ISO 1456, the coating having a thickness of at least 20 μm ISO service condition No. 2 (for ordinary equipment);

– steel: provided with an electroplated coating of tin, according to ISO 2093, the coating having a thickness of at least 12 μm ISO service condition No. 2 (for ordinary equipment);

– pure nickel (at least 99 %).

– silver (at least 90 %).

Annex C
(normative)

Season cracking/corrosion test

~~NOTE~~ In the interest of environmental protection, the following requirements relating to test solution, volume and volume of vessel may be modified at the discretion of the test laboratory. In this event, the test vessel should retain a volume in the range 500 to 1 000 times larger than the volume of the sample and the volume of test solution should be such that the ratio of vessel volume to solution volume is in the range of 20:1 to 10:1. In case of doubt, however, the conditions of Clause C.1 apply.

C.1 Test cabinet

Closable glass vessels shall be used for the test. These may, for example, be desiccator vessels or simple glass troughs with ground rim and lid. The vessels' volume shall be at least 10 l. A certain ratio of test space to volume of test solution shall be maintained (20:1 to 10:1).

C.2 Test solution

Preparation of 1 l of solution

Dissolve 107 g ammonium chloride (reagent grade NH_4Cl) in about 0,75 l of distilled or fully demineralized water and add as much of 30 % sodium hydroxide solution (prepared from reagent grade NaOH and distilled or fully demineralized water) as is necessary to reach a pH value of 10 at 22 °C. For other temperatures, adjust this solution to the corresponding pH values specified in Table C.1.

Table C.1 – Test solution

Temperature °C	Test solution pH
22 ± 1	10,0 ± 0,1
25 ± 1	9,9 ± 0,1
27 ±1	9,8 ± 0,1
30 ± 1	9,7 ± 0,1

After the pH adjustment, make up to 1 l with distilled or fully demineralized water. This does not change the pH value any further.

Keep the temperature constant in any event to within ±1 °C during the pH adjustment, and carry out the pH measurement using an instrument which permits an adjustment of the pH value to within ±0,02.

The test solutions may be used over a prolonged period, but the pH value, which represents a measure of the ammonia concentration in the vapour atmosphere, shall be checked at least every three weeks and adjusted if necessary.

C.3 Test procedure

Introduce, preferably suspended, the specimens in the test cabinet in such a way that the ammonia vapour can take effect unhindered.

The specimens shall not dip into the test solution nor touch each other.

Supports or suspension devices shall be made of materials which are not susceptible to attack by ammonia vapour, for example glass or porcelain.

Testing shall be carried out at a constant temperature of (30 ± 1) °C to exclude visible condensed water formation caused by temperature fluctuations, which could severely falsify the test result.

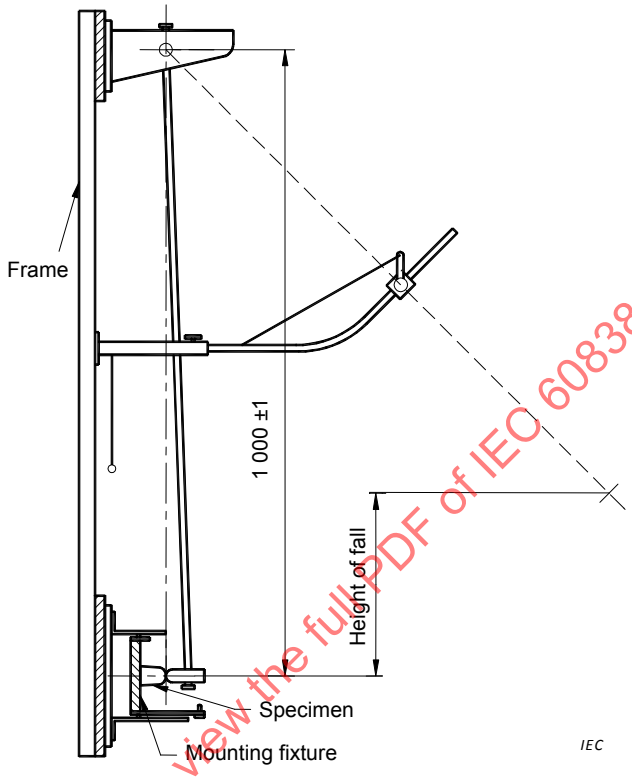
Prior to testing, the test cabinet containing the test solution shall be brought to a temperature of (30 ± 1) °C. The test cabinet shall subsequently be filled as quickly as possible with the specimens pre-heated to 30 °C and closed.

This moment is to be considered the beginning of the test.

Annex D
(normative)

Pendulum impact test apparatus

Dimensions in millimetres



NOTE For information this drawing has been retained in this standard, although there is a basic standard. In case of doubt regarding the drawing refer to IEC 60068-2-75.

Figure D.1 – Impact test apparatus

Dimensions in millimetres

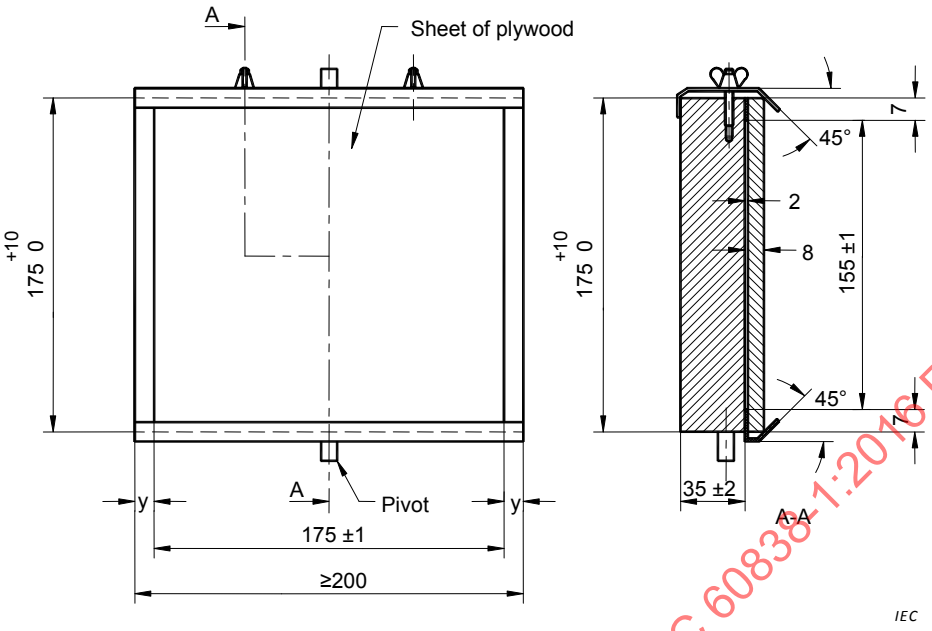


Figure D.2 – Mounting fixture

Annex E
(informative)

Schedule of amended clauses and subclauses containing more serious/ critical requirements which require products to be retested

The schedule of clauses and subclauses given in Annex E details the requirements of this new edition of IEC 60838-1 which require retesting to show compliance with this updated standard. Retesting may not be required in cases where examination of previous test results confirms conformity.

a) Definitions 3.21, 3.22, Subclauses 6.4 and 7.2: amendment of a new classification for lampholders for high pressure discharge lamps for single contact ignition voltage and dual contact ignition voltage.

b) Subclause 7.4: clarification about the test sequence for marking durability test.

c) Clause 16: contradictory dimensional requirements for brass test caps have been corrected.

d) Clause 16: optional alternative use of original lamp pin material enabled for the steel test cap in case of excessive contact temperature and damage of the steel test cap due to the low conductivity of the steel material.

Bibliography

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

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

IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60838-1

Edition 5.0 2016-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Miscellaneous lampholders – Part 1: General requirements and tests

Douilles diverses pour lampes – Partie 1: Exigences générales et essais

IEC 60838-1:2016-05(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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MISCELLANEOUS LAMPHOLDERS –

Part 1: General requirements and tests

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.
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International Standard IEC 60838-1 has been prepared by subcommittee 34B: Lamp caps and holders, of IEC technical committee 34: Lamps and related equipment.

This fifth edition cancels and replaces the fourth edition published in 2004, Amendment 1:2008 and Amendment 2:2011. This edition constitutes a technical revision.

The significant technical changes in this edition with respect to the previous edition include the introduction of new or revised requirements for single and dual contact ignition voltages, steel test caps and brass test caps and an Annex E listing amended requirements/clauses which require products to be retested.

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

FDIS	Report on voting
34B/1850A/FDIS	34B/1856/RVD

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.

A list of all parts in the IEC 60838 series, published under the general title *Miscellaneous lampholders*, can be found on the IEC website.

In this standard, the following type is used:

– *compliance statements: in italic type.*

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.

MISCELLANEOUS LAMPHOLDERS –

Part 1: General requirements and tests

1 Scope

This part of IEC 60838 applies to lampholders of miscellaneous types intended for building-in (to be used with general purpose light sources, projection lamps, floodlighting lamps and street-lighting lamps with caps as listed in Annex A) and the methods of test to be used in determining the safe use of lamps in lampholders.

This part of IEC 60838 also covers lampholders which are integral with a luminaire. It covers the requirements for the lampholder only.

This part of IEC 60838 also covers lampholders integrated in an outer shell and dome similar to Edison screw lampholders. Such lampholders are further tested in accordance with the relevant clauses of IEC 60238.

Requirements for lampholders for tubular fluorescent lamps, Edison screw lampholders and bayonet lampholders are covered by separate standards.

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 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety* (available at http://std.iec.ch/iec60061)

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 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
IEC 60112:2003/AMD1:2009

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60238, *Edison screw lampholders*

IEC 60245 (all parts), *Rubber insulated cables – Rated voltages up to and including 450/750 V*

IEC 60352-1, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60399, *Barrel thread for lampholders with shade holder ring*

IEC 60417, *Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*[1]
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60598-1:2014, *Luminaires – Part 1: General requirements and tests*

IEC 60664-1, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end products (GWEPT)*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

ISO 1456, *Metallic and other inorganic coatings – Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium*

ISO 2081, *Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel*

ISO 2093, *Electroplated coatings of tin – Specification and test methods*

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

3 Terms and definitions

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

3.1
rated voltage
voltage declared by the manufacturer to indicate the highest working voltage for which the lampholder is intended

3.2
working voltage
highest r.m.s. voltage that may occur across any insulation, transients being disregarded, both when the lamp is operating under normal conditions and when the lamp is removed

3.3
rated current
current declared by the manufacturer to indicate the highest current for which the lampholder is intended

[1] A consolidated version of this publication exists, comprising IEC 60529:1989, IEC 60529:1989/AMD1:1999 and IEC 60529:1989/AMD2:2013.

3.4
lampholder for building-in
lampholder designed to be built into a luminaire, an additional enclosure or the like

3.4.1
unenclosed lampholder
lampholder for building-in so designed that it requires additional means, for example enclosures, to meet the requirements of this standard with regard to protection against electric shock

3.4.2
enclosed lampholder
lampholder for building-in so designed that it fulfils on its own the requirements of this standard with regard to protection against electric shock

3.5
rated operating temperature
highest temperature for which the lampholder is designed

3.6
rated pulse voltage
highest peak value of pulse voltages the holder is able to withstand

3.7
lamp connector
set of contacts specially designed to provide for electrical contact but not supporting the lamp

3.8
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

3.9
type test sample
sample consisting of one or more similar specimens submitted by the manufacturer or responsible vendor for the purpose of a type test

3.10
live part
conductive part which may cause an electric shock

3.11
impulse withstand category
numeral defining a transient overvoltage condition

Note 1 to entry: Impulse withstand categories I, II, III and IV are used.

a) Purpose of classification of impulse withstand categories

Impulse withstand categories are to distinguish different degrees of availability of equipment with regard to required expectations on continuity of service and on an acceptable risk of failure.

By selection of impulse withstand levels of equipment, insulation co-ordination can be achieved in the whole installation reducing the risk of failure to an acceptable level providing a basis for overvoltage control.

A higher characteristic numeral of an impulse withstand category indicates a higher specific impulse withstand of the equipment and offers a wider choice of methods for overvoltage control.

The concept of impulse withstand categories is used for equipment energized directly from the mains.

b) Description of impulse withstand categories

Equipment of impulse withstand category I is equipment which is intended to be connected to the fixed electrical installations of buildings. Protective means are taken outside the equipment – either in the fixed

installation or between the fixed installation and the equipment – to limit transient overvoltages to the specific level.

Equipment of impulse withstand category II is equipment to be connected to the fixed electrical installations of buildings.

Equipment of impulse withstand category III is equipment which is part of the fixed electrical installations and other equipment where a higher degree of availability is expected.

Equipment of impulse withstand category IV is for use at or in the proximity of the origin of the electrical installations of buildings upstream of the main distribution board.

3.12
primary circuit
circuit which is directly connected to the AC mains supply

Note 1 to entry: It includes, for example, the means for connection to the AC mains supply, the primary windings of transformers, motors and other loading devices.

3.13
secondary circuit
circuit which has no direct connection to a primary circuit and derives its power from a transformer, converter or equivalent isolation device, or from a battery

Note 1 to entry: Exception: autotransformers. Although having direct connection to a primary circuit, the tapped part of them is also deemed to be a secondary circuit as defined above.

Note 2 to entry: Mains transients in such a circuit are attenuated by the corresponding primary windings. Also inductive ballasts reduce the mains transient voltage height. Therefore, components located after a primary circuit or after an inductive ballast can be suited for an impulse withstand category of one step lower, i.e. for impulse withstand category II.

3.14
basic insulation
insulation applied to live parts to provide basic protection against electric shock

Note 1 to entry: Basic insulation does not necessarily include insulation used exclusively for functional purposes.

3.15
supplementary insulation
independent insulation applied in addition to basic insulation in order to provide protection against electric shock in the event of a failure of basic insulation

3.16
double insulation
insulation comprising both basic insulation and supplementary insulation

3.17
reinforced insulation
single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation under the conditions specified

Note 1 to entry: The term "insulation system" does not imply that the insulation shall be one homogeneous piece. It may comprise several layers which cannot be tested singly as supplementary or basic insulation.

3.18
enclosed reinforced insulated lampholder
lampholder for building-in so designed that on its own it fulfils the requirements for double or reinforced insulated parts in class II applications

3.19
partly reinforced insulated lampholder
lampholder for building-in, so designed that some parts of the lampholder require additional means to fulfil the requirements with regard to double or reinforced insulation

Note 1 to entry: In some cases, the dimensions might be achieved only after mounting into the luminaire.

3.20
polarized lampholder
lampholder for building-in, specially designed for asymmetric rated pulse voltages, where the rated ignition voltage (higher rated pulse voltage) is designated to a fixed contact

3.21
single contact ignition voltage
ignition voltage which appears on one contact of the lampholder only

3.22
dual contact ignition voltage
ignition voltage which is split between the two contacts of the lampholder

4 General requirement

Lampholders shall be so designed and constructed that in normal use they function reliably and cause no danger to persons or surroundings.

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

5 General conditions for tests

5.1 Tests according to this standard are type tests.

NOTE 1 The requirements and tolerances permitted by the standard are related to testing of type test sample submitted for that purpose. Compliance of type test sample does not ensure compliance of the whole production of a manufacturer with this safety standard. Conformity of production is the responsibility of the manufacturer and can include routine tests and quality assurance in addition to type testing.

NOTE 2 For further information on conformity testing during manufacture see IEC 60061-4.

5.2 Unless otherwise specified, the tests are made at an ambient temperature of 20 °C ± 5 °C and with the holder in the most unfavourable position for normal use.

If a lampholder is declared to accept different lamp fits, it shall comply with the requirements of each of the fits mentioned.

Compliance is checked with separate sets of specimens according to 5.3.

If the use of different lamp fits in turn is permitted by the manufacturer, only one set of specimens is used to check compliance with all requirements.

For all tests the most critical of the relevant fits and gauges shall be used and in the most onerous sequence.

5.3 The tests and inspections are carried out in the order of the clauses, on a total of

– 10 pairs of matching holders intended for linear double-capped lamps;

  If a pair of holders consists of identical holders, it is sufficient that one holder instead of one pair is subjected to all the tests, except for the tests of Clause 8, of 11.2, 11.3, of Clause 13, Clause 16 and of 17.6 where pairs are needed.

– 10 specimens intended for single-capped lamps;

in the order of the clauses, as follows:

– three pairs or three specimens: Clause 4 up to and including Clause 15 (except for 9.2);

NOTE The tests of 9.2 are carried out on the number of separate specimens as required by the relevant standards.

– three pairs or three specimens: Clause 16 and 17.6;
– one pair or one specimen: 17.1;
– one pair or one specimen: 17.3;
– one pair or one specimen: 17.4;
– one pair or one specimen: 17.5 and Clause 18.

Together with these units, the manufacturer's mounting instructions (see 7.3) shall be supplied.

In such cases, where according to the mounting instructions the rated pulse voltage of the holder can only be achieved with a cap inserted, suitable caps shall be supplied together with the type test sample. The relevant tests are then carried out with a cap inserted.

5.4 Lampholders are deemed to comply with this standard if no specimen fails in the complete series of tests specified in 5.3.

If one specimen fails in one test, that test and the preceding ones which may have influenced the result of that test are repeated on another set of specimens for the number required by 5.3, all of which shall then comply with the repeated tests and with the subsequent tests. Lampholders are deemed not to comply with this standard if there are more failures than one.

The applicant may submit, together with the first set of specimens, the additional set which may be needed in case of failure of one specimen. The testing station shall then, without further request, test the additional specimens and will reject only if a further failure occurs.

If the additional set of specimens is not submitted at the same time, a failure of one specimen will entail the rejection.

6 Classification

Lampholders are classified as follows.

6.1 According to their installation conditions

– unenclosed lampholders;
– enclosed lampholders;
– partly reinforced insulated lampholders;
– enclosed reinforced insulated lampholders.

NOTE 1 Where a lampholder is used with a working voltage of 50 % or less of its maximum rating, it can be regarded as equivalent to a reinforced insulated lampholder.

6.2 According to their resistance to heat:

– for rated operating temperatures up to and including 80 °C;
– for rated operating temperatures over 80 °C (T-marked lampholders).

The measuring point for the operating temperature is that area of the lampholder which makes electrical contact with the lamp cap/base. If the heat resistance of insulating parts, terminals and leads of the lampholder deviates from this operating temperature, these different values shall be stated in the manufacturer's catalogue and are checked after appropriate installation in a luminaire or other additional enclosure, when that equipment is tested according to its own standard.

6.3 According to polarization

– non-polarized lampholders;

– polarized lampholders.

6.4 According to the application of ignition voltages

– lampholders for single-contact ignition voltages

– lampholders for dual-contact ignition voltages

NOTE 2 By using dual contact ignition voltages advantage can be taken of reduced creepage distance and clearance requirements.

7 Marking

7.1 Lampholders shall be marked with the following mandatory markings:

a) mark of origin (this may take the form of a trade mark, manufacturer's identification mark or the name of the responsible vendor);

b) either a unique catalogue number or an identifying reference.

Available technical documentation of the manufacturer such as printed catalogues or online catalogues shall allow a clear identification of a lampholder either by a unique catalogue number or by an identifying reference on the holder, specifying the essential characteristic features and the basic design of the product supplemented by a clear description. Variations of the basic design, for example different cable length, fixing means, colours, which do not affect safety or performance of the lampholder, may be disregarded in the type reference marked on the product. Variations included in the type testing procedure are listed in the corresponding test reports.

If a combination of lampholder components determines the lampholder designation, for example an assembly of a lamp connector and a retaining spring, the combination should be clearly identifiable.

Compliance is checked by inspection.

7.2 In addition to the above mandatory markings, the following information shall be given either on the lampholder or be made available in the manufacturer's catalogue or the like:

a) the rated voltage in volts and rated pulse voltage in kilovolts (kV), if applicable; for polarized lampholders, the rated voltage in volts and the pair of rated pulse voltages;

NOTE 1 Some lampholders still show rated voltages higher than 500 V. This is an earlier way of expressing the permissible pulse voltage via a rated voltage. For such lampholders, the creepage distances and clearances can be found in IEC 60598-1.

b) the rated current in amperes;

c) the rated operating temperature T, if greater than 80 °C, in steps of 10 °C;

d) the conductor sizes for which the terminal is designed;

e) the high voltage arrow (see IEC 60417-5036:2002-10) for polarized lampholders to identify the connection for the higher pulse voltage, if applicable; it shall be visible close to the relevant terminal or wire entry during lampholder installation;

f) information on the application of ignition voltages.

If symbols are used, these shall be as follows.

For electrical rating:

– volt: V;

– ampere: A;
– watt: W;
– pulse voltage: kV;
– high pulse voltage terminal/wire on polarized lampholders:  (see IEC 60417-5036:2002-10)

NOTE 2 Alternatively, for volt and ampere ratings, figures can be used alone, the figure for the rated current being marked before or above that for the rated voltage and separated from the latter by an oblique stroke or line. Therefore the marking of current and voltage can be as follows:

$$2\ \text{A}\ 250\ \text{V or } 2/250 \text{ or } \frac{2}{250}$$

For the rated pulse voltage, the symbol shall be preceded by its value (e. g. 5 kV). For polarized lampholders as well as for dual contact ignition voltage lampholders, the two rated pulse voltages shall be separated by an oblique stroke (e. g. 15/2,5 kV or 5/2,5 kV).

If a lamp holder is intended to be used for dual contact ignition voltages this information shall be indicated in the manufacturer's catalogue or the like.

For polarized lampholders the figure marked before the oblique stroke represents the higher pulse voltage, the figure behind represents the rated pulse voltage based on the impulse withstand category of the lampholder. For dual contact ignition voltage lampholders the figure marked before the oblique stroke represents the total ignition voltage, the figure behind the oblique stroke represents the ignition voltage from the contacts to the mounting surface or the outer accessible surface.

Compliance is checked by inspection.

For lampholders according to this standard, the distances for impulse withstand category II are usually applicable. For holders in equipment where a higher degree of availability is expected, distances for impulse withstand category III may be applicable. This information has to be indicated in the manufacturer's catalogue or the like.

Enclosed reinforced insulated lampholders offer an adequate level of protection for use in luminaires where they are accessible in normal use. This information shall be indicated in the manufacturer's catalogue or the like.

For partly reinforced insulated lampholders, sufficient creepage distances and clearances to outer accessible surfaces will require additional protection to some parts of the lampholder by the luminaire design or by use of additional attachment(s) or cover(s). This information shall be indicated in the manufacturer's catalogue or the like.

7.3 The instructions supplied by the holder manufacturer or responsible vendor shall contain all the information required to ensure correct mounting and operation of the connectors or holders.

NOTE The information could be part of the manufacturer's or responsible vendor's catalogue.

Compliance is checked by inspection.

7.4 Marking shall be durable and easily legible.

Compliance is checked by inspection and, after the tests of 17.6 have been completed, by trying to remove the marking by rubbing lightly for 15 s with a piece of cloth soaked with water and for a further 15 s with a piece of cloth soaked with petroleum spirit.

After the test the marking shall still be legible.

NOTE The petroleum spirit used typically consists of a solvent hexane with a content of aromatics of maximum 0,1 volume percentage, a kauri-butanol value of 29, an initial boiling point of approximately 65 °C, a dry-point of approximately 69 °C and a specific density of approximately 0,68 g/cm^3.

8 Protection against electric shock

8.1 Enclosed lampholders shall be so constructed that, when the holder has been built in or installed and wired as in normal use, their live parts are not accessible

– without a lamp inserted;
– with the appropriate lamp inserted, and
– during insertion or removal of the lamp.

For lampholders which have been in use for a long time, such as B22d-3, BY22d, G22, G38, P28s, P30s and P40, the above requirement applies only with the appropriate lamp inserted.

The insertion of only one pin of the lamp (in case of caps with more than one pin) to the first point of contact with live parts shall be prevented.

Lampholders G22 and G38 are exempted from this requirement.

Compliance is checked by means of the standard test finger specified in IEC 60529.This test finger is applied in every possible position with a force not exceeding 10 N, an electrical indicator being used to show contact with live parts.

It is recommended that a voltage of not less than 40 V be used.

The lampholders are mounted as in normal use, i.e. on a supporting surface or the like with the most unfavourable conductor size fitted for which it is intended before being subjected to the above test.

Unenclosed lampholders are only tested after appropriate installation in a luminaire or other additional enclosure when that equipment is tested according to its own standard.

8.2 Lampholders for double-ended lamps shall be so constructed that, when the two holders have been built in or installed and wired as in normal use, their live parts are not accessible

– without a lamp inserted,
– with the appropriate lamp inserted, and
– during insertion and removal of the lamp.

In case of lampholders R7s/RX7s, a test which simulates insertion or removal of the lamp is not available because in both cases testing has to be done against the spring force of the single contact. This situation does not give the repeatability required for judgement. Therefore, this test is replaced by one with the lamp inserted.

Compliance is checked in accordance with IEC 60061 or unless otherwise specified in IEC 60061, with the standard test finger.

9 Terminals

9.1 Lampholders shall be provided with at least one of the following means of connection:

– screw-type terminals;

– screwless terminals;
– tabs or pins for push-on connections;
– posts for wire wrapping;
– soldering lugs;
– connecting leads (tails).

Terminal screws and nuts shall have a metric ISO thread.

Lampholders with screwless terminals, unless intended for sale to luminaire or equipment manufacturers, shall be provided with terminals which are equally satisfactory with both rigid (solid or stranded) conductors and flexible cables or cords.

Other means of connection than those specified are permitted provided they are equal in performance to the methods listed. An example for such a means of connection is a contact of a lampholder for extra low voltage halogen lamps providing electrical connection to a metal part of the luminaire during lampholder assembly.

Compliance is checked by the tests of 9.2 or 9.3 respectively.

9.2 Terminals shall comply with the following requirements.

– Screw-type terminals shall comply with Section 14 of IEC 60598-1:2014.
– Screwless terminals shall comply with Section 15 of IEC 60598-1:2014.
– Tabs or pins for push-on connections shall comply with Section 15 of IEC 60598-1:2014.
– Posts for wire wrapping shall comply with IEC 60352-1. Wire wrapping applies only to single solid round wire for internal wiring.
– Soldering lugs shall comply with the requirements for good solderability. Suitable requirements can be found in IEC 60068-2-20.
– Connecting leads (tails) shall comply with the requirements prescribed in 9.3.

For T-marked lampholders, the terminals are tested at the rated operating temperature, unless otherwise stated by the manufacturer.

Lampholders for extra low voltage halogen lamps, having a contact providing electrical connection to a metal part of the luminaire during lampholder assembly are for use of luminaire manufacturers only and are not for retail sale.

The conditions for a reliable installation and operation shall be given in the lampholder manufacturer's or responsible vendor's documents, in particular restrictions on the use of materials, essential dimensions and tolerances for lampholder fixation in the luminaire.

Lampholder contacts providing electrical connection to a metal part of the luminaire during lampholder assembly shall comply with the requirements of Section 15 of IEC 60598-1:2014.

Compliance is checked by the relevant tests.

9.3 Connecting leads (tails) shall be connected to the lampholder by soldering, welding, crimping or any other at least equivalent method.

Leads shall consist of insulated conductors. The insulation of the leads shall be at least equal in their mechanical and electrical properties to those specified in the IEC 60227 series or IEC 60245 series or comply with the relevant requirements given in 5.3 of IEC 60598-1:2014.

Insulation of the free end of the leads may be stripped.

Fixing of the leads to the holder shall withstand the mechanical efforts which may occur in normal use.

Compliance is checked by inspection and by the following test which is made after the test of Clause 16 on the same three specimens.

Each connecting lead is subjected to a pull of 20 N. The pull is applied without jerks for 1 min in the most unfavourable direction. During the test, leads should not move from their fixing. If, however, certain pull directions are not allowed according to the mounting instructions this shall be taken into account.

After the test, the lampholders shall show no damage within the meaning of this standard.

10 Provision for earthing

10.1 Lampholders, with provision for earthing other than those provided with connecting leads, shall have at least one earthing terminal.

Compliance is checked by inspection.

NOTE Lampholders intended to be earthed but not provided with an earthing terminal or with connecting leads are not for retail sale.

10.2 Accessible metal parts of lampholders with an earthing terminal which may become live in the event of an insulation fault shall be permanently and reliably connected to the earthing terminal.

Accessible metal parts of lampholders without an earthing terminal which may become live in the event of an insulation fault shall allow reliable earthing.

There shall be earth continuity between external metal parts unless these are screened from live parts by double or reinforced insulation.

Compliance is checked by the following test:

Lampholders provided with an earthing terminal are fitted with a rigid conductor of the smallest cross-sectional area for which the holder is intended.

Immediately after the electric strength test of 12.2.2, the resistance between the means of earthing and the external metal parts, if applicable, is measured. In case of lampholders provided with an earthing terminal, this is done between the point where the conductor leaves the earthing terminal and the external metal parts, if applicable.

In case of lampholders without an earthing terminal this is done between that area of the lampholder where it is earthed in the luminaire and the external metal parts.

A current of at least 10 A, derived from a source with a no-load voltage not exceeding 12 V, shall be passed for 1 min between the earthing terminal or earthing contact and each of the accessible metal parts in turn.

The voltage drop between the earthing terminal or earthing contact and the accessible metal part shall be measured and the resistance calculated from the current and the voltage drop. In no case shall the resistance exceed 0,1 Ω.

For the purpose of this requirement, small isolated metal screws and the like for fixing bases or covers are not deemed to be accessible parts which may become live in the event of an insulation fault.

10.3 Earthing terminals shall comply with the requirements of Clause 9.

Their clamping means shall be adequately locked against accidental loosening, and it shall not be possible to loosen screw terminals by hand and screwless terminals unintentionally by hand.

Compliance is checked by inspection and by the tests of Clause 9.

In general, the designs commonly used for current-carrying terminals (complying with the requirements of this standard) provide sufficient resilience to comply with the latter requirement; for other designs, special provisions such as the use of an adequate resilient part which is not likely to be removed inadvertently may be necessary.

10.4 The metal of earthing terminals shall be such that there is no risk of corrosion resulting from contact with the copper of the earthing conductor.

The screw or the body of the earthing terminal shall be of brass or other metal no less resistant to corrosion and the contact surfaces shall be bare metal.

Compliance is checked by inspection.

NOTE The risk of corrosion is particularly great when copper is in contact with aluminium.

10.5 Metal parts of the cord anchorage, including clamping screws, shall be insulated from the earthing circuit.

Compliance is checked by inspection.

11 Construction

11.1 Wood, cotton, silk, paper and similar hygroscopic materials are not allowed as insulation unless suitably impregnated. Lacquer or enamel are not deemed to provide insulation.

Compliance is checked by inspection.

11.2 Lampholders shall be so designed that a lamp can be easily inserted and removed and cannot work loose due to vibration or temperature variation.

Lampholder dimensions shall comply with IEC standards in so far as they exist.

Compliance for such lampholders is checked in accordance with IEC 60061-2 and by the test of 11.4.

11.3 Lampholders R7s and RX7s having their contacts declared of silver, shall be so designed that the contact area has a thickness of at least 0,25 mm.

Compliance is checked by measurement.

NOTE The thickness can be measured by means of a magnifying glass (approximately 6x magnification) scaled at tenths of a millimetre (0,1 mm). It could be necessary to cut the contact and measure the thickness of the silver.

11.4 Contacts and all other current-carrying parts shall be so constructed as to prevent excessive temperature rise.

Compliance is checked by the following test.

The holder contacts are bridged by means of a testcap, having nominal dimensions, inserted in the holder, the terminals of which are fitted with conductors of the maximum cross-sectional area for which the holder is intended.

It is not necessary for the test cap to have keys if they only have keying function.

NOTE Nominal values are understood to be the medium values.

In the case of lamp bases, loose contact pins should be used.

In the case of holders for double-ended lamps, a dummy lamp is used having both ends electrically connected. The contacts shall be representative of those of an actual lamp.

For multi-contact holders, the appropriate contacts of the test cap are bridged to carry the rated current.

Care should be taken that the contacts of the test cap have good electrical conductivity, for example, brass. That part of the lamp dummy representing the bulb should be shielded with insulating material.

The contacts shall be carefully cleaned and polished before carrying out the tests.

The lampholder is loaded for 1 h with 1,25 times its rated current.

The temperature rise of the contacts shall not exceed 45 K. This temperature is determined with the aid of melting particles or by thermocouples, not by means of thermometers.

Pellets of beeswax (diameter 3 mm, melting temperature 65 °C) may be used as melting particles provided that the ambient temperature equals 20 °C.

11.5 Lampholders designed with a barrel thread for shade holder rings and shade holder rings shall comply with IEC 60399.

Compliance is checked by means of the gauges given in IEC 60399.

12 Moisture resistance, insulation resistance and electric strength

12.1 Holders shall be moisture-proof.

Compliance is checked as follows.

The humidity treatment is carried out in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air, at all places where specimens can be located, is maintained within 1 °C of any convenient value t between 20 °C and 30 °C. Before being placed in the humidity cabinet, the specimens are brought to a temperature between t and $(t + 4)$ °C.

The specimens are kept in the cabinet for two days (48 h).

After this treatment, the holders shall show no damage within the meaning of this standard.

12.2 The insulation resistance and the electric strength of the holders shall be adequate

– between live parts of different polarity;

– between such live parts and external metal parts, including fixing screws.

Compliance is checked by an insulation resistance measurement according to 12.2.1 and by an electric strength test according to 12.2.2 in the humidity cabinet or the room in which the holder was brought to the prescribed temperature.

NOTE Unenclosed lampholders are tested for insulation resistance and electric strength between live parts and external metal parts only after appropriate installation in a luminaire or other additional enclosure, when that equipment is tested according to its own standard.

12.2.1 Immediately after the moisture treatment, the insulation resistance is measured with a DC voltage of approximately 500 V, the measurement being made 1 min after application of the voltage. The insulation resistance is measured consecutively between the parts mentioned in Table 1 and shall be not less than the value shown.

Table 1 – Minimum values of insulation resistance

Insulation to be tested	Minimum value of insulation resistance MΩ	
	Rated voltage up to and including 50 V	Rated voltage over 50 V
Between live parts of different polarity	1	2
Between live parts connected together and external metal parts intended to be earthed	—	2
Between live parts connected together and external metal parts including fixing screws and metal foil covering external parts of insulating material in lampholders without provision for earthing	1	4

12.2.2 The electric strength test is made immediately after the measurement of the insulation resistance.

The test voltage is applied consecutively between the same parts as indicated for the measurement of the insulation resistance.

The insulation is subjected for 1 min to an AC voltage of substantially sinewave form, with a frequency of 50 Hz or 60 Hz and with an r.m.s. value as follows:

– *for lampholders with a rated voltage up to and including 50 V, the test voltage is 500 V;*

– *between the lamp contacts of lampholders, the electric strength test voltage is twice the working voltage;*

– *for all other cases, the electric strength test voltage is equal to* $(2U + 1\ 000)$ *V (where* U *is the rated voltage);*

– *for enclosed and unenclosed reinforced insulated lampholders, the test voltage shall be determined from Table 10.2 of IEC 60598-1:2014.*

Initially, not more than half the prescribed voltage is applied; it is then raised rapidly to the full value.

No flashover or breakdown shall occur during the test.

NOTE Electric strength test requirements with regard to distances subjected to pulse voltages are under consideration.

13 Mechanical strength

Holders shall have adequate mechanical strength.

The mechanical strength of external parts of insulating material with or without a conductive outer surface is checked by means of the pendulum hammer test specified in IEC 60068-2-75, subject to the following details (see Figure D.1 and D.2 and Clause 4 of IEC 60068-2-75:2014).

a) Method of mounting

Direct, as prescribed in IEC 60068-2-75.

Combined pairs of holders shall be mounted with their relevant bracket.

Connectors shall be held against the support.

NOTE 1 For connectors different from the cylindrical shape, the condition of the axis parallel to the support can be obtained by adequate pinewood shimmings.

b) Height of fall

The striking element shall fall from one of the heights given in the following Table 2:

Table 2 – Height of fall

Material	**Height of fall** mm
Ceramic parts	100 ± 1
Parts made of other material	150 ± 1,5

c) Number of impacts

Four blows shall be applied to points equally divided over the surface of the external parts.

d) Preconditioning

Not applicable.

e) Initial measurements

Not applicable.

f) Attitudes and impact locations

See c) above.

g) Operating mode and functional monitoring

The sample shall not operate during impact.

h) Acceptance and rejection criteria

After the test, the sample shall show no serious damage within the meaning of this standard, in particular:

1) live parts shall not have become accessible.

Damage to the lampholder which does not reduce creepage distances or clearances below the values specified in Clause 15 and small chips which do not adversely affect the protection against electric shock or ingress of water shall be ignored;

2) cracks not visible to the naked eye and surface cracks in fibre-reinforced mouldings and the like shall be ignored.

Cracks or holes in the outer surface of any part of the lampholder shall be ignored if the lampholder complies with this standard even if that part is omitted.

i) Recovery

Not applicable.

j) Final measurements

See h) above.

NOTE 2 The mechanical strength of lampholders used in luminaires or other equipment can be checked by means of the spring hammer specified in IEC 60068-2-75. In IEC 60598-1, the test impact energy used varies from 0,2 Nm to 0,7 Nm depending on component material and luminaire type.

14 Screws, current-carrying parts and connections

Screws, current-carrying parts and mechanical connections, the failure of which might cause the holder to become unsafe, shall withstand the mechanical stresses occurring in normal use.

Compliance is checked by inspection and the tests of 4.11 and 4.12 of IEC 60598-1:2014.

NOTE Examples of suitable metals for current-carrying parts with regard to mechanical strength, electrical conductivity and resistance to corrosion, when used within the permissible temperature range and under normal conditions of chemical pollution, are given in Annex B.

15 Creepage distances and clearances

Live parts and adjacent metal parts shall be adequately spaced. Creepage distances and clearances shall be not less than the values shown in Tables 2a and 2b.

The distances specified in Table 2a apply to impulse withstand category II, the distances specified in Table 2b apply to impulse withstand category III in accordance with IEC 60664-1 and both tables refer to pollution degree 2, where normally only non-conductive pollution occurs but occasionally a temporary conductivity caused by condensation is to be expected. For information on distances for other impulse withstand categories or higher pollution degrees, IEC 60664-1 should be consulted.

Attention is drawn to the fact that the values for creepage distance and clearance given in Clause 15 are the absolute minimum.

The voltages shown in Tables 2a and 2b are rated voltages, not ignition voltages.

Table 2a – Minimum distances for AC (50 Hz/60 Hz) sinusoidal voltages – Impulse withstand category II

Distances mm	Rated voltage V			
	50	**150**	**250**	**500**
1 Between live parts of different polarity, and				
2 Between live parts and external metal parts, or the outer surface of parts of insulating material which are permanently fixed to the holder[a], including screws or devices for fixing covers or fixing the holder to its support:				
Basic insulation				
- Creepage distances insulation PTI ≥ 600 [b]	0,6	0,8	1,5	3
PTI < 600 [b]	1,2	1,6	2,5	5
- Clearances	0,2	0,8	1,5	3
Reinforced insulation				
- *Creepage distances insulation PTI ≥ 600* [b]	-	1,6	3	6
PTI < 600 [b]	-	3,2	5	6
- *Clearances*	-	1,6	3	6
3 Between live parts and the mounting surface or a loose metal cover, if any, if the construction does not ensure that the values under item 2 are maintained under the most unfavourable circumstances:				
- Clearances	0,6	0,8	1,5	3

Values for creepage distances and clearances may be found for intermediate values of rated voltages by linear interpolation between tabulated values. No values are specified for rated voltages below 25 V as the voltage test of 12.2.2 is considered sufficient.

NOTE In Japan, the values given in the table are not applicable. Japan requires larger values than the values given in the table.

[a] The distances between live contacts and the lampholder face (reference plane) shall, however, be in accordance with the relevant standard sheets of IEC 60061-2.

[b] PTI (proof tracking index) in accordance with IEC 60112:2003 and IEC 60112:2003/AMD1:2009.

– In the case of creepage distances to parts not energized or not intended to be earthed, where no tracking can occur, the values specified for material with PTI ≥ 600 apply for all materials (in spite of the real PTI).

– For creepage distances subjected to working voltages of less than 60 s duration, the values specified for material with PTI ≥ 600 apply for all materials.

– For creepage distances not liable to contamination by dust or moisture, the values specified for material with PTI ≥ 600 apply for all materials (independent of the real PTI).

Table 2b – Minimum distances for AC (50 Hz/60 Hz) sinusoidal voltages – Impulse withstand category III

Distances mm	Rated voltage V			
	50	**150**	**250**	**500**
1 Creepage distances and clearances between live parts of different polarity	0,6	0,8	1,5	3
2 Between live parts and external metal parts, or the outer surface of parts of insulating material which are permanently fixed to the holder[a], including screws or devices for fixing covers or fixing the holder to its support:				
– Creepage distances	0,6	1,5	3	4
insulation PTI [b] ≥ 600	1,2	1,6	3	5
PTI [b] < 600	0,2	1,5	3	4
– Clearances				
3 Between live parts and the mounting surface or a loose metal cover, if any, if the construction does not ensure that the values under item 2 are maintained under the most unfavourable circumstances:				
– Clearances	0,6	1,5	3	4

Values for creepage distances and clearances may be found for intermediate values of rated voltages by linear interpolation between tabulated values. No values are specified for rated voltages below 25 V as the voltage test of 12.2.2 is considered sufficient.

NOTE In Japan, the values given in the table are not applicable. Japan requires larger values than the values given in the table.

[a] The distances between live contacts and the lampholder face (reference plane) shall, however, be in accordance with the relevant standard sheets of IEC 60061-2.

[b] PTI (proof tracking index) in accordance with IEC 60112:2003 and IEC 60112:2003/AMD1:2009.

– In the case of creepage distances to parts not energized or not intended to be earthed, where no tracking can occur, the values specified for material with PTI ≥ 600 apply for all materials (in spite of the real PTI).
– For creepage distances subjected to working voltages of less than 60 s duration, the values specified for material with PTI ≥ 600 apply for all materials
– For creepage distances not liable to contamination by dust or moisture, the values specified for material with PTI ≥ 600 apply for all materials (independent of the real PTI).

However, the distances between live contacts and the lampholder face (reference plane) shall be in accordance with the values given in the relevant holder sheets of IEC 60061-2, if required.

In the case of non-sinusoidal pulse voltages, the clearances shall be not less than the values shown in Table 3.

Table 3 – Minimum distances for non-sinusoidal pulse voltages

Rated pulse peak voltage kV	2	2,5	3	4	5	6	8	10	12	15	20	25	30	40	50	60	80	100
Minimum clearance mm	1	1,5	2	3	4	5,5	8	11	14	18	25	33	40	60	75	90	130	170

The distances specified in Table 3 are derived from IEC 60664-1 (inhomogeneous field conditions). For distances subjected to both sinusoidal voltage as well as non-sinusoidal

pulses, the minimum required distance shall be not less than the highest value indicated in either table.

For clearance distances without influence on safety, for example distances between the contacts, advantage might be taken from improved field conditions, but also in this case the values for the homogenous fields (see IEC 60664-1) remain the absolute minimum.

For polarized lampholders, creepage distances and clearances to external metal parts or the outer surface of parts of insulating material may be designed and shall be checked for each pole separately. The distances between the contacts shall be designed according to the high pulse voltage.

Compliance is checked by tests with the rated pulse voltage of the holder. Voltage drops are not permissible.

Creepage distances shall be not less than the required minimum clearances.

16 Endurance

Lampholders shall maintain good electrical contact with the lamp contacts.

Compliance is checked by the following endurance test.

A commercial lamp cap, in accordance with an IEC standard, if applicable, shall be inserted 10 times into and removed 10 times from the holder.

A test cap made of steel having the same dimensions as the test cap mentioned in 11.4 is inserted. In the case of a combined pair of holders, the dummy lamp is replaced by a dummy lamp made of steel without shielding.

For lamp holders where the test leads to excessive contact temperatures and damage of the steel gauge during the testing procedure, the original lamp contact may be used.

The holder is then placed in a heating cabinet with temperature control.

The temperature within the cabinet is adjusted so that, after thermal stabilization, the measuring point for the rated operating temperature attains 90 °C ± 5 °C or (T + 10) °C ± 5 C for T-marked holders, while the holder is loaded with 1,1 times the rated current.

For lampholders which form an integral part of the luminaire, this temperature is replaced by that measured according to the operating conditions given in 12.4.2 of IEC 60598-1:2014, plus 10 K, with a tolerance of ±5 °C.

After reaching and maintaining this temperature, the holder remains for 48 h under these conditions.

After this period, the lampholder is removed from the heating cabinet and allowed to cool down for 24 h without the test cap or the dummy lamp, respectively.

During the test, the holder shall not undergo any change impairing its further use, especially in the following respects:

– *there is no reduction of protection against electric shock;*
– *there is no loosening of electrical contacts;*
– *there are no cracks, swelling or shrinking;*

– *the holder complies with the gauges of IEC 60061-3, as far as they exist.*

After the endurance test, the resistance of the lampholder contacts and connections is measured as follows:

– *a test cap or a dummy lamp as specified in 11.4 is inserted in the lampholder and a current equal to the rated current of the lampholder is allowed to flow for a time just sufficient for the resistance to be measured;*

– *on lampholders equipped with leads, the resistance is measured between the leads 5 mm from where they come out of the holder;*

– *on lampholders without leads, it is necessary to attach leads of the minimum size for which the holder was designed (but not less than 0,5 mm^2 copper wire). The resistance is measured between the leads 5 mm from where they come out of the holder;*

– *the test cap shall be fully seated in the holder, irrespective of the position of the plunger, if any;*

– *for double-ended lamps, the combined pair of holders is measured. In this case the dummy lamp mentioned in 11.4 is used.*

The measured resistance shall not exceed the following value:

$0{,}045\ \Omega + (A \times n)$

with

A = 0,01 Ω, if n = 2;

A = 0,015 Ω, if $n > 2$

where n is the number of separate contact points between holder and cap which are included in the measurement.

Care should be taken that oxidation of the cable insulation will not influence the resistance measurement, for example by removing the insulation from the cable.

17 Resistance to heat and fire

17.1 External parts of insulating material providing protection against electric shock and parts of insulating material retaining live parts or ELV parts in position shall be resistant to heat.

Compliance is checked by subjecting the parts to a ball-pressure test by means of the apparatus shown in Figure 1.

All the tests required by Clause 17 of this standard (except 17.6) are not performed on lampholders which are integral with a luminaire, as similar tests are required in Section 13 of IEC 60598-1. However, the operating conditions of these tests will take into account the ones specific to lampholders and defined in Clause 17 of this standard.

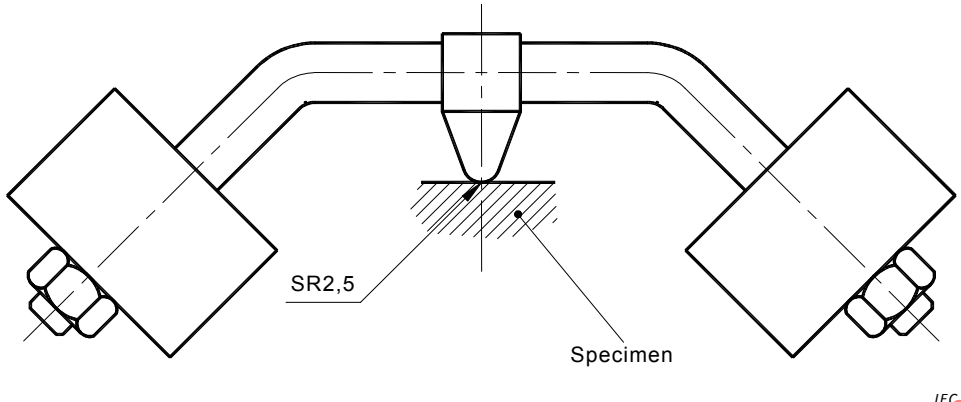


Figure 1 – Ball-pressure test apparatus

The test is not made on parts of ceramic material or on the insulation of wiring.

The surface of the part under test is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against this surface by a force of 20 N.

The test is made in a heating cabinet having a temperature of 25 °C ± 5 °C in excess of the operating temperature (see 6.2) with a minimum temperature of 125 °C when parts retaining live parts in position are tested.

The test load and the supporting means are placed within the heating cabinet for a sufficient time to ensure that they have attained the stabilized testing temperature before the test commences.

The part to be tested is placed in the heating cabinet for a period of 1 h, before the test load is applied.

If the surface under test bends, the part where the ball presses is supported. For this purpose, if the test cannot be made on the complete specimen, a suitable part may be cut from it.

The specimen should be at least 2,5 mm thick, but if such a thickness is not available on the specimen, then two or more pieces are placed together.

After 1 h the ball is removed from the specimen which is then immersed within 10 s in cold water for cooling down to approximately room temperature.

The diameter of the impression caused by the ball is measured and shall not exceed 2 mm.

NOTE In the event of curved surfaces, the shorter axis is measured if the indent is elliptical.

In case of doubt, the depth of the impression is measured and the diameter Φ calculated using the formula: $\phi = 2\sqrt{p\,(5-p)}$ *, where* p *= depth of impression.*

17.2 Parts of insulating material retaining live parts in position and external parts of insulating material providing protection against electric shock shall be resistant to flame and ignition.

Compliance is checked by the tests of 17.3 or 17.4, as appropriate.

These tests are not made on parts of ceramic material.

17.3 External parts of insulating material, including those with a conductive exterior, providing protection against electric shock and parts of insulating material retaining ELV parts in position, are subjected to the glow-wire test in accordance with IEC 60695-2-11, subject to the following details.

– *The test specimen is a complete holder. It may be necessary to take away parts of the holder to perform the test, but care should be taken to ensure that the test conditions are not significantly different from those occurring in normal use.*

– *The test specimen is mounted on the carriage and pressed against the glow-wire tip with a force of 1 N, preferably 15 mm, or more, from the upper edge, into the centre of the surface to be tested. The penetration of the glow-wire into the specimen is mechanically limited to 7 mm.*

  If it is not possible to make the test on a specimen as described above because the specimen is too small, the above test is made on a separate specimen of the same material 30 mm × 30 mm square and with a thickness equal to the smallest thickness of the specimen and manufactured by the similar process.

– *The temperature of the tip of the glow-wire is 650 °C. After 30 s the specimen is withdrawn from contact with the glow-wire tip.*

  The glow-wire temperature and heating current are constant for 1 min prior to commencing the test. Care should be taken to ensure that heat radiation does not influence the specimen during this period.

  The glow-wire tip temperature is measured by means of a sheathed fine-wire thermocouple constructed and calibrated as described in IEC 60695-2-11.

– *Any flame or glowing of the specimen shall extinguish within 30 s of withdrawing the glow-wire and any flaming drops shall not ignite a piece of five-layer tissue paper, specified in definition 4.187 of ISO 4046-4:2002, spread out horizontally 200 mm ± 5 mm below the test specimen.*

17.4 Parts of insulating material retaining live parts or ELV lamp contacts in position, are subjected to the needle-flame test in accordance with IEC 60695-11-5, subject to the following details.

– *The specimen is a complete lampholder. It may be necessary to take away parts of the holder to perform the test, but care should be taken to ensure that the test conditions are not significantly different from those occurring in normal use.*

– *The test flame is applied to the centre of the surface to be tested.*

– *The duration of application is 10 s.*

– *Any self-sustaining flame shall extinguish within 30 s of removal of the gas flame and any flaming drops shall not ignite a piece of five-layer tissue paper, specified in definition 4.187 of ISO 4046-4:2002 spread out horizontally 200 mm ± 5 mm below the test specimen.*

17.5 Insulating parts retaining live parts or ELV parts in position, or which are in contact with such parts shall be of material resistant to tracking if they are exposed to excessive deposit of moisture or dust.

For materials other than ceramic, compliance is checked by the proof-tracking test in accordance with IEC 60112 subject to the following details.

– *If the specimen has no flat surface of at least 15 mm × 15 mm, the test may be carried out on a flat surface with reduced dimensions provided drops of liquid do not flow off the specimen during the test. No artificial means should, however, be used to retain the liquid on the surface. In case of doubt the test may be made on a separate strip of the same material, having the required dimensions and manufactured by the same process.*

– *If the thickness of the specimen is less then 3 mm, two, or if necessary more, specimens shall be stacked to obtain a thickness of at least 3 mm.*

– *The test shall be made at three places of the specimen or on three specimens.*
– *The electrodes shall be of platinum and test solution A, described in 7.3 of IEC 60112:2003 and IEC 60112:2003/AMD1:2009, shall be used.*
– *The specimen shall withstand 50 drops without failure at a test voltage of PTI 175.*
– *A failure has occurred if a current of 0,5 A or more flows for at least 2 s in a conducting path between the electrodes on the surface of the specimen, thus operating the overcurrent relay or if the specimen burns without releasing the overcurrent relay.*
– *Clause 9 of IEC 60112:2003 regarding determination of erosion, does not apply.*

17.6 *The resistance to heat of insulating material and/or outer parts of the lampholder is tested in a heating cabinet at a temperature of 115 °C ± 5 °C or (T + 35) °C ± 5 °C in the case of T-marked holders.*

If the heat resistance of insulating material and/or outer parts deviates from the temperature marking of the holder, the test temperature is adjusted to 35 K ± 5 K above the heat resistance stated in the manufacturer's catalogue for these parts.

This test is not made on lampholders which are integral with the luminaire as a similar test is already given in IEC 60598-1.

The holder is fitted with a solid steel test cap or a dummy lamp made of steel as mentioned in Clause 16.

The holder is placed in a heating cabinet having approximately half the test temperature. This temperature is raised to the required test temperature within 1 h ± 15 min. Following this, the test is continued for 168 h without interruption. The test temperature is maintained with a tolerance of ±5 K.

During the test, the holder shall not undergo any change impairing its further use, especially in the following respects:

– *no reduction of protection against electric shock;*
– *no loosening of electrical contacts;*
– *no cracks, swelling or shrinking;*
– *the holder complies with the gauges of IEC 60061-3 as far as they exist.*

The use of the gauges is not intended for checking the reality of the contact, but only for checking the possible deformation of moulded materials.

In addition, the holder shall withstand the mechanical strength test made under conditions specified in Clause 13, the height of fall, however, being reduced to 50 mm.

The sealing compound shall not flow to such an extent that live parts are exposed; a mere displacement of the compound is neglected.

18 Resistance to excessive residual stresses (season cracking) and to rusting

18.1 Contacts and other parts of rolled sheet of copper or copper alloy, the failure of which might cause the holder to become unsafe, shall not be damaged due to excessive residual stresses.

Compliance is checked by the following test.

The surfaces of the specimens are carefully cleaned, varnish being removed by acetone, grease and finger prints by petroleum spirit or the like.

The specimens are placed for 24 h in a test cabinet, the bottom of which is covered by an ammonium chloride solution having a pH value of 10 (for details of the test cabinet, the test solution and the test procedure see Annex C).

After this treatment, the specimens are washed in running water; 24 h later they shall show no cracks when inspected at an optical magnification of 8 x.

18.2 Ferrous parts, the rusting of which may endanger the safety of the holder, shall be adequately rust-protected.

Compliance is checked by the following test.

All grease is removed from the parts to be tested by immersion in a suitable degreasing agent for 10 min.

The parts are then immersed for 10 min in a water solution of 10 % ammonium chloride at a temperature of 20 °C ± 5 °C. Without drying, but after shaking off drops of water, the parts are placed for 10 min in a box containing air saturated with moisture at a temperature of 20 °C ± 5 °C.

After the specimens have been dried for 10 min in a heating cabinet at a temperature of 100° C ± 5 °C, any traces of rust on sharp edges and of yellowish film may be removed by rubbing, after which their surfaces shall show no signs of rust.

For small helical springs and the like and for ferrous parts exposed to abrasion, a layer of grease is deemed to provide sufficient rust protection. Such parts are not subjected to the test.

Annex A
(informative)

Lampholders covered by this standard

Built-in lampholders used with general purpose light sources, projection lamps, floodlighting lamps and street lighting lamps provided with the caps given in Table A.1 are covered by this standard (see Clause 1).

This list is not exhaustive.

Table A.1 – Lampholders covered by this standard

Lampholders	Lampholder sheet (see IEC 60061-2)
B22d-3	7005-10A
BY22d	7005-17
Fa4	7005-..
Fc2	7005-114
G1.27, GX1.27	7005-..
GUX2.5d, GUY2.5d, GUZ2.5d	7005-137
G2.54, GX2.54	7005-..
G3.17	7005-..
G4	7005-72
GU4	7005-108
GZ4	7005-67
G5.3	7005-73
G5.3-4.8	7005-126
GU5.3	7005-109
GX5.3	7005-73A
GY5.3	7005-73B
G6.35, GX6.35, GY6.35	7005-59
GZ6.35	7005-59A
GU7	7005-113
GZX7d-., GZY7d-., GZZ7d	7005-136
G8.5	7005-122
G9	7005-129
G9.5	7005-70
GX9.5	7005-70A
GY9.5, GZ9.5	7005-70B
GU10	7005-121
GZ10	7005-120
G12	7005-63
GY16	7005-..
G17q, GX17q, GY17q	7005-45
G22	7005-75
G38	7005-76
PG12 & PGX12	7005-64
PG22-6.35	7005-..
P28s	7005-42
P30s-10.3	7005-44
P40	7005-43
R7s, RX7s	7005-53/53A

Lampholders	Lampholder sheet (see IEC 60061-2)
SX4s	7005-..
SY4s	7005-..

Annex B
(normative)

Suitable metals

Suitable metals for current-carrying parts, referred to in Clause 14, when used within the permissible temperature range and under normal conditions of chemical pollution are included but are not limited to:

– copper: an alloy containing at least 58 % copper for parts made from rolled sheet (in cold condition) or at least 50 % copper for other parts;

– stainless steel: containing at least 13 % chromium and not more than 0,09 % carbon;

– steel: provided with an electroplated coating of zinc, according to ISO 2081, with coating having a thickness of at least 5 μm ISO service condition No. 1 (for ordinary equipment);

– steel: provided with an electroplated coating of nickel and chromium according to ISO 1456, the coating having a thickness of at least 20 μm ISO service condition No. 2 (for ordinary equipment);

– steel: provided with an electroplated coating of tin, according to ISO 2093, the coating having a thickness of at least 12 μm ISO service condition No. 2 (for ordinary equipment);

– pure nickel (at least 99 %).

– silver (at least 90 %).

Annex C
(normative)

Season cracking/corrosion test

In the interest of environmental protection, the following requirements relating to test solution, volume and volume of vessel may be modified at the discretion of the test laboratory. In this event, the test vessel should retain a volume in the range 500 to 1 000 times larger than the volume of the sample and the volume of test solution should be such that the ratio of vessel volume to solution volume is in the range of 20:1 to 10:1. In case of doubt, however, the conditions of Clause C.1 apply.

C.1 Test cabinet

Closable glass vessels shall be used for the test. These may, for example, be desiccator vessels or simple glass troughs with ground rim and lid. The vessels' volume shall be at least 10 l. A certain ratio of test space to volume of test solution shall be maintained (20:1 to 10:1).

C.2 Test solution

Preparation of 1 l of solution

Dissolve 107 g ammonium chloride (reagent grade NH_4Cl) in about 0,75 l of distilled or fully demineralized water and add as much of 30 % sodium hydroxide solution (prepared from reagent grade NaOH and distilled or fully demineralized water) as is necessary to reach a pH value of 10 at 22 °C. For other temperatures, adjust this solution to the corresponding pH values specified in Table C.1.

Table C.1 – Test solution

Temperature °C	Test solution pH
22 ± 1	10,0 ± 0,1
25 ± 1	9,9 ± 0,1
27 ±1	9,8 ± 0,1
30 ± 1	9,7 ± 0,1

After the pH adjustment, make up to 1 l with distilled or fully demineralized water. This does not change the pH value any further.

Keep the temperature constant in any event to within ±1 °C during the pH adjustment, and carry out the pH measurement using an instrument which permits an adjustment of the pH value to within ±0,02.

The test solutions may be used over a prolonged period, but the pH value, which represents a measure of the ammonia concentration in the vapour atmosphere, shall be checked at least every three weeks and adjusted if necessary.

C.3 Test procedure

Introduce, preferably suspended, the specimens in the test cabinet in such a way that the ammonia vapour can take effect unhindered.

The specimens shall not dip into the test solution nor touch each other.

Supports or suspension devices shall be made of materials which are not susceptible to attack by ammonia vapour, for example glass or porcelain.

Testing shall be carried out at a constant temperature of (30 ± 1) °C to exclude visible condensed water formation caused by temperature fluctuations, which could severely falsify the test result.

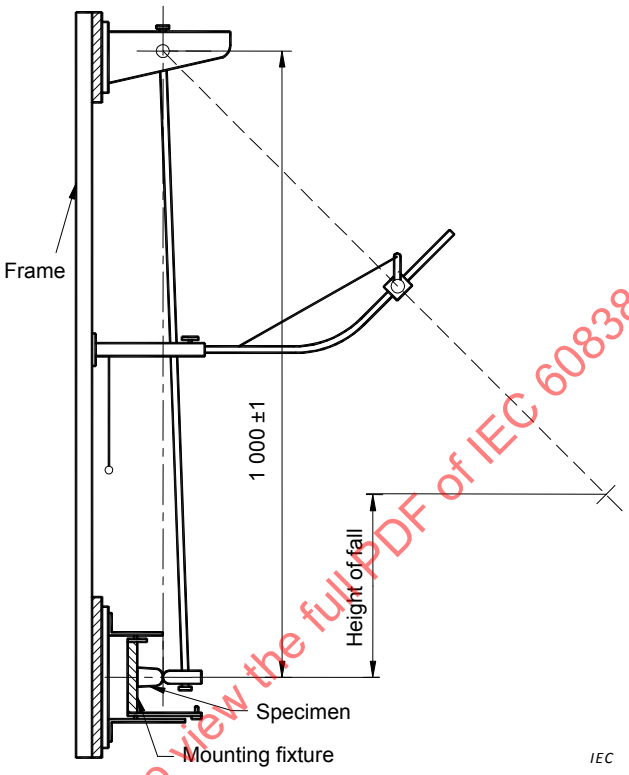
Prior to testing, the test cabinet containing the test solution shall be brought to a temperature of (30 ± 1) °C. The test cabinet shall subsequently be filled as quickly as possible with the specimens pre-heated to 30 °C and closed.

This moment is to be considered the beginning of the test.

Annex D
(normative)

Pendulum impact test apparatus

Dimensions in millimetres



NOTE For information this drawing has been retained in this standard, although there is a basic standard. In case of doubt regarding the drawing refer to IEC 60068-2-75.

Figure D.1 – Impact test apparatus

Dimensions in millimetres

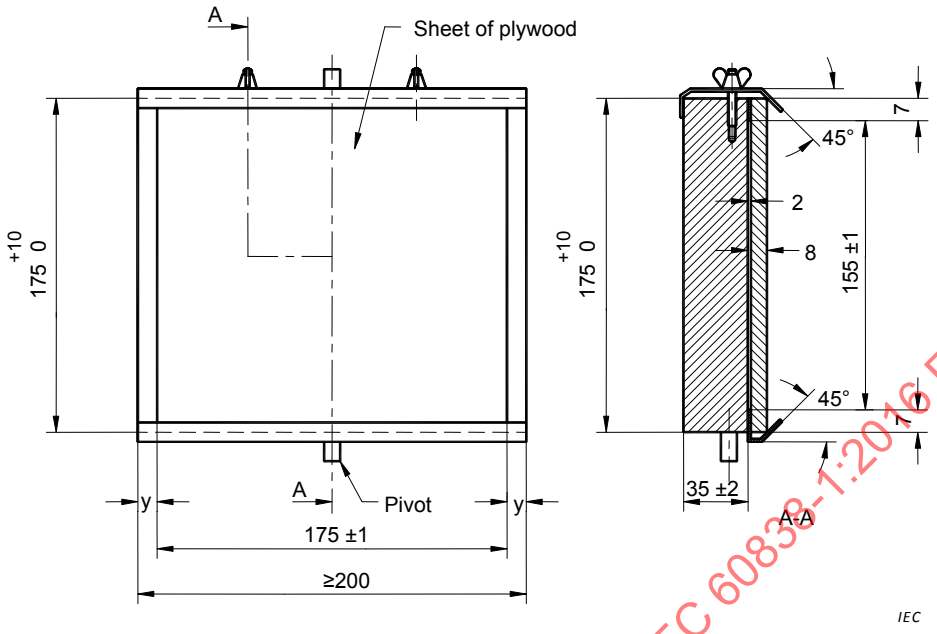


Figure D.2 – Mounting fixture

Annex E
(informative)

Schedule of amended clauses and subclauses containing more serious/ critical requirements which require products to be retested

The schedule of clauses and subclauses given in Annex E details the requirements of this new edition of IEC 60838-1 which require retesting to show compliance with this updated standard. Retesting may not be required in cases where examination of previous test results confirms conformity.

a) Definitions 3.21, 3.22, Subclauses 6.4 and 7.2: amendment of a new classification for lampholders for high pressure discharge lamps for single contact ignition voltage and dual contact ignition voltage.

b) Subclause 7.4: clarification about the test sequence for marking durability test.

c) Clause 16: contradictory dimensional requirements for brass test caps have been corrected.

d) Clause 16: optional alternative use of original lamp pin material enabled for the steel test cap in case of excessive contact temperature and damage of the steel test cap due to the low conductivity of the steel material.

Bibliography

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

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

IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

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SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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DOUILLES DIVERSES POUR LAMPES –

Partie 1: Exigences générales et essais

AVANT-PROPOS

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La Norme internationale IEC 60838-1 a été établie par le sous-comité 34B: Culots et douilles, du comité d'études 34 de l'IEC: Lampes et équipements associés.

Cette cinquième édition annule et remplace la quatrième édition parue en 2004, l'Amendement 1:2008 et l'Amendement 2:2011. Cette édition constitue une révision technique.

Les modifications techniques majeures dans la présente édition par rapport à l'édition précédente incluent l'introduction de nouvelles exigences ou d'exigences révisées concernant les tensions d'amorçage à contact simple ou double, les culots d'essai en acier et les culots d'essai en laiton ainsi qu'une Annexe E répertoriant les exigences/articles nécessitant la réalisation de nouveaux essais sur les produits.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
34B/1850A/FDIS	34B/1856/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60838, publiées sous le titre général *Douilles diverses pour lampes*, peut être consultée sur le site web de l'IEC.

Dans la présente norme, les caractères suivants sont utilisés:

– *les énoncés concernant la conformité: caractères italiques.*

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

DOUILLES DIVERSES POUR LAMPES –

Partie 1: Exigences générales et essais

1 Domaine d'application

La présente partie de l'IEC 60838 s'applique aux douilles de types divers prévues pour être incorporées (et destinées à être utilisées avec les sources lumineuses à usage général, les lampes de projection, les lampes d'illumination et les lampes pour l'éclairage public dotées de culots et répertoriées à titre d'exemple dans l'Annexe A) ainsi qu'aux méthodes d'essai à utiliser pour démontrer la sécurité d'utilisation des lampes dans les douilles.

La présente partie de l'IEC 60838 couvre également les douilles intégrées dans un luminaire. Elle couvre seulement les exigences de la douille.

La présente partie de l'IEC 60838 couvre également les douilles intégrées dans une chemise extérieure et un fond semblables aux douilles à vis Edison. De telles douilles sont alors soumises à essai selon les articles correspondants de l'IEC 60238.

Les exigences relatives aux douilles pour lampes tubulaires à fluorescence, aux douilles à vis Edison et aux douilles à baïonnette font l'objet de normes séparées.

2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. 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 60061 (toutes les parties), *Culots de lampes et douilles ainsi que calibres pour le contrôle de l'interchangeabilité et de la sécurité* (disponible à l'adresse http://std.iec.ch/iec60061)

IEC 60061-2, *Culots de lampes et douilles ainsi que calibres pour le contrôle de l'interchangeabilité et de la sécurité – Partie 2: Douilles*

IEC 60061-3, *Culots de lampes et douilles ainsi que calibres pour le contrôle de l'interchangeabilité et de la sécurité – Partie 3: Calibres*

IEC 60068-2-75:2014, *Essais d'environnement – Partie 2-75: Essais – Essai Eh: Essais au marteau*

IEC 60112:2003, *Méthode de détermination des indices de résistance et de tenue au cheminement des matériaux isolants solides*
IEC 60112:2003/AM1:2009

IEC 60227 (toutes les parties), *Conducteurs et câbles isolés au polychlorure de vinyle, de tension nominale au plus égale à 450/750 V*

IEC 60238, *Douilles à vis Edison pour lampes*

IEC 60245 (toutes les parties), *Conducteurs et câbles isolés au caoutchouc – Tension assignée au plus égale à 450/750 V*

IEC 60352-1, *Connexions sans soudure – Partie 1: Connexions enroulées – Règles générales, méthodes d'essai et guide pratique*

IEC 60399, *Filetage à filets ronds pour douilles avec bague support d'abat-jour*

IEC 60417, *Symboles graphiques utilisables sur le matériel* (disponible à l'adresse suivante: http://www.graphical-symbols.info/equipment)

IEC 60529:1989, *Degrés de protection procurés par les enveloppes (code IP)*[1]
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60598-1:2014, *Luminaires – Partie 1: Exigences générales et essais*

IEC 60664-1, *Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension – Partie 1: Principes, exigences et essais*

IEC 60695-2-11, *Essais relatifs aux risques du feu – Partie 2-11: Essais au fil incandescent/chauffant – Méthode d'essai d'inflammabilité pour produits finis*

IEC 60695-11-5, *Essais relatifs aux risques du feu – Partie 11-5: Flammes d'essai – Méthode d'essai au brûleur-aiguille – Appareillage, dispositif d'essai de vérification et lignes directrices*

ISO 1456, *Revêtements métalliques et autres revêtements inorganiques – Dépôts électrolytiques de nickel, de nickel plus chrome, de cuivre plus nickel et de cuivre plus nickel plus chrome*

ISO 2081, *Revêtements métalliques et autres revêtements inorganiques – Dépôts électrolytiques de zinc avec traitements supplémentaires sur fer ou acier*

ISO 2093, *Dépôts électrolytiques d'étain – Spécifications et méthodes d'essai*

ISO 4046-4:2002, *Papier, carton, pâtes et termes connexes – Vocabulaire – Partie 4: Catégories et produits transformés de papier et de carton*

3 Termes et définitions

Pour les besoins du présent document, les termes et définitions suivants s'appliquent.

3.1
tension assignée
valeur déclarée par le fabricant comme étant la tension de travail la plus élevée pour laquelle la douille a été prévue

3.2
tension de travail
tension efficace la plus élevée pouvant être mesurée aux extrémités de tout isolant (les transitoires étant négligées) lorsque la lampe fonctionne dans les conditions normales ou lorsqu'elle est retirée

[1] Il existe une version consolidée de cette publication comprenant l'IEC 60529:1989, l'IEC60529:1989/AMD1:1999 et l'IEC 60529:1989/AMD2:2013.

3.3
courant assigné
courant déclaré par le fabricant comme étant le courant le plus élevé pour lequel la douille a été prévue

3.4
douille à incorporer
douille conçue pour être incorporée dans un luminaire, une enceinte additionnelle ou un dispositif analogue

3.4.1
douille non protégée
douille à incorporer, conçue de telle sorte qu'elle exige des moyens additionnels, une enveloppe par exemple, pour satisfaire aux exigences de la présente norme concernant la protection contre les chocs électriques

3.4.2
douille protégée
douille à incorporer conçue de telle sorte qu'elle satisfait, par elle-même, aux exigences de la présente norme concernant la protection contre les chocs électriques

3.5
température de fonctionnement assignée
température la plus élevée pour laquelle la douille a été conçue

3.6
tension d'impulsion assignée
valeur de crête la plus élevée des tensions d'impulsion à laquelle la douille est capable de résister

3.7
connecteur de la lampe
ensemble de dispositifs de contact conçus spécialement pour établir le contact électrique mais ne servant pas de support à la lampe

3.8
essai de type
essai ou série d'essais effectués sur un échantillon d'essai de type dans le but de vérifier la conformité de la conception d'un produit donné aux exigences de la norme correspondante

3.9
échantillon d'essai de type
échantillon constitué d'un ou plusieurs spécimens similaires présentés par le fabricant ou le vendeur responsable en vue de l'essai de type

3.10
partie active
partie conductrice susceptible de causer un choc électrique

3.11
catégorie de tenue aux chocs
chiffre définissant une condition de surtension transitoire

Note 1 à l'article: Les catégories de tenue aux chocs I, II, III et IV sont utilisées.

a) But de la classification des catégories de tenue aux chocs

Les catégories de tenue aux chocs servent à différencier les différents degrés de disponibilité des équipements en ce qui concerne les attentes requises en matière de continuité de service et de tolérance des risques de défauts.

En sélectionnant les niveaux de tenue aux chocs des équipements, la coordination de l'isolement peut être réalisée pour l'installation complète en réduisant le risque de défaut à un niveau acceptable qui servira de base dans la maîtrise de la surtension.

Un chiffre plus élevé désignant la catégorie de tenue aux chocs indique une tenue aux chocs de l'équipement plus élevée et permet un plus grand choix de méthodes pour la maîtrise de la surtension.

Le concept de catégorie de tenue aux chocs est utilisé pour les équipements directement alimentés par le réseau.

b) Description des catégories de tenue aux chocs

Un équipement de catégorie de tenue aux chocs I est un équipement destiné à être connecté aux installations électriques fixes des bâtiments. Des moyens de protection sont pris à l'extérieur de l'équipement – soit dans l'installation fixe soit entre l'installation fixe et l'équipement – pour limiter les surtensions transitoires à un niveau donné.

Un équipement de catégorie de tenue aux chocs II est un équipement destiné à être connecté aux installations électriques fixes des bâtiments.

Un équipement de catégorie de tenue aux chocs III est un équipement qui constitue une partie des installations électriques fixes et des autres équipements dont le degré de disponibilité attendu est plus élevé.

Un équipement de catégorie de tenue aux chocs IV est destiné à être utilisé à proximité ou dans les installations électriques des bâtiments en amont du tableau de distribution.

3.12
circuit primaire
circuit directement connecté au réseau alternatif

Note 1 à l'article: Il comporte, par exemple, les moyens de connexion au réseau alternatif, les enroulements primaires des transformateurs, moteurs et autres dispositifs en charge.

3.13
circuit secondaire
circuit qui n'a pas de connexion directe avec le circuit primaire en tirant sa puissance d'un transformateur, convertisseur ou système d'isolation équivalent, ou d'un accumulateur

Note 1 à l'article: Exception: les autotransformateurs. Bien qu'ayant une connexion directe avec le circuit primaire, leur partie connectée est également considérée comme un circuit secondaire au sens de la présente définition.

Note 2 à l'article: Les régimes transitoires dans de tels circuits sont amortis par les enroulements primaires correspondants. Les ballasts inductifs réduisent également la valeur de la tension des régimes transitoires. En conséquence, les composants situés après un circuit primaire ou après un ballast inductif peuvent être adaptés à une catégorie de tenue aux chocs un niveau plus bas, c'est-à-dire une catégorie de tenue aux chocs II.

3.14
isolation principale
isolation des parties actives destinée à assurer la protection de base contre les chocs électriques

Note 1 à l'article: L'isolation principale ne comprend pas nécessairement l'isolation exclusivement utilisée à des fins fonctionnelles.

3.15
isolation supplémentaire
isolation indépendante prévue en plus de l'isolation principale en vue d'assurer la protection contre les chocs électriques en cas de défaut de l'isolation principale

3.16
double isolation
isolation comprenant à la fois l'isolation principale et l'isolation supplémentaire

3.17
isolation renforcée
système d'isolation unique des parties sous tension assurant un degré de protection contre les chocs électriques équivalent à une double isolation dans les conditions spécifiées

Note 1 à l'article: L'expression «système d'isolation» ne sous-entend pas que l'isolation doive se composer d'une pièce homogène. Le système peut comporter plusieurs couches qui ne peuvent pas être soumises aux essais séparément comme isolation principale ou supplémentaire.

3.18
douille protégée à isolation renforcée
douille à incorporer conçue de façon qu'elle satisfasse par elle-même aux exigences des parties à isolation double ou renforcée dans les applications de classe II

3.19
douille à isolation partiellement renforcée
douille à incorporer conçue de façon que certaines parties de la douille nécessitent des dispositions supplémentaires pour satisfaire aux exigences concernant l'isolation double ou renforcée

Note 1 à l'article: Dans certains cas, il est possible que les dimensions soient satisfaites uniquement après montage dans le luminaire.

3.20
douille polarisée
douille à incorporer spécifiquement conçue pour des tensions d'impulsion assignées asymétriques, dont la tension d'amorçage assignée (plus haute tension d'impulsion assignée) est appliquée à un contact fixe

3.21
tension d'amorçage à contact simple
tension d'amorçage apparaissant sur un seul contact de la douille

3.22
tension d'amorçage à double contact
tension d'amorçage divisée entre les deux contacts de la douille

4 Exigence générale

Les douilles doivent être conçues et construites de façon qu'en usage normal leur fonctionnement soit sûr et ne présente aucun danger pour les personnes ou l'environnement.

En général, la conformité est vérifiée en exécutant la totalité des essais spécifiés.

5 Conditions générales des essais

5.1 Les essais prescrits par la présente norme sont des essais de type.

NOTE 1 Les exigences et tolérances admises par la norme s'appliquent aux essais auxquels est soumis l'échantillon d'essai de type présenté en tant que tel. La conformité de l'échantillon d'essai de type ne garantit pas la conformité de la totalité de la production d'un fabricant aux exigences de la présente norme de sécurité. La conformité de la production est de la responsabilité du fabricant et peut inclure, en plus de l'essai de type, des essais de série et des procédures d'assurance de la qualité.

NOTE 2 Pour de plus amples informations sur les essais de conformité en cours de fabrication, voir l'IEC 60061-4.

5.2 Sauf spécification contraire, les essais sont exécutés à la température ambiante de 20 °C ± 5 °C, la douille étant placée dans la position la plus défavorable pour une utilisation normale.

Si une douille est déclarée accepter différents systèmes d'assemblage pour lampe, elle doit satisfaire aux exigences de chacun des systèmes mentionnés.

La conformité est vérifiée avec des lots de spécimens séparés selon 5.3.

Si l'utilisation successive de différents systèmes d'assemblage pour lampe est autorisée par le fabricant, seulement un lot de spécimens est utilisé pour vérifier la conformité à toutes les exigences.

Pour tous les essais, le système et son calibre correspondant le plus critique doivent être utilisés, et dans la séquence la plus sévère.

5.3 Les essais et examens sont exécutés dans l'ordre des articles, sur un total de

– 10 paires de douilles appariées pour être utilisées avec des lampes linéaires à deux culots;

  Si une paire de douilles est constituée de douilles identiques, il suffit qu'une seule de ces douilles soit soumise à la totalité des essais, excepté ceux de l'Article 8, de 11.2, de 11.3, de l'Article 13, de l'Article 16 et de 17.6 pour lesquels les paires sont nécessaires.

– 10 spécimens prévus pour les lampes à culot unique;

l'ordre des articles étant le suivant:

– trois paires ou trois spécimens: Articles 4 à 15 inclus (sauf pour 9.2);

  NOTE Les essais de 9.2 sont exécutés sur le nombre de spécimens séparés exigé par les normes correspondantes.

– trois paires ou trois spécimens: Article 16 et 17.6;
– une paire ou un spécimen: 17.1;
– une paire ou un spécimen: 17.3;
– une paire ou un spécimen: 17.4;
– une paire ou un spécimen: 17.5 et Article 18.

Les instructions de montage du fabricant doivent être fournies en même temps que ces pièces (voir 7.3).

Dans ce cas, des culots appropriés doivent être fournis avec l'échantillon d'essai de type si, suivant les instructions de montage, la tension d'impulsion assignée de la douille ne peut être atteinte qu'avec un culot inséré. Les essais correspondants sont alors effectués avec culot inséré.

5.4 Les douilles sont censées être conformes à la présente norme si aucun des spécimens n'est refusé au cours de la série complète des essais spécifiés en 5.3.

Si un spécimen est refusé à un essai, cet essai et ceux qui l'ont précédé, qui ont pu influencer le résultat de cet essai, sont répétés sur un autre lot de spécimens en nombre égal à celui exigé par 5.3, et qui tous doivent alors satisfaire aux essais répétés et aux suivants. Les douilles sont considérées comme ne répondant pas à la présente norme s'il se produit plus d'une défaillance.

Le demandeur peut présenter, avec le premier lot de spécimens, le lot supplémentaire qui peut s'avérer nécessaire en cas de défaillance de l'un des spécimens. Le laboratoire d'essais doit alors, sans autre requête, soumettre à essai les spécimens supplémentaires et ne prononcer le rejet que s'il enregistre une autre défaillance.

Si le lot supplémentaire de spécimens n'est pas présenté en même temps que le premier, une défaillance d'un spécimen entraînera le rejet.

6 Classification

Les douilles sont classées comme suit.

6.1 Selon leurs conditions d'installation

– douilles non protégées;
– douilles protégées;
– douilles à isolation partiellement renforcée;
– douilles protégées à isolation renforcée.

NOTE 1 Lorsqu'une douille est utilisée avec une tension de service de 50 % ou moins par rapport à la valeur maximale assignée, elle peut être considérée comme équivalente à une douille à isolation renforcée.

6.2 D'après leur résistance à la chaleur:

– pour températures de fonctionnement assignées jusqu'à 80 °C inclus;
– pour températures de fonctionnement assignées supérieures à 80 °C (douilles à marquage T).

Le point de mesure de la température de fonctionnement est la partie de la douille où est situé le contact électrique avec le culot/socle de la lampe. Si la résistance à la chaleur des parties isolantes, des bornes et des conducteurs s'écarte de cette température de fonctionnement, ces différentes valeurs doivent être indiquées dans le catalogue du fabricant et vérifiées après installation appropriée dans un luminaire ou autre enveloppe additionnelle, lorsque cet équipement est contrôlé d'après sa propre norme.

6.3 Selon la polarisation

– douilles non polarisées;
– douilles polarisées.

6.4 Selon l'application de tensions d'amorçage

– douilles pour tensions d'amorçage à contact simple
– douilles pour tensions d'amorçage à double contact

NOTE 2 L'utilisation de tensions d'amorçage à double contact permet de profiter d'exigences de lignes de fuite et de distances dans l'air réduites.

7 Marquage

7.1 Les douilles doivent porter les marquages obligatoires suivants:

a) la marque d'origine (qui peut prendre la forme d'une marque déposée, d'une marque d'identification du fabricant ou du nom du vendeur responsable);
b) soit un numéro de catalogue unique, soit une référence d'identification.

La documentation technique disponible du fabricant telle que des catalogues imprimés ou en ligne doit permettre une identification claire de la douille, soit par un numéro de catalogue unique soit par une référence d'identification sur le culot, spécifiant les caractéristiques essentielles et la conception de base du produit, complétée d'une description claire. Les variantes de la conception de base, par exemple, une longueur de câble différente, des moyens de fixation différents, une couleur différente, qui n'affectent pas la sécurité ou la performance de la douille, peuvent être ignorées dans la référence du type marqué sur le produit. Les variantes incluses dans la procédure d'essai de type sont répertoriées dans les rapports d'essai correspondants.

Si une combinaison de composants de douilles détermine la désignation de la douille, un ensemble constitué par un connecteur de lampe et un ressort de maintien par exemple, il convient que la combinaison soit clairement identifiable.

La conformité est vérifiée par examen.

7.2 En plus des marquages obligatoires ci-dessus, les renseignements suivants doivent être soit portés sur la douille soit donnés dans le catalogue du fabricant ou tout autre document similaire:

a) la tension assignée en volts et la tension d'impulsion assignée en kilovolts (kV), le cas échéant; pour les douilles polarisées, la tension assignée en volts et la paire des tensions d'impulsion assignées;

NOTE 1 Certaines douilles continuent à indiquer des tensions assignées supérieures à 500 V. C'était la façon autrefois utilisée d'exprimer la tension d'impulsion autorisée par l'intermédiaire d'une tension assignée. Pour de telles douilles, les lignes de fuite et les distances dans l'air sont indiquées dans l'IEC 60598-1.

b) le courant assigné en ampères;

c) la température de fonctionnement assignée T, si elle est supérieure à 80 °C, par intervalles de 10 °C;

d) les sections des conducteurs pour lesquelles les bornes sont prévues;

e) la flèche de haute tension (voir IEC 60417-5036:2002-10) pour les douilles polarisées pour identifier la connexion à la plus haute tension d'impulsion, le cas échéant; elle doit être visible à proximité de la borne correspondante ou du câble d'entrée pendant l'installation de la douille;

f) les renseignements relatifs à l'application des tensions d'amorçage.

Si des symboles sont utilisés, ils doivent être conformes aux indications suivantes.

Pour les valeurs électriques assignées:

– volt: V;
– ampère: A;
– watt: W;
– tension d'impulsion: kV;

– borne/câble correspondant à la tension d'impulsion élevée des douilles polarisées:  (voir IEC 60417-5036:2002-10)

NOTE 2 Il est possible, en variante, d'utiliser uniquement des chiffres pour les valeurs en volts et en ampères, pourvu que le chiffre du courant assigné marqué soit suivi, ou soit placé au-dessus, de celui de la tension assignée et séparé du premier par une barre transversale ou une ligne horizontale. Le marquage du courant et de la tension peut donc être comme suit:

$$2\ \text{A}\ 250\ \text{V ou } 2/250 \text{ ou } \frac{2}{250}$$

Pour la tension d'impulsion assignée, le symbole doit être précédé par sa valeur (par exemple, 5 kV). Pour les douilles polarisées ainsi que pour les douilles à tension d'amorçage à double contact, les deux tensions d'impulsion assignées doivent être séparées par une barre oblique (par exemple 15/2,5 kV ou 5/2,5 kV).

Si une douille est destinée à être utilisée pour des tensions d'amorçage à double contact, cette information doit figurer dans le catalogue du fabricant ou autre endroit similaire.

Pour les douilles polarisées, la valeur indiquée avant la barre oblique représente la plus haute tension d'impulsion, la valeur indiquée derrière représente la tension d'impulsion assignée basée sur la catégorie de résistance aux chocs électriques de la douille. Pour les douilles à tension d'amorçage à double contact, la valeur indiquée avant la barre oblique représente la tension d'amorçage totale, la valeur indiquée derrière la barre oblique représente la tension d'amorçage entre les contacts et la surface de montage ou la surface extérieure accessible.

La conformité est vérifiée par examen.

Pour les douilles selon la présente norme, les distances correspondant à la catégorie de tenue aux chocs II sont normalement applicables. Pour les douilles des équipements dont un degré de disponibilité supérieur est attendu, les distances de la catégorie de tenue aux chocs III peuvent être applicables. Cette information doit figurer dans le catalogue du fabricant ou autre document similaire.

Les douilles protégées à isolation renforcée offrent un niveau satisfaisant de protection pour une utilisation dans les luminaires où elles sont accessibles en usage normal. Cette information doit être indiquée dans le catalogue du fabricant ou document similaire.

Pour les douilles à isolation partiellement renforcée, les lignes de fuite et distances dans l'air suffisantes par rapport aux surfaces extérieures accessibles nécessiteront des protections additionnelles sur certaines parties de la douille grâce à la conception du luminaire ou l'utilisation d'accessoire(s) ou couvercle(s) additionnel(s). Cette information doit être indiquée dans le catalogue du fabricant ou document similaire.

7.3 Les instructions fournies par le fabricant de la douille ou le vendeur responsable doivent contenir tous les renseignements exigés pour assurer le montage et le fonctionnement corrects des connecteurs ou des douilles.

NOTE Les renseignements pourraient faire partie du catalogue du fabricant ou du vendeur responsable.

La conformité est vérifiée par examen.

7.4 Le marquage doit être durable et facilement lisible.

La conformité est vérifiée par examen et, après la réalisation des essais du 17.6, en essayant d'effacer le marquage en le frottant légèrement pendant 15 s au moyen d'un chiffon imbibé d'eau puis pendant 15 s au moyen d'un chiffon imbibé de white spirit.

Le marquage doit encore être lisible après l'essai.

NOTE Le white spirit utilisé est généralement composé d'un solvant hexane avec une teneur en produits aromatiques d'au maximum 0,1 % en volume, d'une valeur 29 en kauri-butanol, avec une température d'ébullition initiale d'approximativement 65 °C, un point sec d'approximativement 69 °C et une densité spécifique d'environ 0,68 g/cm^3.

8 Protection contre les chocs électriques

8.1 Les douilles protégées doivent être construites de façon que, lorsque la douille a été incorporée ou installée et câblée comme pour une utilisation normale, les parties actives ne soient pas accessibles

– lorsqu'il n'y a pas de lampe insérée;
– lorsque la douille est équipée d'une lampe insérée appropriée, et
– pendant l'insertion ou l'extraction de la lampe.

Pour les douilles utilisées depuis longtemps, comme les B22d-3, BY22d, G22, G38, P28s, P30s et P40, l'exigence ci-dessus s'applique uniquement lorsque la lampe appropriée est insérée.

L'insertion d'une seule broche de la lampe (dans le cas d'un culot à plus d'une broche) dans le premier point de contact avec les parties actives ne doit pas être possible.

Les douilles G22 et G38 sont exemptées de cette exigence.

La conformité est vérifiée au moyen du doigt d'épreuve normalisé spécifié dans l'IEC 60529. Ce doigt d'épreuve est appliqué dans toutes les positions avec une force n'excédant pas

10 N, un indicateur électrique étant utilisé pour montrer le contact électrique avec les parties actives.

Il est recommandé d'utiliser une tension égale ou supérieure à 40 V.

Les douilles sont montées comme pour l'emploi normal, c'est-à-dire sur une surface support ou un dispositif similaire, avec des conducteurs convenables mais de la section la plus défavorable, avant d'être soumises à l'essai ci-dessus.

Les douilles non protégées ne sont soumises aux essais qu'après installation appropriée dans un luminaire ou autre enveloppe additionnelle, au moment où l'équipement est soumis aux essais d'après sa propre norme.

8.2 Les douilles pour lampes à deux culots doivent être construites de façon que, lorsque les deux douilles ont été incorporées ou installées et câblées comme pour une utilisation normale, les parties actives ne soient pas accessibles

– lorsqu'il n'y a pas de lampe insérée,
– lorsque la douille est équipée d'une lampe insérée appropriée, et
– pendant l'insertion ou l'extraction de la lampe.

Dans le cas des douilles R7s/RX7s, un essai simulant l'insertion ou l'extraction de la lampe n'est pas possible car, dans les deux cas, l'essai doit être réalisé en s'opposant à la force du ressort du contact simple. Cette situation ne permet pas la répétitivité nécessaire pour l'évaluation de l'essai. En conséquence, cet essai est remplacé par celui correspondant à la lampe insérée.

La conformité est vérifiée selon l'IEC 60061 ou, sauf spécification contraire dans cette même publication, avec le doigt d'épreuve normalisé.

9 Bornes

9.1 Les douilles doivent être munies d'au moins un des moyens de connexion suivants:

– bornes à vis;
– bornes sans vis;
– pattes ou broches pour connexions à poussoir;
– bornes pour fil enroulé;
– languettes à souder;
– fils de connexion (sorties de fils).

Les bornes à vis et les écrous doivent avoir un pas métrique ISO.

Les douilles à bornes sans vis, à moins qu'elles ne soient prévues pour la vente aux fabricants de luminaires ou d'équipements, doivent être munies de bornes donnant également satisfaction avec les conducteurs rigides (massifs ou toronnés) et avec les câbles flexibles ou les cordons.

Des moyens de connexion autres que ceux spécifiés sont permis, à condition que leur performance vis-à-vis des méthodes répertoriées soit égale. Un exemple de ces moyens de connexion est un contact de douille pour lampe halogène à très basse tension procurant une connexion électrique à une partie métallique de luminaire pendant l'assemblage de la douille.

La conformité est vérifiée par application des essais de 9.2 ou de 9.3, respectivement.

9.2 Les bornes doivent satisfaire aux exigences suivantes.

– Les bornes à vis doivent être conformes à la Section 14 de l'IEC 60598-1:2014.
– Les bornes sans vis doivent être conformes à la Section 15 de l'IEC 60598-1:2014.
– Les pattes ou broches pour connexion à poussoir doivent être conformes à la Section 15 de l'IEC 60598-1:2014.
– Les bornes pour fil enroulé doivent être conformes à l'IEC 60352-1. L'enroulement du fil ne s'applique qu'aux conducteurs simples, massifs, ronds, destinés au câblage interne.
– Les languettes à souder doivent être conformes aux exigences de bonne soudabilité. Des exigences convenables peuvent être trouvées dans l'IEC 60068-2-20.
– Les fils de connexion (sorties de fils) doivent être conformes aux exigences de 9.3.

Pour les douilles à marquage T, les bornes sont soumises aux essais à la température de fonctionnement assignée, sauf déclaration contraire du fabricant.

Les douilles pour lampe halogène très basse tension ayant un contact procurant une connexion électrique à une partie métallique du luminaire pendant l'assemblage de la douille sont destinées uniquement à l'usage des fabricants de luminaires et non à la vente au détail.

Les conditions pour une installation et un fonctionnement fiables doivent être indiquées dans les documents du fabricant de douilles ou du vendeur responsable, en particulier les restrictions au sujet des matériaux à utiliser, des dimensions et des tolérances essentielles à respecter pour la fixation de la douille dans le luminaire.

Les contacts de la douille procurant une connexion électrique à une partie métallique du luminaire pendant l'assemblage de la douille doivent satisfaire aux exigences de la Section 15 de l'IEC 60598-1:2014.

La conformité est vérifiée au moyen des essais correspondants.

9.3 Les fils de connexion (sorties de fils) doivent être reliés à la douille par soudage, brasage, sertissage ou toute autre méthode pour le moins équivalente.

Les fils doivent être des conducteurs isolés. Les propriétés mécaniques et électriques de l'isolation des fils doivent être égales ou supérieures à celles spécifiées dans l'IEC 60227 ou l'IEC 60245, ou bien elles doivent être conformes aux exigences appropriées de 5.3 de l'IEC 60598-1:2014.

L'isolation de l'extrémité libre des fils peut être dénudée.

La fixation des conducteurs à la douille doit résister aux efforts mécaniques qui peuvent se produire en usage normal.

La conformité est vérifiée par examen et au moyen de l'essai suivant effectué après celui de l'Article 16, sur les trois mêmes spécimens.

Chaque fil de raccordement est soumis à une traction de 20 N. La traction est appliquée sans secousse pendant 1 min dans la direction la plus défavorable. Pendant l'essai, il est recommandé que les fils ne se déplacent pas par rapport à leur point de fixation. Si toutefois certaines directions de traction sont interdites par les instructions de montage, il faut en tenir compte pendant l'essai.

Après l'essai, les douilles ne doivent présenter aucun dommage au sens de la présente norme.

10 Moyens de mise à la terre

10.1 Les douilles munies de moyens de mise à la terre autres que ceux fournis par les fils de raccordement doivent avoir au moins une borne de mise à la terre.

La conformité est vérifiée par examen.

NOTE Les douilles prévues pour être mises à la terre mais qui ne possèdent pas de borne de mise à la terre ou de fils de raccordement ne sont pas destinées à la vente au détail.

10.2 Les parties métalliques accessibles des douilles munies d'une borne de mise à la terre, parties qui peuvent être mises sous tension en cas de défaut d'isolement, doivent être connectées de manière permanente et sûre à la borne de terre.

Les parties métalliques accessibles des douilles sans borne de terre, parties qui peuvent être mises sous tension en cas de défaut d'isolement, doivent pouvoir être mises à la terre de manière sûre.

Il doit y avoir continuité de la ligne de terre entre les parties métalliques externes à moins que celles-ci ne soient protégées des parties actives par une double isolation ou une isolation renforcée.

La conformité est vérifiée au moyen de l'essai suivant:

Les douilles munies d'une borne de terre sont équipées d'un conducteur rigide ayant la plus petite section droite pour laquelle les douilles sont prévues.

La résistance entre les dispositifs de mise à la terre et les parties métalliques extérieures est mesurée, s'il y a lieu, immédiatement après l'essai de rigidité diélectrique de 12.2.2. Dans le cas de douilles munies de bornes de terre, la mesure est effectuée, s'il y a lieu, entre le point où le conducteur quitte la borne de terre et les parties métalliques externes.

Dans le cas de douilles sans borne de terre, la mesure est effectuée entre la zone de la douille par laquelle celle-ci est raccordée à la terre du luminaire et les parties métalliques externes.

Un courant d'au moins 10 A, dérivé d'une source de tension à vide d'au maximum 12 V, doit passer pendant 1 min entre la borne de terre ou le contact de terre et, successivement, chacune des parties métalliques accessibles.

La chute de tension entre la borne de terre ou le contact de terre et la partie métallique accessible doit être mesurée et la résistance calculée à partir de la valeur du courant et de celle de la chute de tension. La résistance ne doit en aucun cas être supérieure à 0,1 Ω.

Au sens de la présente exigence, les petites vis métalliques isolées ou pièces similaires destinées à la fixation des semelles supports ou des couvercles ne sont pas considérées comme des parties accessibles susceptibles de devenir actives dans le cas d'un défaut d'isolement.

10.3 Les bornes de terre doivent être conformes aux exigences de l'Article 9.

Leur dispositif de serrage doit être bloqué de manière adéquate afin d'éviter le desserrage accidentel, et il ne doit pas être possible de desserrer à la main les bornes à vis ni par inadvertance les bornes sans vis.

La conformité est vérifiée par examen et au moyen des essais de l'Article 9.

En général, les modèles de bornes conductrices (conformes aux exigences de la présente norme) communément utilisés possèdent une résilience suffisante pour respecter la dernière