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Edition 4.2 2024-07
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

colour inside

Bayonet lampholders

IEC 61184:2017-05+AMD1:2019-12+AMD2:2024-07 CSV(en)

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INTERNATIONAL
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COMMISSION

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BAYONET LAMPHOLDERS

FOREWORD

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This consolidated version of the official IEC Standard and its amendments has been prepared for user convenience.

IEC 61184 edition 4.2 contains the fourth edition (2017-05) [documents 34B/1898/FDIS and 34B/1905/RVD], its amendment 1 (2019-12) [documents 34B/2030/CDV and 34B/2041A/RVC] and its amendment 2 (2024-07) [documents 34B/2194/FDIS and 34B/2196/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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International Standard IEC 61184 has been prepared by subcommittee 34B: Lamp caps and holders, of IEC technical committee 34: Lamps and related equipment.

This fourth edition constitutes a technical revision.

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

a) Restructuring of the standard in accordance with IEC Directives Part 2.

b) Clause 18: Update on creepage distances and clearances;

c) Addition of Annex B.

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

In this standard, the following print types are used:

– requirements proper: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

The committee has decided that the contents of this document and its amendments will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
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INTRODUCTION

This document covers safety requirements for bayonet lampholders and includes references to IEC 60061 (all parts) for the control of interchangeability and safety of the cap and holder fit.

NOTE Safety requirements ensure that electrical equipment constructed in accordance with these requirements does not endanger the safety of persons, domestic animals or property when properly installed and maintained and used in applications for which it was intended.

The thermal characteristics of lampholders are specified by the rated operating temperature (symbol T), which is the highest temperature for which the lampholder is designed. The temperature rating and the resistance to heat specified in this document are based on two different principles, as presently found in IEC 60238 for Edison screw lampholders and in other national standards for bayonet lampholders. After experience, it may be possible to rationalize the systems in future editions of this document.

INTRODUCTION to Amendment 1

Some changes and corrections needed for IEC 61184 became obvious during the work on the fourth edition of IEC 61184.

Change 1:

Actual lamp holder safety standards require a ball pressure test in line with IEC 60695-10-2 in sections "Resistance to heat, fire and tracking". Within this test there is an alternative depth indentation method described for the calculation of the indentation diameter.

This alternative calculation option was removed from the latest edition of IEC 60695-10-2 dated 2014 and during its meeting held in Sydney in 2018, SC 34B/WG1 agreed to delete the alternative method as well from IEC 61184.

Change 2:

Based on IEC 60664-1:2007, 4.8.1.5 "Non tracking materials":

"For glass, ceramics or other inorganic insulating materials which do not track, creepage distances need not be greater than their associated clearance for the purpose of insulation coordination. The dimensions of this table are appropriate."

This is not completely reflected in TC 34 standards as revised recently. For applications with ELV it is of high importance whether the creepage distance shall be 0,6 mm or may be 0,2 mm in the case where inorganic insulating material is used.

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BAYONET LAMPHOLDERS

1 Scope

This document applies to bayonet lampholders B15d and B22d for connection of lamps and semi-luminaires to a supply voltage of 250 V.

This document also covers lampholders which are integral with a luminaire or intended to be built into appliances. It covers the requirements for the lampholder only.

For all other requirements, such as protection against electric shock in the area of the terminals, the requirements of the relevant appliance standard are observed and tested after building into the appropriate equipment, when that equipment is tested according to its own standard. Lampholders for use by luminaire manufacturers only are not for retail sale.

Where lampholders are used in luminaires, their maximum operating temperatures are specified in IEC 60598-1.

B15d denotes the cap/holder fit as defined by IEC 60061-1, sheet 7004-11 and IEC 60061-2, sheet 7005-16 with the corresponding gauges.

B22d denotes the cap/holder fit as defined by IEC 60061-1, sheet 7004-10 and IEC 60061-2, sheet 7005-10 with the corresponding gauges.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 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 60068-2-75:2014, *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*

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

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 60432 (all parts), *Incandescent lamps – Safety specifications*

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

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

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-2-11:2014, *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 4046-4:2016, *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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Materials

3.1.1
plastic lampholder
lampholder, the exterior of which is made wholly of plastic material

Note 1 to entry: The exterior is any part of the lampholder which, when wired and fully assembled and fitted with the testing device shown in Figure 7, can be touched directly by the standard test finger of IEC 60529:1989 and IEC 60529:1989/AMD1:1999.

3.1.2
ceramic lampholder
lampholder, the exterior of which is made wholly of ceramic material

Note 1 to entry: See note in 3.1.1.

3.1.3
metal lampholder
lampholder, the exterior of which is made wholly or partly of metal

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Note 1 to entry: See note in 3.1.1.

3.2 Means of fixing

3.2.1
cord grip lampholder
lampholder incorporating a method of retaining a flexible cord by which it may be suspended

SEE: Figure 4a).

3.2.2
threaded entry lampholder
lampholder incorporating a threaded component at the point of entry of the supply wires permitting the lampholder to be mounted on a mating threaded support

Note 1 to entry: A threaded entry lampholder was formerly called “nipple lampholder”.

SEE: Figure 4b).

3.2.3
backplate lampholder
lampholder so designed as to be suitable for mounting, by means of an associated or integral backplate, directly on to a supporting surface or appropriate box

SEE: Figure 4c).

3.3
terminal/contact assembly
part or assembly of parts which provides a means of connection between the termination of a supply conductor and the contact-making surfaces of the corresponding lamp cap as well as resilient means to maintain contact pressure

Note 1 to entry: A rising type is where the terminal is allowed to rise parallel with the lamp axis on insertion of a lamp cap.

Note 2 to entry: A non-rising type is where the terminal is not allowed to rise on insertion of a lamp cap;

Note 3 to entry: The terminal and the barrel can be a unique element.

SEE: Figure 4.

3.4
union ring
cylindrical component which joins together separate external parts of the lampholder

SEE: Figure 4.

3.5
shade ring
cylindrical component having an internal thread or other means to engage a corresponding support on the outer shell and intended to carry or retain a shade

SEE: Figure 4.

3.6
skirt
component similar to a shade ring but having a longer cylindrical form to extend to the full length of the lampholder body

Note 1 to entry: Applicable to plastic lampholders only.

SEE: Figure 4.

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3.6.1
protective shield
component similar to a skirt but having a flared open end to protect the user from accidental contact with the lamp cap

Note 1 to entry: Applicable to plastic lampholders only.

SEE: Figure 9.

3.7
dome
part of a cord grip lampholder or threaded entry lampholder which shields the connecting terminals

SEE: Figure 4.

3.8
barrel
part of a lampholder which serves for mechanical connection of the lamp cap with the lampholder

SEE: Figure 4.

3.9
lampholder for building-in
lampholder designed to be built into a luminaire, an additional enclosure or the like

3.9.1
unenclosed lampholder
lampholder for building-in so designed that it requires additional means, for example enclosures, to meet the requirements of IEC 61184 with regard to protection against electric shock

3.9.2
enclosed lampholder
lampholder for building-in so designed that, on its own, it fulfils the requirements of IEC 61184 with regard to protection against electric shock and, if appropriate, IP classification

3.10
independent lampholder
lampholder so designed that it can be mounted separately from a luminaire and at the same time provide all the necessary protection according to its classification and marking

3.11
switched lampholder
lampholder provided with an integral switch to control the supply to the lamp

3.12
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.

3.13
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

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3.14
double insulation
insulation comprising both basic insulation and supplementary insulation

3.15
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 is one homogeneous piece. It may comprise several layers which cannot be tested singly as supplementary or basic insulation.

3.16
live part
conductive part which may cause an electric shock in normal use

Note 1 to entry: The neutral conductor is, however, regarded as a live part.

Note 2 to entry: The test to determine whether or not a conductive part is a live part which may cause an electric shock is given in Annex A of IEC 60598-1.

3.17
type test
test or series of tests made on a type test specimen for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard

3.18
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

3.19
semi-luminaire
unit similar to a self-ballasted lamp but designed to utilize a replaceable light source and/or starting device

3.20
rated operating temperature
highest temperature for which the lampholder is designed

3.21
rated ignition voltage
highest peak of an ignition pulse voltage that the holder is able to withstand

3.22
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

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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.

3.23
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.

3.24
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 in the above sense.

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.

3.25
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

3.26
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.

3.27
rated voltage
voltage declared by the manufacturer to indicate the highest working voltage for which the lampholder is intended

[SOURCE: IEC 60838-1:2016, 3.1]

3.28
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

[SOURCE: IEC 60838-1:2016, 3.2]

3.29
rated current
current declared by the manufacturer to indicate the highest current for which the lampholder is intended

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[SOURCE: IEC 60838-1:2016, 3.3]

3.30
ignition voltage
peak voltage applied to ignite a discharge lamp

[SOURCE: IEC 61347-1:2015, 3.46]

3.30.1
ignition pulse voltage
peak ignition voltage with a total duration of ≤ 750 µs (summation of all pulse durations) within 10 ms, with the duration time (width) of each pulse being measured at the level of 50 % of the maximum absolute peak value

Note 1 to entry: Ignition pulse waveforms, which are considered as ignition pulse voltage, should not contain any dominant frequency above 30 kHz or should be usually highly damped (after 20 µs the peak voltage level should be less than one half of the maximum peak voltage). For the assessment of the dominant frequency IEC 60664-4:2005, Annex E should be consulted.

[SOURCE: IEC 61347-1:2015, 3.46.1]

4 General requirements

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 relevant tests specified.

Independent lampholders, not specifically intended for building-in, shall comply with the requirements of the following sections and subclauses of IEC 60598-1 where the subject-matter of these headings is not dealt with in the present document.

Section 2	–	Classification
Section 3	–	Marking
Section 4	–	Construction (as appropriate)
Section 8	–	Protection against electric shock
Section 9	–	Resistance to dust, solid objects and moisture
Section 10	–	Insulation resistance and electric strength (for class II)
Subclauses 12.4 and 12.5	–	Thermal tests

5 General conditions for tests

5.1 Tests according to this document are type tests.

NOTE The requirements and tolerances given in this document are related to testing of a type test sample submitted for that purpose. Compliance of the type test sample does not ensure compliance of the whole production of a manufacturer with this safety standard. In addition to type testing, conformity of production is the responsibility of the manufacturer and can include routine tests and quality control.

For further information see IEC 60061-4, sheet 7007-13.

5.2 Unless otherwise specified, the samples are tested as delivered and installed as in normal use without lamps, at an ambient temperature of 20 °C ± 5 °C.

5.3 All inspections and tests are carried out on a total of:

– 8 specimens for unswitched lampholders, or

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– 11 specimens for switched lampholders;

in the order of the clauses as follows:

– 3 specimens: Clauses 4 to 13;
– 3 specimens: Clauses 15 to 19;
– 3 specimens: Clause 14 (switched lampholder tests only);
– 2 specimens: Clauses 20 and 21.

For testing of screwless terminals according to 11.2, separate additional specimens are required.

This is also necessary for independent lampholders not specifically intended for building-in (see Clause 4).

5.4 If no lampholder fails in the complete series of tests specified in 5.3, then lampholders of that type shall be deemed to comply with this document.

If one lampholder fails in any group in the complete series of tests specified in 5.3, the lampholders of that type shall be deemed to have failed to comply with this document, unless that lampholder can be shown to be not representative of normal production or design, in which case a further set of lampholders shall be submitted to the test or tests in that group. Generally, it will be necessary to only repeat the test in which failure occurs. However, if the lampholder fails in the test specified in Clauses 15 to 19 inclusive, the tests shall be repeated from the tests of Clause 15 onwards.

An additional type test sample may be submitted, together with the first type test sample, in case one lampholder fails, in which case the additional type test sample shall then be tested and shall only be rejected if a further failure occurs. If there is no failure in this retest, then lampholders of that type shall be deemed to comply with this document. If the additional type test sample is not submitted at the same time, a failure of one lampholder shall entail a rejection.

If more than one specimen fails in the complete series of tests specified in 5.3 then lampholders of that type shall be deemed to have failed to comply with this document.

NOTE In view of the duration of the test procedure, lampholders differing only in detail and having the same constructional principles and materials can be covered by a single series of type tests, subject to agreement between applicant and test house.

6 Standard ratings

6.1 Standard rated voltage

For all lampholders only a rated voltage of 250 V is allowed.

Lampholders B15d are not intended for use in circuits with ignitors.

Lampholders B22d shall not be used in circuits with ignitors without approval from the lampholder manufacturer.

NOTE From a theoretical point of view, the minimum creepage distance required for a holder B22d will result in a clearance sufficient to withstand an ignition voltage of 2,5 kV.

The measures required to allow easy contact travel and lamp removal might in some situations, however, be accompanied by unforeseen reduction of the clearance without influence on normal operation (without ignition) where only the creepage distances are critical.

BY22d lampholders are specially designed for use in ignitor circuits.

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6.2 Standard rated currents

Standard rated currents are:

– 2 A for lampholders B15d;

– 2 A for lampholders B22d.

The rated current shall be not less than the standard value. Rated currents higher than 2 A are allowed.

Compliance with the requirements of 6.1 and 6.2 is checked by inspection of the marking.

7 Classification

Lampholders are classified:

7.1 According to the material of the exterior:

– lampholders whose exterior is made wholly of plastic material;

– lampholders whose exterior is made wholly of ceramic material;

– lampholders whose exterior is made wholly or partly of metal.

NOTE For the definition of "exterior", see the note in 3.1.1.

Lampholders with external parts consisting partly of metal and lampholders comprising external parts of insulating material with a conductive outer surface, for example a metallized outer shell, are considered as metal lampholders.

This does not apply to threaded entries and external parts, as for example a metal shade ring mounted on to the outside of a lampholder of insulating material, which cannot become live even in the case of an insulation fault. Metal lampholders with insulating coverings are considered as metal lampholders.

If in doubt as to whether or not a surface is conductive, two stripe-electrodes 1,5 mm wide, 25 mm long and with a distance of 2 mm from each other are applied to the surface (e.g. with silver conductive paint). In accordance with 15.3, the insulating resistance is measured between the stripes. The surface is considered to be conductive if the resistance is less than 5 MΩ.

7.2 According to degree of protection against solid objects and ingress of water:

– ordinary lampholders;

– drip-proof lampholders.

NOTE A classification for higher degrees of protection against ingress of water is under consideration.

7.3 According to method of fixing:

– threaded entry lampholders;

– cord grip lampholders;

– backplate lampholders;

– other lampholders.

NOTE Examples of other lampholders are lampholders provided with a mechanical suspension device, for example a hook.

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7.4 According to type:

– switched lampholders provided with an integral switch to control the supply to the lamp;
– non-switched lampholders.

7.5 According to protection against electric shock:

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

Where a lampholder is used with a working voltage of 50 % or less of its maximum rating, it may be regarded as equivalent to a reinforced insulated lampholder. Lampholders having a metal barrel are not classified as reinforced insulated.

7.6 According to resistance to heat:

– without T marking, suitable for rated operating temperatures up to and including 135 °C for B15d lampholders and 165 °C for B22d lampholders;
– –with Txxx marking, suitable for rated operating temperatures up to and including the temperature marked or declared by the manufacturer. These temperatures shall be not lower than 140 °C for B15d lampholders and not lower than 170 °C for B22d lampholders;

The value of the temperature marking is increased by steps of 10 °C.

– with T1 marking, suitable for temperatures on the lamp cap up to and including 165 °C;

NOTE The continued use of T1 lampholders is subject to review.

– with T2 marking, suitable for temperatures on the lamp cap up to and including 210 °C.

8 Marking

8.1 Lampholders shall be marked with:

– rated voltage, in volts;
– rated operating temperature Txxx, T1 or T2, if applicable (see 6.6).

  In the first version, the letter T shall be followed by the value of the rated operating temperature in degrees Celsius;
– symbol for nature of supply, if required (for switched lampholders only);
– for lampholders whose exterior is made wholly of ceramic material, information on the rated operating temperature, if applicable, shall either be marked on the lampholder or given in the manufacturer's catalogue;
– mark of origin (this may take the form of a trade mark, or the manufacturer's or responsible vendor's name or identification mark);

  NOTE The mark of origin is not intended to mean the country of origin.
– either a unique catalogue number or an identifying reference;

  Available technical documentation of the manufacturer such as printed catalogues or online catalogues should 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 such as, 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.

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– rated current, in amperes, if greater than 2 A;

– IP number, if other than ordinary, for degree of protection against ingress of water (see 7.2);

– for single-pole switched lampholders, the switched pole shall be identified.

For lampholders according to this document, the distances for impulse withstand category II are applicable. This information shall 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 the use of additional attachment(s) or cover(s). This information shall be indicated in the manufacturer’s catalogue or the like.

8.2 If symbols are used for current and voltage, A shall denote amperes and V volts.

Alternatively, figures alone may be used, the figure for the rated current being marked before or above that for the rated voltage and separated from the latter by a line.

Therefore, the marking for current and voltage may be as follows:

$$4\ \text{A}\ 250\ \text{V or } 4/250 \text{ or } \frac{4}{250}$$

The symbol for direct current shall be ⎓ (see IEC 60417-5031:2002-10).

The symbol for protection against ingress of water shall, for drip-proof lampholders, be IPX1.

NOTE Where X is used in an IP number, it is intended to indicate a missing numeral in the symbol but both the appropriate numerals, in accordance with IEC 60529, are marked on the lampholder.

8.3 The marking of degree of protection against ingress of water shall be on the outside of the lampholder.

8.4 An earthing terminal shall be indicated by the symbol ⏚ (see IEC 60417-5019:2006-08).

This symbol shall not be placed on screws, removable washers or other easily removable parts.

Compliance is checked by inspection.

In the United Kingdom, metal lampholders intended for retail sale must have the following warning notice attached or incorporated in the associated packaging:

"THIS LAMPHOLDER MUST BE EARTHED".

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8.5 Where the terminal size specified in 11.2 is not complied with, the relevant value, or values in case of a range, shall be shown in mm^2 followed by a small square (for example 0,5 ☐)

For unenclosed lampholders such marking is not required but relevant information shall be given in the manufacturer's mounting instructions.

8.6 Marking shall be durable and easily legible.

Compliance with the requirements of 8.1 to 8.5 shall be checked by inspection, and 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 tests, the marking shall still be legible.

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.

8.7 In the United Kingdom a threaded entry lampholder without means for restraining the flexible cord, intended for retail sale, shall have the following warning notice attached or incorporated in the associated packaging:

"Do not connect this lampholder to a flexible cord which may be subject to tension in normal use, unless means are provided to relieve the conductors from strain and to protect the insulation".

9 Dimensions

9.1 Lampholder dimensions shall comply with the current edition of the standard sheets of IEC 60061 (all parts).

Compliance is checked by measuring in accordance with standard sheets 7005-10 and 7005-16 of IEC 60061-2 and by application of the specified gauges according to the current edition of IEC 60061-3.

Lampholders designed with a barrel thread for shade holder rings and shade holder rings shall comply with IEC 60399 where applicable and with the dimensional requirements of Figure 8.

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

9.2 The threaded entries of lampholders shall be provided with one of the following screw threads in accordance with Figure 13.

– lampholders B15d: M10×1;

– lampholders B22d: M10×1 or M13×1.

- The threaded entry M10×1 is mainly intended for the internal wiring of luminaires.
- In the United Kingdom, threaded entry lampholders with 3/8 inch × 26 TPI and 1/2 inch × 26 TPI screw threads are permitted for retail sale.
- In France, threaded entry lampholders with 11 mm × 19 TPI and 17 mm × 19 TPI screw threads are permitted for replacement.

Compliance is checked by means of the gauges in accordance with Figure 14. In case of doubt, the gauge is introduced into the entry by applying a torque of 0,5 Nm.

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Other thread sizes are permissible for lampholders not intended for retail sale.

9.3 The dimensions of threaded entries and set screws, if any, shall not be less than the values shown in Table 1.

Table 1 – Dimensions of threaded entries and set screws

Nominal thread diameter	**M13×1** **M10×1** mm
Length of threaded entry	
– metal entry	3,0
– entry of insulating material	5,0
Diameter of set screw (if any)	
– screw with head	2,5
– screw without head	3,0

A negative deviation of 0,15 mm from the nominal value for thread diameter is allowed.

Compliance is checked by measurement.

NOTE If it is necessary to take the lampholder apart in order to check compliance with the requirements of 9.2 to 9.3, such checking is done after the tests of Clause 13.

10 Protection against electric shock

10.1 Lampholders shall be so designed that, when fully assembled, live parts of the lampholder are not accessible when the lampholder is fitted with the testing device shown in Figure 7.

NOTE The use of a skirt or protective shield (see 3.6 and 3.6.1) is optional. An example of a protective shield is shown in Figure 9.

For independent and enclosed lampholders compliance shall be checked by the application of the standard test finger in accordance with IEC 60529:1989 and IEC 60529:1989/AMD1:1999 and IEC 60529:1989/AMD2:2013.

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 is used.

Independent lampholders and enclosed lampholders are mounted as in normal use, for example on a threaded support or on a supporting surface or the like.

Unenclosed lampholders are tested only after appropriate installation in a luminaire or other additional enclosure. For these reasons, such lampholders are not for retail sale.

10.2 The construction shall be such that no metal parts of the lampholder other than the terminals and contact mechanism shall become live in normal service either before, during or after insertion of the lamp.

Compliance is checked by inspection.

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10.3 Parts providing protection against accidental contact with live parts shall, when correctly assembled, have sufficient mechanical strength to withstand such forces as may arise during normal removal and replacement as may be necessary to fit supply cords or cables.

They shall also withstand the normal stresses arising from the fitting of corresponding normal lamps and appropriate lamp shades.

It shall be possible to remove and replace, using a reasonable degree of force corresponding to normal use, a corresponding normal lamp and shade, or similar device if fitted, without removing those parts providing protection against accidental contact with live parts.

Compliance is checked by inspection and by the tests of 16.3 which shall be repeated following the test of 19.1.

10.4 External parts of drip-proof lampholders shall be of insulating material, with the exception of threaded entries and shade carrier rings, which cannot become live in the event of a fault.

Lacquer or enamel is not deemed to provide adequate protection for the purpose of 10.4.

Compliance is checked by inspection.

Parts which are separated from live parts by double or by reinforced insulation are considered as parts which cannot become live in the event of a fault.

11 Terminals

11.1 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 (non-rewirable tails).

Compliance is checked by inspection.

11.2 Terminals shall permit the connection of conductors having the following nominal cross-sectional areas unless otherwise specified in the manufacturer's mounting instructions or marked on the lampholder (see 8.5):

– 0,5 mm^2 to 1,0 mm^2, for lampholders B15d and B22d with M10×1 threaded entry and those with cord grip;

NOTE In the United Kingdom, this requirement is amended to read:

"0,5 mm^2 to 0,75 mm^2 for 2 and 3 core PVC insulated sheathed flexible cord for use with lampholders B15d and B22d with a cord grip, or 0,5 mm^2 to 1,0 mm^2 for single insulated conductors for use with B15d and B22d lampholders with M10×1 threaded entry".

– 0,5 mm^2 to 2,5 mm^2 for other B22d lampholders.

Compliance is checked by inspection, by fitting conductors of the smallest and largest cross-sectional area specified and by the tests of Clause 17.

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For cord grip lampholders, lampholders B15d and B22d with M10×1 threaded entry, flexible conductors are used. In all other cases, the conductors are of the solid type. Threaded entry lampholders are tested on a screwed conduit.

11.3 Terminals shall be of the screw type or the method of connection shall be at least equivalent.

Screw-type terminals shall have an ISO (metric) thread or a thread comparable in pitch and mechanical strength, and shall otherwise comply with Section 14 of IEC 60598-1.

Terminals of the pillar type shall have dimensions not less than those shown in Table 2.

Table 2 – Minimum dimensions of pillar type terminals

Lampholder	Minimum nominal thread diameter mm	Minimum diameter conductor hole[a] mm
B22d	2,5	2,5
B15d	2,5	2,5
[a] The diameter of the hole shall be not more than 0,6 mm larger than the diameter of the screw.		

The length of the threaded part of the terminal screw shall be not less than the sum of the diameter of the hole for the conductor and the length of thread in the pillar.

In order to minimize damage to the conductor, the screw should have a slightly rounded end, and the wall of the hole (against which the screw clamps the conductor) should be unbroken.

Screwless terminals shall be considered equivalent to screw-type terminals when complying with Section 15 of IEC 60598-1. Lampholders, unless intended for sale to luminaire or other equipment manufacturers, shall be provided with terminals which will be equally satisfactory with both rigid (solid or stranded) conductors and flexible cables or cords.

Compliance is checked by inspection and measurement.

11.4 Terminals shall be so located that, after correct fitting of the wires, there is no risk of accidental contact between live parts and accessible metal parts, or moving parts of a switch, before, during and after operation.

Compliance is checked by inspection and by the following test:

The insulation is removed over a length of 4 mm from the end of a flexible conductor having the minimum nominal cross-sectional area specified in 11.2. One wire of the stranded conductor is left free and the remainder are fully inserted into and clamped in the terminal of the lampholder mounted and installed as in normal use (locking screws tightened, etc.).

The free wire is bent, without tearing the insulation back, in every possible direction, but without making sharp bends around barriers.

The free wire of a conductor connected to a live terminal shall not touch any metal part which is accessible, or moving parts of a switch, and that of a conductor connected to an earthing terminal shall not touch any live part.

If necessary, the test is repeated with the free wire in another position.

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NOTE The prohibition against making sharp bends around barriers does not imply that the free wire is kept straight during the test. Sharp bends are, moreover, made if it is considered likely that such bends can occur during the normal assembly of the lampholder.

11.5 The requirements of 11.3 do not apply to lampholders intended to be factory-mounted in luminaires and which are provided with connecting leads (non-rewirable tails), tab-terminals or equally effective means.

Connecting leads (non-rewirable tails) shall be connected to the lampholders by soldering, welding, crimping or by any other equivalent method.

Leads shall consist of insulated conductors.

The insulation of the leads shall be at least equal in mechanical and electrical properties to those specified in IEC 60227 (all parts) or IEC 60245 (all parts) or comply with the relevant requirements of 5.3 in IEC 60598-1.

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

Fixing of the leads to the lampholders shall withstand the mechanical forces that may occur in normal use.

Compliance is checked by inspection and by the following test, which is made after the test of 19.2 on the same three specimens.

Each connecting lead is subjected to a pull of 20 N, applied without jerks for 1 min in the most unfavourable direction.

During the test, the leads shall not move from their fixing.

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

12 Provision for earthing

12.1 If provision is required for earthing a lampholder, the means adopted shall not interfere with clearance or creepage distance or with the normal functioning of the lampholder. For metal lampholders, the earth terminal or other means of earthing shall be in effective electrical contact with all exposed non-current-carrying metal parts.

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

Compliance is checked by inspection.

12.2 Earthing terminals shall comply with the requirements of Clause 11.

Their clamping means shall be such that it shall not be possible to loosen screw terminals without the use of a tool or screwless terminals unintentionally by hand.

Compliance is checked by inspection and by the tests of Clause 11.

In general, the designs commonly used for current-carrying terminals (complying with the requirements of this document) 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.

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12.3 Metal lampholders intended to be earthed shall be so designed that all accessible external metal parts can be connected electrically to earth, the method of connection depending upon the intended method of installation of the lampholder.

This requirement may be met by the use of an earthing terminal or other particular provision for the connection of an independent earth continuity conductor. This does, however, not preclude the use of other means by earthing continuity, such as the nipple, the backplate, the shade ring or other means for attaching the lampholder to earthed parts of the luminaire.

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

Accessible metal parts of lampholders without earthing terminal which may become live in the event of an insulation fault shall allow reliable earthing. There shall be earth continuity between the outer shell and dome unless the outer shell is screened from live parts by double or reinforced insulation.

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

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 lampholder is intended. In case the earth continuity between outer shell and dome also has to be checked, the coupling between these parts shall be tightened with a torque equivalent to the test values given under 16.3.

Immediately after the electric strength test of 15.3, the resistance between the means of earthing and the dome (outer shell) is measured. In the case of lampholders provided with an earthing terminal, this is done between the point where the conductor leaves the earthing terminal and the dome (outer shell).

In the 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 dome (outer shell).

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.

12.4 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 material no less resistant to corrosion, and the contact surface shall be bare metal.

Compliance is checked by inspection.

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

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13 Construction

13.1 The contact-making faces shall be smooth and so shaped at their edges that they do not prevent the easy insertion and removal of a corresponding lamp.

The contact profiles shall be in accordance with sheets 7005-10 (B22d) or 7005-16 (B15d) of IEC 60061-2.

Associated resilient means shall provide adequate contact force. The contact force for each contact shall comply with the values shown in Table 3.

Table 3 – Limits for contact forces

Rated current A	**Contact force** N	
	min	**max**
≤ 4	2,5	15
> 4	5	20

Compliance is checked by inspection and by measurement in accordance with sheets 7005-10 or 7005-16 of IEC 60061-2.

The contact force is checked by means of the gauges shown on sheets 7006-15A (B22d) and 7006-15B (B15d) of IEC 60061-3.

This test shall be repeated following the test of 19.2.

13.2 The various parts of a lampholder shall be reliably connected together. Devices for fixing shades shall be so designed that the lampholder will not be dismantled by rotating the shade ring.

In cord grip or threaded entry lampholders where protection against accidental contact with live parts is provided by a dome screwing directly on to a body, or by a dome or other parts secured by a union ring, such parts shall be attached by at least one and three-quarter turns of thread.

Compliance is checked by inspection and by the tests specified in 16.3.

13.3 Where provision is made for a screwed type of shade ring, the outer edge of the ring shall be designed to facilitate turning by hand.

Compliance is checked by inspection.

13.4 Where a union ring is used it shall be designed to facilitate turning by hand. It shall retain the parts of the lampholder in concentric positions and the design shall be such as to prevent relative rotation of those parts.

Compliance is checked by inspection.

13.5 If the construction incorporates a separate interior member which supports the current-carrying parts, it shall be keyed in such a way as to prevent rotation with respect to the other parts of the lampholder.

Compliance is checked by inspection.

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13.6 There shall be adequate space for the supply wires in the dome of the lampholder. Parts of the lampholder with which insulated conductors may come into contact shall have no sharp edges or a shape likely to damage the insulation.

Threaded entry lampholders with a dome shall be provided with means to prevent the conduit entering too far into the dome.

Such means can either be part of the lampholder or be provided by the design of a luminaire.

If such means are provided by the design of a luminaire, their efficiency cannot be checked when testing the lampholder; such a check shall be made during testing of the luminaire.

NOTE 1 Such lampholders are not intended for retail sale.

Compliance is checked by inspection and,

- *for cord-grip lampholders, B15d lampholders and B22d lampholders with M10x1 thread, by fitting cables or cords of the largest cross-sectional area according to 11.2 and;*
- *for other B22d lampholders, by fitting conductors with a cross-sectional area one size less than the specified maximum cross-sectional area.*

For cord-grip lampholders, an ordinary sheathed flexible cord is used. In all other cases, two or three PVC insulated single-core cables are used.

For threaded entry lampholders, the dome of the lampholder is screwed on to a conduit having a length of about 100 mm. The cables are then introduced into the conduit and dome, and clamped at the free end of the conduit.

The ends of the cables, after having been prepared in the usual manner, are cut to a length just sufficient to make connection possible, and connected to the terminals of the lampholder. The clamping on the conduit is removed and the cables and the body are moved along a distance of 10 mm in the direction of the conduit.

After this, the cables are again clamped at the free end of the conduit and the lampholder is assembled.

After dismantling, the cables and cords shall not be damaged.

NOTE 2 The requirement concerning the sharp edges is not meant for the screw ends of threaded entries if they are not in contact with the wires when the lampholder is mounted on a conduit.

In case of doubt with regard to the means to prevent the conduit entering too far into the dome of a threaded entry lampholder, the lampholder is fixed, as in normal use, to an appropriate nipple or conduit and is then subjected for 1 min in a clockwise direction to the following torque:

- *1,0 Nm for threads M10×1;*
- *1,3 Nm for threads M13×1.*

After this test, the nipple or conduit shall not have entered into the space provided for the supply wires in the dome of the lampholder and the lampholder shall not show any change impairing its further use.

13.7 It shall be possible to lock the threaded entry on the conduit. Such device can either be part of the lampholder or be provided by the design of a luminaire.

Except for angle lampholders, it shall be possible to operate the locking device from the inside, if provided as part of the lampholder.

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If such means are provided by the design of a luminaire, their efficiency cannot be checked when testing the lampholder; such a check should be made during testing of the luminaire. Such lampholders are not intended for retail sale.

Compliance is checked by inspection and, for lampholders having an integral locking device, by the test of 16.2.

13.8 Cord grip lampholders shall be provided with a device allowing the lampholder to be so fixed to a flexible cord that the conductors are relieved from strain, including twisting, where they are connected to the terminals, and that the outer covering of the cord is gripped in the lampholder and protected from abrasion.

NOTE Only in the following countries, Poland and the United Kingdom, labyrinth type cord restraints, which do not grip the outer covering of the cord, can be utilized provided they meet the test requirements of this document.

It shall be clear how the relief from strain and the prevention of twisting is intended to be effected.

It shall not be possible to push the cord into the lampholder to such an extent that the cord is subjected to undue mechanical or thermal stress.

Makeshift precautions, such as tying the cord into a knot or tying the end with string, are not permissible.

The device shall be of insulating material or be provided with a fixed insulating lining, if otherwise an insulation fault on the cord could make accessible metal parts live.

The design shall be such that the device:

– has at least one part fixed to or integral with the lampholder;
– is suitable for the different types of flexible cord which may be connected to the lampholder;
– does not exert excessive pressure on the cord;
– is unlikely to be damaged when it is tightened or loosened as in normal use.

The device shall be suitable for flexible cords of any one of the following types:

– 60245 IEC 51, or
– 60245 IEC 53, or the like,
– 60227 IEC 52.

Compliance is checked by inspection and by the following test:

The lampholder is fitted with one of the flexible cords mentioned above, the device for strain and twist relief being appropriately used. The conductors are introduced into the terminals and the terminal screws are slightly tightened so that the conductors cannot easily change their position. After this preparation, it shall not be possible to push the cord further into the lampholder.

The flexible cord is then subjected 100 times to a pull of the appropriate value shown in Table 4 below for a duration of 1 s each. The pull shall not be applied in jerks.

Immediately afterwards, the flexible cord is subjected for a period of 1 min to a torque as specified in Table 4 applied as close as is practical to the cord entry in the most unfavourable direction:

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Table 4 – Pull and torque values

Total nominal cross-sectional area of all conductors together mm^2	Pull N	Torque Nm
Up to and including 1,5	60	0,15
Over 1,5 up to and including 3	60	0,25
Over 3 up to and including 5	80	0,35
Over 5 up to and including 8	120	0,35

The lampholders are tested with each of the appropriate types of cord, as specified above, complying with IEC 60245 (all parts) or IEC 60227 (all parts).

The test is made first with conductors of the smallest cross-sectional area specified in 11.2, and then with conductors of either the largest cross-sectional area allowed by the suspending device or the largest cross-sectional area specified in 11.2, whichever is the smaller.

During the test, no damage shall be caused to the flexible cord by the device for strain and twist relief. At the end of the test, the cord shall not have been displaced by more than 2 mm, and the ends of the conductors shall not have been noticeably displaced in the terminals.

In order to enable the displacement to be measured, before starting the test a mark is made on the cord under strain at a distance approximately 20 mm from the strain-relieving device. At the end of the test, the displacement of this mark in relation to the strain-relieving device is measured while the cord is still under strain.

13.9 Suspension devices of enclosed and independent lampholders shall have no accessible metal parts which can become live, even in the event of a fault in the lampholder. Moreover, suspension devices intended to be screwed into threaded entry lampholders shall comply with the requirements of 13.8.

13.10 Where provision for cable entry/entries is made on the accessible external surface of a backplate lampholder it shall allow the introduction of cable covering, conduit or trunking etc., as appropriate, so as to afford mechanical protection for at least a distance of 1 mm measured from the accessible external surface of the backplate lampholder.

Compliance is checked by measurement and by the installation test of 11.2.

NOTE To meet this requirement, use can be made of knock-outs placed side by side or concentrically.

13.11 The base of backplate lampholders, other than those specifically intended for building-in, shall be suitable for fixing by means of screws with a diameter of at least 4 mm.

Compliance is checked by means of a gauge according to Figure 3. For this test, the plug is inserted into the hole from the back and the bush is placed on the plug from the front. The bush shall enter the recess of the screw head.

13.12 Insulating barriers forming an integral part of the lampholder shall be provided between the terminals if these are of the rising type to prevent inadvertent contact between conductors at different potentials. This applies whatever the range of movement of the terminals.

Terminals of the rising type are not permitted in backplate lampholders other than those specifically intended for building-in.

Compliance is checked by inspection and by the tests of Clause 18.

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13.13 Lampholders shall not be fitted with a socket-outlet.

Compliance is checked by inspection.

14 Switched lampholders

14.1 Switches are allowed only in ordinary lampholders.

Compliance is checked by inspection.

14.2 The lampholder shall be so constructed that accidental contact between moving parts of the switch and the supply conductors is prevented.

Compliance is checked by the test of 11.4 and by a manual test.

14.3 The switch operating member shall be effectively insulated from live parts and, if broken or damaged, shall not expose live parts.

Compliance is checked by inspection and by the tests of 14.4.

14.4 Switches in lampholders shall be capable of making and breaking a load comprising a general lighting service (GLS) tungsten filament lamp at rated voltage.

Compliance is checked by the following tests.

For lampholders without temperature marking or marked Txxx, the switch is tested in a heating cabinet with alternating current (cos φ = 0,6 ± 0,05) at 1,1 times rated voltage and 1,25 times rated current.The switch shall be operated in a normal manner for 200 switch movements at a rate of 30 movements per minute at regular intervals.

The switch is then tested with alternating current (cos φ = 1) at rated voltage and rated current.

The switch shall be operated in a normal manner for 20 000 switch movements at a rate of 30 movements per minute at regular intervals.

NOTE This test is based on the requirements of IEC 60238. Its replacement by the corresponding test of IEC 61058-1 is under consideration.

Switches in lampholders B15d without temperature marking shall be tested for an operating temperature of 100 °C and switches in lampholders B22d without temperature marking shall be tested for an operating temperature of 125 °C.

Switches in lampholders with Txxx marking shall be tested for operating temperatures as follows:

- *lampholders B15d: the temperature marking on the lampholder minus 40 °C;*
- *lampholders B22d: the temperature marking on the lampholder minus 50 °C.*

For T1 and T2 rated lampholders, the lampholder shall be mounted in a shade and placed in a draught-free enclosure as described in 19.5. Suitable access apertures may be made to enable the switch to be operated, but such apertures shall be as small as possible to maintain the required testing conditions.

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Voltage adjustments shall be made as described in item a) of 19.6, and the temperature of the lamp cap shall be maintained within the specified T1 or T2 testing temperature limits for 2 h immediately before the switching test.

The switch shall then be operated in a normal manner for 20 000 switch movements at a rate not exceeding 12 movements per minute at regular intervals.

At the conclusion of the test, the lampholders shall withstand the tests specified in 15.3 for insulation resistance and electric strength and they shall be in satisfactory working order.

15 Moisture resistance, insulation resistance and electrical strength

15.1 The enclosure of drip-proof lampholders shall provide the necessary degree of protection against ingress of water.

Inlet openings of drip-proof lampholders shall allow the connection of the supply wires in such a way that drops of water running along the wires cannot reach the inside of the lampholder.

Compliance is checked by the following test:

Lampholders are fitted with the cables or conduits for which they are designed.

Backplate lampholders are mounted on a vertical surface with one drain-hole, if any, open and directed downwards. Other lampholders are mounted with their lamp entry pointing vertically downwards.

The test is made by means of equipment, the principle of which is shown in Figure 3 of IEC 60529:1989; the rate of discharge shall be reasonably uniform over the whole area of the apparatus and shall produce a rainfall of between 3 mm and 5 mm of water per minute, falling vertically from a height of 200 mm measured from the lampholder. The test duration shall be 10 min. The water used for the test shall be at a temperature of 15 °C ± 10 °C.

Immediately after this treatment, the lampholder shall withstand the same electric strength test as specified in 15.3, and inspection shall show that water has not entered to an appreciable extent.

NOTE It is considered that water has entered to an appreciable extent if it has come into contact with live parts.

15.2 Lampholders shall be proof against humid conditions which may occur in normal use.

Compliance is checked by the humidity treatment described in 15.2 followed immediately by the measurement of the insulation resistance and by the electric strength test specified in 15.3.

Cable entries, if any, are left open; if knock-outs are provided, one of them is opened.

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 samples 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 °C and (t + 4) °C.

Lampholders are kept in the cabinet for:

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– *2 days (48 h) for ordinary lampholders;*

– *7 days (168 h) for IPX1 drip-proof lampholders.*

NOTE In most cases, the specimens can be brought to the specified temperature by keeping them at this temperature for at least 4 h before the humidity treatment.

Relative humidity between 91 % and 95 % can be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate (Na_2SO_4) or potassium nitrate (KNO_3) in water having a sufficiently large contact surface with the air. In order to achieve the specified conditions within the cabinet, it is necessary to ensure constant circulation of the air within and, in general, to use a cabinet which is thermally insulated.

After this treatment, the lampholders shall show no damage within the meaning of this document.

15.3 The insulation resistance and the electric strength shall be adequate:

a) between live parts of different polarity;

   For the purposes of this subclause, switch contacts in the open position are considered to be live parts of different polarity.

b) between such live parts and external metal parts, including fixing screws of base or enclosure of backplate lampholders and accessible assembling screws;

c) between the inner and outer surfaces of the lining of metal enclosures, if such accessible lining is required to give protection in the case that the distance between any live part and the metal of the enclosure is smaller than that required under item 2 in Table 8.

Compliance is checked by an insulation resistance test and an electric strength test, which are applied immediately after the humidity treatment of 15.2 in the humidity cabinet, or in the room in which the specimens were brought to the prescribed temperature.

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 live parts of different polarity;*

– *between such live parts connected together and external metal parts, fixing screws of the base and of the enclosure, accessible assembling screws and metal foil in contact with the surface of external insulating parts.*

  Both of the measurements prescribed above are made first on the lampholder in which a test cap as shown in Figure 10 or Figure 11 is inserted and then on an empty lampholder;

– *between accessible metal parts and metal foil in contact with the inner surface of insulating lining, if any.*

The switch, if any, is placed in the "on" position.

The insulation resistance shall not be less than 4 MΩ. This value may be reduced to 2 MΩ for the measurement between live parts of different polarity.

Care should be taken to ensure that the insulating material of the test cap will not influence the results.

Immediately after the insulation resistance test, an AC voltage of substantially sine wave form, with a frequency of 50 Hz or 60 Hz and with an r. m. s. value of (2 U + 1 000) V (where U is the rated voltage) is applied for 1 min between the points prescribed. For enclosed and unenclosed reinforced insulated lampholders, the test voltage shall be determined from Table 10.2 of IEC 60598-1. Additionally, for switched lampholders, this voltage shall be

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applied between live parts of different polarity and other metal parts with the switch both closed and open.

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

No flashover or breakdown shall occur.

The high-voltage transformer used for the test shall be so designed that, when the output terminals are short-circuited after the output voltage has been adjusted to the appropriate test voltage, the output current is at least 200 mA.

The overcurrent relay shall not trip when the output current is less than 100 mA.

Care is taken that the r.m.s. value of the test voltage applied is measured within ±3 %.

Glow discharges without drop in voltage are ignored.

16 Mechanical strength

16.1 Lampholders shall have sufficient strength to withstand the stresses of normal operation in service.

Brackets or similar devices for the mounting or attachment of lampholders are not covered by the requirements of Clause 16. The mechanical strength of such devices shall comply with the requirements of the standard for the equipment for which the lampholder is intended.

Compliance is checked by the following tests:

The lampholder shall be supported in any convenient manner with the open end pointed vertically downwards. A mass of 5 kg shall be suspended evenly from the bayonet slots by means of a loading device as shown in Figure 1, so that the lampholder plungers will not make contact with it.

After 1 h, there shall be no deterioration in the lampholder such as would affect its normal use.

16.2 Threaded entry lampholders shall be so designed that mounting by means of the attachment thread is effective and will cause no damage to the lampholder rendering it unsafe in normal use.

Compliance is checked by the following test:

The lampholder is fixed, as in normal use, to an appropriate conduit and is subjected to the following torque:

- *1,2 Nm for B15d lampholders;*
- *2,0 Nm for B22d lampholders.*

The torque is applied for 1 min in a clockwise direction.

If the lampholder is fitted with a locking device with respect to the conduit, its efficiency shall be checked by repeating the above test for 1 min in an anti-clockwise direction; the set screws being tightened with a torque as specified in Clause 17. If, however, the lampholder loosens, the set screw is further tightened with the smallest torque necessary to prevent the

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lampholder from loosening during this test. The minimum value of the torque applied should be noted for the purpose of the test of Clause 17.

NOTE It is practical to increase the torque by increments of about 20 % during this test.

At the conclusion of the test, there shall be no deformation, damage to parts or loosening of the lampholder such as would render it unsafe in normal use.

16.3 External parts of lampholders when correctly assembled shall have adequate mechanical strength.

Compliance is checked by inspection and by the following tests:

Where protection against accidental contact with live parts is provided by a dome screwing directly on to a body or a dome secured by a union ring, or by other screwed parts of the exterior, such parts shall be removed and replaced by hand 10 times, tightening each time with a torque of:

- *0,75 Nm for B15d domes and union rings;*
- *1,25 Nm for B22d domes and union rings;*
- *(0,03 × diameter) Nm for other screwed parts of the exterior depending on their nominal outside diameter in millimetres.*

NOTE The constant of 0,03 is derived from the test torques for domes and union rings of commonly known dimensions, and will enable relative torques to be calculated for components of other dimensions.

Where screwed shade rings or equivalent parts are provided, they shall be removed and replaced by hand 10 times, tightening each time with half the torque specified for domes and union rings.

Where protection against accidental contact with live parts is provided by a construction not assembled by the rotation of co-operating threaded components, such a construction shall be checked by dismantling and assembling the external protective parts 10 times and, after each assembly, by applying, between the bayonet slots and such parts, an axial torque of the same value as specified for domes and union rings. The torque shall be applied in a clockwise and in an anti-clockwise direction each time, sustaining the torque for 5 s upon each application.

During the tests, no change impairing the further use of any part shall have occurred and the protection against accidental contact with live parts shall not have been impaired.

16.4 *The strength of the connection between dome and threaded entry shall be checked as indicated in Figure 2.*

The specimen is fixed by the threaded entry in a horizontal position.

A device having the maximum dimensions acceptable for caps, and with other dimensions according to Figure 2, is inserted into the lampholder and fixed as shown in the drawing. It is loaded for 1 min with a mass, as indicated in Figure 2. The end of the mandrel shall not sag more than 5 mm.

The specimen shall not be damaged. If a permanent deformation occurs, the specimen is forced into the original position and the test is repeated five times, after which the specimen shall show no damage impairing its normal use.

16.5 *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 60068-2-75:2014, subject to the following details (see IEC 60068-2-75:2014, Clause 4):*

a) Method of mounting

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The specimen shall be held against the plywood sheet of the mounting fixture in such a manner that its axis is horizontal and parallel to the support and its outer edge touches the plywood.

NOTE 1 For lampholders different from the cylindrical shape, the condition of the axis parallel to the plywood sheet can be obtained by adequate pine-wood shimmings.

b) Height of fall

The striking element shall fall from one of the heights given in Table 5.

Table 5 – Heights 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 circumference of the external parts of the lampholder excluding the area of the bayonet slots.

d) Pre-conditioning

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 document, 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 18 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 document 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 60068-2-75:2014. 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.

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16.6 *For metal lampholders the mechanical strength of external metal parts shall be tested by means of a pressure apparatus according to Figure 18.*

The various parts are tested on the complete lampholder. Each part is subjected twice for 1 min to a force as indicated in Table 6, the pressure being applied on two diameters at right angles to each other.

The test is not made on outer cases of insulating material with a conductive outer surface. Moreover, this test does not apply to the bayonet barrel.

During and after the test, the deformation of the specimen shall not exceed the values indicated in Table 6.

Table 6 – Maximum deformation values

Lampholder	Force N	Maximum deformation mm	
		During the test	After the test
B15d	75	1	0,3
B22d	100	2	0,3

16.7 Entry spouts and glands of drip-proof lampholders shall withstand the mechanical stresses occurring during normal fitting and use.

Compliance is checked by the following test:

Screwed glands are fitted with a cylindrical metal rod having a diameter equal to the nearest whole number of millimetres below the internal diameter of the packing.

The glands are then tightened by means of a suitable spanner, a force of 30 N for metal glands, or 20 N for glands of moulded material, being applied for 1 min at a radius of 250 mm.

At the end of the test, the glands, the spouts and the enclosures shall show no damage.

16.8 Backplate lampholders shall be so designed as to withstand fixing to a support without damage.

Compliance is checked by the following test:

The backplate of the lampholder is fixed by means of M4 screws or those of maximum insertable diameter to a rigid flat steel sheet. This sheet has two drilled and tapped holes at a distance equal to the distance between the axis of the fixing holes of the backplate. The screws are gradually tightened, the maximum torque applied being 1,2 Nm.

For backplate lampholders specifically intended for building-in, this test is carried out with the means of attachment specified by the manufacturer.

After this test, the backplate lampholder shall show no damage impairing its further use.

17 Screws, current-carrying parts and connections

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

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Compliance is checked by inspection and the tests of Section 4, Subclauses 4.11 and 4.12 of IEC 60598-1 except that the first line of Table 4.1 of IEC 60598-1 is replaced by Table 7.

Table 7 – Torque values

Nominal diameter of screw mm	**Torque** Nm	
	1	**2**
Up to and including 2,6	0,15	0,3
Over 2,6 up to and including 2,8	0,2	0,4

NOTE 1 Screwed connections are already partially checked by the tests of Clause 16.

NOTE 2 For the material requirements shown in 4.11.4 of IEC 60598-1, the tests of Clauses 19 and 21 will show whether current-carrying parts are equivalent to copper in respect of current-carrying capacity, mechanical strength and corrosion resistance likely to be met in normal service.

18 Creepage distances and clearances

Creepage distances and clearances shall be not less than the values shown in Table 8, the lampholder being fitted as in normal use.

All distances apply in every position of the plunger.

The distances specified in Table 8 apply to impulse withstand category II in accordance with IEC 60664-1 and refer to pollution degree 2, where normally only non-conductive pollution occurs but occasionally a temporary conductivity caused by condensation must be expected.

NOTE 1 For information on distances for other impulse withstand categories or higher pollution degrees, IEC 60598-1 and IEC 60664-1 can be consulted.

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

NOTE 2 The voltages shown in Table 8 are the rated voltage, not the ignition voltage.

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Table 8 – Minimum distances for AC (50/60 Hz) sinusoidal voltages – Impulse withstand category II

Rated voltage 250 V	Distances mm
Basic insulation 1 Distances between live parts of different polarity, and 2 Between live parts and external metal parts, mounting surfaces, loose metal cover, if any, the outer surface of parts of insulating material which are permanently fixed to the holder, including screws or devices for fixing covers or fixing the holder to its support: [a] – Creepage distances	
insulation PTI ≥ 600 [a]	1,5
PTI < 600 [a]	2,5
– Clearances [c]	1,5
Reinforced insulation Between live parts and external metal parts, mounting surfaces, loose metal cover, if any, the outer surface of parts of insulating material which are permanently fixed to the holder, including screws or devices for fixing covers or fixing the holder to its support: [a] – Creepage distances	
insulation PTI ≥ 600 [a]	3
PTI < 600 [a]	5
– Clearances [c]	3
Clearances for backplate lampholders [a] [b] – Between live parts and the mounting surface, and – Between live parts and the boundary of the space for the supply wires	3,6

~~Values for creepage distances can be found for intermediate values of rated voltages by linear interpolation between tabulated values. No values are specified for rated voltages below 25 V AC and 60 V DC ripple free as the voltage test of 11.2.2 is considered sufficient.~~ Creepage distances shall not be less than the required minimum clearance.

For glass, ceramics or other inorganic insulating materials which do not track, creepage distances need not be greater than their associated clearance for the purpose of insulation coordination. The dimensions of this table are appropriate.

[a] 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).
- For creepage distances, the equivalent DC voltage is equal to the r.m.s. value of the sinusoidal AC voltage.

[b] This value takes account of the possible uneveness of the mounting surface.

[c] For clearances, the equivalent DC voltage is equal to the peak of the AC voltage.

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Compliance is checked by measuring with and without supply wires of the largest cross-sectional area according to 11.2, connected to the terminals.

19 General resistance to heat

19.1 Lampholders shall be sufficiently resistant to heat.

Compliance is checked:

- *for lampholders without temperature marking or marked Txxx, by the tests of 19.2, 19.3 and 19.4;*
- *for lampholders marked T1 or T2, by the tests of 19.3, 19.5, 19.6 and 19.7.*

19.2 Lampholders without temperature marking shall be tested first in a heating cabinet at the temperature indicated in Table 9.

Table 9 – Heating cabinet temperature

Lampholder	Temperature °C
B15d	145
B22d	175

Lampholders marked Txxx shall be tested at the marked temperature plus 10 K.

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, plus 10 K, with a tolerance of ±5 °C.

For this test, a solid steel test cap shall be inserted into the lampholder in vertical lampholder-up position because the weight of the test cap must not bear on the lampholder. In the area of the contacts, the test cap shall comply with maximal dimensions in accordance with the current edition of standard sheets 7004-10 (B22d/22) and 7004-11 (B15d/19) of IEC 60061-1.

The temperature is maintained with a tolerance of ±5 K for 48 h without interruption.

After cooling down for 24 h, without the test cap, the contact force test shall be repeated in accordance with 13.1.

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

Compliance is checked by the following test which shall be made immediately after the test of 19.2 on the lampholders in whose terminals conductors of the maximum cross-sectional area according to 11.2 are fitted.

The terminal screws shall be tightened with a torque equal to two-thirds of the torque specified in Clause 17; the lampholder is placed with the open end downwards and loaded for 1 h with 1,25 times its rated current. The temperature rise of terminals shall not exceed 45 K.

This temperature is determined with the aid of melting particles or by thermocouples, not by means of a thermometer.

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For this test, a special test cap as shown in Figure 5 (B15d) or Figure 6 (B22d) is used. Before the test, the contact surface is carefully cleaned and polished.

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

After the test, the conductors shall not be damaged.

19.4 The resistance to heat is then tested in a heating cabinet at the temperature indicated in Table 10.

Table 10 – Heating cabinet temperature

Lampholder	Temperature °C
B15d	170
B22d	200

Lampholders marked Txxx shall be tested at the marked temperature plus 35 K.

Lampholders which form an integral part of the luminaire shall be tested at the temperature measured in the luminaire according to 12.4.2 of IEC 60598-1, plus 35 K, with a tolerance of ±5 C.

For this test, a solid steel (preferably stainless steel) test cap is inserted into the lampholder. In the area of the contacts, the test cap shall comply with maximal dimensions in accordance with the current edition of the standard sheets 7004-10 (B22d/22) and 7004-11 (B15d/19) of IEC 60061-1.

The lampholder, with the test cap inserted is placed in the vertical lampholder-up position (because the weight of the test cap must not bear on the lampholder) in a heating cabinet having approximately half the temperature specified in Table 10. 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 lampholder shall not undergo any change impairing its further use especially in the following respects:

– *reduction of the protection against electric shock;*
– *loosening of electrical contacts;*
– *cracks, swelling or shrinking;*
– *sealing compound flowing out.*

The test cap is removed from the lampholder after cooling down to approximately room temperature.

After the test, the lampholder is examined to determine that:

– the shade ring or skirt, if provided, is removable and replaceable without damage;

Compliance is checked by inspection and manual test.

– there is no deformation which could affect the safety or further use of the lampholder;

Compliance is checked by the application of the gauges according to standard sheets 7006-12C and 7006-12D (B15d) and 7006-12A and 7006-12B (B22d) of IEC 60061-3.

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