

BS EN 60400:2008+A2:2014



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Lampholders for tubular fluorescent lamps and starterholders

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National foreword

This British Standard is the UK implementation of EN 60400:2008+A2:2014. It is identical to IEC 60400:2008, incorporating amendments 1:2011 and 2:2014. It supersedes BS EN 60400:2008+A1:2011, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted by Technical Committee CPL/34, Lamps and Related Equipment, to Subcommittee CPL/34/2, Lamp caps and holders.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Amendments/corrigenda issued since publication

Date	Text affected
31 August 2011	Implementation of IEC amendment 1:2011 with CENELEC endorsement A1:2011.
31 October 2014	Implementation of IEC amendment 2:2014 with CENELEC endorsement A2:2014.

**Lampholders for tubular fluorescent lamps and starterholders
(IEC 60400:2008)**

Douilles pour lampes tubulaires
à fluorescence et douilles pour starters
(CEI 60400:2008)

Lampenfassungen für röhrenförmige
Leuchtstofflampen und Starterfassungen
(IEC 60400:2008)

This European Standard was approved by CENELEC on 2008-08-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 34B/1383/FDIS, future edition 7 of IEC 60400, prepared by SC 34B, Lamp caps and holders, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60400 on 2008-08-01.

This European Standard supersedes EN 60400:2000 + A1:2002 + A1:2002/corrigendum July 2003 + A2:2004.

In EN 60400:2008, information on lampholders intended to be used in applications where they are accessible in normal use (class II luminaires as well as class I luminaires) has been introduced, as well as requirements for contact-making to pins for single-capped fluorescent lamps, introduction of new fits in the text and Annex A, and requirements for shade holder rings have been adopted.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2009-05-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2011-08-01

In this standard, the following print types are used:

- requirements proper: in roman type;
- *test specifications: in italic type;*
- notes: in smaller roman type.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60400:2008 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60061-4 NOTE Harmonized as EN 60061-4:1992 (modified).

Foreword to amendment A1

The text of document 34B/1591/FDIS, future amendment 1 to IEC 60400:2008, prepared by SC 34B, Lamp caps and holders, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60400:2008 on 2011-05-25.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the amendment has to be
implemented at national level by publication of
an identical national standard or by endorsement (dop) 2012-02-25
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2014-05-25

Endorsement notice

The text of amendment 1:2011 to the International Standard IEC 60400:2008 was approved by CENELEC as an amendment to the European Standard without any modification.

Foreword to amendment A2

The text of document 34B/1730/FDIS, future IEC 60400:2008/A2, prepared by SC 34B, Lamp caps and holders, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60400:2008/A2:2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

The following dates were fixed:

- | | | |
|---|-------|------------|
| – latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2015-05-04 |
| – latest date by which the national standards conflicting with the amendment have to be withdrawn | (dow) | 2017-08-04 |

Endorsement notice

The text of the International Standard IEC 60400:2008/A2:2014 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60061-1 (mod)	- ¹⁾	Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 1: Lamp caps	EN 60061-1	1993 ²⁾
IEC 60061-2 (mod)	- ¹⁾	Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 2: Lampholders	EN 60061-2	1993 ²⁾
IEC 60061-3 (mod)	- ¹⁾	Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 3: Gauges	EN 60061-3	1993 ²⁾
IEC 60068-2-20	1979	Environmental testing - Part 2-20: Tests - Test T: Soldering	HD 323.2.20 S3 ³⁾	1988
IEC 60068-2-75	1997	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	1997
IEC 60081	- ¹⁾	Double-capped fluorescent lamps - Performance specifications	EN 60081	1998 ²⁾
IEC 60112	2003	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	2003
IEC 60155	- ¹⁾	Glow-starters for fluorescent lamps	EN 60155	1995 ²⁾
IEC 60238	- ¹⁾	Edison screw lampholders	EN 60238 + corr. January	2004 ²⁾ 2005
IEC 60352-1	1997	Solderless connections - Part 1: Wrapped connections - General requirements, test methods and practical guidance	EN 60352-1	1997
IEC 60399	- ¹⁾	Barrel thread for lampholders with shade holder ring	EN 60399	2004 ²⁾
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
A1	1999		A1	2000

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

³⁾ HD 323.2.20 S3 includes A2:1987 to IEC 60068-2-20:1979. It is superseded by EN 60068-2-20:2008, which is based on IEC 60068-2-20:2008.

<u>Publication</u>		<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60598-1 (mod)	- ¹⁾	Luminaires - Part 1: General requirements and tests	EN 60598-1	200X ⁴⁾
IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 60695-2-11	2000	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	EN 60695-2-11	2001
IEC 60695-11-5	2004	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	2005
IEC 61199	- ¹⁾	Single-capped fluorescent lamps - Safety specifications	EN 61199	1999 ²⁾
ISO 4046-4	2002	Paper, board, pulps and related terms - Vocabulary - Part 4: Paper and board grades and converted products	-	-

⁴⁾ To be ratified.

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LAMPHOLDERS FOR TUBULAR FLUORESCENT LAMPS AND STARTERHOLDERS

1 General

1.1 Scope

This International Standard states the technical and dimensional requirements for lampholders for tubular fluorescent lamps and for starterholders, and the methods of test to be used in determining the safety and the fit of the lamps in the lampholders and the starters in the starterholders.

This standard covers independent lampholders and lampholders for building-in, used with tubular fluorescent lamps provided with caps as listed in Annex A, and independent starterholders and starterholders for building-in, used with starters in accordance with IEC 60155, intended for use in a.c. circuits where the working voltage does not exceed 1 000 V r.m.s.

This standard also covers lampholders for single-capped tubular fluorescent lamps integrated in an outer shell and dome similar to Edison screw lampholders (e.g. for G23 and G24 capped lamps). Such lampholders are tested in accordance with the following clauses and subclauses of IEC 60238: 8.4; 8.5; 8.6; 9.3; 10.7; 11; 12.2; 12.5; 12.6; 12.7; 13; 15.3; 15.4; 15.5 and 15.9.

This standard 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 to be 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.

This standard also applies, as far as is reasonable, to lampholders and starterholders other than the types explicitly mentioned above and to lamp connectors.

Where the term "holder" is used in the standard, both lampholders and starterholders are intended.

A1 Where the term "bi-pin lampholder" is used, lampholders for wedged caps are also intended. **A1**

1.2 Normative references

The following referenced documents are indispensable for the application 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 60061-1, *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, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60081, *Double-capped fluorescent lamps – Performance specifications*

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

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60238, *Edison screw lampholders*

IEC 60352-1:1997, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

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

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
Amendment 1 (1999)

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 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-11-5:2004, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 61199, *Single-capped fluorescent lamps – Safety specifications*

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

2 Terms and definitions

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

2.1

rated voltage

voltage declared by the manufacturer to indicate the highest working voltage for which the holder is intended

2.2

working voltage

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

2.3

flexible lampholders for linear double-capped fluorescent lamps

pair of lampholders in which the base of each holder is rigidly mounted in the luminaire but which has one or both of the lampholders so designed as to allow axial movement of the contacts to provide compensation for variations in lamp lengths and, where necessary, to permit insertion and removal of the lamp

A1 NOTE In case of doubt as to whether a lampholder G5, GX5 or G13 provides the required axial movement of the contacts, a test with the device shown in Figure 3 may be carried out. **A1**

2.4

inflexible lampholders for linear double-capped fluorescent lamps

pair of lampholders intended for rigid mounting and in which no axial movement of the contacts is provided or is needed, either for the insertion and removal of the lamp or as compensation for variation in lamp lengths

2.5

flexibly mounted lampholders for linear double-capped fluorescent lamps

pair of lampholders which do not in themselves provide for any axial movement of the contact system but which are intended to be mounted in a luminaire in a specified manner so that the combination provides the necessary axial movement of the contact system

NOTE Lampholders of this type may or may not also be suitable for rigid mounting.

2.6

lamp connectors

set of contacts mounted on flexible conductors which provide for electrical contact but do not support the lamp

2.7

holder for building-in

holder designed to be built into a luminaire, an additional enclosure or the like

2.7.1

unenclosed holder

holder for building-in so designed that it requires additional means, for example an enclosure, to meet the requirements of this standard with regard to protection against electric shock

2.7.2

enclosed holder

holder for building-in so designed that on its own it fulfils the requirements of this standard with regard to protection against electric shock and IP classification, if appropriate

2.8

independent holder

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

2.9

rated operating temperature

highest temperature for which the holder is designed

2.10

rated lampholder rearside temperature

rearside temperature for lampholders with *T* marking ascertained by test b) in 17.1, or a higher temperature as declared by the manufacturer

2.11

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

2.12

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

2.13

live part

conductive part which may cause an electric shock

2.14

rated pulse voltage

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

2.15

multilamp ballast

electronic mains ballast designed and declared to comply for application of lamps with different keys

2.16

impulse withstand categorie

numeral defining a transient overvoltage condition

NOTE 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.

2.17

primary circuit

circuit which is directly connected to the AC mains supply

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

2.18

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

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 Mains transients in such a circuit are attenuated by the corresponding primary windings. In addition, 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. from impulse withstand category IV.



2.19

basic insulation

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

NOTE Basic insulation does not necessarily include insulation used exclusively for functional purposes.

2.20

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

2.21

double insulation

insulation comprising both basic insulation and supplementary insulation

2.22

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

2.23

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

2.24

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 In some cases, the dimensions might be achieved only after mounting into the luminaire.

3 General requirement

Holders 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.

In addition, the enclosure of independent holders shall comply with the appropriate requirements of IEC 60598-1, including the classification and marking requirements of that standard.

4 General conditions for tests

4.1 Tests according to this standard are type tests.

NOTE The requirements and tolerances permitted by this standard 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 may include routine tests and quality assurance.

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

4.2 Unless otherwise specified, the tests are made at an ambient temperature of $20\text{ °C} \pm 5\text{ °C}$ and with the holder in the most unfavourable position for normal use.

4.3 The tests shall be carried out in the order of the clauses, unless another succession of tests is specified.

Holders intended to provide an IP classification greater than IP20 shall be subjected to the tests in 11.1 and 11.2 after the test in 17.1.

4.4 The tests and inspections are carried out on a total of:

- eight pairs of matching lampholders intended for linear double-capped fluorescent lamps;

NOTE If a pair of lampholders consists of identical holders, it is sufficient for one holder instead of one pair to be subjected to all the tests, except for the test of item d) in 10.5, where one pair is needed.

- eight specimens intended for single-capped fluorescent lamps and eight starter-holders; in the order of the clauses, as follows:
- two pairs or two specimens: Clause 5 up to and including Clause 16 (except for 9.2 and 9.5);

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: 9.5 and 17.1;
- two pairs or two specimens: 17.2 up to and including 17.5 (of which one specimen for the test in 17.2 and the other for the tests in 17.4 and 17.5);
- one pair or one specimen: 17.6 and Clause 18.

A1 In the case of flexible and inflexible lampholders G5, GX5 or G13 (see Definitions 2.3 and 2.4 respectively), the specimens are mounted on two pairs of mounting sheets as specified in Figure 2. **A1**

One pair of holders is mounted so as to represent the minimum mounting distance for this pair of holders according to the manufacturer's mounting instructions; the other pair is mounted at the maximum distance. The matching mounting sheets are marked.

In special cases, it may be necessary to test more than the number of specimens specified above.

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

For holders intended to provide an IP classification greater than IP20 with detachable gaskets having a maximum operating temperature different from the values in 17.1, an additional set of gaskets shall be supplied with the specimen, together with information on their maximum operating temperature (this is part of the manufacturer's mounting instructions).

NOTE This does not refer to detachable gaskets on the mounting surface of the holder (see 17.1).

4.5 Holders are deemed to comply with this standard if no specimen fails in the complete series of tests specified in 4.4.

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 to the number required in 4.4, all specimens of which shall then comply with the repeated tests and with the subsequent tests. Holders are deemed not to comply with this standard if there are more failures than that of one specimen in one of the tests.

NOTE In general, it will only be necessary to repeat the relevant test, unless the specimen fails in the tests according to Clause 13 or 14, in which case the tests must be repeated from the test according to Clause 12 onwards.

A second type test sample, which may be required should one specimen fail, may be submitted together with the first sample.

If the additional type test sample is not submitted at the same time, a failure of one specimen entails a rejection.

5 Electrical rating

The electrical rating shall be:

- not less than 125 V and not more than 1 000 V a.c. r.m.s.;
- not less than 1 A;
-  – not less than 2 A for lampholders GX5, G13, 2G8, 2G13, G20, Fa6, Fa8 and R17d. 

NOTE In countries where marking of rated wattage is required in place of rated current, the rating of the G5 lampholder should be not less than 75 W.

6 Classification

Holders are classified as follows.

6.1 According to the protection against electric shock:

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

NOTE 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. 

6.2 According to the degree of protection against ingress of dust or water in accordance with the system of classification (IP Code) explained in IEC 60529.

Symbols for the degrees of protection are given in 7.4 (independent and enclosed holders only).

6.3 According to the resistance to heat:

- holders for rated operating temperatures up to and including 80 °C;
- holders for rated operating temperatures over 80 °C.

NOTE The measuring point for the operating temperature is that area of the lampholder where it touches the lamp cap.

6.4 Moreover, starterholders are classified according to the possibility of accepting different types of starters:

- starterholders intended for starters according to IEC 60155;
- starterholders intended for starters according to IEC 60155, Annex B only.

7 Marking

7.1 Holders shall be marked with the following:

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

[A1] NOTE Available technical documentation of the manufacturer like 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 like for example different cable length, fixing means, colours etc., 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. **[A1]**

- c) rated voltage, in volts and rated pulse voltage, in kilovolts, if applicable;

NOTE For holders where, during dimming, i.e. reduction of the load, exceeding of the marked voltage rating is permissible (increased creepage distances and clearances), the maximum allowed value under these operating conditions should be given in the manufacturer's catalogue or the like (for example, maximum dimming voltage: ...V).

- d) rated current, in amperes (see note to Clause 5);
- e) rated operating temperature T if greater than 80 °C, in steps of 10 °C;
- f) degree of protection against ingress of dust and water, for drip-proof holders only (see 7.4);

Marking of IP20 on ordinary holders is not required;

- g) for holders protected against dust and moisture, the holder manufacturer shall indicate in his instructions the nominal diameter of the lamp(s) or starter for which the holder is intended.

Compliance is checked by inspection.

7.2 The following information, if applicable, shall either be given on the holder, or be made available in the manufacturer's catalogue or the like:

- the temperature T_m for the rearside of the holder, for holders tested according to item b) in 17.1;
- the temperature measured for the screwless terminals, for holders tested according to item b) in 17.1;
- a declaration in conformity with 9.3 of the cross-section of the conductor(s) for which the holder terminals are suitable.

Compliance is checked by inspection.

For lampholders according to this standard, the distances for impulse withstand category II are applicable. This information shall be indicated in the manufacturer's catalogue or the like.

[A1] 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. **[A1]**

7.3 The instructions supplied by the holder manufacturer or responsible vendor in order to ensure correct mounting and operation of a pair of holders for linear double-capped fluorescent lamps shall contain at least the following information:

- method of mounting. For flexibly mounted holders, it shall be clearly stated whether both or only one of the methods of mounting is intended;

A₂ NOTE A pair of flexible holders could consist of two holders each having a spring or one holder with and the second without a spring. The two methods of mounting are with and without a separate spring for flexible mounting. **A₂**

- mounting distance, with tolerance or reference to standard sheets;
- which holders shall be used as a pair;

A₂ Text deleted **A₂**

- required mounting plate thickness, if the holder is designed for screwless mounting.

The above information may be part of the manufacturer's or responsible vendor's catalogue.

Compliance is checked by inspection.

7.4 If symbols are used, these shall be as follows:

a) for electrical rating:

- volt: V
- ampere: A
- watt: W

NOTE Alternatively, for volt and ampere ratings, figures may 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 a line.

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

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

b) for operating temperature: T,

followed by the operating temperature in degrees Celsius (°C), for example T 200

c) for degrees of protection against ingress of dust or water:

- ordinary: IP20
- protected against dripping water (drip-proof): IPX1
- protected against dripping water when tilted up to 15°: IPX2
- protected against spraying water (rain-proof): IPX3
- protected against splashing water (splash-proof): IPX4
- protected against water jet (jet-proof): IPX5
- protected against the effects of immersion (watertight): IPX7
- protected against submersion (pressure watertight): IPX8
- protected against ingress of solid objects greater than 1,0 mm: IP4X
- dust-protected (dust-proof): IP5X
- dust-tight: IP6X

Where X is used in an IP number in 7.4, it is intended to indicate a missing numeral in the symbol, but both the appropriate numerals in accordance with IEC 60529 shall be marked on the holder.

d) for cross-section of conductors:

- the relevant value, or values in the case of a range, in square millimetres (mm²), followed by a small square (for example 0,5 □).

Compliance is checked by inspection.

7.5 Marking shall be suitably placed.

The marking of items a) to e) in 7.1 on holders, when installed as in normal use, shall be easily discernible, covers being removed if necessary. If item f) is marked on holders for building-in, it shall not be visible when the holder is installed as in normal use, in order to avoid the mark being applied to the complete luminaire.

Compliance is checked by inspection.

7.6 Marking shall be durable and easily legible.

A2 *Compliance is checked by inspection and, after the tests of 17.1 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 further 15 s with a piece of cloth soaked with petroleum spirit. **A2***

After the test, the marking shall still be legible.

NOTE The petroleum spirit used should consist 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 density of approximately 0,68 g/cm³.

8 Protection against electric shock

8.1 Holders shall be so designed that their live parts are not accessible when the holder has been built-in or installed and wired as in normal use and is fitted with the appropriate lamp and/or starter.

For enclosed holders, compliance is checked by means of the standard test finger shown in Figure 41. This test finger is applied in every possible position with a force of 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.

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

NOTE Unenclosed holders are only tested after appropriate installation in a luminaire or other additional enclosure.

8.2 Protection against electric shock shall be provided when the holder is installed as in normal use, both without lamp or starter, and during insertion or removal of the lamp and starter.

The insertion of only one pin of the lamp (in case of caps with more than one pin) or starter to the first point of contact shall be prevented. This requirement is not applicable to G10q holders.

A1 *In the case of side entry lampholders for linear G5, GX5 and G13 capped lamps, compliance is checked:*

- *for lampholders G5 by means of gauge II as per IEC 60061-3, standard sheet 7006-47C, and*
- *for lampholders GX5 by means of gauge II as per IEC 60061-3, standard sheet 7006-47E, and*
- *for lampholders G13 by means of gauge II as per IEC 60061-3, standard sheet 7006-60C,*

*with the gauge face touching the lampholder face **A1***

NOTE 1 A side entry holder is a holder where the cap pins enter the insertion slot(s) of the holder in a direction perpendicular to the lamp axis. For further information, see Figures C.1, C.2 and C.3.

Lampholders incorporating a rotating part shall be tested with this part in the position of normal lamp insertion.

Protection against electric shock shall be ensured when a lamp is inserted into a lampholder at an angle not greater than 5° from the axis of the normal inserted position of the lamp. This requirement does not apply to lampholders G20, Fa6, Fa8 and R17d.

NOTE For further information, see Figure C.4.

Compliance is checked as follows:

- for starterholders, by means of the standard test finger shown in Figure 41;
- for lampholders G5, by means of the gauge as per IEC 60061-3, standard sheet 7006-47A, and in conjunction with gauge II as per IEC 60061-3, standard sheet 7006-47C and the standard test finger shown in Figure 41;

NOTE To prevent electrical contact between the test finger and the metal body of gauge II, the "cap" face of the gauge is covered with insulating material, having a thickness not exceeding 0,1 mm.

- for lampholders G13, by means of the gauge II as per IEC 60061-3, standard sheet 7006-60C and the standard test finger shown in Figure 41;

NOTE 2 To prevent electrical contact between the test finger and the metal body of gauge II, the "cap" face of the gauge is covered with insulating material, having a thickness not exceeding 0,1 mm.

- A1** – for lampholders GX5, by means of the gauge as per IEC 60061-3, standard sheet 7006-47A, and in conjunction with gauge II as per IEC 60061-3, standard sheet 7006-47E and the standard test finger shown in Figure 41; **A1**
- for lampholders Fa8 and R17d, by means of a gauge having a cylindrical form with a hemispherical end radius of 5,2 mm;
- for all other lampholders, by means of the standard test finger shown in Figure 41.

8.3 Parts providing protection against electric shock shall have adequate mechanical strength and shall not work loose in normal use. It shall not be possible to remove these parts by hand.

Compliance is checked by inspection, by manual test and by the tests according to Clauses 13 and 14.

8.4 External parts of holders accessible after installation shall either be of insulating material or, if of conducting material, be adequately insulated from live parts of the holder.

Compliance is checked by inspection and by the relevant tests of this standard.

9 Terminals

9.1 Holders 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).

Compliance is checked by inspection.

9.2 Terminals shall comply with the following requirements with the restriction that the requirements referring to internal wiring relate to wiring inside independent holders and to wiring inside luminaires for holders for building-in.

All terminal tests shall be made on separate specimens which have not been subjected to any other test:

- screw type terminals shall comply with Section 14 of IEC 60598-1;
- screwless terminals shall comply with Section 15 of IEC 60598-1; however, if the resistance to heat of the lampholder has to be tested in accordance with the test in 17.1 b), then the recorded screwless terminal temperature according to 17.1 b) shall apply for the test in Section 15 of IEC 60598-1;
- tabs or pins for push-on connections shall comply with Section 15 of IEC 60598-1;
- 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 9.5.

9.3 Unless otherwise specified in Sections 14 and 15 of IEC 60598-1, terminals shall permit the connection of conductors with a cross-sectional core area from 0,5 mm² to 1,0 mm² for holders for building-in and from 1,0 mm² to 1,5 mm² for independent holders.

For lampholders exclusively designed to be built into a luminaire or other additional enclosure, deviations from this conductor size range are permitted but, in this case, the manufacturer shall state the conductor size(s) for which the terminal is designed.

NOTE It is recommended that lampholders employing spring or wedge type terminals be designed to accept connecting wires having stripped lengths ranging from a minimum of 8 mm to a maximum of 11,5 mm.

Compliance is checked by the appropriate tests in 9.2, with wires of the smallest and largest cross-sectional area fitted.

9.4 Any terminal shall be so located that the conductors can be easily introduced and connected and the cover, if any, can be fitted without any risk of damage to the conductors.

Compliance is checked by inspection and by manual test.

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

Leads shall be made of insulated conductors with a cross-sectional core area from 0,5 mm² to 1,0 mm².

Insulation of the free end of the leads may be stripped to expose the conductors.

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

Compliance is checked by inspection and by the following test which shall be made after the test in 17.1 on the same three specimens.

Each connecting lead is subjected to a pull of 50 N. The pull is applied without jerks for 1 min in the most unfavourable direction.

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

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

9.6 Hinged lampholders shall be so constructed that wiring is not damaged.

For holders intended for wiring other than with flexible conductors, compliance is checked by the following test.

The holder is fitted with solid copper wires of the appropriate required cross-sectional area and fixed on a mounting plate in its intended operating position.

On the same mounting plate, a clamping device for the conductors is provided at a distance of 50 mm to the entrance opening of the terminals. The conductors are pulled taut and marked at the entrance opening of the clamping device.

An additional wire length measuring 30 mm is added to the length marked before clamping.

The holder is then moved over 45 cycles of operation. A cycle of operation is a movement from one extreme of the range to the other and back to the starting position. If no limitation is given, 90° is taken.

After the test, the holder shall comply with the following:

- the measurement of the contact resistance shall be in accordance with Clause 13;*
- the conductor shall show no deep or sharp indentations.*

10 Construction

10.1 Wood, cotton, silk, paper and similar hygroscopic materials are not allowed as insulation unless suitably impregnated.

Compliance is checked by inspection.

10.2 Holders shall be so designed that a lamp or starter as appropriate can be easily inserted and removed, and cannot work loose due to vibration or temperature variation.

Provisions for fixing holders shall be such that the fixed part of the holder cannot be turned.

NOTE Inflexible holders could also be flexibly mounted in the luminaire so that the assembly as a whole then acts as a pair of flexible holders.

Compliance is checked by inspection and by manual test, using a commercial lamp or starter, as appropriate.

[A1] Lampholders GX5 shall only be for side entry, requiring a single entry slot as shown in Figures C.3 and C.4.

Lampholders GX5 shall be of flexible type or flexibly mounted. The maximum mounting distance between a pair of GX5 lampholders without a lamp inserted shall be based on the minimum lamp length as given in IEC 60081. This information shall be given in the lampholder manufacturer's or responsible vendor's documents. **[A1]**

10.3 Holders shall be so designed that adequate contact force is provided.

Compliance is checked by inspection and by the tests in 10.3.1 to 10.3.4, as appropriate.

A1 10.3.1 a) For bi-pin lampholders G5, GX5, G13 and G20 making contact mainly along one side of each pin of the cap, the contact force is measured with a single-ended gauge having pin dimensions and pin distances according to the following sheets of IEC 60061-3:

- for lampholders G5: 7006-47B, gauges III and V;
- for lampholders GX5: 7006-47D, gauges IV and V;
- for lampholders G13: 7006-60B, gauges III and V;
- for lampholders G20: under consideration.

The contact force is between:

- 2 N and 30 N for lampholders not providing support for the lamp pins;
- 2 N and 35 N for lampholders G5 and GX5, when the lamp pins are supported by the holder construction;
- 2 N and 45 N for lampholders G13 and G20, when the lamp pins are supported by the holder construction.

First the maximum contact force is measured with a pin distance as shown for gauge V. This is followed by measurement of the minimum contact force with the pin distance of gauge III for lampholders G5 and G13 and with the pin distance of gauge IV for lampholders GX5. **A1**

b) For G5 and G13 lampholders, where contact is made by a tubular shaped contact, the contact force is checked with single pin gauge E according to standard sheet 7006-69E of IEC 60061-3.

Each contact of the lampholder shall retain the gauge with a force of at least 0,5 N (under consideration).

The test shall be carried out after the test with the "Go" gauges as mentioned in 10.5 d).

NOTE Contact making at the pin ends is not recommended for new lamp holder designs.

c) For lampholders G20: under consideration.

A1 d) For bi-pin lampholders G5, GX5, G13 and G20 requiring a rotary motion for the insertion and removal of the lamp, the torque required shall be measured with single-ended gauges having pin dimensions and pin distances according to the following standard sheets of IEC 60061-3:

- for lampholders G5: 7006-47B, gauge V, and a second gauge of the same dimensions but with E and D changed to 2,44 mm and 4,4 mm respectively;
- for lampholders GX5: 7006-47D, gauge V, and a second gauge of the same dimensions but with E2 and D changed to 2,75 mm and 4,4 mm respectively;
- for lampholders G13: 7006-60B, gauge V, and a second gauge of the same dimensions but with E and D changed to 2,44 mm and 12,35 mm respectively;
- for lampholders G20: under consideration.

The torque required to insert the gauges until the position representing the operating position of the lamp is reached shall not exceed:

- 0,3 Nm for lampholders G5 and GX5;
- 0,5 Nm for lampholders G13 and G20.

The torque required to clear the gauges from the normal seated position shall be between:

- 0,02 Nm and 0,3 Nm for lampholders G5 and GX5;
- 0,1 Nm and 0,5 Nm for lampholders G13 and G20.

During complete removal of the gauges, the maximum values shall not be exceeded. **A1**

e) For bi-pin lampholders G5, G13, 2G13 and G20 requiring a lateral push-in motion for the insertion and the removal of the lamp, the force required is measured with single-ended gauges having pin dimensions and pin distances according to the following standard sheets of IEC 60061-3:

- for lampholders G5: 7006-47B, gauges IV and V and a third gauge of the same dimensions but with E and D changed to 2,44 mm and 4,4 mm respectively;
- for lampholders G13: 7006-60B, gauges IV and V and a third gauge of the same dimensions but with E and D changed to 2,44 mm and 12,35 mm respectively;
- for lampholders G20: under consideration.

The force required to insert and remove the gauges shall not exceed 50 N.

The force required to withdraw the gauges from the normal seated position shall be not less than 10 N.

During the torque and force testing, care should be taken that the front face of the gauges is kept parallel with the holder face.

As a preconditioning cycle, there shall be one clockwise and one anticlockwise rotation, or one insertion and withdrawal routine of each test device, before the initial measurement is taken.

In case this might influence the test results, conductors of the smallest and largest cross-sectional area for which the holder is designed are fitted to it.

10.3.2 All other lampholders shall comply with the tests of the appropriate gauges in IEC 60061-3.

10.3.3 For lampholders R17d, contact with the lamp may be made either on the ends of the lamp contacts, or on the internal surfaces of the lamp contacts, or both. The electrical contacts shall be so designed that they make and maintain electrical contact with the minimum cap gauges, and will not prevent the acceptance of the maximum cap gauges (see 10.5).

The resistance of the lampholder contacts and connections shall not exceed 0,2 Ω , when measured as follows:

- on lampholders equipped with leads, the resistance is measured between points 75 mm from where the leads come out of the holder;
- on holders without leads, it is necessary to attach leads of the minimum size for which the holder was designed (but not less than 0,75 mm² copper wire). The resistance is measured between points 75 mm from where the leads come out of the holder;
- the lamp cap used shall meet the dimensional requirements of standard sheet 7004-56 of IEC 60061-1 and shall have shorted contacts with overall resistance not in excess of 0,01 Ω ;
- the cap shall be fully seated in the holder, irrespective of the position of the plunger;
- the resistance measurement is made by the bridge method.

The force required to fully compress the spring on the compressible end shall be not less than 35 N nor greater than 90 N.

10.3.4 For starterholders making contact mainly along one side of each pin on the starter, the contact force is measured with a device made according to the dimensions of gauge A shown in Figure 11.

The contact force shall be between 2 N and 25 N.

NOTE For starterholders where the contact is made at the pin ends, a test for checking the contact force is under consideration.

If a rotary motion is necessary for the removal of the starter from the starterholder, the torque required is measured; it shall be between 0,05 Nm and 0,3 Nm.

Compliance is checked by the use of gauge A of Figure 11.

10.4 Lampholders shall be so constructed that the seating position of the lamp is clearly felt when inserting the lamp.

The method of removing the lamp from the lampholder shall be simple and obvious or, if necessary, indicated by marking.

Compliance is checked by inspection and by manual test.

10.5 Holder dimensions shall comply with IEC standards as far as they exist.

a) *Lampholders shall comply with the following standard sheets of IEC 60061-2 with regard to the dimensions of the holders:*

- 7005-50: Mounting of combined pair of inflexible lampholders G13
- 7005-51: Mounting of combined pair of inflexible lampholders G5
- 7005-55: Lampholder for tubular fluorescent lamps Fa6
- 7005-56: Lampholder for circular fluorescent lamps G10q
- 7005-57: Lampholder for recessed double contact cap R17d
- 7005-68: Lampholder GR8
- 7005-77: Lampholder GR10q
- 7005-69: Lampholder G23
- 7005-86: Lampholder GX23
- 7005-84: Lampholder GX10q
- 7005-85: Lampholder GY10q
- 7005-87: Lampholders G32, GX32 and GY32
- 7005-78: Lampholders G24, GX24 and GY24 (see Note 1 below)
- 7005-82: Lampholder 2G11
- 7005-33: Lampholder 2G13
- 7005-58: Lampholder Fa8
- 7005-123: Lampholder GU10q
- 7005-124: Lampholder GZ10q
-  7005-51A: Mounting of combined pair of lampholders GX5
- 7005-82A: Lampholder 2GX11
- 7005-115: Lampholder W4.3x8.5d
- 7005-125: Lampholder 2GX13
- 7005-131: Lampholder GRZ10d
- 7005-132: Lampholder GRZ10t
- 7005-141: Lampholder 2G8
- 7005-142: Lampholder GX53
- 7005-156: Lampholder GR14q
- 7005-160: Lampholder G28d 

NOTE 1 Lampholders G24q and GX24q, allowing insertion of lamps with keys -3 and -4 are intended for sale to luminaire or equipment manufacturers only. For such two-key lampholders, insertion of "No Go" gauges (see IEC 60061-3, sheet 7006-78F) for keys -3 and -4 is accepted.

NOTE 2 Subclause 2.3 and Annexes F and H of IEC 61199 provide background information regarding the need for keys.

- b) *Starterholder dimensions shall comply with the standard sheet shown in Figure 10.*
- c) *Starterholders intended for starters according to Annex B of IEC 60155 only shall comply with the standard sheet shown in Figure 10a.*

A1 d) *Compliance is checked as follows:*

- *For lampholders G5, GX5 and G13, with two pairs of matching holders mounted in the mounting jig shown in Figure 1 and by use of the specified gauges, that is:*
 - *for lampholders G5: "Go" gauges 7006-47C and the gauges for testing contact-making 7006-47B;*
 - *for lampholders GX5: "Go" gauges 7006-47E and the gauges for testing contact-making 7006-47D;*
 - *for lampholders G13: "Go" gauges 7006-60C and the gauges for testing contact-making 7006-60B.*
- *Lampholders which, due to their design, do not allow testing in the mounting jig, and flexibly mounted lampholders (see 2.5) shall be tested together with the relevant luminaire and by use of the above gauges adapted to the specific lamp length according to IEC 60081.*

When testing holders, the force required to insert the "Go" gauge shall not exceed:

	G5	G13
– <i>force in the direction of the lamp axis:</i>	15 N	30 N
– <i>force in the direction perpendicular to the lamp axis:</i>	<i>under consideration¹</i>	<i>under consideration</i>

When testing contact-making, the gauges are pushed in the direction of each of the holder faces in turn with a force of:

- *for lampholders G5 and GX5: 2 N;*
- *for lampholders G13: 5 N.*

When testing in the mounting jig, this force can be achieved by vertical position of the gauge:

NOTE 3 For lampholders intended for use with more than one lamp at the same time, additional mass according to the number of lamps is placed on the lampholder face.

- *for lampholders R17d, by means of the gauges shown in standard sheets 7006-57A and 7006-57B of IEC 60061-3;*
- *for lampholders Fa8, by means of the gauges shown in standard sheets 7006-58 and 7006-58G of IEC 60061-3;*
- *for lampholders 2G13, by means of the gauges shown in standard sheets 7006-33A and 7006-33B of IEC 60061-3;*
- *for all other lampholders, by means of the relevant gauges shown in IEC 60061-3;*
- *for starterholders, by means of the gauges shown in Figures 11, 12 and 13;*
- *for starterholders intended for accepting only starters for class II luminaires, dimensions V and W indicated in Figure 10a are measured in addition.*

The manufacturer's mounting instructions shall show all information necessary for the correct mounting of the holders.

For (multi-key) lampholders G24q and GX24q, allowing insertion of lamps with keys –3 and –4, the lampholder manufacturer's documents shall include a warning notice about the restricted application, stating that these holders may only be used with ballasts which are approved for the operation of lamps with keys –3 and –4 (multilamp ballast).

NOTE 4 It is essential that the relevant safety and performance requirements are met with every lamp key. **A1**

1) Not applicable for lampholders where the final seating position of the cap within the holder is reached without an additional turning motion. These holders are already tested under 10.3.1 with single-ended gauges.

10.6 Contact-making in the area of crimp zones on single-capped fluorescent lamps as defined in the appropriate cap datasheet of IEC 60061-1 shall only be allowed on the condition that contacts acting on both sides of the lamp contact pin, opposing each other, are used and at least one part of the holder contact is always in contact with the non-crimped side of the lamp contact.

The lampholder contact shall be so designed that it cannot intrude into the crimp of the lamp pin and thus hamper removal of the lamp.

NOTE Due to flexibility in manufacturing, no-crimp zones on cap contacts in IEC 60061-1 are mostly defined symmetrically. However, crimping in practice is only done on one side as to maintain required minimum pin diameter.

10.7 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.

11 Resistance to dust and moisture

11.1 In the case of holders provided with IP code marking, the enclosure shall provide the degree of protection against dust or moisture in accordance with the classification of the holders after installation.

Compliance is checked by testing in accordance with the relevant requirements of IEC 60598-1 appropriate to the holder marking.

The insulation resistance and electric strength are checked in accordance with Clause 12.

A1 *The holders are mounted as in normal use and fitted either with test probes of minimum and maximum diameter according to Figure 46 for which the holders are designed or, if available, with lamps of the smallest and largest diameters as required by Figure 46.*

Before the test, the holders are heated and brought to a stable operating temperature either by operating the lamp or with the test probes by heating within the heating cabinet at a temperature according to the T-marking or Tm-marking of the holder.

NOTE This test is for type test approval of the lampholder only and does not replace luminaire testing. **A1**

11.2 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) for holders classified IPX0;
- seven days (168 h) for all other holders.

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

12 Insulation resistance and electric strength

12.1 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 and by an electric strength test according to 12.3 made immediately after the humidity treatment in the humidity cabinet or the room in which the holder was brought to the prescribed temperature.

12.2 *The insulation resistance is measured with a d.c. 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
Between live parts of different polarity	2 ^a
Between live parts and external metal parts, including fixing screws and metal foil covering external parts of insulating material	2
^a Between the lamp contacts of lampholders, the insulation resistance shall, however, be not less than 0,5 MΩ.	

For holders designed for use in class II luminaires, compliance is checked in accordance with the conditions of Section 10 of IEC 60598-1 when the luminaire is complete with the lamp(s) and starter(s) inserted.

12.3 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 a.c. voltage of substantially sinewave form, with a frequency of 50 Hz or 60 Hz and with an r.m.s. value as follows:

- *between the lamp contacts of lampholders, the electric strength test voltage is 500 V;*
- *for all other cases, the electric strength test voltage is equal to (2 U + 1 000) V (where U is the rated voltage).*

[A1] – *for enclosed and unenclosed reinforced insulated lampholders, the test voltage shall be determined from Table 10.2 of IEC 60598-1. [A1]*

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.

The high voltage transformer used for the test should 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 $\pm 3\%$

Glow discharges without drop in voltage are ignored.