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British Standard Specification for Edison screw lampholders

Douilles à vis Edison pour lampes

Lampenfassung mit Edisongewinde

This European Standard EN 60 238 has the status of a British Standard

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National foreword

This revision of this British Standard has been prepared under the direction of the Electrical Illumination Standards Policy Committee and supersedes BS 6776 : 1986 which is withdrawn. It implements the English language version of EN 60 238 which is identical with IEC Publication 238 : 1987 'Edison screw lampholders', published by the International Electrotechnical Commission (IEC) as modified by CENELEC common modifications. For the sake of clarity, these common modifications have been incorporated at the appropriate places in the text of IEC 238 (1987); they are marked by a vertical line at the left-hand margin. The relevant parts of the original IEC text have been quoted as 'INFORMATION' directly after the text of the common modifications.

Cross-references. Details of other international publications quoted in this standard are given in annex ZA. Where there are British Standards either identical or technically equivalent to these international standards the relationship is given in national appendix X.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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Key words: Edison screw holders; dimensions; requirements; testing; definitions; switches

English version

Edison screw lampholders

(IEC 238 (1987) ed 4, modified)

Douilles à vis Edison pour lampes
(CEI 238 (1987) ed 4, modifiée)

Lampenfassungen mit Edisongewinde
(IEC 238 (1987) ausg. 4, modifiziert)

This European Standard was ratified by CENELEC on 1 March 1989. CENELEC members are bound to comply with the requirements of the 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 CENELEC Central Secretariat or to any CENELEC member.

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

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CENELEC

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

Central Secretariat: Rue Bréderode 2, B-1000 Brussels

Brief history

The CENELEC Questionnaire Procedure performed for finding out whether or not IEC 238 (4th edition - 1987) could be accepted without textual changes, has shown that some common modifications were necessary for the acceptance as European Standard (EN). The Reference Document was submitted to the CENELEC members for formal vote and acceptance by CENELEC.

Technical text

The text of the International Standard IEC 238 (4th edition - 1987) modified by common modifications of technical nature was approved by CENELEC on 1 March 1989 as European Standard.

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given only for information.

In this standard, Annex ZA is normative.

The following dates were fixed:

date of announcement (doa)	: 1989-09-01
date of latest publication (dop)	: 1990-03-01
date of withdrawal of conflicting national standard (dow)	: 1990-03-01

This European Standard supersedes EN 60 238, February 1986 and Amendment 1 to EN 60 238, April 1988.

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INFORMATION as to original IEC text:

The Foreword of IEC 238 (1987) is not part of this European Standard. Annex ZA (normative) is not included in IEC 238 (1987).

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EDISON SCREW LAMPHOLDERS

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by Sub-Committee 34B: Lamp Caps and Holders, of IEC Technical Committee No.34: Lamps and Related Equipment.

This standard forms the fourth edition of IEC Publication 238 and replaces the third edition (1982) and Amendment No.1 (1985).

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

Six Months' Rule	Reports on Voting
34B(CO)481	34B(CO)516
34B(CO)482	34B(CO)517
34B(CO)483	34B(CO)518

Full information on the voting for the approval of this standard can be found in the Voting Reports indicated in the above table.

In this standard, the following print types are used:

- requirements proper: in roman type;
- test specifications: in italic type;
- explanatory matter: in smaller roman type.

The following IEC publications are quoted in this standard:

- Publications Nos. 61: Lamp Caps and Holders together with Gauges for the Control of Interchangeability and Safety.
- 61-1: Part 1: Lamp Caps.
 - 61-2: Part 2: Lampholders.
 - 61-3: Part 3: Gauges.
 - 227: Polyvinyl Chloride Insulated Cables of Rated Voltages up to and Including 450/750 V.
 - 245: Rubber Insulated Cables of Rated Voltages up to and Including 450/750 V.
 - 328 (1972): Switches for Appliances.
 - 529 (1976): Classification of Degrees of Protection Provided by Enclosures.
 - 598-1 (1986): Luminaires, Part 1: General Requirements and Tests.
 - 695-2-1 (1980): Fire Hazard Testing, Part 2: Test Methods, Glow-wire Test and Guidance.
 - 695-2-2 (1980): Fire Hazard Testing, Part 2: Test Methods, Needle-flame Test.

EDISON SCREW LAMPHOLDERS

1. Scope

This standard applies to lampholders with Edison thread E14, E27 and E40, designed for connection to the supply of lamps and semi-luminaires* only.

It also applies to switched-lampholders for use in a.c. circuits only, where the working voltage does not exceed 250 V r.m.s.

This standard also applies to lampholders with Edison thread E10 designed for connection to the supply of series-connected lamps with a rated voltage not exceeding 60 V, to be used indoors or outdoors.

As far as it reasonably applies, this standard also covers lampholders other than lampholders with Edison thread designed for connection of series-connected lamps to the supply.

This type of lampholder is for example used in Christmas-tree lighting chains.

As far as it reasonably applies, the standard also covers lampholders which are, wholly or partly, integral with a luminaire or intended to be built into appliances. Independent lampholders, e.g. back-plate lampholders, not specifically intended for building-in, are also tested as luminaires.

This standard applies to lampholders to be used indoors or outdoors in residential as well as in industrial lighting installations. It also applies to candle lampholders. In locations where special conditions prevail, as for street lighting, on board ships, in vehicles and in hazardous locations, e.g. where explosions are liable to occur, special constructions may be required.

This standard does not apply to three-light lampholders E26d.

This standard is based on the following data relative to lamps for general lighting service:

- caps E14 are used for lamps with a current not exceeding 2 A;
- caps E27 are used for lamps with a current not exceeding 4 A;
- caps E40 are used for lamps with a current not exceeding 16 A.

If the nominal voltage of the supply does not exceed 130 V, the maximum current for caps E40 is 32 A (see Sub-clauses 4.5 and 5.3).

The tests described in this standard are based on the normal use of general lighting service lamps, the caps of which have a temperature rise not exceeding:

- for lampholders without temperature marking:

110°C for E14 caps;
140°C for E27 caps;
200°C for E40 caps;

- for lampholders with temperature marking:

the marked temperature minus 25°C.

* Requirements for lampholders suitable for semi-luminaires are under consideration.

2. Definitions

For the purposes of this standard the following definitions apply. For clarification of some definitions see also Figure 20.

2.1 *Cord-grip lampholder*

A lampholder incorporating a method of retaining a flexible cord by which it may then be suspended.

2.2 *Threaded entry lampholder*

A 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 (formerly called nipple lampholder).

2.3 *Backplate lampholder*

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

2.4 *Lampholder for building-in*

A lampholder designed to be built into a luminaire, an additional enclosure or the like.

2.4.1 *Unenclosed lampholder*

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

2.4.2 *Enclosed lampholder*

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

2.5 *Independent lampholder*

A lampholder 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.

2.6 *Terminal/contact assembly*

A part or assembly of parts which provide(s) a means of connection between the termination of a supply conductor and the contact making surfaces of the corresponding lamp cap.

2.7 *Outer shell*

A cylindrical component protecting the user from contact with the lamp cap. It may or may not be provided with an external screw thread for fixing a shade ring.

2.8 *Screw shell*

A cylindrical component having an internal screw thread of Edison form for the retention of the corresponding lamp (cap). In some constructions, the screw shell is permanently fixed to or integral with the outer shell.

2.9 *Insulating ring*

A cylindrical intermediate piece of insulating material separating a metal screw shell and a metal outer shell.

2.10 *Shade ring*

A 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.

2.11 *Dome*

A part of a cord-grip lampholder or threaded entry lampholder which shields the connecting terminals.

2.12 *Basic insulation*

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

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

2.13 *Supplementary insulation*

An 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.

2.14 *Double insulation*

An insulation comprising both basic insulation and supplementary insulation.

2.15 *Reinforced insulation*

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

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.

2.16 *Live part*

A conductive part which may cause an electric shock.

2.17 *Type test*

A 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.

2.18 *Type test sample*

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

2.19 *Semi-luminaire*

A unit similar to a self-ballasted lamp but designed to utilize a replaceable light source and/or starting device.

3. General requirement

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

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

In addition, independent lampholders shall comply with the appropriate requirements of IEC Publication 598-1.

4. General conditions for tests

4.1 *Tests according to this standard are type tests.*

4.2 *Unless otherwise specified, the tests are made at an ambient temperature of $20 \pm 5^\circ\text{C}$ and with the holder tested as delivered and installed as in normal use.*

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

- nine specimens for non-switched lampholders, or*
- twelve specimens for switched lampholders,*

in the following order of clauses:

- three specimens: Clauses 1 to 12 (except for Sub-clause 10.2) and 14 to 17;*
- three specimens: Clause 13 (switched-lampholder tests only);*
- three specimens: Clauses 18 and 19;*
- two specimens: Clause 20 (of which one specimen for the test of Sub-clause 20.1 and the other for the tests of Sub-clauses 20.3 or 20.4);*
- one specimen: Sub-clause 20.5 and Clause 21.*

For testing of screwless terminals according to Sub-clause 10.2, separate specimens are required in addition.

4.4 *In case of doubt, gauges, test caps and mandrels are introduced into the specimens, unless otherwise specified, by applying the following torques:*

- 0.2 Nm for lampholders E10;*
- 0.2 Nm for lampholders E14;*
- 0.4 Nm for lampholders E27;*
- 0.8 Nm for lampholders E40.*

4.5 *For lampholders E40 with a rated current of 32 A, the tests shall be based on this rated current.*

4.6 *Lampholders are deemed to comply with this standard if no specimen fails in the complete series of tests specified in Sub-clause 4.3.*

If one specimen fails in one test, that test and the preceding ones which may have influenced the result of that test are repeated on another set of specimens to the number required by Sub-clause 4.3, all of which shall then comply with the repeated tests and with the subsequent tests. Lampholders are deemed not to comply with this standard if there are more failures than one.

In general, it will only be necessary to repeat the relevant test unless the specimen fails in the tests according to Clauses 18 and 19, or if failure occurs with regard to resilient side or central contact(s); in these cases, both tests are repeated with a second set of three specimens.

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

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

5. Standard ratings

5.1 Standard rated voltages are: 250 V, 500 V and 750 V.

For lampholders E10 and E14, and for switched lampholders E27, a rated voltage of 250 V only is allowed.

The rated voltage shall be not less than 250 V, an additional rated voltage of 125 V being allowed for lampholders E40.

Compliance is checked by inspection of the marking.

5.2 Standard rated currents are:

- 0.5 A, for lampholders E10;
- 2 A, for lampholders E14;
- 0.5 A, for lampholders (with or without switch) intended for use in refrigerators and food freezers. For such lampholders replacement of the rated current by the rated wattage of the lamp is also allowed; the choice shall be made between 10 W, 15 W and 25 W”.
- 2 A, for switched-lampholders E27;
- 4 A, for other lampholders E27;
- 16 A, for lampholders E40.

The rated current shall be not less than the standard value

Compliance is checked by inspection of the marking.

5.3 Lampholders E40 to be used on 125 V* installations may have an additional nominal rating of 32 A.

* This nominal rating covers the voltages up to and including 130 V.

Compliance is checked by inspection of the marking.

5.4 The rated operating temperature for lampholders intended for use in high temperature conditions (T marked holders) shall be not lower than 140°C for E14 lampholders, not lower than 170°C for E27 lampholders and not lower than 230°C for lampholders E40.

The values of the temperature marking shall be increased by steps of 10°C.

Compliance is checked by inspection of the marking.

For lampholders intended to be installed in a refrigerated compartment of refrigerators and food freezers, a rated operating temperature lower than 80 °C is not allowed. For lampholders intended to be installed outside a refrigerated compartment, the existing values of IEC 238 apply.

6. Classification

Lampholders are classified:

6.1 According to the material of the external parts:

- lampholders of insulating material;
- metal lampholders.

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 (see Sub-clause 12.3).

This does not apply to threaded entries and external parts, as for example a metal shade ring mounted onto the outside of a lampholder of insulating material, which cannot become live even in the case of an insulation fault. Metal holders with insulating coverings are considered as metal lampholders (see Sub-clause 9.4).

In order to check 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 Sub-clause 14.3, the insulating resistance is measured between the stripes. The surface is considered to be conductive if the resistance is less than 5 MΩ.

6.2 According to degree of protection against ingress of water:

- ordinary lampholders;
- drip-proof lampholders.

6.3 According to method of fixing:

- threaded entry lampholders;
- cord-grip lampholders;
- backplate lampholders;
- other lampholders.

Examples of other lampholders are suspension lampholders not being threaded entry lampholders.

6.4 According to type:

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

6.5 According to protection against electric shock:

- unenclosed lampholders;
- enclosed lampholders;
- independent lampholders.

7. Marking

7.1 Lampholders, other than lampholders E10, shall be marked with:

- rated current, in amperes;
- rated current, in amperes;
In case of lampholders intended for use in refrigerators and food freezers the marking with the rated wattage of the lamp instead is allowed.
If no marking of the rated wattage is provided on such holders, it shall be accompanied by the relevant manufacturer's instructions.
If marking of the rated wattage is provided, it shall be so placed that it cannot be confused with the wattage marking in the refrigerator.”
- symbol for nature of current, if required. (for switched lampholders only);
- mark of origin (this may take the form of a trade mark, manufacturer's identification mark or the name of the responsible vendor);
- type reference;
- the degree of protection against ingress of water for drip-proof lampholders (see Sub-clause 7.2);

- rated operating temperature “T”, indicating the highest operating temperature, if applicable.
- In case of lampholders intended for use in a refrigerated compartment of refrigerators and food freezers, the minimum temperature to which the lampholders can be subjected (e.g. -30°C).
The marking of the rated operating temperature is not required for lampholders the exterior of which is made wholly of ceramic material. For these lampholders, this information, if applicable, shall either be marked on the lampholder or be made available in the manufacturer's catalogue.

Lampholders E10 shall be marked with:

- mark of origin;
- type reference;
- the degree of protection against ingress of water, if applicable.

Compliance is checked by inspection.

1. The type reference may be a catalogue number.

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

Alternatively, 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 a line.

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

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

The symbol for d.c. shall be ===.

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

The letter T shall be followed by the value of the rated operating temperature in degrees Celsius.

Compliance is checked by inspection.

7.3 The marking of the degree of protection against ingress of water shall be on the outside of the holder.

Compliance is checked by inspection.

7.4 An earthing terminal shall be indicated by the symbol $\perp$. This symbol shall not be placed on screws, removable washers or other easily removable parts.

Compliance is checked by inspection.

7.5 Marking shall be durable and easily legible.

Compliance is checked by inspection and, after the tests of Clause 19 have been completed, by trying to remove the marking by rubbing lightly for 15 s with a piece of cloth soaked with water and for a further 15 s with a piece of cloth soaked with petroleum spirit.

After the test, the marking shall still be legible.

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 specific density of approximately 0.68 g/cm³.

8. Dimensions

8.1 Lampholders E14, E27 and E40 shall comply with the current edition of the standard sheets of IEC Publication 61.

Compliance is checked, on one hand, by measuring in conformity with the current edition of IEC Publication 61-2, Standard Sheet 7005-20, the dimension X being checked by means of the gauges according to Figure 1, the screw thread of which is in accordance with the IEC standard sheets, screw dimensions for caps, and on the other hand with the aid of gauges according to the current edition of Standard Sheets 7006-25 and 7006-26 of IEC Publication 61-3.

8.2 Lampholders shall allow insertion of all corresponding lamps so as to make contact.

Compliance is checked by means of gauges according to the current edition of the following standard sheets of IEC Publication 61-3 and according to the indications of these sheets:

- lampholders E14: 7006-30 and 7006-31;
- candle lampholders E14: 7006-30A and 7006-31;
- lampholders E27: 7006-21 and 7006-22A;
- lampholders E40: 7006-23 and 7006-24.

Pending gauges for lampholders E10, the contact-making is checked by means of the corresponding lamps. It is presumed that the manufacturer of the lampholder for the purpose of the test delivers the lamps for which the lampholder is intended.

The checking of contact-making is done on lampholders as delivered and after the tests of Clause 18 and Sub-clause 19.2.

8.3 The following dimensions shall be not less than the values shown in the table:

	E10 (mm)	E14 (mm)	E27 (mm)	E40 (mm)
Thickness of the screw shell, if any:				
– when the shell is unsupported	0.20	0.30	0.30	0.50
– when the shell is supported by insulating material over a total distance of at least three-quarters of the circumference of the shell	0.15	0.25	0.25	0.40
Thickness of side or central contacts, if resilient	0.18	0.28	0.38	0.48*

* For the use of side-contacts in lampholders E40, see Sub-clause 12.11.

Compliance is checked by measurement.

Thicknesses are measured by means of a micrometer with pointed noses and ratchet screw.

For the screw shell, two sets of three measurements are made, each set carried out on one of two different generating lines of the screw shell. The mean value of the six measurements is at least equal to the specified value.

The deletion of dimensional requirements is under consideration.

8.4 The effective length of screw engagement, if any, of outer shell and dome shall meet one of the following requirements whereby the engagement shall always be over one full turn:

– either the effective length shall be not less than the values shown in the following table:

	E14 (mm)	E27 (mm)	E40 (mm)
Metal lampholders:			
for rolled thread	5.0	7.0	10.0
for cut thread	5.0	5.0	7.0
Lampholders of insulating material	5.0	7.0	10.0

– or the effective length shall be at least two turns provided the test according to Sub-clause 15.3 is withstood with a torque equal to 1.2 times the torque given in Sub-clause 15.2.

These requirements do not apply to lampholders E10.

Compliance is checked by measurement.

8.5 The threaded entries of lampholders shall be provided with one of the following screw threads:

- lampholders E14: M10×1;
- lampholders E27: M10×1, M13×1 or M16×1;
- lampholders E40: M13×1, M16×1 or (G3/8A).

The size between brackets is non-preferred; in addition, the threaded entry M10 is mainly intended for internal wiring of luminaires.

The thread of the entry shall comply with Figures 2a or 2b.

These requirements do not apply to lampholders E10.

Compliance is checked by measurement and by means of gauges according to Figures 3a or 3b.

In case of doubt, the gauge is introduced into the entry by applying a torque of 0.5 Nm.

- 8.6 The dimensions of threaded entries and set screws, if any, shall be not less than the values shown in the following table:

Nominal thread diameter	M10×1 M13×1 (mm)	M16×1 G3/8 A (mm)
Length of thread:		
metal entry	3	8
entry of insulating material	5	10
Diameter of set-screw:		
screw with head	2.5	3.0
screw without head		
– in case of one screw	3.0	4.0
– in case of more than one screw	3.0	3.0

A negative deviation of 0.15 mm from the nominal values for thread diameter is allowed.

Compliance is checked by measurement.

These requirements do not apply to lampholders E10.

If it is necessary to take the lampholder apart in order to check compliance with the requirements under Sub-clauses 8.3 to 8.6, such checking is done after the test of Clause 17.

- 8.7 Lampholders shall be so designed that they do not interfere with the proper engagement or disengagement of lamps, even if the lamp cap is slightly dented. In no case shall the holder contacts present a cutting edge to the lamp cap.

Compliance is checked by the following test:

A commercial lamp is screwed in and out of the lampholder three times with the same torque as specified in Clause 18. Inspection after the completion of this test shall show that the lamp cap has not been damaged.

Lamp caps are considered to be damaged if they show surface scratches or incisions which could eventually lead to jamming of the cap in the lampholder.

- 8.8 Deviations from the standard dimensions are allowed only if they provide a special technical advantage and do not interfere with the purpose of lampholders and lamps in accordance with the standard dimensions.

In particular, care should be taken, however, that the bulb neck of lamps is not scored. This implies *inter alia* that the requirement for the contact-making gauges should always apply.

Lampholders with such deviations shall comply with all the requirements of this standard as far as they reasonably apply.

9. Protection against electric shock

- 9.1 Lampholders E10, E14 and E27 shall be so designed that the lamp caps are not accessible when they become live during insertion.

Details for checking compliance regarding protection against accidental contact during insertion for lampholders E10 are under consideration.

Lampholders E40 shall be so designed that the lamp cap is not accessible when fully inserted.

Candle lampholders are tested without decorative cover, unless this cover cannot be removed without making the lampholders obviously useless.

Compliance is checked as follows:

- For lampholders E10, by means of corresponding lamps and the standard test finger, shown in Figure 18. For the purpose of the test, the lampholder manufacturer shall provide the lamps for which the lampholder is intended.
- For lampholders E14, E27 and E40, by means of gauges according to the current edition of the following standard sheets of IEC Publication 61-3:
 - 7006-31 for lampholders E14;
 - 7006-22A for lampholders E27;
 - 7006-24 for lampholders E40.

- 9.2 The external parts of enclosed and independent lampholders shall be so designed that live parts of the lampholder ready for use and with a corresponding normal lamp inserted are not accessible.

Candle lampholders are tested without decorative cover, unless this cover cannot be removed without making the lampholder obviously useless.

Compliance is checked by means of the standard test finger. For the purpose of the test:

- Enclosed lampholders are mounted as in normal use, for example on a threaded support, or the like, if appropriate, and provided with the most unfavourable conductor size fitted for which the lampholders are intended.
- Independent lampholders shall be mounted as in normal use on an appropriate plane surface.

The standard test finger shown in Figure 18 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.

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

- 9.3 Parts providing protection against accidental contact with the lamp cap shall be reliably secured so that they will not become detached when a tightly fitting lamp is removed, or when rotating the shade, if applicable.

Compliance is checked by the following test:

The coupling between dome and outer shell is tightened initially with a torque equal to two-thirds of the torque test value specified below. The relevant parts are then subjected to a torque during 1 min in an anti-clockwise direction with the following test values:

- 1 Nm for lampholders E14;
- 2 Nm for lampholders E27.

The lampholder is mounted as in normal use and is tested first with and then without the appropriate test cap A according to Figure 15 or Figure 16.

After the test, the parts providing protection against accidental contact with the lamp cap shall not have become dismantled.

It shall not be possible to dismantle lampholders E10 without the aid of a tool.

Requirements for lampholders E40 are under consideration.

- 9.4 Where provision is made for attaching a shade to the lampholder, it is fitted to the lampholder by separate means, such as a shade ring; it is not permitted to fix a shade between parts providing protection against electric shock.

Compliance is checked by inspection.

- 9.5 The external parts of:

- drip-proof lampholders;
- lampholders with a rated voltage of more than 250 V;
- switched-lampholders, and
- lampholders E10

shall be of insulating material, with the exception of threaded entries and of those parts which cannot become live even in the event of a fault.

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

Compliance is checked by inspection.

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

An example of an external part which cannot become live, even in the event of a fault, is a metal shade ring mounted on the outside of an insulated lampholder.

Switched-lampholders with external metal parts are permitted under the conditions of Sub-clause 12.3.

10. Terminals

- 10.1 Lampholders, other than those provided with connecting leads (tails), shall be provided with terminals which allow connection of conductors having the following nominal cross-sectional areas:

- 0.5 mm² to 0.75 mm² for lampholders E10;
- 0.5 mm² to 1.0 mm² for lampholders E14 and lampholders E27 with M10×1 threaded entry;
- 0.5 mm² to 2.5 mm² for other lampholders E27;
- 1.5 mm² to 4 mm² for lampholders E40 with a rated current of 16 A;
- 2.5 mm² to 6 mm² for lampholders E40 with a rated current of 32 A.

Compliance is checked by inspection and by fitting conductors of the smallest and largest cross-sectional area specified. For cord-grip lampholders, lampholders E10, E14 and lampholders E27 with M10×1 threaded entry, stranded conductors are used; in all other cases the conductors are of the solid type.

Threaded entry lampholders are to be tested on a screwed conduit.

Lampholders E27 with screwless terminals intended for use by luminaire or equipment manufacturers only need not fulfil the requirements for all the appropriate nominal cross-sectional areas.

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

Terminals screws shall have a metric (ISO) thread or a thread comparable in pitch and mechanical strength.

Compliance is checked by inspection and by measurement, and in addition, by the tests of Sub-clauses 10.1 and 16.1.

Conductors may also be connected to E10 and similar small lampholders by soldering, welding, crimping or other equally effective means.

Lampholders, unless intended for sale to luminaire or other equipment manufacturers only, may have to be provided with terminals which will be equally satisfactory with both rigid (solid or stranded) conductors and flexible cables or cords.

Screwless terminals are considered equivalent to screw terminals when complying with Section Fifteen of IEC Publication 598-1, subject to the following electrical test amendments of Sub-clauses 15.6 or 15.9:

Terminals and connections already subjected to the contact resistance test are placed in a heating cabinet, which shall initially be at a temperature of $20 \pm 5^\circ\text{C}$.

During the test, a current equal to the test current is passed.

The whole test arrangement including the conductors is not moved until all the voltage drop tests have been completed.

The terminals are then subjected to 100 temperature cycles, each cycle having a duration of approximately 1 h, as follows:

The temperature in the cabinet is raised in approximately 20 min to the test temperature specified in Sub-clause 19.2.

It is maintained within $\pm 5^\circ\text{C}$ of this value for 10 min. The terminals are then allowed to cool down, in approximately 20 min, to a temperature between 20°C and 30°C , forced cooling being allowed; they are kept at this temperature for approximately 10 min and, if necessary for measuring the voltage drop, are allowed to cool down further to a temperature of $20 \pm 5^\circ\text{C}$.

The voltage drop in each terminal is also determined, after each of the 25 temperature cycles and after the 100 temperature cycles have been completed, each time at a temperature of $20 \pm 5^\circ\text{C}$.

In no case shall the voltage drop exceed 22.5 mV.

If one of the terminals does not withstand this test, the test is repeated on a second set of terminals all of which shall then comply with the repeated test.

The temperature in the heating cabinet is measured at a distance of at least 50 mm from the sample assemblies.

The total voltage drop of two inseparable joints, when measured together, shall not exceed twice the value specified above.

If a terminal is so designed that the conductor is tightened against a surface of insulating material, this surface shall not be deformed in such a way that compliance with the requirements of Sub-clause 16.3 is impaired.

10.3 Terminals shall be fixed in such a way that they will not work loose when fastening or loosening the conductors.

For screw terminals, compliance is checked by inspection and by fastening and loosening a conductor of the largest cross-sectional area specified in Sub-clause 10.1 ten times, the applied torque being two-thirds of the torque specified in Sub-clause 16.1.

Terminals may be prevented from working loose by fixing with one screw in a recess without appreciable play, or by other suitable means. Covering with sealing compound without other means of locking is not deemed to be sufficient.

- 10.4 Screw terminals shall be so designed that they clamp the conductor between metal surfaces with sufficient contact pressure and without damage to the conductor. Terminals shall be so designed that they will prevent a conductor slipping out when the screws or nuts are tightened. They shall allow a conductor to be connected without special preparation (e.g. soldering of the strands of the conductor, use of cable lugs, formation of eyelets, etc.).

Compliance is checked by inspection of the conductors after fitting according to Sub-clause 10.1 and after the test of Sub-clause 19.3.

The conductors are considered to be damaged if they show deep or sharp indentations.

- 10.5 Terminals of the pillar type shall have dimensions not less than those shown in the following table:

Lampholder	Nominal thread diameter (mm)	Diameter of hole for conductor (mm)	Length of thread in pillar (mm)
E10	2.5	2.5	1.8
E14	2.5	2.5	1.8
E27	2.5	2.5	1.8
E40	3.5	3.5	2.5

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.

The length of the thread of the pillar is measured to the point where the thread is broken by the pillar hole.

Compliance is checked by measurement.

- 10.6 Screw terminals shall have dimensions not less than those shown in the following table:

Lampholder	Nominal thread diameter (mm)	Length of thread under the head (mm)	Length of thread in nut (mm)	Nominal difference between diameter of head and shank of screw (mm)	Height of head of screw (mm)
E10	2.5	4.0	1.5	2.5	1.4
E14	3.0	5.0	1.5	3.0	1.8
E27	3.5	5.0	1.5	3.5	2.0
E40	4.0	6.0	2.5	4.0	2.4

INFORMATION as to original IEC text.

There is an asterisk against 3.0 mm nominal thread diameter and a note under the table which reads:

* In some countries, the nominal value is 2.8 mm.

If an intermediate part locked against rotation, such as a washer or a pressure plate, is used between the head of the screw and the conductor, the difference in diameter between head and shank of the screw may be reduced by 1 mm.

Compliance is checked by measurement.

A negative deviation of 0.15 mm from the nominal values of the thread diameter and of the difference in diameter of head and shank is allowed.

If it is necessary to take the lampholder apart in order to check compliance with the requirements under Sub-clauses 10.5 and 10.6, such checking is done after the test of Clause 17.

- 10.7 Terminals shall be so located that, after correct fitting of the wires, there is no risk of accidental contact between live parts or between such parts and accessible metal parts.

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 Sub-clause 10.1. 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 not a live part, and that of a conductor connected to the earthing terminal shall not touch any live part.

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

The prohibition against making sharp bends around barriers does not imply that the free wire shall be 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. See also Sub-clause 12.3.

- 10.8 Pillar terminals in which the end of the conductor is not visible shall have a length of hole beyond the terminal screw at least equal to half the value of the diameter of the screw or 2.5 mm, whichever is the higher.

Compliance is checked by measurement.

- 10.9 Terminals which are floating shall show no appreciable lateral play and shall not move longitudinally more than 3 mm when a lamp is removed or inserted.

Compliance is checked by measurement.

- 10.10 The requirements of Sub-clauses 10.2 to 10.6 inclusive and of Sub-clause 10.8 do not apply to lampholders intended to be factory-mounted in luminaires and which are provided with connecting leads (tails).

Lampholders intended to be factory-mounted in luminaires or built into equipment may be provided with connecting leads (tails), tab-terminals or equally effective means.

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

Leads shall consist of insulated conductors.

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 Sub-clause 19.2 on the same three specimens.

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

During the test leads shall not move from their fixing.

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

11. Provision for earthing

- 11.1 Threaded entry lampholders, cord-grip lampholders and backplate lampholders, with provisions for earthing, other than those provided with connecting leads, shall have at least one internal earthing terminal; other lampholders without threaded entry, for example, lampholders for building-in, may be provided with an external earthing terminal.

Compliance is checked by inspection.

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

Compliance is checked by inspection.

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

- 11.3 Earthing terminals shall comply with the requirements of Clause 10.

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

Compliance is checked by inspection and by the tests of Clause 10.

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

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

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

Compliance is checked by inspection.

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

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

Compliance is checked by inspection.