

BS EN 60598-2-20:2010



BSI Standards Publication

Luminaires

Part 2-20: Particular requirements —
Lighting chains



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National foreword

This British Standard is the UK implementation of EN 60598-2-20:2010. It was derived by CENELEC from IEC 60598-2-20:2010. It supersedes BS EN 60598-2-20:1998, which will be withdrawn on 1 April 2013.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by tags (e.g.  ).

The UK participation in its preparation was entrusted by Technical Committee CPL/34, Lamps and Related Equipment, to Subcommittee CPL/34/4, Luminaires.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Amendments/corrigenda issued since publication

Date	Text affected
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English version

**Luminaire -
Part 2-20: Particular requirements -
Lighting chains
(IEC 60598-2-20:2010)**

Luminaire -
Partie 2-20: Règles particulières -
Guirlandes lumineuses
(CEI 60598-2-20:2010)

Leuchten -
Teil 2-20: Besondere Anforderungen -
Lichtketten
(IEC 60598-2-20:2010)

This European Standard was approved by CENELEC on 2010-04-01. 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.

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CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 34D/946/FDIS, future edition 3 of IEC 60598-2-20, prepared by SC 34D, Luminaires, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote.

A draft amendment prepared by the Technical Committee CENELEC TC 34Z, Luminaires and associated equipment and was simultaneously submitted to the formal vote.

The combined texts were approved by CENELEC as EN 60598-2-20 on 2010-04-01.

This European Standard supersedes EN 60598-2-20:1997 + A1:1998 + A2:2004.

This standard is to be used in conjunction with EN 60598-1:2008.

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) 2011-01-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2013-04-01

Annexes ZA and ZB have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60598-2-20:2010 was approved by CENELEC as a European Standard with agreed common modifications.

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60238 + A1	2004 2008	Edison screw lampholders	EN 60238 + corr. January + A1	2004 2005 2008
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-
IEC 60598-1 (mod)	2008	Luminaires - Part 1: General requirements and tests	EN 60598-1 + A11	2008 2009
IEC 60811-3-1 + A1 + A2	1985 1994 2001	Common test methods for insulating and sheathing materials of electric cables - Part 3: Methods specific to PVC compounds - Section 1: Pressure test at high temperature - Tests for resistance to cracking	EN 60811-3-1 + A1 + A2	1995 1996 2001
IEC 61184	-	Bayonet lampholders	EN 61184	-
IEC 61347-2-11	2001	Lamp controlgear - Part 2-11: Particular requirements for miscellaneous electronic circuits used with luminaires	EN 61347-2-11 + corr. January	2001 2002

Annex ZB (normative)

Requirements for Edison screw lampholders E5 and E10 and similar small lampholders of the push-in type

This annex consists of modifications to EN 60238:2004 + A1:2008 to cover Edison screw lampholders E5 and E10 and similar small lampholders of push-in type.

1.1 Add at the end of the 3rd paragraph:

It also applies to push-in lampholders, where applicable.

9.1 In the 1st line of the test specification **add** "E5 and" before "E10".

15.9 Replace the 2nd paragraph of the test by:

The backplate of lampholders shall be fixed by means of screws to a rigid flat steel sheet as follows:

- 3 mm screws for lampholders E10;
- 4 mm for lampholders other than E10.

This sheet shall have two drilled and tapped holes at a distance equal to the distance between the axes of the fixing holes of the backplate. The screws shall be gradually tightened, the maximum torque applied being

- 0,5 Nm for 3 mm screws, and
- 1,2 Nm for 4 mm screws.

These requirements do not apply to lampholders E5.

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LUMINAIRES –

Part 2-20: Particular requirements – Lighting chains

20.1 Scope

This part of IEC 60598 specifies requirements for lighting chains fitted with series- or parallel- or a combination of series/parallel-connected incandescent lamps for use either indoors or outdoors on supply voltages not exceeding 250 V.

NOTE 1 A Christmas tree chain is an example of a lighting chain fitted with series or series/parallel connected lamps.

A chain for illuminating ski-tracks or promenades is an example of a lighting chain fitted with parallel connected lamps.

NOTE 2 For lighting chains fitted with lampholders of the push-in type, the appropriate requirements of this part of IEC 60598 apply.

NOTE 3 In some countries, the term "strings" is used instead of "chains".

NOTE 4 For lighting chains with non-standardised lamps (e.g. lamps of the push-in type) the lamps are regarded as a part of the lighting chain and consequently included in the testing (and thereby in the certificate, if any).

20.2 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 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

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

IEC 60238:2004, *Edison screw lampholders*¹⁾
Amendment 1 (2008)

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

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60598-1:2008, *Luminaires – Part 1: General requirements and tests*

IEC 60811-3-1:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 3: Methods specific to PVC compounds – Section One: Pressure test at high temperature – Tests for resistance to cracking*
Amendment 1 (1994)
Amendment 2 (2001)

IEC 61184, *Bayonet lampholders*

¹⁾ There exists a consolidated edition 8.1 (2008) that comprises IEC 60238 (2004) and its Amendment 1 (2008).

IEC 61347-2-11, *Safety of lamp controlgear – Part 2-11: Particular requirements for miscellaneous electronic circuits used with luminaires*

20.3 General test requirements

The provisions of section 0 of IEC 60598-1 apply. The tests described in each appropriate section of IEC 60598-1 shall be carried out in the order listed in this part of IEC 60598.

20.4 Definitions

For the purposes of this document, the definitions given in section 1 of IEC 60598-1 apply together with the following definitions.

20.4.1

lighting chain

luminaire comprising an assembly of series-connected lampholders, parallel-connected lampholders or series/parallel-connected lampholders and interconnecting insulated conductors

NOTE 1 For lighting chains with non-standardised lamps (e.g. lamps of the push-in type) the lamps are regarded as part of the chain.

NOTE 2 For lighting chains with non-removable lamps, the lamps are regarded as part of the chain.

NOTE 3 A lighting chain may incorporate control devices (e.g. flasher units, see 20.7.16).

20.4.2

sealed chain

a lighting chain enclosed in a rigid or flexible insulating translucent pipe or tube, sealed at the ends and having no joints

20.5 Classification of luminaires

Luminaires shall be classified in accordance with the provisions of section 2 of IEC 60598-1 together with the requirements of 20.5.1 and 20.5.2.

NOTE As lighting chains are mandatorily required to be suitable for mounting on normally flammable surfaces they do not require F marking nor provision of a warning notice.

20.5.1 According to the type of protection against electric shock, lighting chains shall be classified as Class II or Class III.

20.5.2 According to the degree of protection against dust and moisture, lighting chains for outdoor use shall be classified as "of rain-proof, splash-proof, jet-proof or watertight construction".

20.6 Marking

The provisions of section 3 of IEC 60598-1 apply together with the requirements of 20.6.1 and 20.6.2.

20.6.1 The following information shall be marked on the lighting chains.

- a) Lighting chains shall be marked with the type reference or the electrical data of the lamps and with the rated voltage of the complete chain. Where it is impractical to mark this information on the lighting chain, the information shall be marked on a durable non-removable sleeve or label fitted to the cable.
- b) Lighting chains shall be accompanied by the substance of the following warnings:
 - 1) do not remove or insert lamps while the chain is connected to the supply;

- 2) for series-connected lamps, replace failed lamps immediately by lamps of the same rated voltage and wattage to prevent overheating; this requirement does not apply to sealed chains;
 - 3) do not connect the chain to the supply while it is in the packing unless the packing has been adapted for display purposes;
 - 4) for series-connected lamps where fused lamps are used to ensure compliance with 20.13.3 hereafter, do not replace a fused lamp with a non-fused lamp [see item e)].
 - 5) ensure all lampholders are fitted with a lamp.
- c) Ordinary lighting chains shall additionally be accompanied by the substance of the following information:

"FOR INDOOR USE ONLY"

Lighting chains which rely on gaskets to provide the specified degree of protection against dust and moisture shall additionally be accompanied by the substance of the following information:

"WARNING – THIS LIGHTING CHAIN MUST NOT
BE USED WITHOUT ALL GASKETS BEING IN PLACE"

- d) Lighting chains not intended for interconnection shall in addition be accompanied by the substance of the following warning:
- "Do not connect this chain electrically to another chain."
- e) Lighting chains fitted with fused lamps to ensure compliance with 20.13.3 shall be accompanied by information indicating the means for identification of fused lamps (see 20.6.3).
- ☐ NOTE For the purpose of this subclause, a fused lamp is a lamp designed so as to break the circuit in the event of an overload either by means of a separate fuse incorporated within the lamp or by any other means e.g. a special filament. Such fuses or special filaments are not considered integral components (see 0.5.1 of EN 60598-1). ☐
- f) Lighting chains with non-standardised lamps shall be accompanied by information indicating that replacement lamps must be of the same type as delivered or of a type specified by the manufacturer (see 20.6.2).
- g) Lighting chains provided with non-replaceable lamps shall be accompanied by the information that the lamps are not replaceable.

The information required under items b)3), f) and g) shall be indicated on the packing.

20.6.2 The following information shall be marked on the lampholder or on the cable, or on a durable non-removable sleeve or label fitted to the cable.

- a) Mark of origin (this may take the form of a trade mark, the manufacturer's identification mark or the name of the responsible vendor).
- b) Symbol for class II or class III, if applicable.
- c) Marking for degree of protection against dust and moisture, if applicable, or warning that the chain is for indoor use only.
- d) Rated voltage of class III chains.
- e) Voltage and wattage of replacement lamps.
- f) Use only replacement lamps of the same kind provided with this lighting chain.

20.6.3 Fused lamps used to ensure compliance with 20.13.3 shall have a suitable means of identification, such as a special colour.

20.7 Construction

The provisions of section 4 of IEC 60598-1 apply together with the requirements of 20.7.1 to 20.7.16.

☐ **20.7.1** Edison screw lampholders E14 and E27 shall meet the requirements of EN 60238:2004.

Edison screw lampholders E5 and E10 and similar small lampholders of the push-in type shall meet the appropriate requirements of EN 60238:2004 as modified by Annex ZB.

Edison screw lampholders larger than E10 with non-metallic screw threads shall meet the requirements of 12.1 of EN 60238:2004.

NOTE E10 and small lampholders may have screw threads of insulating material.

In lighting chains fitted with parallel connected lamps, E27 and B22 lampholders with insulation piercing contacts shall meet the requirements of this part of IEC 60598. In addition, E27 lampholders with insulation piercing contacts shall meet the requirements of 12.1 of EN 60238:2004.

Bayonet lampholders shall meet the requirements of EN 61184.

In lighting chains where non-standardized lamps (e.g. lamps of the push-in type) are used, the lamps are regarded as parts of the lighting chain and tested accordingly. ☐

20.7.2 Clause 4.6 of section 4 of IEC 60598-1 referring to terminal block does not apply.

20.7.3 Clause 4.7 of section 4 of IEC 60598-1 referring to terminals and supply connections applies together with the following requirement:

The method of connection of wiring, external or internal, to components of chains shall give reliable electrical contact over the service life of the component.

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

20.7.4 Only 4.11.4 and 4.11.5 of 4.11 of section 4 of IEC 60598-1, referring to electrical connections and current-carrying parts, apply.

20.7.5 Gaskets used to provide the specified degree of protection against dust and moisture of lighting chains for outdoor use shall be weather resistant. Such gaskets shall remain in place on the chain when the lamp is removed and shall fit tightly round the inserted lamp.

Compliance shall be checked by inspection and by manual test.

No requirements are specified at present for checking the weather resistance of gaskets.

☐ **20.7.6** Compliance with the mechanical strength requirements of 4.13 of EN 60598-1:2008 for E14 and E27 lampholders incorporated in lighting chains shall be checked by the tests given in Clause 15 of EN 60238:2004.

E5 and E10 and similar small lampholders of push-in type shall be checked by the tests given in Clause 15 of EN 60238:2004 as modified by Annex ZB.

The tests are made on three samples of the lampholder without lamps inserted. After the test, the relevant compliance requirements of 4.13 of EN 60598-1:2008 shall be met. ☐

20.7.7 E5 and E10 lampholders and similar small lampholders of the push-in type shall be used only if the rated voltage of each lamp does not exceed:

- for E5 and similar small lampholders 25 V;
- for series connected E10 and similar small lampholders 60 V;
- for parallel connected E10 lampholders 250 V.

Compliance is checked by inspection.

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20.7.8 For lighting chains fitted with series-connected lamps, resistors, if any, for bridging the lamp filaments shall be contained within the lamps. The protection against electric shock and fire shall not be impaired when these resistors are functioning.

Compliance is checked by inspection and, where appropriate, by a test during which the filaments of the lamps are interrupted.

20.7.9 Flasher units forming an integral part of the lighting chain, shall be enclosed in non-flammable insulating material; they shall be securely fixed to the cable of the chain.

Compliance is checked by inspection and, for the non-flammability of the insulating material, by the test of 20.16.

20.7.10 No requirement.

20.7.11 Lampholders for replaceable push-in lamps shall have a body of insulating material.

Compliance is checked by inspection.

☐ **20.7.12** The cap, if any, and the lamp bulb glass of replaceable push-in lamps shall not rotate in relation to the lampholder.

Compliance is checked by applying a torque of 0,025 Nm for 1 min between the lamp bulb and the lampholder. ☐

20.7.13 Replaceable push-in type lamps shall remain in the seated position when the lamp is subjected to a pull force of up to 3 N. Replaceable push-in type lamps shall make electrical contact with the lampholder contacts by applying a push-in force of between 3 N and 10 N (under consideration). Withdrawal of the lamp from the holder shall be effected when subjected to a pull force of between 3 N and 10 N (under consideration).

Non-replaceable lamps shall withstand a pull force of $10\text{ N} \pm 1\text{ N}$ during which the lamp shall remain seated and shall not have become unsafe.

During each application of the specified forces, no damage shall occur impairing safety and in particular no breakage or separation of the lamp glass envelope from the lamp cap shall take place.

Compliance is checked on a new sample by manual test, by measurement of the forces and by inspection.

The sample is then placed in an oven at a temperature of $120\text{ °C} \pm 5\text{ °C}$ for 2 h (under consideration) following which it is allowed to cool down to room temperature.

The sample is then re-submitted to the same tests, requirements and compliance criteria as those specified for the sample before the heating treatment.

20.7.14 Sealed lighting chains shall have adequate mechanical strength.

For rigid sealed lighting chains, compliance is checked by subjecting the pipe 45 times to each of the following tests carried out in turn:

- a) a pull of 60 N, the stress being applied to the ends of the pipe, without jerks, for 1 min;
- b) a torque of 0,15 Nm, the stress being applied to the ends of the pipe in the most unfavorable direction (alternatively in cases of doubt) without jerks for 1 min.

For flexible sealed lighting chains, compliance is checked by the tests of a) and b) above followed by the additional test below:

Test:

Wind the pipe on a cylinder of 250 mm diameter with a pull of 60 N for the number of operations and at the ambient temperature given below:

- | | |
|---|---------------------------|
| – for chains having an IP number up to and including 20 | 10 times at 25 °C ± 5 °C |
| – for chains having an IP number over 20 | 10 times at 25 °C ± 5 °C |
| | followed by |
| | 10 times at –15 °C ± 5 °C |

After the test, the pipe shall show no damage affecting the safety of the chain and shall comply with the electric strength test of Clause 20.15 applied between live parts and the body.

NOTE 1 Failure of lamps during the test is permitted.

NOTE 2 An example of a test device suitable for winding a flexible pipe is given in Figure 3.

20.7.15

The lamp bulbs in lighting chains shall meet the mechanical requirements of Subclause 4.13.1 of IEC 60598-1 using an impact energy of 0,2 Nm when:


- a) the lamps are non-removable;
- or
- b) the lamps are non-standardized and parallel connected.

20.7.16 Any electronic control device (e.g. flasher units) shall, in addition to the requirements of this standard, comply with the requirements of IEC 61347-2-11.

Compliance is checked by carrying out the relevant tests.

20.8 Creepage distances and clearances

The provisions of Section 11 of EN 60598-1 apply except that

- for Edison screw lampholders E10, E14 and E27, Clause 17 of EN 60238:2004 applies
- for Edison screw lampholders E5 and similar small lampholders of push-in type, Clause 17 of EN 60238:2004, as modified by Annex ZB, applies. 

20.9 Provisions for earthing

The provisions of section 7 of IEC 60598-1 do not apply.

20.10 Terminals

The provisions of section 15 of IEC 60598-1 apply.

20.11 External and internal wiring

☐ 20.11.1 Subclause 5.2.2 of EN 60598-1:2008 does not apply. Internal and external cables of lighting chains, sealed chains and external cables of sealed chains shall not be lighter than the following:

- for ordinary lighting chains using series-connected lampholders H03VH7-H
- for Class II ordinary lighting chains using parallel-connected lampholders H03VV-F or H03VVH2-F
- for Class III lighting chains using parallel-connected lampholders and with a maximum rated wattage exceeding 50 W H03VVH2-F
- for other lighting chains using series-connected lampholders H03RN-F (see NOTE) (HD 22.8)
- for other lighting chains using parallel-connected lampholders H05RNH2-F or H05RN-F (HD 22.4 and HD 22.8)
- for other lighting chains where the length of cable between the supply plug and the nearest lampholder exceeds 3 m for that part of the cable H07RN-F

NOTE H03RN-F is only suitable for use with the following lampholders: E5, E10, E14 and B15 or similar miniaturised (small) lampholders.

Internal and external cables of Class III lighting chains with a maximum rated wattage not exceeding 50 W and the internal conductors of sealed chains may have a cross-sectional area of less than 0,4 mm² provided that the current-carrying capacity and mechanical properties are adequate. For sealed chains class III chains, conductors without insulation are accepted, provided adequate precautions have been taken to ensure compliance with requirements of 5.3.1 of EN 60598-1:2008.

Compliance is checked by inspection, measurement and by calculation.

The nominal cross-sectional area of the conductors for the cables listed above shall be not less than one of the following values:

- a) 0,5 mm² for lighting chains with E5 or E10 lampholders or similar small lampholders of push-in type;
- b) 0,75 mm² for lighting chains with E14, E27, B15 or B22 lampholders and fitted with series-connected lamps;
- c) 1,5 mm² for lighting chains with E14, E27, B15 or B22 lampholders and fitted with parallel connected lamps. ☐

20.11.2 For lighting chains incorporating a single-core cable, the test described in 5.2.10.3 of section 5 of IEC 60598-1 is made in the following way.

The cable is subjected 50 times to a pull of 30 N. The torque test is not made.

20.11.3 Plugs of lighting chains shall meet the requirements of IEC 60083.

Lighting chains for outdoor use shall either be provided with a splash-proof plug or be suitable for permanent connection to fixed wiring by means of a junction box.

The length of the cable between the plug and the first lampholder shall be not less than 1,5 m.

Compliance is checked by measurement.

NOTE 1 Lampholders in a non-rewirable lighting chain fitted with parallel-connected lamps may be connected to a flat cable by means of pin contacts or edge contacts, which penetrate the insulation of the cable and provide electric contact with the conductors.

NOTE 2 National rules in some countries do not permit plugs in accordance with IEC 60083.

20.12 Protection against electric shock

The provisions of section 8 of IEC 60598-1 apply together with the requirements of 20.12.1 to 20.12.3.

20.12.1 For lighting chains with means for retaining lamps other than E10 or larger lampholders, the protection against electric shock shall be at least equivalent to that required for lighting chains provided with E10 lampholders.

If the plug of a lighting chain incorporates a means for disconnecting one end of the chain to facilitate installation, the connector fitted at the end of the cable shall have an entry such that the diameter of the opening and the distance from the front to live parts are equal to the corresponding dimensions specified in Figure 1. The two parts of the connector shall not separate when subjected to a pull force of 10 N.

For metal parts of lampholders and for the cap of bayonet lamps, compliance shall be checked by a test with the standard test finger specified in IEC 60529.

A lamp with the longest commercially available lamp-cap shall be inserted when the inaccessibility of bayonet lamp-caps is checked.

NOTE The gasket referred to in 20.7.5 may serve as protection against accidental contact with the cap of a lamp with a bayonet cap.

For plugs incorporating means for disconnecting one end of the chain, the degree of protection against electric shock shall be such that it is not possible to touch the contact piece with the standard test finger specified in IEC 60529. In general, the contact piece is a pin fitted in the body of the plug, the pin being shrouded by the body of the plug or otherwise protected.

20.12.2 Lighting chains shall not electrify tinsel or other metallic decorations with which they are used.

Compliance shall be checked by means of a flat probe, 0,5 mm thick and 8 mm wide, with a rounded tip having a radius of 4 mm. It shall not be possible to touch live parts with this probe, when it is applied in any position with a force not exceeding 0,5 N, the chain being fitted with the lamps with which it is delivered.

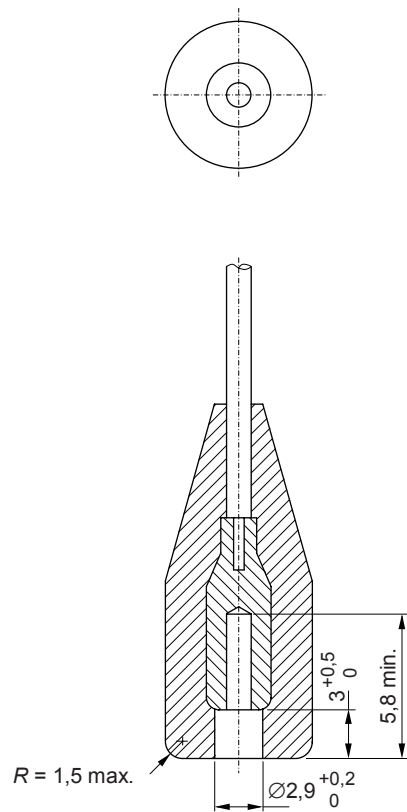
20.12.3 Lampholder contact shall be reliably secured in the lampholder body by means other than friction to avoid such a displacement of the lampholder contacts that live parts of the chain become accessible. An example of an adequate securing method is by the provision of ears on the contacts of the lampholder.

Compliance is checked by inspection and by the following test.

Six lampholders are heated for 7 h according to the requirements of Clause 12.3 of section 12 of IEC 60598-1 in an orientation to reach the highest temperature. After the lampholders have cooled down to room temperature, the incandescent lamps are removed and a force of 15 N is applied for 1 min to each of the conductors connected. Following this, a force of 30 N is applied for 1 min to the two conductors together. The forces are applied at a distance of $3 \text{ mm} \pm 0,8 \text{ mm}$ from the insertion points in the lampholder so as to try to move the contacts from the lampholders.

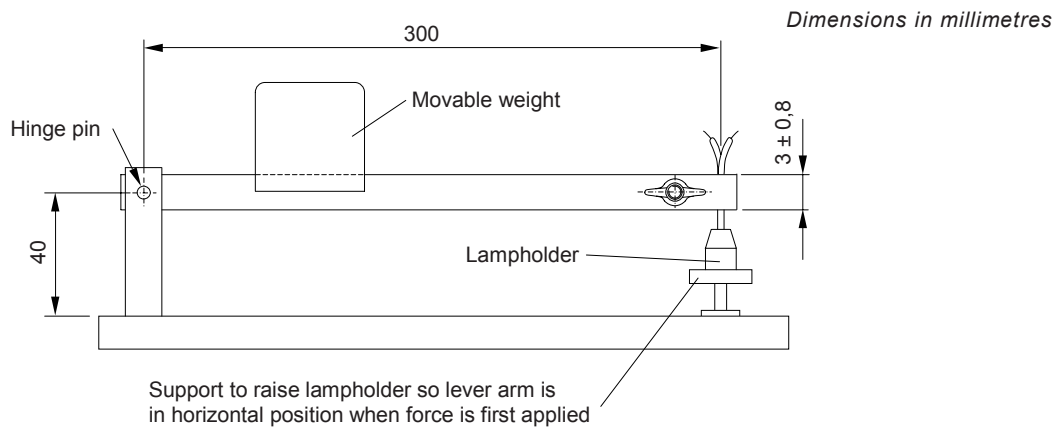
During the test, the contacts shall not move more than 0,8 mm. An example of a device suitable for this test is shown in Figure 2.

Dimensions in millimetres

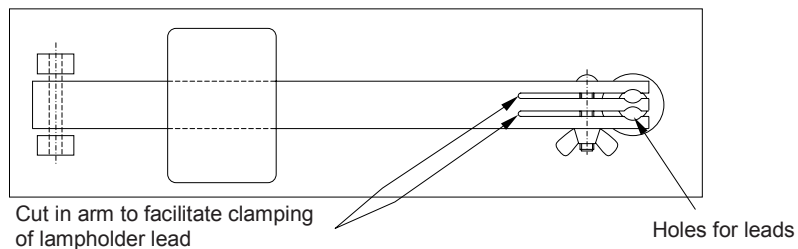


IEC 289/10

Figure 1 – Example of a suitable connection for lighting chains

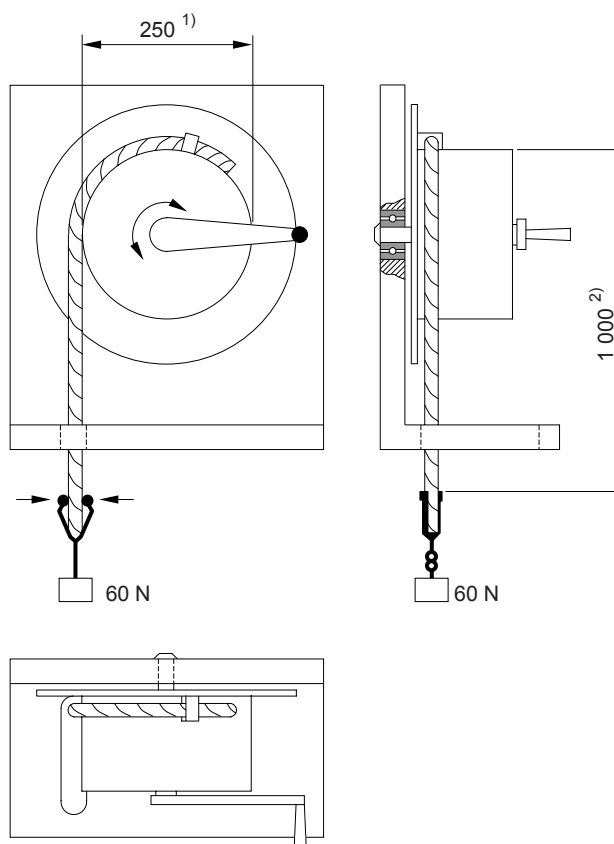


Dimensions in millimetres



IEC 290/10

Figure 2 – Example of test device suitable for checking security of lampholder contacts

Dimensions in millimetres

IEC 291/10

Key

- 1) Diameter of wooden cylinder.
- 2) Distance between the fixing point of the flexible pipe and the weight prior to commencement of the test.

Figure 3 – Example of test device suitable for winding a flexible pipe**20.13 Endurance tests and thermal tests**

The provisions of section 12 of IEC 60598-1 apply together with the requirements of 20.13.1 to 20.13.3.

Luminaires with an IP classification greater than IP20 shall be subjected to the relevant tests of Clauses 12.4, 12.5 and 12.6 of section 12 of IEC 60598-1 after the test(s) of Clause 9.2 but before the test(s) of Clause 9.3 of section 9 of IEC 60598-1 specified in Clause 20.14 of this part of IEC 60598.

20.13.1 The requirements of item d) of 12.3.1 and item d) of 12.4.1 of section 12 of IEC 60598-1 are replaced by the following:

The tests are carried out at a voltage such that the wattage is equal to 1,05 times the wattage measured when the lighting chain is supplied at the rated voltage.

20.13.2 The requirements of item e) of 12.3.1 and item g) of 12.4.1 of section 12 of IEC 60598-1 apply except that lamps for sealed chains are not replaced.

20.13.3 The operation of devices for bridging the lamp filament, where fitted in accordance with 20.7.8, shall not cause any part of the lighting chain to attain a temperature which would impair safety.

Compliance is checked by causing the bridging device to operate successively on each lamp, the lamp not being replaced. The temperature of the component parts of the lighting chain shall be allowed to stabilize before each bridging device is made to operate. The temperature of lampholders and cables shall not exceed the appropriate values given in Tables 12.1 and 12.2 of IEC 60598-1.

If a protective device (e.g. a fused lamp) operates during the test, the highest temperatures reached shall be taken as the final temperatures.

20.14 Resistance to dust and moisture

The provisions of section 9 of IEC 60598-1 apply together with the following requirement. For luminaires with an IP classification greater than IP20 the order of the tests specified in section 9 of IEC 60598-1 shall be as specified in 20.13 of this part of IEC 60598.

Lighting chains are completely assembled ready for use, appropriate lamps are inserted and the lampholders are positioned at random during the test described in Clause 9.2 of section 9 of IEC 60598-1.

20.15 Insulation resistance and electric strength

The provisions of section 10 of IEC 60598-1 apply.

☐ 20.16 Resistance to heat, fire and tracking

The provisions of Section 13 of EN 60598-1:2008 apply except that

- for flexible pipes of sealed chains, the test of 13.2.1 is replaced by the test of Clause 8 of EN 60811-3-1:1995,
- for lampholders, the tests of Clause 13 are replaced by the tests of
 - for E14 and E27 lampholders: Clause 20 of EN 60238:2004,
 - for E5 and E10 and similar lampholders of the push-in type: Clause 20 of EN 60238:2004 as modified by Annex ZB. ☐

Annex A
(informative)

Tumbling barrel test

(Applicable to class II lighting chains only.)

No requirement.

Bibliography

IEC 61347-1, *Lamp controlgear – Part 1: General and safety requirements*

NOTE Harmonized as EN 61347-1.

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