



BSI Standards Publication

Luminaires

Part 1: General requirements and tests (IEC 60598-1:2014)

National foreword

This British Standard is the UK implementation of EN 60598-1:2015, including amendment A1:2018. It is derived from IEC 60598-1:2014, including amendment 1:2017. It supersedes BS EN 60598-1:2015, which will be withdrawn on 23 February 2021.

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 CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags **C** **C**.

The text of IEC amendment 1:2017 has been provided in its entirety at the beginning of this document. BSI's policy of providing consolidated content remains unchanged; however, in the interest of expediency, in this instance BSI have chosen to collate the relevant content at the beginning of this document.

The UK participation in its preparation was entrusted to Technical Committee 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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Amendments/corrigenda issued since publication

Date	Text affected
31 March 2016	Implementation of IEC corrigendum December 2015; Subclause 5.2.1 corrected
31 March 2018	Implementation of IEC amendment 1:2017 with CENELEC endorsement A1:2018, including additional Annex ZA references
30 September 2018	IEC amendment A1 with CENELEC endorsement A1:2018 consolidated into the core standard text

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60598-1:2015+A1

February 2018

ICS 29.140.40

English Version

**Luminaires -
Part 1: General requirements and tests
(IEC 60598-1:2014 , modified)**

Luminaires -
Partie 1: Exigences générales et essais
(IEC 60598-1:2014 , modifiée)

Leuchten -
Teil 1: Allgemeine Anforderungen und Prüfungen
(IEC 60598-1:2014 , modifiziert)

This European Standard was approved by CENELEC on 2014-10-20. 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 CEN-CENELEC Management Centre or to any CENELEC member.

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European foreword

The text of document 34D/1110/FDIS, future edition 8 of IEC 60598-1, prepared by SC 34D "Luminaires" of IEC/TC 34 "Lamps and related equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60598-1:2015.

A draft amendment, which covers common modifications to IEC 60598-1 (34D/1110/FDIS), was prepared by CLC/TC 34Z "Luminaires and associated equipment" and approved by CENELEC.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-10-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-10-20

This document supersedes 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. CENELEC [and/or CEN] 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).

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 60598-1:2014 are prefixed "Z".

Endorsement notice

The text of the International Standard IEC 60598-1:2014 was approved by CENELEC as a European Standard with agreed common modifications.

Foreword to amendment A1

The text of document 34D/1292/FDIS, future IEC 60598-1:2014/A1, prepared by SC 34D "Luminaires" of IEC/TC 34 "Lamps and related equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60598-1:2015/A1:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-08-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-02-23

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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 60598-1:2014/A1:2017 was approved by CENELEC as a European Standard without any modification.

In the Bibliography of EN 60598-1:2015, the following note has to be added for the standard indicated:

IEC 60664 Series

NOTE Harmonized as EN 60664 Series.



Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60061	Series	Lamp caps and holders together with gauges for the control of interchangeability and safety	EN 60061	Series
IEC 60061-2 (mod)	1969	Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 2: Lampholders	EN 60061-2 + A1 to A37	1993
IEC 60061-3	1969	Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 3: Gauges	EN 60061-3 + A1 to A38	1993
IEC 60065 (mod)	2001	Audio, video and similar electronic apparatus - Safety requirements	EN 60065 + corr. March + corr. August + A11 + A12	2002 2006 2007 2008 2011
IEC 60068-2-75	1997	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	1997
IEC 60079	Series	Explosive atmospheres	EN 60079	Series
IEC/TR 60083	—	Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC	—	—
IEC 60085	2007	Electrical insulation - Thermal evaluation and designation	EN 60085	2008
IEC 60112	2003	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	2003
IEC 60155	1993	Glow-starters for fluorescent lamps	EN 60155	1995
IEC 60227	Series	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V	EN 50525 ¹⁾	Series

¹⁾ EN 50525 Series, which is related to, but not directly equivalent with IEC 60227 Series, applies instead

 Publication	Year	Title	EN/HD	Year
IEC 60228	2004	Conductors of insulated cables	EN 60228	2005
IEC 60238	2004	Edison screw lampholders	EN 60238 + corr. January	2004 2005
IEC 60245	Series	Rubber insulated cables - Rated voltages up to and including 450/750 V	EN 50525 ²⁾	Series
IEC 60269	Series	Low-voltage fuses	EN/HD 60269	Series
IEC 60320	Series	Appliance couplers for household and similar general purposes	EN 60320	Series
IEC 60357	2002	Tungsten halogen lamps (non-vehicle) - Performance specifications	EN 60357 + corr. July	2003 2003
IEC 60360	1998	Standard method of measurement of lamp cap temperature rise	EN 60360	1998
IEC 60364-4-41 (mod)	2005	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41 + corr. July	2007 2007
IEC 60384-14	2005	Fixed capacitors for use in electronic equipment - Part 14: Sectional specification - Fixed capacitors for electromagnetic interference suppression and connection to the supply mains	EN 60384-14	2005 ³⁾
IEC 60400	2008	Lampholders for tubular fluorescent lamps and starterholders	EN 60400	2008
IEC 60417	data-base	Graphical symbols for use on equipment	—	—
IEC 60432-1 (mod) A1	1999 2005	Incandescent lamps - Safety specifications - Part 1: Tungsten filament lamps for domestic and similar general lighting purposes	EN 60432-1 A1	2000 2005
IEC 60432-2 (mod) A1 (mod)	1999 2005	Incandescent lamps - Safety specifications - Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes	EN 60432-2 A1	2000 2005
IEC 60432-3	2002	Incandescent lamps - Safety specifications - Part 3: Tungsten-halogen lamps (non-vehicle)	EN 60432-3	2003 ⁴⁾
IEC 60449 + A1	1973 1979	Voltage bands for electrical installations of buildings	HD 193 S2	1982
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993

²⁾ EN 50525 Series, which is related to, but not directly equivalent with IEC 60245 Series, applies instead.

³⁾ Superseded by EN 60384-14:2013 (DOW = 2016-07-10).

⁴⁾ Superseded by EN 60432-3:2013 (DOW = 2015-08-08).

 Publication	Year	Title	EN/HD	Year
IEC 60570 (mod)	2003	Electrical supply track systems for luminaires	EN 60570	2003
IEC 60598-2	Series	Luminaires - Part 2: Particular requirements	EN 60598-2	Series
IEC 60598-2-4	1997	Luminaires - Part 2: Particular requirements - Section 4: Portable general purpose luminaires	EN 60598-2-4	1997
IEC 60634	1993	Heat test source (H.T.S.) lamps for carrying out heating tests on luminaires	EN 60634	1995
IEC 60662 (mod)	1980	High-pressure sodium vapour lamps	EN 60662	1993 ⁵⁾
IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 60664-4	2005	Insulation coordination for equipment within low-voltage systems -- Part 4: Consideration of high-frequency voltage stress	EN 60664-4	2006
IEC 60682	1980	Standard method of measuring the pinch temperature of quartz-tungsten-halogen lamps	EN 60682	1993
IEC 60684	Series	Flexible insulating sleeving	EN 60684	Series
IEC 60695-2	Series	Fire hazard testing - Part 2: Glowing/hot-wire based test methods	EN 60695-2	Series
IEC 60695-2-10	2000	Fire hazard testing - Part 2-10: Glowing/hot-wire based test methods - Glow-wire apparatus and common test procedure	EN 60695-2-10	2001 ⁶⁾
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 60838	Series	Miscellaneous lampholders	EN 60838	Series
IEC 60989	—	Separating transformers, autotransformers, variable transformers and reactors	—	—
IEC 60990	1999	Methods of measurement of touch current and protective conductor current	EN 60990	1999
IEC 60998-2-1 (mod) —		Connecting devices for low-voltage circuits for household and similar purposes - Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units	EN 60998-2-1	2004

⁵⁾ Superseded by EN 60662:2012 (DOW = 2015-01-02).

⁶⁾ Superseded by EN 60695-2-10:2013 (DOW = 2016-05-14).

C Publication	Year	Title	EN/HD	Year
IEC 60998-2-2 (mod) –		Connecting devices for low-voltage circuits for household and similar purposes - Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units	EN 60998-2-2	2004
IEC 61032	1997	Protection of persons and equipment by enclosures - Probes for verification	EN 61032	1998
IEC 61058-1 (mod)	2000	Switches for appliances - Part 1: General requirements	EN 61058-1	2002 ⁷⁾
IEC 61140	2001	Protection against electric shock - Common aspects for installation and equipment	EN 61140	2002
IEC 61167	1992	Metal halide lamps	EN 61167	1994 ⁸⁾
IEC 61184	2008	Bayonet lampholders	EN 61184	2008
IEC 61199	1999	Single-capped fluorescent lamps - Safety specifications	EN 61199	1999 ⁹⁾
IEC 61249	Series	Materials for printed boards and other interconnecting structures	EN 61249	Series
IEC 61347	Series	Lamp controlgear	EN 61347	Series
IEC 61347-2-9	2000	Lamp controlgear - Part 2-9: Particular requirements for ballasts for discharge lamps (excluding fluorescent lamps)	EN 61347-2-9 + corr. July + corr. December	2001 ¹⁰⁾ 2003 2010
IEC 61558-1	2005	Safety of power transformers, power supplies, reactors and similar products - Part 1: General requirements and tests	EN 61558-1 + corr. August	2005 2006
IEC 61558-2 (mod)	Series	Safety of power transformers, power supplies, reactors and similar products - Part 2: Particular requirements and test	EN 61558-2	Series
IEC 61558-2-5	1997	Safety of power transformers, power supply units and similar - Part 2-5: Particular requirements for shaver transformers and shaver supply units	EN 61558-2-5 + A11	1998 ¹¹⁾ 2004 ¹¹⁾
IEC 61558-2-6	1997	Safety of power transformers, power supply units and similar - Part 2-6: Particular requirements for safety isolating transformers for general use	EN 61558-2-6	1997 ¹²⁾

7) EN 61058-1 includes A1:2001 to IEC 61058-1 (mod).

8) Superseded by EN 61167:2011.

9) Superseded by EN 61199:2011.

10) Superseded by EN 61347-2-9:2013 (DOW = 2015-12-04).

11) Superseded by EN 61558-2-5:2010.

12) Superseded by EN 61558-2-6:2009.

 Publication	Year	Title	EN/HD	Year
IEC 62031	2008	LED modules for general lighting - Safety specifications	EN 62031	2008
IEC 62035 (mod)	1999	Discharge lamps (excluding fluorescent lamps) - Safety specifications	EN 62035	2000 ¹³⁾
IEC 62471 (mod)	2006	Photobiological safety of lamps and lamp systems	EN 62471	2008
IEC 80416-1	2001	Basic principles for graphical symbols for use on equipment - Part 1: Creation of symbol originals	EN 80416-1	2001 ¹⁴⁾
ISO 4046-4	2002	Paper, board, pulps and related terms - Vocabulary - Part 4: Paper and board grades and converted products	—	—

¹³⁾ Superseded by EN 62035:2014 (DOW = 2017-09-15).

¹⁴⁾ Superseded by EN 80416-1:2009.



Annex ZB (normative)

Special national conditions

Special national condition: National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions.

NOTE If it affects harmonization, it forms part of the European Standard or Harmonization Document.

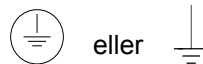
For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

Clause Special national condition

3.3 **Denmark**

Supply cords of class I luminaires, which are delivered without a plug, shall be provided with a visible tag with the following text:

Vigtigt !
Lederen med grøn/gul isolation
må kun tilsluttes en klemme mærket



If essential for the safety of the luminaire, the tag shall in addition be provided with a diagram, which shows the connection of the other conductors, or be provided with the following text:

For tilslutning af the øvrige ledere,
se medfølgende vejledning.

NOTE "ø" may be replaced by "oe"; "æ" may be replaced by "ae".



Clause Special national condition

4.5.1 Denmark

Socket-outlets intended for providing power to other appliances shall be in compliance with DS60884-2-D1:2011, the Standard Sheets being applied as follows:

Class I Standard Sheet DK 1-3a, DK 1-1c and DK 1-1d

For class I luminaires, the earthing contact of the socket-outlet shall be electrically connected to the earthing terminal of the appliance.

Class II luminaires with a degree of protection not higher than IPX0, Standard Sheet DKA 1-4a can be used.

EXEMPTION:

Socket-outlets supplied from isolation transformers (shaver supply units) and socket-outlets on outdoor luminaires may be in accordance with the requirement of DS60884-2-D1:2011 for fixed socket-outlets.

5.2.1 Cyprus

Domestic luminaires intended for connection to a standard United Kingdom 13 A socket must be pre-fitted with an approved plug complying with BS 1363.

Cord sets for domestic luminaires for connection with an appliance inlet must be pre-fitted with an approved plug complying with BS 1363.

Plugs must be fitted with the correct fuse.

Denmark

Supply cords on single-phase portable luminaires having a rated current not exceeding 13 A shall be provided with a plug according to the following table:

Class of luminaire	DS60884-2-D1:2011	EN 50075 Standard Sheet
Class I	DK 2-1a, C 2b, C 3b or C 4	
Class II	DKA 2-1a, DKA 2-1b, C 5, C 6	I

For luminaires having an appliance inlet, the plug on the supply cord shall comply with the above requirements.

If multi-phase luminaires and single-phase luminaires having a rated current exceeding 13 A are provided with a supply cord with a plug, the plug shall comply with the following table or EN 60309.

Plug	
Class of luminaire	DS60884-2-D1:2011
Class I	DK 6-1a
Class II	DK 6-1a*
* Earthing contact not connected.	



Ⓒ Clause Special national condition**Finland**

For luminaires provided with non-detachable flexible cables and cords and a plug, the plug shall comply with the requirements of CEE Publication 7 and EN 50075, the Standard Sheets to be applied being as follows:

- Class I luminaires CEE 7, sheet IV or VII
- Class II luminaires CEE 7, sheet XVI (alt I only) or CEE 7, sheet XVII or
EN 50075, sheet I

United Kingdom

Domestic luminaires intended for connection to a standard United Kingdom 13 A socket must be pre-fitted with an approved plug complying with BS 1363.

Cord sets for domestic luminaires for connection with an appliance inlet must be pre-fitted with an approved plug complying with BS 1363.

Plugs must be fitted with the correct fuse.





Annex ZC (informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

This European Standard falls under Directive 2006/95/EC.

NOTE (from CEN/CENELEC IR Part 2:2008, 2.17) Where standards fall under EC Directives, it is the view of the Commission of the European Communities (OJ No. C59; 1982-03-09) that the effect of the decision of the Court of Justice in case 815/79 Cremonini/Vrankovich (European Court Reports 1980, p. 3583) is that compliance with A-deviations is no longer mandatory and that the free movement of products complying with such a standard should not be restricted except under the safeguard procedure provided for in the relevant Directive.

A-deviations in an EFTA-country are **valid instead** of the relevant provisions of the European Standard in that country until they have been removed.

Clause	Deviation
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4 & 5	France (Arrêté of the 22th September 1969) Socket-outlets 10/16 A intended for providing power to other appliances except those supplied by an isolating transformer shall be shuttered. (Arrêté du 30 décembre 2011 portant règlement de sécurité pour la construction des immeubles de grande hauteur et leur protection contre les risques d'incendie et de panique) Section VIII, Installations électriques et éclairage Article GH 48, Eclairage § 1 Généralités: c) Les parties externes des luminaires satisfont à l'essai au fil incandescent, la température du fil incandescent étant de : – 850°C pour les luminaires dans les escaliers et les circulations horizontales communes ; – 650°C pour les luminaires dans les locaux. United Kingdom (Approved Document B of the United Kingdom Building Regulations) Particular fire protection requirements relating to thermoplastic diffusers are listed in Subclause 6.15 of the above Regulations.
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Annex ZZ

(informative)

Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered

This European Standard has been prepared under a Commission's standardization request relating to harmonized standards in the field of the Low Voltage Directive, M/511, to provide one voluntary means of conforming to safety objectives of Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding safety objectives of that Directive, and associated EFTA regulations.

Table ZZ.1 – Correspondence between this European standard and Annex I of Directive 2014/35/EU [2014 OJ L96]

Safety objectives of Directive 2014/35/EU	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
1. General conditions		
a) the essential characteristics, the recognition and observance of which will ensure that electrical equipment will be used safely and in applications for which it was made, shall be marked on the electrical equipment, or, if this is not possible, on an accompanying document;	Section 3	To be used in conjunction with relevant part 2
b) the electrical equipment, together with its component parts, shall be made in such a way as to ensure that it can be safely and properly assembled and connected;	Section 4	To be used in conjunction with relevant part 2
c) the electrical equipment shall be so designed and manufactured as to ensure that protection against the hazards set out in points 2 and 3 is assured, providing that the equipment is used in applications for which it was made and is adequately	See item 2 and 3 of this table	

maintained.		
2. Protection against hazards arising from the electrical equipment Measures of a technical nature shall be laid down in accordance with point 1, in order to ensure that:		
a) persons and domestic animals are adequately protected against the danger of physical injury or other harm which might be caused by direct or indirect contact;	Section 4 Section 7 Section 14 and 15 Section 5 Section 8	All to be used in conjunction with relevant part 2
b) temperatures, arcs or radiation which would cause a danger, are not produced;	Section 4 Section 11 Section 12 Section 10	EMF is not covered All to be used in conjunction with relevant part 2
c) persons, domestic animals and property are adequately protected against non-electrical dangers caused by the electrical equipment which are revealed by experience;	Section 4 Section 10 Section 11	All to be used in conjunction with relevant part 2
d) the insulation is suitable for foreseeable conditions.	Section 9 Section 10	All to be used in conjunction with relevant part 2
3. Protection against hazards which may be caused by external influences on the electrical equipment Technical measures shall be laid down in accordance with point 1, in order to ensure that the electrical equipment:		
a) meets the expected mechanical requirements in such a way that persons, domestic animals and property are not endangered;	Section 3 Section 4	All to be used in conjunction with relevant part 2
b) is resistant to non-mechanical influences in expected environmental conditions, in such a way that persons, domestic animals and property are not endangered;	Section 9 Section 13	All to be used in conjunction with relevant part 2
c) does not endanger persons, domestic animals and property	Section 4	All to be used in conjunction with relevant part 2

in foreseeable conditions of overload.	Section 12	
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WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LUMINAIRES –

Part 1: General requirements and tests

FOREWORD

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International Standard IEC 60598-1 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lamps and related equipment.

This eighth edition constitutes a technical revision and includes the following significant technical changes with respect to the previous edition:

- a) requirements to support the construction methods for new LED luminaires entering the market;
- b) photobiological requirements extended;
- c) more precise requirements for insulation between different types of electrical circuit;
- d) other general updates and improvements.

The major changes which may affect certification are given in Annex R.

Annex R shows where a new text has been included which contains more serious/critical requirements requiring products to be re-tested.

NOTE In this standard, the following print types are used:

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

A list of all parts of the IEC 60598 series, under the general title: *Luminaires*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

LUMINAIRES –

Part 1: General requirements and tests

SECTION 0: GENERAL INTRODUCTION

0.1 Scope

This Part 1 of IEC 60598 specifies general requirements for luminaires, incorporating electric light sources for operation from supply voltages up to 1 000 V. The requirements and related tests of this standard cover: classification, marking, mechanical construction, electrical construction and photobiological safety.

Each section of this Part 1 is read in conjunction with this Section 0 and with other relevant sections to which reference is made.

Each part of IEC 60598-2 details requirements for a particular type of luminaire or group of luminaires on supply voltages not exceeding 1 000 V. These parts are published separately for ease of revision and additional sections will be added as and when a need for them is recognized.

The presentation of photometric data for luminaires is under consideration by the International Commission on Illumination (CIE) and is not, therefore, included in this Part 1.

Requirements are included in this Part 1 for luminaires incorporating ignitors with nominal peak values of the voltage pulse not exceeding those of Table 11.2. The requirements apply to luminaires with ignitors built into ballasts and to luminaires with ignitors separate from ballasts. For luminaires with ignitors built into lamps, the requirements are under consideration.

Requirements for semi-luminaires are included in this Part 1.

In general, this Part 1 covers safety requirements for luminaires. The object of this Part 1 is to provide a set of requirements and tests which are considered to be generally applicable to most types of luminaires and which can be called up as required by the detail specifications of IEC 60598-2. This Part 1 is thus not regarded as a specification in itself for any type of luminaire, and its provisions apply only to particular types of luminaires to the extent determined by the appropriate part of IEC 60598-2.

The parts of IEC 60598-2, in making reference to any of the sections of Part 1, specify the extent to which that section is applicable and the order in which the tests are to be performed; they also include additional requirements as necessary.

The order in which the sections of Part 1 are numbered has no particular significance as the order in which their provisions apply is determined for each type of luminaire or group of luminaires by the appropriate part of IEC 60598-2. All parts of IEC 60598-2 are self-contained and therefore do not contain references to other parts of IEC 60598-2.

Where the requirements of any of the sections of Part 1 are referred to in the parts of IEC 60598-2 by the phrase "The requirements of section... of IEC 60598-1 apply", this phrase is to be interpreted as meaning that all the requirements of that section of Part 1 apply except those which are clearly inapplicable to the particular type of luminaire covered by that part of IEC 60598-2.

For explosion proof luminaires, as covered by IEC 60079, the requirements of IEC 60598 (selecting the appropriate parts 2) are applied in addition to the requirements of IEC 60079. In the event of any conflict between IEC 60598 and IEC 60079, the requirements of IEC 60079 take priority. A1 *Text deleted* A1

Improvements in safety to take into account the state of the art technology are incorporated in the standards with revisions and amendments on an ongoing basis. Regional standardisation bodies may include statements in their derived standards to cover products which have complied with the previous document as shown by the manufacturer or standardization body. The statements may require that for such products, the previous standard may continue to apply to production until a defined date after which the new standard shall apply.

0.2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60061, *Lamp caps and holders together with gauges for the control of interchangeability and safety*

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 60065:2001, *Audio, video and similar electronic apparatus – Safety requirements*
Amendment 1:2005

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

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

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

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

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

A1 IEC 60228:2004, *Conductors of insulated cables* A1

IEC 60238, *Edison screw lampholders*

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

IEC 60320 (all parts), *Appliance couplers for household and similar general purposes*

IEC 60357, *Tungsten halogen lamps (non-vehicle) – Performance specifications*

IEC 60360, *Standard method of measurement of lamp cap temperature rise*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60400, *Lampholders for tubular fluorescent lamps and starterholders*

IEC 60417, *Graphical symbols for use on equipment* Available at: <http://www.graphical-symbols.info/equipment>

IEC 60432-1, *Incandescent lamps – Safety specifications – Part 1: Tungsten filament lamps for domestic and similar general lighting purposes*

IEC 60432-2, *Incandescent lamps – Safety specifications – Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes*

IEC 60432-3, *Incandescent lamps – Safety specifications – Part 3: Tungsten-halogen lamps (non-vehicle)*

IEC 60449:1973, *Voltage bands for electrical installations of buildings*
Amendment 1:1979

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

IEC 60570:2003, *Electrical supply track systems for luminaires*

IEC 60598-2 (all parts), *Luminaires – Part 2: Particular requirements*

IEC 60598-2-4, *Luminaires – Part 2: Particular requirements – Section 4: Portable general purpose luminaires*

IEC 60662, *High-pressure sodium vapour lamps – Performance specifications*

A1 IEC 60664-4:2005, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress* **A1**

IEC 60682, *Standard method of measuring the pinch temperature of quartz-tungsten-halogen lamps*

IEC 60684 (all parts), *Flexible insulating sleeving*

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

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

IEC 60838 (all parts), *Miscellaneous lampholders*

IEC 60989, *Separating transformers, autotransformers, variable transformers and reactors*

IEC 60990:1999, *Methods of measurement of touch current and protective conductor current*

A1 IEC 60998-2-1, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

IEC 60998-2-2, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units* **A1**

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61058-1:2000, *Switches for appliances – Part 1: General requirements*

IEC 61167, *Metal halide lamps – Performance specification*

IEC 61184, *Bayonet lampholders*

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

IEC 61249 (all parts), *Materials for printed boards and other interconnecting structures*

IEC 61347 (all parts), *Lamp controlgear*

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

IEC 61347-2-9, *Lamp controlgear – Part 2-9: Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps)*

IEC 61558 (all parts), *Safety of power transformers, power supplies, reactors and similar products*

IEC 61558-1:2005, *Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests*

IEC 61558-2 (all parts), *Safety of power transformers, power supplies, reactors and similar products – Part 2: Particular requirements and tests*

IEC 61558-2-5, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-5: Particular requirements and test for transformer for shavers, power supply units for shavers and shaver supply units*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*

IEC 61643-11, *Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems – requirements and tests*

IEC 62031, *LED modules for general lighting – Safety specifications*

IEC 62035, *Discharge lamps (excluding fluorescent lamps) – Safety specifications*

IEC/TR 62778, *Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires*

0.3 General requirements

0.3.1 Luminaires shall be so designed and constructed that in normal use they function safely and cause no danger to persons or surroundings. In general, compliance is checked by carrying out all the tests specified.

0.3.2 A luminaire shall comply with a part of IEC 60598-2. If, however, an appropriate part of IEC 60598-2 does not exist for a particular luminaire or group of luminaires, the nearest applicable part of IEC 60598-2 may be used as a guide to the requirements and tests.

Where the design of a luminaire is such that two or more parts of IEC 60598-2 are applicable, the luminaire shall comply with both or all of the appropriate sections.

0.3.3 Semi-luminaires should be regarded as luminaires for test purposes.

0.4 General test requirements and verification

0.4.1 Tests according to this standard are type tests. For the definition of a "type test", see Section 1 of this Part 1.

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. Compliance for production is the responsibility of the manufacturer and may include routine tests and quality assurance in addition to type testing.

0.4.2 Except where otherwise specified in the sections of Part 1 or Part 2, luminaires shall be tested as delivered, and installed as for normal use, in an ambient temperature of between 10 °C and 30 °C, having regard to the manufacturer's installation instructions. The lamp (or lamps) is (are) not included except where essential for the test.

Luminaires cannot be regarded as meeting the requirements of this Part 1 unless all internal wiring is complete.

In general, the tests are made on a single sample luminaire or, where a range of similar luminaires is involved, on a single luminaire of each rated wattage in the range or on a representative selection from the range as agreed with the manufacturer (see Annex S). This selection shall include the luminaire, together with any attachments, which represents the most unfavourable combination from a testing point of view. ~~A1 Text deleted A1~~

Each sample luminaire shall comply with all the relevant tests. In order to reduce the time of testing and to allow for any tests which may be destructive, the manufacturer may submit additional luminaires or parts of luminaires provided that these are of the same materials and design as the original luminaire and that the results of the test are the same as if carried out on an identical luminaire. Where the test for compliance is shown as being "by inspection", this shall include any necessary handling.

For track-mounted luminaires the manufacturer shall provide, together with the luminaire, a sample of the appropriate track, connector and adaptors for the luminaire to be connected.

Combination luminaires are tested for safety requirements with that assemblage of parts which gives the most unfavourable result.

Certain parts of luminaires, such as joints, raising and lowering devices, may be tested separately provided that the design of these parts is such that their performance is not dependent upon the other parts of the luminaires.

Luminaires intended to be used with supply cords are tested with the flexible supply cord connected to the luminaire.

For luminaires intended to be used with a shade, but not normally supplied with a shade, the manufacturer shall provide a shade, typical of the type that might be used with the luminaire.

0.4.3 Verification and tests

Luminaires for testing to the requirements of this standard may have earlier test reports updated in accordance with this standard by submitting a new sample for test together with the previous test reports.

Full type testing need not generally be necessary and the product and the previous test results shall be reviewed only against any amended clauses marked "R" and scheduled in Annex R.

NOTE Clauses marked "R" and scheduled in Annex R will be included in future amendments/editions.

0.5 Components of luminaires

0.5.1 Components, other than integral components, shall comply with the requirements of the relevant IEC standards, if any.

Components which comply with the requirements of the relevant IEC standard and marked with individual ratings are checked to establish that they suit the conditions which may occur in use. Aspects of use not covered by the respective standard shall require them to satisfy the additional relevant requirements of this standard.

Compliance is checked by inspection and the relevant tests.

Integral components shall comply as far as is reasonable with the IEC component standards, as part of the luminaire.

NOTE 1 This does not imply that components need to be separately tested before approval of the luminaire.

NOTE 2 Guidance for selection of components in different kinds of luminaires can be found in Annex L.

Internal wiring of a luminaire shall comply with the requirements in 5.3.

NOTE 3 This does not exclude the use of standardized cables.

0.5.2 Components complying with the requirements of their own standard and used in accordance with their intended use, shall only be tested to the requirements of this standard where there are no requirements in the component standard (covering the requirement heading of this standard).

A valid test report is considered adequate to show compliance.

Lampholders and starterholders shall additionally comply with the gauging and interchangeability requirements of the appropriate IEC component standard where applicable after building into the luminaire.

For terminal blocks with an integrated screwless earthing contact for direct connection to the luminaire or to parts of the body, special requirements apply according to Annex V.

0.5.3 Components for which no appropriate IEC standard exists shall satisfy the relevant requirements of this luminaire standard as part of the luminaire. Lampholders and starterholders shall additionally comply with the gauging and interchangeability requirements of the appropriate IEC component standard where applicable.

NOTE Examples of components are lampholders, switches, transformers, ballasts, flexible cables and cords and plugs.

0.5.4 Compliance with this standard can only be assured if protective shields of identical specification are used.

0.6 List of parts of IEC 60598-2

- Part 2-1 Fixed general purpose luminaires
- Part 2-2 Recessed luminaires
- Part 2-3 Luminaires for road and street lighting
- Part 2-4 Portable general purpose luminaires
- Part 2-5 Floodlights
- Part 2-6 Luminaires with built-in transformers for tungsten filament lamps (See Note.)
- Part 2-7 Portable luminaires for garden use
- Part 2-8 Handlamps
- Part 2-9 Photo and film luminaires (non-professional)
- Part 2-10 Portable luminaires for children
- Part 2-11 Aquarium luminaires
- Part 2-12 Mains socket-outlet mounted nightlights
- Part 2-13 Ground recessed luminaires
- Part 2-14 Luminaires for cold cathode tubular discharge lamps (neon tubes) and similar equipment
- Part 2-15 Not used at present
- Part 2-16 Not used at present
- Part 2-17 Luminaires for stage lighting, television and film studios (outdoor and indoor)
- Part 2-18 Luminaires for swimming-pools and similar applications
- Part 2-19 Air-handling luminaires (safety requirements)
- Part 2-20 Lighting chains
- Part 2-21 Sealed lighting chains¹
- Part 2-22 Luminaires for emergency lighting
- Part 2-23 Extra low voltage lighting systems for filament lamps
- Part 2-24 Luminaires with limited surface temperatures
- Part 2-25 Luminaires for use in clinical areas of hospitals and health care buildings

NOTE In this edition of IEC 60598-1 all requirements listed in IEC 60598-2-6 have been incorporated. As a consequence, IEC 60598-2-6 will be withdrawn after publication of this standard. For this reason, compliance to IEC 60598-2-6 for luminaire with built-in transformer or controlgear, is not required when tested according to this edition of IEC 60598-1.

A1 0.7 Information for luminaire design in light sources standards

0.7.1 In accordance with IEC guidelines, IEC standards are divided into those covering either safety or performance.

¹ To be published.

0.7.2 In light source safety standards, “information for luminaire design” is given for the safe operation of light sources; this shall be regarded as normative when testing luminaires to this standard.

0.7.3 In light source performance standards, “information for luminaire design” is given for the correct performance of light sources; this shall be regarded as informative when testing luminaires to this standard. Testing of light source performance is not required as part of the type test approval for luminaires. 

SECTION 1: TERMS AND DEFINITIONS

1.1 General

This section gives general definitions applicable to luminaires.

1.2 Terms and definitions

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

NOTE 1 Other definitions related to lamps are to be found in the relevant lamp standards.

NOTE 2 Where the terms “voltage” and “current” are used, they imply the r.m.s. values unless otherwise stated.

1.2.1

luminaire

apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes all the parts necessary for supporting, fixing and protecting the lamps, but not the lamps themselves, and where necessary, circuit auxiliaries together with the means for connecting them to the supply

Note 1 to entry: A luminaire with integral non-replaceable lamps is regarded as a luminaire, except that the tests are not applied to the integral lamp or integral self ballasted lamp.

1.2.2

main part of luminaire

that which is fixed to the mounting surface or is directly suspended from it or standing on it (it may or may not carry the lamps, lampholders and auxiliary gear)

Note 1 to entry: In luminaires for tungsten filament lamps, the part carrying the lampholder is normally the main part.

1.2.3

ordinary luminaire

luminaire providing protection against accidental contact with live parts but without any other special protection against dust, solid objects or moisture

1.2.4

general purpose luminaire

luminaire which is not designed for a special purpose

Note 1 to entry: Examples of general purpose luminaires include pendants, some spotlights and certain fixed luminaires for surface or recessed mounting. Examples of special purpose luminaires are those for rough usage, photo and film applications and swimming-pools.

1.2.5

adjustable luminaire

luminaire, the main part of which can be turned or moved by means of joints, raising and lowering devices, telescopic tubes or similar devices

Note 1 to entry: An adjustable luminaire may be fixed or portable.

1.2.6

basic luminaire

smallest number of assembled parts that can satisfy the requirements of any of the parts of IEC 60598-2

1.2.7

combination luminaire

luminaire consisting of a basic luminaire in combination with one or more parts which may be replaced by other parts, or used in a different combination with other parts and changed either by hand or with the use of tools

1.2.8

fixed luminaire

luminaire which cannot easily be moved from one place to another, either because the fixing is such that the luminaire can only be removed with the aid of a tool, or because it is intended for use out of arms reach

Note 1 to entry: In general, fixed luminaires are designed for permanent connection to the supply, but connection may also be made by means of a plug or similar device.

1.2.9

portable luminaire

luminaire which, in normal use, can be moved from one place to another while connected to the supply

Note 1 to entry: Luminaires for wall mounting provided with a supply cord for connection to a plug and luminaires which may be fixed to their support by means of a wing screw, a clip or a hook so that they can easily be removed from their support by hand, are considered to be portable luminaires.

1.2.10

recessed luminaire

luminaire intended by the manufacturer to be fully or partly recessed into a mounting surface

Note 1 to entry: The term applies both to luminaires for operation in enclosed cavities and to luminaires for mounting through a surface such as a suspended ceiling.

1.2.11

rated voltage

supply voltage or voltages assigned to the luminaire by the manufacturer

1.2.11.1

rated constant input voltage

input voltage or voltages assigned by the manufacturer for luminaires not equipped with controlgear

Note 1 to entry: The rated constant input voltage of the luminaire corresponds to the rated output voltage of the constant voltage controlgear. 

1.2.12

supply current

current at the supply terminals when the luminaire has stabilized in normal use at the rated voltage and frequency

1.2.12.1

rated constant input current

input current or currents assigned by the manufacturer for luminaires not equipped with controlgear

Note 1 to entry: The rated constant input current of the luminaire corresponds to the rated output current for constant current controlgear. 

1.2.13

rated wattage

number and rated wattage of the lamps for which the luminaire is designed

1.2.14

supply cord

external flexible cable or cord, for supply purposes, that is fixed to the luminaire

Note 1 to entry: Luminaires may be provided with the supply cord or designed for attachment of a supply cord e.g. type X or Y attachment.

Note 2 to entry: It is the intention to amend each Part 2 of the standard to align with this modification; however, this will be done when each Part 2 is amended for other reasons. In the meantime, therefore, wherever a Part 2 makes reference to a "non-detachable flexible cable or cord" read "supply cord".

1.2.15

live part

conductive part which may cause an electric shock in normal use. The neutral conductor is, however, regarded as a live part.

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

1.2.16

basic insulation

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

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

1.2.17

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

1.2.18

double insulation

insulation comprising both basic insulation and supplementary insulation

1.2.19

reinforced insulation

single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation

Note 1 to entry: 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.

1.2.20

protective impedance device

component or assembly of components used to bridge double or reinforced insulation and the impedance and construction of which are such as to ensure that steady state touch current and charge are limited to a non-hazardous level

1.2.21

class 0 luminaire (applicable to ordinary luminaires only)

luminaire in which protection against electric shock relies upon basic insulation

This implies that there are no means for the connection of accessible conductive parts, if any, to the protective conductor in the fixed wiring of the installation, reliance in the event of a

failure of the basic insulation being placed on the environment. For the application of Class 0, see Annex T for reference to test requirements.

Note 1 to entry: Class 0 luminaires may have either an enclosure of insulating material which forms a part or the whole of the basic insulation or a metal enclosure which is separated from live parts by at least basic insulation.

Note 2 to entry: If a luminaire with an enclosure of insulating material has provision for earthing internal parts, it is class I.

Note 3 to entry: Class 0 luminaires may have parts with double insulation or reinforced insulation.

Note 4 to entry: In Japan, Class 0 is applicable only to ordinary luminaires for use with a supply voltage from 100 V to 127 V.

1.2.22

class I luminaire

luminaire in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective (earthing) conductor in the fixed wiring of the installation in such a way that accessible conductive parts cannot become live in the event of a failure of the basic insulation

Note 1 to entry: For a luminaire intended for use with a flexible cord or cable, this provision includes a protective conductor as part of the flexible cord or cable.

Note 2 to entry: Class I luminaires may have parts with double insulation or reinforced insulation.

Note 3 to entry: Class I luminaires may have parts in which protection against electric shock relies on operation at safety extra-low voltage (SELV).

1.2.23

class II luminaire

luminaire in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions such as double insulation or reinforced insulation are provided, there being no provision for protective earthing or reliance upon installation conditions

Note 1 to entry: Such a luminaire may be of one of the following types:

- a) A luminaire having a durable and substantially continuous enclosure of insulating material which envelopes all metal parts with the exception of small parts such as nameplates, screws and rivets which are isolated from live parts by insulation at least equivalent to reinforced insulation. Such a luminaire is called an insulation encased class II luminaire.
- b) A luminaire having a substantially continuous enclosure of metal, insulated from live parts by insulation at least equivalent to double or reinforced insulation. Such a luminaire is called a metal-encased class II luminaire.
- c) A luminaire which is a combination of types a) and b) above.

Note 2 to entry: The enclosure of an insulation-encased class II luminaire may form a part or the whole of the supplementary insulation or the reinforced insulation.

Note 3 to entry: If earthing is provided to assist starting, or for EMC reasons, but is not connected to an accessible metal part, the luminaire may still be deemed to be of class II. Accessible metal parts in compliance with the appropriate IEC lamp specification and other metal parts not normally earthed and not normally accessible during normal use are not regarded to be conductive parts which may cause an electric shock unless the tests of Annex A show them to be live parts.

Note 4 to entry: If a luminaire with double insulation and/or reinforced insulation throughout has a protective earthing terminal or a protective earthing contact, it is class I construction. However, a fixed class II luminaire may have an internal terminal or contact for maintaining the electrical continuity (e.g. for looping in or through wiring) of an earthing conductor, provided that the terminal is insulated from accessible metal parts by class II insulation.

Note 5 to entry: Class II luminaires may have parts in which protection against electric shock relies on operation at safety extra-low voltage (SELV).

1.2.24

class III luminaire

luminaire in which protection against electric shock relies on supply at safety extra-low voltage (SELV) and in which voltages higher than those of SELV are not generated

1.2.25**rated maximum ambient temperature** **t_a**

temperature assigned to a luminaire by the manufacturer to indicate the highest sustained temperature in which the luminaire may be operated under normal conditions

Note 1 to entry: This does not preclude temporary operation at a temperature not exceeding $(t_a + 10) ^\circ\text{C}$.

1.2.26**rated maximum operating temperature of the case of a controlgear or capacitor** **t_c**

highest permissible temperature which may occur on the outer surface (at the indicated place if marked) of the component under normal operating conditions at the rated voltage or maximum of the rated voltage range

1.2.27**rated maximum operating temperature of a lamp controlgear winding** **t_w**

winding temperature assigned by the manufacturer as the highest temperature at which 50/60 Hz lamp controlgear may be expected to have a service life of at least 10 years continuous operation

1.2.28**ballast**

unit inserted between the supply and one or more discharge lamps which by means of inductance, capacitance or resistance, single or in combination, serves mainly to limit the current of the lamp(s) to the required value

It may also include means for transforming from the supply voltage and arrangements which help to provide starting voltage and preheating current, prevent cold starting, reduce stroboscopic effect, correct the power factor and suppress radio interference.

1.2.29**independent lamp controlgear**

lamp control gear consisting of one or more separate elements so designed that it, or they, can be mounted separately outside a luminaire with protection according to the marking on the lamp control gear and without any additional enclosure

1.2.30**built-in lamp controlgear**

lamp controlgear designed to be built into a luminaire and not intended to be mounted outside a luminaire without special precautions

1.2.31**integral lampholder**

part of a luminaire which supports the lamp and provides electrical contact with it and which is designed as part of the luminaire

1.2.32

(Not used at present)

1.2.33**translucent cover**

light-transmitting parts of the luminaire which may also protect the lamps and other component parts including diffusers, lens panels and similar light-control elements

1.2.34

fixed wiring

cable which is part of the fixed installation to which the luminaire is connected

Note 1 to entry: Fixed wiring may be brought into the luminaire and connected to terminals, including terminals of lampholders, switches and the like.

1.2.35

appliance coupler

means enabling a flexible cable to be connected at will to the luminaire consisting of two parts: a connector provided with contact tubes which is the part integral with or designed to be attached to the flexible cable connected to the supply and an appliance inlet, provided with contact pins, which is the part incorporated in or fixed to the luminaire

1.2.36

external wiring

wiring generally outside the luminaire but delivered with it

Note 1 to entry: External wiring may be used for connecting the luminaire to the supply, to other luminaires, or to any external ballast.

Note 2 to entry: External wiring is not necessarily outside the luminaire for its full length.

1.2.37

internal wiring

wiring generally inside the luminaire and delivered with it, which forms the connection between terminations for external wiring or supply cords and terminations of lampholders, switches and similar components

Note 1 to entry: Internal wiring is not necessarily inside the luminaire for its full length.

1.2.38

normally flammable material

material having an ignition temperature of at least 200 °C and which will not deform or weaken at this temperature

EXAMPLE: Wood and materials based on wood of more than 2 mm thickness.

Note 1 to entry: The ignition temperature and the resistance of normally flammable materials to deformation or weakening are based on widely accepted values determined during a test period of 15 min.

1.2.39

readily flammable material

material which cannot be classified as either normally flammable or non-combustible

EXAMPLE: Wood fibre and materials based on wood of up to 2 mm thickness

1.2.40

non-combustible material

material incapable of supporting combustion

Note 1 to entry: For the purpose of this standard, materials such as metal, plaster and concrete are regarded as non-combustible materials.

1.2.41

flammable material

material which does not comply with the glow-wire test requirements of 13.3.2.

1.2.42

ELV

extra low voltage

voltage which does not exceed 50 V a.c. r.m.s. or 120 V ripple free d.c. between conductors, or between any conductor and earth (voltage band I of IEC 60449)

Note 1 to entry: "Ripple free" is conventionally defined for sinusoidal ripple voltage as a ripple content of not more than 10 % r.m.s.: the maximum peak value does not exceed 140 V for a nominal 120 V ripple-free d.c. system, respectively 70 V for a nominal 60 V ripple-free d.c. system, and 35 V for a nominal 30 V ripple-free system.

1.2.42.1

FELV

functional extra low voltage

ELV in a circuit having ELV voltage for functional reason and not fulfilling the requirements for SELV (or PELV)

1.2.42.2

SELV

safety extra low voltage

ELV in a circuit which is insulated from the mains supply by an insulation not less than that between the primary and secondary circuits of a safety isolating transformer according to IEC 61558-2-6 or equivalent

Note 1 to entry: Maximum voltage lower than 50 V a.c. r.m.s. or 120 V ripple free d.c. may be specified in particular requirements, especially when direct contact with current-carrying parts is allowed.

1.2.43

working voltage

highest r.m.s. voltage which may occur across any insulation at rated supply volts, transients being neglected, in open-circuit conditions or during normal operation

1.2.43.1

maximum working peak output voltage

$\hat{U}_{out}$

maximum repetitive occurring peak working voltage between the output terminals or between the output terminals and earth, during normal or abnormal operating condition and with transients neglected

[SOURCE: IEC 61347-1:2015, 3.45]

1.2.43.2

ignition voltage

peak voltage applied to ignite a discharge lamp

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

1.2.43.3

ignition pulse voltage

peak ignition voltage with a total duration of $\leq 750 \mu\text{s}$ (summation of all pulses durations) within 10 ms with the duration time (width) of each pulse being measured at the level of 50 % of the maximum absolute peak value

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

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

1.2.43.4
equivalent transformed peak voltage

U_p
transformed output peak voltage, which is converted for the worst case peak voltage with its related frequency into an ignition pulse voltage

Note 1 to entry: The value of the declared equivalent transformed output peak voltage is the essential parameter for selecting the associated components.

Note 2 to entry: See 1.2.43.3.

[SOURCE: IEC 61347-1:2015, 3.47 , modified – notes 3 and 4 have been deleted.] 

1.2.44
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

1.2.45
type test sample

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

1.2.46
by hand

not requiring the use of a tool

1.2.47
terminal

that part of a luminaire or component which is necessary to make electrical connection to a conductor

Note 1 to entry: See Sections 14 and 15.

1.2.48
looping-in

system of mains supply connection to two or more luminaires where each supply conductor is taken into and out of the same terminal

Note 1 to entry: A supply conductor may be cut to facilitate connections to a terminal (see Figure 20).

1.2.49
through wiring

wiring which passes through the luminaire intended for interconnection of a row of luminaires

Note 1 to entry: Some countries do not permit joints in through wiring.

Note 2 to entry: The luminaire may or may not be electrically connected to the through wiring (see Figure 20).

1.2.50
starting device

apparatus that, by itself or in combination with other components in the circuit, provides the appropriate electrical conditions to start a discharge type of lamp

1.2.51
starter

starting device, usually for fluorescent lamps, that provides for the necessary preheating of the electrodes and in combination with the series impedance of the ballast, causes a surge in the voltage applied to the lamp

1.2.52

ignitor

starting device that generates voltage pulses to start a discharge lamp and that does not provide for preheating of electrodes

1.2.53

terminal block

assembly of one or more terminals in or on a housing or body of insulating material to facilitate interconnection between conductors

1.2.54

rough service luminaire

luminaire designed to withstand severe mechanical handling

Note 1 to entry: The luminaire may:

- be permanently fixed, or
- be temporarily fixed on a construction or stand, or
- incorporate an integral stand or handle.

Note 2 to entry: Such luminaires are for use where normally rough circumstances occur, or where temporary lighting is required, for example on building sites, engineering workshops and similar applications.

1.2.55

electro-mechanical contact system

connection system within a luminaire by which the main part carrying the lampholder is electrically and mechanically connected to the base plate or suspension device

SEE: Figure 31 describes an electro-mechanical contact system as defined in 1.2.55. As such the requirements of 4.11.6 and 7.2.1 apply. Because, in the situation described, the base and gear tray are unique and non-interchangeable, the base plate does not require marking with the rated current of the electrical connection, as specified in 3.2.

Note 1 to entry: The system can incorporate an adjusting device.

Note 2 to entry: The system can be dedicated to a specific luminaire design or can provide for connection of a variety of luminaire types.

1.2.56

(Not used at present)

1.2.57

mounting surface

part of any building, furniture or other structure which a luminaire may in any way be attached to, suspended from, stood on or placed upon in normal use and which will or is intended to support the luminaire

1.2.58

integral component

component which forms a non-replaceable part of a luminaire and which cannot be tested separately from the luminaire

1.2.59

self-ballasted lamps

unit which cannot be dismantled without being permanently damaged, provided with a lamp cap and incorporating a light source and any additional elements necessary for starting and stable operation of the light source

Note 1 to entry: The light source component of a self-ballasted lamp is not replaceable.

Note 2 to entry: The ballast component is part of the self-ballasted lamp; it is not part of the luminaire. It is discarded at the end of the life of the unit.

Note 3 to entry: For test purposes, self-ballasted lamp units should be regarded as conventional lamps.

Note 4 to entry: For examples and further information, see IEC 60972.

1.2.60

semi-luminaire

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

Note 1 to entry: The light source component and/or starting device of a semi luminaire is readily replaceable.

Note 2 to entry: The ballast component is not replaceable and is not disposed of each time a light source is replaced.

Note 3 to entry: A lampholder is required for a supply connection.

Note 4 to entry: For examples and further information, see IEC 60972.

1.2.61

plug-ballast/transformer

ballast or transformer incorporated in an enclosure provided with an integral plug as the means of connection to the electrical supply

1.2.62

mains socket-outlet-mounted luminaire

luminaire provided with an integral plug as the means of both mounting and connection to the electrical supply

1.2.63

clip-mounted luminaire

integral assembly of a luminaire and resilient spring clip, securing the luminaire in position on its mounting surface by a single hand action

1.2.64

lamp connectors

set of contacts specially designed to provide a means of electrical contact but not to support the lamp

1.2.65

mains socket-outlet

accessory having socket-contacts designed to engage with the pins or blades of a mains plug and having terminals for the connection of cables or cords

1.2.66

(Not used at present)

1.2.67

(Not used at present)

1.2.68

lamp controlgear

devices employed for the control of lamps, for example ballasts, transformers and step-down convertors

Note 1 to entry: The definition does not include devices for the switching of lamps or the control of brightness such as dimmers and daylight sensors.

1.2.69

(Not used at present)

1.2.70

dummy lamp

device incorporating a cap which is in compliance with the requirements of IEC 60061 where applicable

1.2.71

self-shielded lamp

tungsten halogen lamp or metal halide lamp for which the luminaire needs no protective shield for protection against UV emission or lamp shattering

1.2.72

external flexible cable or cord

flexible cable or cord for external connection to the input or output circuit, fixed to or assembled with, the luminaire according to one of the following methods of attachment:

1.2.72.1

type X attachment

method of attachment of the cable or cord such that it can be easily replaced

Note 1 to entry: The flexible cable or cord may be specially prepared and only available from the manufacturer or his service agent.

Note 2 to entry: A specially prepared cable or cord may also include a part of the luminaire.

1.2.72.2

type Y attachment

method of attachment of the cable or cord such that any replacement can only be made by the manufacturer, his service agent or similarly qualified person

Note 1 to entry: Type Y attachment may be used either with an ordinary or a special flexible cable or cord.

1.2.72.3

type Z attachment

method of attachment of the cable or cord such that it cannot be replaced without breaking or destroying the luminaire

1.2.73

functional earthing

earthing of a point in a system or in an installation or in equipment, which is necessary for the proper function, but does not form part of the protection against electric shock

1.2.74

inter-connecting cable

wiring or wiring assembly between two main parts of a luminaire as supplied by the luminaire manufacturer and which can be regarded as being part of the luminaire

Note 1 to entry: A wiring assembly may contain a combination of different wiring, e.g. to feed through the supply voltage, to provide earthing, to supply starting and working voltages and wiring providing functional connection. Examples of applications are: between a luminaire and a control gear box, a mounting box or a connector fitting to a track system.

1.2.75

ferrule

mechanical fixture, generally a rigid tube, used to confine the stripped end of a cable

1.2.76

impulse withstand category

overvoltage category

numeral defining a transient overvoltage condition

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

Note 2 to entry: The following explanation is taken from IEC 60364-4-443 (withdrawn).

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, coordination 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.

1.2.77

circuits and circuit characteristics

1.2.77.1

primary circuit

circuit which is directly connected to the a.c. mains supply

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

[SOURCE: IEC 60950-1:2005, 1.2.8.4, modified — Additional information has been transferred to a note to entry and the existing note has been deleted]

1.2.77.2

secondary circuit

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

Note 1 to entry: In autotransformers, although having direct connection to a primary circuit, the tapped part of the transformer is also deemed to be a secondary circuit in the above sense.

Note 2 to entry: Mains transients in such a circuit are attenuated by the corresponding primary windings. Inductive ballasts also 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, see Annex U.

[SOURCE: IEC 60950-1:2005, 1.2.8.5, modified — Two new notes to entry have been added replacing the existing note]

1.2.78

touch current

electric current passing through a human body or through an animal body when it touches one or more accessible parts of an installation or equipment

Note 1 to entry: In this standard, the human body is represented by the networks in Figures G.2 or G.3.

[SOURCE: IEC 60050-826:2004, 826.05.21, modified — The word "electrical" has been deleted from "electrical installation or electrical equipment" and a note to entry has been added.]

1.2.79

protective conductor current

current which flows in a protective conductor

Note 1 to entry: This current may have an influence on the operation of RCD's (residual current protection devices) connected in the same circuit.

1.2.80

electric burn

burning of the skin or of an organ, caused by passing an electric current across or through the surface

[SOURCE: IEC 60050-604:1987, 604.04.18]

1.2.81

means of adjustment

part of a luminaire, which may be the lamp compartment, obviously intended to be manipulated by the user during use of the luminaire, e.g. to redirect the light beam

1.2.82

arms reach

zone of accessibility to touch extending from any point on a surface where persons usually stand or move about to the limits which a person can reach with the hand, in any direction, without assistance

Note 1 to entry: IEC 60364-4-41 incorporates a drawing representing the zone of accessibility. In general terms, the height being 2,5 m from the floor, and the width being 1,25 m in all horizontal directions from the locations a person may be.

[SOURCE: IEC 60050-195:1998, 195.06.12]

1.2.83

terminal block with integrated screwless earthing contact

terminal with earthing connection performed by means of an integrated contact or by means of an auxiliary contact without additional assembly actions (e.g. screwing) when fitted

1.2.84

detachable cord

flexible cable or cord, for supply or interconnection, intended to be connected to the luminaire by means of a suitable appliance connector

Note 1 to entry: A detachable cord is considered to be easily replaceable.

1.2.85

tool

screwdriver, coin or other object that may be used to operate a screw or similar fixing means

1.2.86

specially prepared cord

flexible cable or cord the replacement of which with another non-special cable or cord would create a hazard or diminish safety

1.2.87

settable luminaire

fixed luminaire, the main part of which can be turned or moved by means of joints, raising and lowering devices, telescopic tubes or similar devices, but which has a locking device (or devices) operated by a tool and is not intended to be adjusted during use

1.2.88

light source

lamp, provided with a lamp-cap, or module (LED) or other light source made in order to produce an optical visible radiation to be used or incorporated into the luminaire

1.2.88.1

replaceable light source

lamp, provided with a lamp-cap ^{A1} *Text deleted* ^{A1}, or light source designed to be connected by terminals, connector or similar devices and designed to be replaced during normal use or during maintenance of the luminaire

EXAMPLE: All kinds of lamps provided with lamp caps.

Note 1 to entry: Built-in LED module according to the IEC 62031 are normally considered as replaceable light source unless the requirements for non replaceable or non-user replaceable light sources are fulfilled.

1.2.88.2

non replaceable light source

light source which is a non replaceable part of the luminaire either because it cannot be replaced without breaking or destroying the luminaire or because it is enclosed under a cover fixed by screw or similar fixing means designed to be used only once and which is not possible to be opened

1.2.88.3

non-user replaceable light source

light source which can only be replaced by the manufacturer, his service agent, or similar qualified person

1.2.89

controllable luminaire

luminaire having a control terminal for the purpose of controlgear information exchange and/or setting of controlgear functions

1.2.90

control terminal

control terminal connections, other than power supply terminals to the electronic controlgear, which are used to exchange information with the controlgear

Note 1 to entry: The power supply terminals can also be used to exchange information with the controlgear.

1.2.91

LV supply

circuits, wiring or part of them connected to the Low Voltage (LV) public distribution network; the voltage of these circuits correspond to the voltage band II of IEC 60449

EXAMPLE: 230 V distribution network

Note 1 to entry: SELV and FELV are not included in the definition given here for a LV supply

Note 2 to entry: High Voltage (HV) supply corresponding to band III of IEC 60449 is not included in the definition given here for an LV supply.

A1 1.2.92
connecting leads
tails

Internal wiring of luminaires intended to be connected to fixed wiring through separate terminals which are to be enclosed inside the luminaire or connecting box

1.2.93
rated value

value of a quantity used for specification purposes, established under standard test conditions as declared by the manufacturer or responsible vendor

[SOURCE: IEC 62504:2014, 3.33, modified – the note has been deleted.]

1.2.94
input power

electrical power consumed by the luminaire **A1**

SECTION 2: CLASSIFICATION OF LUMINAIRES

2.1 General

This section describes the classification of luminaires.

Luminaires are classified according to the type of protection against electric shock, the degree of protection against ingress of dust, solid objects and moisture, the material of the supporting surface and the circumstances of use.

2.2 Classification according to type of protection against electric shock

Luminaires shall be classified according to the type of protection against electric shock provided, as class I, class II or class III (see definitions in Section 1).

Luminaires shall have only a single classification. For example, for a luminaire with a built-in extra-low voltage transformer with provision for earthing, the luminaire shall be classified as class I and no part of the luminaire shall be classified as class III even though the lamp compartment is separated by a barrier from the transformer compartment.

Semi-luminaires shall comply with all relevant requirements for class II luminaires without being provided with the class II symbol.

Unless a luminaire has been specifically designed for use with semi-luminaires, the luminaire manufacturer is not responsible for continued IEC 60598 conformity in the situation where the user has replaced specified lamp types with semi-luminaires. The semi-luminaire manufacturer has a responsibility to provide information with respect to limitations of use.

NOTE The class II symbol is omitted in order to avoid the symbol being applied to the complete luminaire in which the semi-luminaire is used.

2.3 Classification according to degree of protection against ingress of dust, solid objects and moisture

Luminaires shall be classified in accordance with the "IP number" system of classification described in IEC 60529.

Tests for the degrees of protection are given in Section 9.

NOTE Luminaires classified as watertight are not necessarily suitable for operation under water. Pressure watertight luminaires can be used for such applications.

2.4 Classification according to material of supporting surface for which the luminaire is designed

Luminaires shall be classified according to whether they are suitable for direct mounting on normally flammable surfaces or are only suitable for mounting on non-combustible surfaces as follows:

Classification	Symbol
– Luminaires suitable for direct mounting on normally flammable surfaces	No symbol required
– Luminaires not suitable for direct mounting on normally flammable surfaces	The relevant symbol – see Figure 1

NOTE Readily flammable surfaces are not suitable for the direct mounting of luminaires. Requirements for luminaires classified as primarily intended for direct mounting on normally flammable surfaces are given in Section 4 and related tests in Section 12.

2.5 Classification according to the circumstances of use

Luminaires shall be classified according to whether they are intended for normal use or for rough service.

Classification	Symbol
– Luminaires for normal use	No symbol
– Luminaires for rough service	Symbol – see Figure 1

SECTION 3: MARKING

3.1 General

This section specifies the information to be marked on luminaires or given by instruction.

Any written instructions related to safety shall be in a language which is acceptable in the country in which the equipment is to be installed.

3.2 Marking on luminaires

The following information shall be distinctly and durably marked on the luminaire (see Table 3.1).

- Marking to be observed when replacing lamps or other replaceable components, shall be visible on the outside of the luminaire (except the mounting side) or behind a cover which is removed during lamp or other component replacement and with the lamp removed.
- Marking to be observed during installation shall be visible during installation on the outside of the luminaire or behind a cover or part which is removed during installation.
- Marking to be observed after installation shall be visible with the luminaire assembled and installed as for normal use and with the lamp in place.

Marking may be on ballasts provided the conditions under a) or b) above, as appropriate, are fulfilled. See Table 3.1 for details.

Table 3.1 – Marking

Markings belonging to item a)	Markings belonging to item b)	Markings belonging to item c)
3.2.8 ^a Rated wattage 3.2.10 Special lamps 3.2.11 Cool beam 3.2.15 Bowl mirror 3.2.16 Protective shield 3.2.18 Ignition warning 3.2.19 Self-shielded lamp 3.2.22 Internal replaceable fuse(s) 3.2.23 Do not stare at light source ^e 3.2.24 Symbol for electric shock risk	3.2.1 – 3.2.2 ^b 3.2.3 Ambient temperature 3.2.4 – 3.2.5 3.2.6 IP number 3.2.7 Type reference  3.2.8.2 Rated input power 3.2.9 Symbols The relevant symbol for luminaires not suitable for direct mounting on normally flammable surfaces 3.2.12 Termination 3.2.17 ^c Interconnected luminaires 3.2.21 The relevant symbol for luminaires not suitable for covering with thermally insulating material 3.2.25 Rated input constant voltage ^f 3.2.26 Rated input constant current and value of U_{out} ^g 	3.2.13 Lighted objects ^d 3.2.14 Rough service 3.2.20 Means of adjustment 3.2.23 Do not stare at light source ^e
^a 3.2.8 Rated wattage. For luminaires for discharge lamps with remote control gear, the marking may be replaced by the instruction: "For lamp designation, see control gear". ^b 3.2.2 Rated voltage. For luminaires for discharge lamps, if the ballast is not built into the luminaire, the luminaire shall be marked with the working voltage instead of the mains voltage. ^c 3.2.17 Interconnected luminaires. For fixed luminaires, this information may alternatively be provided within the installation instructions. ^d 3.2.13 Lighted objects. Only the symbol shall be provided on the luminaire. The explanation of the symbol shall be provided in the instruction accompanying the luminaire, where not already provided on the luminaire. ^e 3.2.23 The different conditions of this marking for fixed, portable and handheld luminaires are given in 3.2.23  ^f 3.2.25 for constant voltage operation of the luminaire. ^g 3.2.26 for constant current operation of the luminaire. 		

The earthing symbol referred to in 3.2.12 may be marked on the ballast, instead of the luminaire, if the ballast is of a non-replaceable type. The height of graphical symbols shall not be less than 5 mm, except for symbols for class II and class III classification which may be reduced to a minimum of 3 mm where the space available for marking is restricted. The height of letters and numerals either shown separately or with or as part of symbols shall not be less than 2 mm.

For combination luminaires where the type references or the rated inputs are different for different combinations, the main part and the alternative parts may be marked with a type reference or a rated input, as appropriate, provided that the type can be identified and the rated input of the complete unit may be established from a catalogue or a similar document.

For luminaires with electro-mechanical contact systems, the base plate shall be marked with the rated current of the electrical connection if the system can be used with a variety of different luminaire types.