

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Luminaires –  
Part 1: General requirements and tests**

**Luminaires –  
Partie 1: Exigences générales et essais**



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2024 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

#### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

#### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Discover our powerful search engine and read freely all the publications provided, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

#### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Recherche de publications IEC -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Luminaire –  
Part 1: General requirements and tests**

**Luminaire –  
Partie 1: Exigences générales et essais**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 29.140.40

ISBN 978-2-8322-9936-4

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	12
INTRODUCTION.....	15
1 Scope.....	16
2 Normative references .....	16
3 Terms and definitions .....	19
4 General requirements .....	43
4.1 General.....	43
4.2 General test requirements and verification .....	43
4.3 Components of luminaires.....	44
4.4 Information for luminaire design in light sources and controlgear standards .....	46
5 Classification of luminaires .....	46
5.1 General.....	46
5.2 Classification according to the type of protection against electric shock .....	46
5.3 Classification according to the degree of protection against ingress of dust, solid objects and moisture .....	46
5.4 Classification according to the material of the mounting surface for which the luminaire is designed .....	47
5.5 Classification according to the circumstances of use .....	47
6 Marking .....	47
6.1 General.....	47
6.2 Marking on luminaires .....	47
6.3 Information to be marked on luminaires .....	49
6.4 Additional information .....	58
6.5 Test of marking .....	63
7 Construction .....	64
7.1 General.....	64
7.2 Replaceable components .....	64
7.3 Wireways .....	64
7.4 Lampholders .....	64
7.5 Starterholders .....	66
7.6 Terminal blocks .....	66
7.7 Terminals and supply connections .....	67
7.8 Switches .....	69
7.9 Insulating linings and sleeves .....	70
7.10 Double and reinforced insulation .....	70
7.11 Electrical connections and current-carrying parts .....	72
7.12 Screws, connections (mechanical) and glands .....	74
7.13 Mechanical strength .....	77
7.14 Suspensions, fixings and means of adjustment .....	80
7.15 Flammable materials.....	83
7.16 Luminaires for mounting on normally flammable surfaces .....	85
7.17 Drain holes .....	87
7.18 Resistance to corrosion .....	87
7.19 Ignitors .....	87
7.20 Rough service luminaires.....	87
7.21 Protective shield .....	89
7.22 Attachments to lamps.....	90

7.23	Semi-luminaires .....	90
7.24	Photobiological hazards .....	90
7.24.1	Actinic UV hazards for skin and eye (200 nm to 400 nm) .....	90
7.24.2	UV-A hazard for the eye lens (315 nm to 400 nm) .....	91
7.24.3	Retinal blue light hazard .....	91
7.24.4	Retinal thermal hazard (380 nm to 1 400 nm) .....	92
7.24.5	Infrared hazard for the eye (780 nm to 3 000 nm) .....	93
7.24.6	Thermal hazard for the skin (380 nm to 3 000 nm) .....	93
7.25	Mechanical hazard .....	93
7.26	Short-circuit protection .....	93
7.27	Terminal blocks with integrated screwless protective earthing contacts .....	94
7.28	Fixing of thermal sensing controls .....	94
7.29	Luminaires with non-replaceable light sources .....	95
7.30	Luminaires with non-user replaceable light sources and non-user serviceable components .....	95
7.31	Insulation between circuits .....	95
7.31.1	General .....	95
7.31.2	SELV or PELV circuits .....	96
7.31.3	FELV circuits .....	97
7.31.4	Other circuits .....	97
7.31.5	Additional requirements for luminaires using non-dimmable controlgear providing SELV output(s) .....	98
7.32	Overvoltage protective devices external to controlgear .....	98
7.32.1	General .....	98
7.32.2	Surge protective devices (SPDs) .....	99
7.32.3	Surge protective components (SPCs) .....	99
7.33	Luminaire powered via information technology communication cabling .....	101
7.34	Electromagnetic fields (EMF) .....	101
7.35	Protection against moving parts .....	102
7.36	Track-mounted luminaires .....	102
8	External and internal wiring .....	102
8.1	General .....	102
8.2	Supply connection and other external wiring .....	102
8.3	Internal wiring .....	111
8.4	Test to determine the suitability of conductors having a reduced cross-sectional area .....	113
9	Provision for earthing .....	114
9.1	General .....	114
9.2	Provision for earthing .....	114
10	Protection against electric shock .....	117
10.1	General .....	117
10.2	Protection against electric shock .....	117
11	Resistance to dust, solid objects and moisture .....	121
11.1	General .....	121
11.2	General conditions and tests for IP classification .....	121
11.2.1	General .....	121
11.2.2	Tests for first characteristics IP numerals 2, 3 and 4 .....	123
11.2.3	Tests for first characteristic IP numeral 5 and 6 .....	123
11.2.4	Drip-proof luminaires – Tests for second characteristic IP numeral 1 .....	124

11.2.5	Drip-proof luminaires – Tests for second characteristic IP numeral 2 .....	125
11.2.6	Rain-proof luminaires – Tests for second characteristic IP numeral 3 .....	125
11.2.7	Splash-proof luminaires – Tests for second characteristic IP numeral 4 .....	126
11.2.8	Jet-proof luminaires – Tests for second characteristic IP numeral 5 .....	126
11.2.9	Powerful jet-proof luminaires – Tests for second characteristic IP numeral 6 .....	127
11.2.10	Watertight luminaires – Tests for second characteristic IP numeral 7 .....	127
11.2.11	Pressure watertight luminaires – Tests for second characteristic IP numeral 8 .....	128
11.2.12	High pressure and temperature water jet-proof luminaires – Tests for second characteristic IP numeral 9 (80 °C) .....	128
11.2.13	High pressure and cold water jet-proof luminaires – Tests for second characteristic IP numeral 9 (15 °C) .....	128
11.3	Humidity test .....	128
12	Insulation resistance and electric strength, touch current and protective conductor current .....	129
12.1	General .....	129
12.2	Insulation resistance and electric strength .....	129
12.2.1	General .....	129
12.2.2	Test – Insulation resistance .....	130
12.2.3	Test – Electric strength .....	131
12.3	Touch current, protective conductor current and electric burn .....	133
13	Creepage distances and clearances .....	134
13.1	General .....	134
13.2	Requirements .....	135
13.2.1	General .....	135
13.2.2	Creepage distances .....	136
13.2.3	Clearances .....	137
14	Endurance test and thermal test .....	139
14.1	General .....	139
14.2	Selection of lamps and controlgear .....	139
14.3	Endurance test .....	140
14.3.1	General .....	140
14.3.2	Test .....	140
14.3.3	Compliance .....	141
14.4	Thermal test (normal operation) .....	141
14.4.1	General .....	141
14.4.2	Test .....	142
14.4.3	Compliance .....	144
14.5	Thermal test (abnormal operation) .....	147
14.5.1	General .....	147
14.5.2	Test .....	148
14.5.3	Compliance .....	149
14.6	Thermal test (failed windings in controlgear) .....	151
14.6.1	General .....	151
14.6.2	Test for luminaires without thermal cut-outs .....	151
14.6.3	Test for luminaires with temperature sensing controls .....	152
14.7	Thermal test in regard to fault conditions in controlgear or electronic devices incorporated in thermoplastic luminaires .....	153
14.7.1	General .....	153

14.7.2	Test for luminaires without temperature sensing controls .....	153
14.7.3	Test for luminaires with temperature sensing controls internal or external to the controlgear or transformer .....	156
15	Resistance to heat, fire and tracking .....	157
15.1	General .....	157
15.2	Resistance to heat .....	157
15.3	Resistance to flame and ignition .....	158
15.4	Resistance to tracking .....	158
16	Screw terminals .....	159
16.1	General .....	159
16.2	General requirements and basic principles .....	165
16.3	Mechanical requirements and tests .....	167
17	Screwless terminals and electrical connections .....	171
17.1	General .....	171
17.2	General requirements .....	173
17.3	General instructions for tests .....	175
17.3.1	Preparation of samples .....	175
17.3.2	Test conductors .....	175
17.3.3	Multi-conductor terminals .....	175
17.3.4	Multi-way terminals .....	175
17.3.5	Test quantities .....	175
17.4	Terminal and connections for internal wiring .....	175
17.4.1	Mechanical tests .....	175
17.4.2	Electrical tests .....	176
17.5	Terminals and connections for external wiring .....	177
17.5.1	Conductors .....	177
17.5.2	Mechanical tests .....	178
17.5.3	Electrical tests .....	179
Annex A (normative)	Test to establish whether a conductive part can cause an electric shock .....	181
A.1	General .....	181
A.2	Touch voltage limits .....	181
A.3	Touch current limits .....	181
A.4	Compliance .....	181
Annex B (normative)	Test lamps .....	182
B.1	General .....	182
B.2	Filament lamps within the scope of IEC 60432-1 and IEC 60432-2 .....	182
B.2.1	Principal modes of heat transfer and lamps used for testing .....	182
B.2.2	Filament test lamps .....	183
B.3	Halogen lamps within the scope of IEC 60432-3 .....	184
B.4	Tubular fluorescent and other discharge lamps .....	184
B.5	LED modules within the scope of IEC 62031 .....	184
Annex C (normative)	Abnormal circuit conditions .....	185
Annex D (normative)	Thermal testing .....	188
D.1	Draught-proof enclosure .....	188
D.2	Mounting surface .....	188
D.3	Alternative test procedure for adjustment of measured temperatures for luminaire $t_a$ rating(s) .....	189

D.3.1	General .....	189
D.3.2	Thermal test of normal operation for luminaires without temperature sensing controls and where the rated ambient temperature $t_a$ as marked on the luminaire is higher than the ambient temperature in the draught-proof enclosure.....	189
Annex E (normative)	Determination of winding temperature rises by the increase-in-resistance method .....	190
Annex F (normative)	Test for resistance to stress corrosion of copper and copper alloys.....	191
F.1	Test cabinet .....	191
F.2	Test solution .....	191
F.3	Test piece .....	191
F.4	Test procedure.....	192
Annex G (normative)	Measurement of touch current and protective conductor current .....	193
G.1	General.....	193
G.2	Test conditions .....	193
G.3	Test procedures .....	193
G.4	Test measurements .....	193
G.5	Test sequence .....	195
Annex H (informative)	Explanation of IP numbers for degrees of protection .....	197
Annex I (informative)	Temperature measurements .....	199
I.1	Temperature measurements of the luminaire .....	199
I.2	Temperature measurement of the insulation parts of lampholders .....	200
Annex J (informative)	Guidelines for good practice in luminaire design .....	202
J.1	General.....	202
J.2	Plastics in luminaires .....	202
J.3	Rust resistance .....	203
J.4	Corrosion resistance .....	203
J.5	Chemically corrosive atmospheres .....	204
J.6	Reflector design.....	204
J.7	Components in different kinds of luminaires .....	205
J.8	Recommendations for electromagnetic ballast protection for end of life phenomenon of HID lamps .....	205
J.9	Resistance against the effects of vibration .....	205
J.10	Flammability of components.....	206
J.11	Permanent magnets .....	206
Annex K (normative)	Determination of creepage distances and clearances .....	208
Annex L (informative)	Explanation of marking for luminaires that are not suitable for mounting on normally flammable surfaces and covering with insulation materials .....	209
L.1	General.....	209
L.2	Protection against flame .....	209
L.3	Protection against heat .....	210
L.3.1	General .....	210
L.3.2	Spacing .....	210
L.3.3	Temperature measurements of mounting surface under abnormal or failed ballast conditions .....	210
L.4	Thermal protectors.....	212
L.5	Deletion of the F mark requirements .....	213
Annex M (normative)	Absorption requirements for the protective shield to be fitted to luminaires designed for metal halide lamps which emit a high level of UV radiation .....	214

M.1	General.....	214
M.2	Procedure A.....	214
M.3	Procedure B.....	215
Annex N	(informative) Conformity testing during manufacture .....	216
N.1	General.....	216
N.2	Testing .....	216
Annex O	(normative) Schedule of amended subclauses containing more serious or critical requirements which call for products to be retested .....	218
Annex P	(normative) Requirements for the identification of a family or range of luminaires for type testing.....	219
P.1	General.....	219
P.2	Range or family of luminaires.....	219
Annex Q	(informative) Additional requirements for luminaires where a higher degree of availability (overvoltage category III) may be requested .....	220
Q.1	General.....	220
Q.2	Requirements for overvoltage category III.....	220
Annex R	(normative) Additional test requirements for terminal blocks with integrated screwless protective earthing contact for direct connection to the luminaire housing or to parts of the body.....	222
R.1	Additional requirements to 9.2.1.....	222
R.1.1	Requirements for mechanical strength.....	222
R.1.2	Test for terminal fixing .....	222
R.1.3	Test for supporting plate.....	222
R.2	Additional requirements to 9.2.3.....	222
Annex S	(normative) Alternative thermal test for thermoplastic luminaires .....	224
S.1	General.....	224
S.2	Thermal test in regard to fault conditions in controlgear or electronic devices without temperature sensing components in thermoplastic luminaires for fluorescent lamps ≤ 70 W.....	224
Annex T	(normative) Requirements for insulation between live parts of circuits and accessible conductive parts .....	226
Annex U	(informative) Information regarding power sourcing equipment powering class III luminaires via information technology communication cabling.....	228
U.1	General.....	228
U.2	Insulation of the mains supply .....	228
U.3	Electrical limits of a PSE.....	228
Annex V	(informative) Cross-references to the previous edition of IEC 60598-1 .....	230
Annex W	(normative) Battery/EDLC-operated luminaires .....	233
W.1	General.....	233
W.2	General test requirements and verification .....	233
W.3	Marking.....	235
W.3.1	General .....	235
W.3.2	Luminaires with replaceable battery.....	235
W.3.3	Coin and button batteries.....	235
W.3.4	Other standardized batteries (e.g. AAA or AA).....	236
W.3.5	Luminaires with non-standardized replaceable rechargeable battery.....	237
W.3.6	Luminaires with non-user replaceable battery/EDLC .....	237
W.3.7	Luminaires with non-replaceable battery/EDLC.....	238
W.3.8	Luminaires supplied by external dedicated power supply units.....	238

W.3.9	Rechargeable luminaires other than ordinary .....	238
W.3.10	Conditions for charging .....	238
W.4	Construction .....	239
W.4.1	General .....	239
W.4.2	Small batteries (coins, button and other non-standardized batteries) .....	239
W.4.3	Battery compartment fasteners for small batteries and other standardized batteries (e.g. AAA or AA) .....	240
W.4.4	Battery/EDLC chargers incorporated in luminaires .....	240
W.4.5	Short-circuit protection .....	240
W.4.6	Electrical parameters of the batteries operation .....	241
W.4.7	Protection against overpressure for Li-ion batteries used in luminaires .....	242
W.4.8	Protection against the consequence of failure of cells or EDLCs .....	242
W.5	Protection against electric shock .....	243
W.6	Endurance test and thermal test .....	243
W.6.1	Endurance test .....	243
W.6.2	Thermal test (normal operation) .....	243
W.6.3	Thermal test (abnormal operation) .....	244
W.6.4	Lithium-ion charging systems – Fault conditions .....	245
	Bibliography .....	247
	Figure 1 – Example of "looping-in" (feed through) .....	30
	Figure 2 – Examples of "through wiring" .....	30
	Figure 3 – Example of electro-mechanical contact system with plug or socket connection .....	32
	Figure 4 – AC supply .....	49
	Figure 5 – DC supply .....	49
	Figure 6 – DC and AC supply .....	49
	Figure 7 – Class II .....	50
	Figure 8 – Class III .....	50
	Figure 9 – Luminaire not suitable for direct mounting on normally flammable surfaces .....	52
	Figure 10 – High-pressure sodium lamps that require an external ignitor (to the lamp) .....	52
	Figure 11 – High-pressure sodium lamps having an internal starting device .....	52
	Figure 12 – Warning against the use of cool-beam lamps .....	52
	Figure 13 – Functional earthing .....	53
	Figure 14 – Protective earthing .....	53
	Figure 15 – Minimum distance from lighted objects (metres) .....	54
	Figure 16 – Rough service .....	54
	Figure 17 – Bowl mirror lamp .....	54
	Figure 18 – Replace any cracked protective shield .....	55
	Figure 19 – Test circuit for safety during insertion .....	55
	Figure 20 – Self-shielded lamp .....	55
	Figure 21 – Luminaires with internal fuses .....	56
	Figure 22 – Do not stare at the operating light source .....	56
	Figure 23 – Caution, risk of electric shock .....	57
	Figure 24 – Use of heat resistant supply cables, interconnecting cables or external wiring .....	58

Figure 25 – Pictogram for non-replaceable light source.....	60
Figure 26 – Pictogram for non-user replaceable light source.....	61
Figure 27 – Pictogram for replaceable light source .....	61
Figure 28 – Pictogram for non-replaceable controlgear .....	62
Figure 29 – Pictogram for non-user replaceable controlgear .....	63
Figure 30 – Pictogram for replaceable controlgear .....	63
Figure 31 – Terminal block arrangement for installation test for luminaires with connecting leads (tails) .....	67
Figure 32 – Examples of self-tapping, thread-cutting and thread-forming screws .....	73
Figure 33 – Illustration of the requirements of 7.15.1 .....	84
Figure 34 – Apparatus for ball impact tests .....	88
Figure 35 – Test chain .....	94
Figure 36 – Example of permitted degree of soldering .....	109
Figure 37 – Circuit for checking electrical contact between socket-outlet and plug .....	110
Figure 38 – Test to determine the suitability of conductors having a reduced cross- sectional area .....	114
Figure 39 – Example of a thread-forming screw used in a groove of a metallic material .....	115
Figure 40 – Apparatus for proving protection against dust.....	124
Figure 41 – Apparatus for testing protection against rain and splashing .....	125
Figure 42 – Nozzle for spray test .....	127
Figure 43 – Illustration of creepage and clearance measurements at a supply terminal.....	136
Figure 44 – Test circuit for luminaires incorporating fluorescent lamp $\leq 70$ W .....	154
Figure 45 – Ball-pressure apparatus .....	157
Figure 46 – Pillar terminals .....	160
Figure 47 – Screw terminals and stud terminals .....	162
Figure 48 – Saddle terminals .....	163
Figure 49 – Lug terminals .....	164
Figure 50 – Mantle terminals.....	165
Figure 51 – Construction of electrical connections .....	171
Figure 52 – Examples of spring-type screwless terminals .....	172
Figure 53 – Further examples of screwless terminals.....	173
Figure C.1 – Circuit for testing rectifying effect (some capacitive starterless ballasts only) .....	186
Figure C.2 – Circuit for testing rectifying effect (ballasts for single pin lamps).....	186
Figure C.3 – Circuit for testing rectifying effect of some high-pressure sodium and some metal halide lamps .....	187
Figure G.1 – Test configuration: single-phase equipment on star TN or TT system .....	195
Figure G.2 – Measuring network, touch current weighted for perception or reaction .....	196
Figure G.3 – Measuring network, touch current weighted for let-go (for portable class I luminaires).....	196
Figure G.4 – Measuring network, weighted for high frequency .....	196
Figure I.1 – Placing of thermocouples on a typical lampholder .....	201
Figure L.1 – Relation between winding temperature and mounting surface temperature.....	211
Figure L.2 – Ignition temperatures of wood as a function of time .....	212
Figure R.1 – Arrangement for voltage drop test.....	223

Figure T.1 – Declaration of $LV_{\text{supply}}$ and $U_{\text{out}}$ and the insulation barriers between the light source and accessible parts .....	226
Table 1 – Marking .....	48
Table 2 – IP numbers for degree of protection against ingress of dust, solid objects and moisture .....	51
Table 3 – Identification of extra-low-voltage DC leads and terminations .....	53
Table 4 – Overview of required Y capacitors .....	72
Table 5 – Torque tests on screws .....	75
Table 6 – Torque tests on cable glands .....	77
Table 7 – Impact energy and spring compression .....	78
Table 8 – Test on semi-luminaires .....	82
Table 9 – Test on adjusting devices .....	83
Table 10 – Nominal discharge current (used in the combination wave test) .....	100
Table 11 – Supply cord .....	104
Table 12 – Wiring dimension .....	105
Table 13 – Tests for cord anchorage .....	108
Table 14 – Solid-object-proof luminaire test .....	123
Table 15 – Minimum insulation resistance .....	130
Table 16 – Electric strength .....	132
Table 17 – Limits of touch current or protective conductor current and electric burn .....	134
Table 18 – Minimum creepage distances for AC sinusoidal voltages up to 30 kHz (to be used in conjunction with Annex K) .....	137
Table 19 – Minimum clearances for working voltages (to be used in conjunction with Annex K) .....	138
Table 20 – Minimum distances for ignition pulse voltages or equivalent transformed peak voltage $U_p$ .....	139
Table 21 – Maximum temperatures under the test conditions of 14.4.3, for principal parts .....	145
Table 22 – Maximum temperatures under the test conditions of 14.4.3, for common materials used in luminaires .....	146
Table 23 – Maximum temperatures under the test conditions of 14.5.2 .....	149
Table 24 – Maximum temperature of windings under abnormal operating conditions and at 110 % of rated voltage for controlgear .....	150
Table 25 – Maximum temperature of windings under abnormal operating conditions and at 110 % of rated voltage for controlgear marked "D6" .....	151
Table 26 – Temperature overshoot time limitation .....	153
Table 27 – Nominal cross-sectional areas of conductors according to terminal sizes .....	166
Table 28 – Nominal cross-sectional areas of conductors according to maximum current .....	167
Table 29 – Composition of conductors .....	168
Table 30 – Torque to be applied to screws and nuts .....	169
Table 31 – Pull to be applied to conductor .....	170
Table 32 – Conductor rating .....	178
Table 33 – Conductor pull force .....	178
Table F.1 – pH value of the test solution .....	191

Table G.1 – Position of switches e, n and p for the measurements of the different classes of luminaires .....	195
Table H.1 – Degrees of protection indicated by the first characteristic numeral .....	197
Table H.2 – Degrees of protection indicated by the second characteristic numeral.....	198
Table J.1 – Damaging influences .....	202
Table K.1 – Determination of creepage distances and clearances (see Table 18, Table 19 and Table 20).....	208
Table L.1 – Guidance on when to use the symbol and its explanation on the luminaire or in the manufacturer’s instructions provided with the luminaire.....	209
Table L.2 – Thermal protection operation.....	213
Table N.1 – Minimum values for electrical tests .....	217
Table Q.1 – Minimum clearance distances for AC sinusoidal working voltages overvoltage category III .....	220
Table Q.2 – Overview of required Y capacitors.....	221
Table Q.3 – Nominal discharge current (used in the combination wave test) .....	221
Table T.1 – Insulation requirements between live parts and accessible conductive parts .....	227
Table U.1 – Limits for the electrical parameters of a PSE.....	228
Table U.2 – Electrical parameters for communication cables or connectors.....	229
Table V.1 – Cross-references .....	230
Table W.1 – Artificial source characteristics.....	234
Table W.2 – Total area of openings for Li-ion cells.....	242
Table W.3 – Volume of air injected at 2 070 kPa .....	242

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

## LUMINAIRES –

### Part 1: General requirements and tests

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60598-1 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lighting. It is an International Standard.

This tenth edition cancels and replaces the ninth edition published in 2020. This edition constitutes a technical revision.

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

- a) new structure to comply with the ISO/IEC Directives, Part 2;
- b) addition of a new Annex V for comparison with the previous edition;
- c) revision of 7.32 for SPDs and for SPCs;
- d) the terms "live part" and "active part" were reviewed and aligned with the definitions of "live part" and "hazardous live part" given in IEC 60050-195;

- e) revision of 7.14.2 for conductor mechanical stress;
- f) revision of 14.5.2, Item 4 to include controlgear;
- g) revision of 9.2.1 (Earthing) with the deletion of the word "permanently";
- h) revision of Annex N: earth continuity test time;
- i) revision of 7.11.4; 7.14.1; Table 22 (14.4.3): Introduction of requirements for suspension by magnets;
- j) addition of a new Annex W for luminaires using batteries;
- k) clarification of Clause 6 for marking requirements for nature of supply;
- l) addition of a new Subclause 7.31.5: Additional requirements for luminaires using controllable controlgear providing SELV output(s);
- m) revision of 6.4.16: Information to be provided for luminaire having protective earth current > 10 mA;
- n) revision of 6.3.23; 6.4.18; 6.4.24; 7.30 and 10.2.1 for serviceable, non-user serviceable and non-serviceable components;
- o) revision of Annex D: Draught-proof enclosure;
- p) revision of 8.2.1 and 13.2.1: Inconsistencies in the inclusion of the limits of voltage ranges;
- q) revision of 9.2.10 for looping-in;
- r) Revision of Clause 2 and 7.8: update of the reference to IEC 61058-1-1, IEC 61058-1-2 and IEC 61058-2-1. Update of temperature limits in Table 21 (14.4.3) for luminaires incorporating switches according to IEC 60669-1 or IEC 60669-2-1;
- s) revision of 6.3.22 and 7.24 for photobiological safety;
- t) addition of a new Subclause 6.3.27 for marking of mains socket outlet moved from information requirements.

The major changes which can affect certification are given in Annex O.

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

The text of this International Standard is based on the following documents:

Draft	Report on voting
34D/1739/FDIS	34D/1751/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

When using this document with already published parts of the IEC 60598-2 series, Annex V of this document is to be used to update the cross-referencing of the relevant part of the IEC 60598-2 series to the new structure of this document. SC 34D projects to update the structure of the IEC 60598-2 series in line with the new structure of this document are to follow.

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

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

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

**IMPORTANT – The "colour inside" logo on the cover page of this document 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.**

## INTRODUCTION

In general, this document covers safety requirements for luminaires. The object of this document 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 the IEC 60598-2 series. This document 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 the IEC 60598-2 series.

Each part of the IEC 60598-2 series details the requirements for a particular type of luminaire or group of luminaires. These parts of the IEC 60598-2 series are published separately for ease of revision and additional documents will be added as and when a need for them is recognized.

The IEC 60598-2 series comprises the following parts:

IEC 60598-2-1:	Fixed general purpose luminaires
IEC 60598-2-2:	Recessed luminaires and recessed air-handling luminaires
IEC 60598-2-3:	Luminaires for road and street lighting
IEC 60598-2-4:	Portable general purpose luminaires
IEC 60598-2-5:	Floodlights
IEC 60598-2-6:	Luminaires with built-in transformer for filament lamps (withdrawn)
IEC 60598-2-7:	Portable luminaires for garden use (withdrawn)
IEC 60598-2-8:	Handlamps
IEC 60598-2-9:	Photo and film luminaires (non-professional) (withdrawn)
IEC 60598-2-10:	Portable luminaires for children
IEC 60598-2-11:	Aquarium luminaires
IEC 60598-2-12:	Mains socket-outlet mounted nightlights
IEC 60598-2-13:	Ground recessed luminaires
IEC 60598-2-14:	Luminaires for cold cathode tubular discharge lamps (neon tubes) and similar equipment
IEC 60598-2-15:	Not used at present
IEC 60598-2-16:	Not used at present
IEC 60598-2-17:	Luminaires for stage lighting, television and film studios (outdoor and indoor)
IEC 60598-2-18:	Luminaires for swimming pools and similar applications
IEC 60598-2-19:	Air-handling luminaires (safety requirements) (withdrawn)
IEC 60598-2-20:	Lighting chains
IEC 60598-2-21:	Rope lights
IEC 60598-2-22:	Luminaires for emergency lighting
IEC 60598-2-23:	Extra-low-voltage lighting systems for filament lamps
IEC 60598-2-24:	Luminaires with limited surface temperatures
IEC 60598-2-25:	Luminaires for use in clinical areas of hospitals and health care buildings

## LUMINAIRES –

### Part 1: General requirements and tests

#### 1 Scope

This part of IEC 60598 specifies general safety requirements for luminaires, incorporating electric light sources for operation from supply voltages up to 1 000 V.

Requirements for semi-luminaires are included in this document.

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

This document does not cover performance. Performance of luminaires is covered by the IEC 62722 series.

#### 2 Normative references

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

IEC 60061-2, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 2: Lampholders*, available at <http://std.iec.ch/iec60061>

IEC 60061-3, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 3: Gauges*, available at <http://std.iec.ch/iec60061>

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

IEC 60068-2-14:2023, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-31:2008, *Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens*

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 60112:2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60155, *Glow-starters for fluorescent lamps*