

VALGUSTID. OSA 1: ÜLDNÕUDED JA KATSETUSED

Luminaires - Part 1: General requirements and tests

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>See Eesti standard EVS-EN IEC 60598-1:2024 sisaldab Euroopa standardi EN IEC 60598-1:2024 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 20.12.2024.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN IEC 60598-1:2024 consists of the English text of the European standard EN IEC 60598-1:2024.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 20.12.2024.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
--	---

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 29.140.40

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation: Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

EUROPEAN STANDARD

EN IEC 60598-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2024

ICS 29.140.40

Supersedes EN IEC 60598-1:2021; EN IEC 60598-1:2021/A11:2022

English Version

Luminaires - Part 1: General requirements and tests (IEC 60598-1:2024)

Luminaires - Partie 1: Exigences générales et essais
(IEC 60598-1:2024)

Leuchten - Teil 1: Allgemeine Anforderungen und
Prüfungen
(IEC 60598-1:2024)

This European Standard was approved by CENELEC on 2024-12-11. 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.

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

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



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 34D/1739/FDIS, future edition 10 of IEC 60598-1, prepared by SC 34D "Luminaires" of IEC/TC 34 "Lighting" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60598-1:2024.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2025-12-31 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2027-12-31 document have to be withdrawn

This document supersedes EN IEC 60598-1:2021 and all of its amendments and corrigenda (if any).

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

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZZ, which is an integral part of EN IEC 60598-1:2024/A11:2024.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60598-1:2024 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60061 (series) NOTE Approved as EN 60061 (series)

IEC 60068-2-2:2007 NOTE Approved as EN 60068-2-2:2007 (not modified)

IEC 60079 (series) NOTE Approved as EN IEC 60079 (series)

IEC 60081 NOTE Approved as EN 60081

IEC 60086-1 NOTE Approved as EN IEC 60086-1

IEC 60086-2 NOTE Approved as EN IEC 60086-2

IEC 60216 (series)	NOTE	Approved as EN 60216 (series)
IEC 60228	NOTE	Approved as EN IEC 60228
IEC 60269 (series)	NOTE	Approved as EN 60269 (series)
IEC 60357	NOTE	Approved as EN 60357
IEC 60364 (series)	NOTE	Approved as HD 60364 (series)
IEC 60364-4-41	NOTE	Approved as HD 60364-4-41
IEC 60364-5-51	NOTE	Approved as HD 60364-5-51
IEC 60364-5-54:2011	NOTE	Approved as HD 60364-5-54:2011 (not modified) + A11:2017
IEC 60364-7-701	NOTE	Approved as HD 60364-7-701
IEC 60364-7-702	NOTE	Approved as HD 60364-7-702
IEC 60400	NOTE	Approved as EN 60400
IEC 60432-3	NOTE	Approved as EN 60432-3
IEC 60598-2-2	NOTE	Approved as EN IEC 60598-2-2
IEC 60598-2-3	NOTE	Approved as EN 60598-2-3
IEC 60598-2-5	NOTE	Approved as EN 60598-2-5
IEC 60664 (series)	NOTE	Approved as EN 60664 (series)
IEC 60664-1:2020	NOTE	Approved as EN IEC 60664-1:2020 (not modified)
IEC 60664-3	NOTE	Approved as EN 60664-3
IEC 60682	NOTE	Approved as EN 60682
IEC 60695 (series)	NOTE	Approved as EN IEC 60695 (series)
IEC 60695-2 (series)	NOTE	Approved as EN IEC 60695-2 (series)
IEC 60838 (series)	NOTE	Approved as EN 60838 (series)
IEC 60901	NOTE	Approved as EN 60901
IEC 60921	NOTE	Approved as EN 60921

IEC 60923	NOTE	Approved as EN 60923
IEC 60929	NOTE	Approved as EN 60929
IEC 61140:2016	NOTE	Approved as EN 61140:2016 (not modified)
IEC 61184	NOTE	Approved as EN 61184
IEC 61195	NOTE	Approved as EN 61195
IEC 61199:2011	NOTE	Approved as EN 61199:2011 (not modified)
IEC 61199:2011/A1:2012	NOTE	Approved as EN 61199:2011/A1:2013 (not modified)
IEC 61199:2011/A2:2014	NOTE	Approved as EN 61199:2011/A2:2015 (not modified)
IEC 61210	NOTE	Approved as EN 61210
IEC 61558-2-5	NOTE	Approved as EN 61558-2-5
IEC 61995 (series)	NOTE	Approved as EN 61995 (series)
IEC 62031	NOTE	Approved as EN IEC 62031
IEC 62035	NOTE	Approved as EN 62035
IEC 62133-1	NOTE	Approved as EN 62133-1
IEC 62368 (series)	NOTE	Approved as EN IEC 62368 (series)
IEC 62368-3:2017	NOTE	Approved as EN IEC 62368-3:2020 (not modified)
IEC 62471:2006	NOTE	Approved as EN 62471:2008
IEC 62504:2014	NOTE	Approved as EN 62504:2014 (not modified)
IEC 62722 (series)	NOTE	Approved as EN IEC 62722 (series)

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
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

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

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

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

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, 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

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

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

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

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

IEC Products & Services Portal - 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

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



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

**Luminaires –
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.....	45
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 controllable 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 fan blades.....	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 controls 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 ≤ 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_{supply} and U_{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

preview generated by EVS

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. The main document types developed by IEC are described in greater detail at 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 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.

This document is a preview generated by EVS

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*

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

IEC 60238:2016, *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 60335-1:2020, *Household and similar electrical appliances – Safety – Part 1: General requirements*

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

IEC 60432-1:1999, *Incandescent lamps – Safety specifications – Part 1: Tungsten filament lamps for domestic and similar general lighting purposes*

IEC 60432-1:1999/AMD1:2005

IEC 60432-1:1999/AMD2:2011

IEC 60432-2:1999, *Incandescent lamps – Safety specifications – Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes*

IEC 60432-2:1999/AMD1:2005

IEC 60432-2:1999/AMD2:2012

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

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

IEC 60570:2003/AMD1:2017

IEC 60570:2003/AMD2:2019

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

IEC 60598-2-4:2017, *Luminaires – Part 2-4: Particular requirements – Portable general purpose luminaires*

IEC 60603 (all parts), *Connectors for frequencies below 3 MHz for use with printed boards*

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

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

IEC 60669-1, *Switches for household and similar fixed-electrical installations – Part 1: General requirements*

IEC 60669-2-1, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic control devices*

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 (GWEPT)*

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

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

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*

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

IEC 61051-2:2021, *Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors*

IEC 61058-1:2016, *Switches for appliances – Part 1: General requirements*

IEC 61058-1-1, *Switches for appliances – Part 1-1: Requirements for mechanical switches*

IEC 61058-1-2, *Switches for appliances – Part 1-2: Requirements for electronic switches*

IEC 61058-2-1, *Switches for appliances – Part 2-1: Particular requirements for cord switches*

IEC 61167, *Metal halide lamps – Performance specification*

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

IEC 61347 (all parts), *Lamp controlgear*

IEC 61347-1:2015, *Lamp controlgear – Part 1: General and safety requirements*
IEC 61347-1:2015/AMD1:2017

IEC 61535:2023, *Installation couplers intended for permanent connection in fixed installations*

IEC 61558 (all parts), *Safety of transformers, reactors, power supply units and combinations thereof*

IEC 61558-1:2017, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

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

IEC 61643-331:2020, *Components for low-voltage surge protection – Part 331: Performance requirements and test methods for metal oxide varistors (MOV)*

IEC 61984:2008, *Connectors – Safety requirements and tests*

IEC 62133-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems*

IEC 62368-1:2018, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

IEC 62391-1, *Fixed electric double-layer capacitors for use in electric and electronic equipment – Part 1: Generic specification*

IEC 62391-2, *Fixed electric double-layer capacitors for use in electronic equipment – Part 2: Sectional specification – Electric double layer capacitors for power application*

IEC 62471-7:2023, *Photobiological safety of lamps and lamp systems – Part 7: Light sources and luminaires primarily emitting visible radiation*

IEC 62493:2015, *Assessment of lighting equipment related to human exposure to electromagnetic fields*
IEC 62493:2015/AMD1:2022

IEC 62680 (all parts), *Universal serial bus interfaces for data and power*

IEC TR 62778:2014¹, *Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 7000, *Graphical symbols for use on equipment – Registered symbols*, available at <https://www.graphical-symbols.info/equipment>

ISO 8124-1:2022, *Safety of toys – Part 1: Safety aspects related to mechanical and physical properties*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

NOTE Other definitions related to light sources can be found in the relevant light source standards.

¹ Withdrawn.