

INTERNATIONAL STANDARD

**Switches for appliances -
Part 1: General requirements**

CONTENTS

FOREWORD	7
1 Scope	9
2 Normative references	9
3 Terms and definitions	11
3.1 General terms and definitions	11
3.2 Terms and definitions relating to voltage and current	14
3.3 Terms and definitions relating to the different types of switches	15
3.4 Terms and definitions relating to the operation of the switch	17
3.5 Terms and definitions relating to connections to the switch	18
3.6 Terms and definitions relating to terminals and terminations	18
3.7 Terms and definitions relating to insulation	20
3.8 Terms and definitions relating to pollution	21
3.9 Terms and definitions relating to manufacturers' tests	22
4 General requirements	22
5 General information on tests	22
5.1 General	22
5.2 Electrical information	23
5.3 Test loads on multiway switches	24
5.4 Test specimens	24
6 Rating	24
7 Classification	25
7.1 According to nature of supply	25
7.2 According to type of load to be controlled by each circuit of the switch	25
7.3 According to ambient temperature	25
7.4 According to number of operating cycles	26
7.5 According to the degree of protection against solid foreign objects	26
7.6 According to the degree of protection against ingress of water	26
7.7 According to degree of protection against electric shock for an incorporated switch for use in	27
7.8 According to degree of pollution inside the switch	27
7.9 According to degree of pollution outside the switch	27
7.10 According to marking	27
7.11 According to resistance to ignitability by the glow wire temperature	27
7.12 According to the rated impulse withstand voltage	28
7.13 According to the rated overvoltage category	28
7.14 According to type of disconnection	28
7.15 According to the type of coating for rigid printed board assemblies	28
7.16 According to type and/or connection of switches	28
7.17 According to configuration of switching device	29
7.18 According to duty type	29
7.19 According to linkage between contact and actuator speed	29
7.20 According to the type of terminals	29
7.21 According to the type of built in protection	30
7.22 According to the type of forced cooling	30
7.23 According to the capacitor provided with the switch	30
8 Marking and documentation	37

8.1	Switch information	37
8.1.1	General	37
8.1.2	By switch marking.....	37
8.1.3	By documentation.....	38
8.2	Symbols.....	41
8.3	Load rating	41
8.3.1	General	41
8.3.2	Substantially resistive load	41
8.3.3	Resistive load and motor load.....	42
8.3.4	Resistive load and capacitive load	42
8.3.5	Resistive load and tungsten filament lamp load	43
8.3.6	Declared specific load	43
8.3.7	Inductive loads	43
8.3.8	General purpose loads	44
8.4	Temperature rating	44
8.5	Operating cycles	44
8.6	Switches intended for use in Class II equipment or appliances.....	44
8.7	Required marking.....	44
8.8	Legibility and durability of marking	45
8.9	Switches with their own enclosure.....	45
9	Protection against electric shock	45
10	Provision for earthing	47
11	Terminals and terminations.....	49
11.1	Common requirements to terminals.....	49
11.1.1	General	49
11.1.2	Design of terminals.....	50
11.1.3	Insulation.....	50
11.1.4	Connection	50
11.2	Fixing of terminals	50
11.3	Location and shielding of terminals	51
11.4	Terminals for interconnection of more than one conductors.....	51
11.5	Thermal stress.....	51
11.6	Terminal tests	51
11.7	Conductor escape test (TT1).....	52
11.8	Terminal displacement test (TT2).....	53
11.8.1	Connection test (for screwless terminals)	53
11.8.2	Connection tests (for screw-type terminals)	53
11.8.3	Flat quick-connect termination.....	53
11.8.4	Push in terminals.....	54
11.9	Strand escape test (TT3)	54
11.10	Multiple conductors (TT4)	55
12	Construction	55
12.1	Constructional requirements relating to protection against electric shock	55
12.2	Constructional requirements relating to safety during mounting and normal operation of the switch.....	56
12.3	Constructional requirements relating to the mounting of switches and to the attachment of cords	57
13	Mechanism.....	57

14	Protection against ingress of solid foreign objects, ingress of water and humid conditions	58
14.1	Protection against ingress of solid foreign objects	58
14.2	Protection against ingress of water	58
14.3	Protection against humid conditions	59
15	Insulation resistance and dielectric strength	60
15.1	General requirements	60
15.2	Measurement of insulation resistance	60
15.3	Insulation test voltage	61
16	Heating	62
16.1	General requirements	62
16.2	Contacts and terminals	62
16.3	Other parts	63
16.4	Heating test	63
16.4.1	Test specimen	63
16.4.2	Conductor Connections	63
16.4.3	Test preparation setup	63
16.4.4	Test procedure	63
16.4.5	Evaluation of compliance	64
17	Endurance	64
18	Mechanical strength	65
18.1	General requirements	65
18.2	Impact	65
18.3	Pull	65
18.4	Push	66
19	Screws, current-carrying parts and connections	66
19.1	General requirements for electrical connections	66
19.2	Screwed connections	66
19.3	Current-carrying parts	69
20	Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies	69
20.1	General requirements	69
20.2	Clearances	70
20.2.1	General	70
20.2.2	Clearances for basic insulation	70
20.2.3	Clearances for functional insulation	70
20.2.4	Clearances for supplementary insulation	70
20.2.5	Clearances for reinforced insulation	71
20.3	Clearances for disconnection	71
20.3.1	Electronic disconnection	71
20.3.2	Micro-disconnection	71
20.3.3	Full disconnection	72
20.4	Creepage distances	72
20.4.1	General	72
20.4.2	Creepage distances for basic insulation	72
20.4.3	Creepage distances for functional insulation	73
20.4.4	Creepage distances for supplementary insulation	74
20.4.5	Creepage distances for reinforced insulation	74

20.4.6	Creepage distances for disconnection	74
20.5	Solid insulation	75
20.6	Coatings of rigid printed board assemblies.....	75
20.6.1	General	75
20.6.2	Type 1 coating.....	75
20.6.3	Type 2 coating.....	76
21	Resistance to heat and abnormal heat.....	76
21.1	General.....	76
21.2	Resistance to heat	76
21.3	Resistance to abnormal heat.....	77
22	Resistance to rusting	78
23	Abnormal operation and fault conditions for switches.....	78
24	Components for switches.....	78
24.1	General requirements	78
24.2	Protective devices.....	79
24.2.1	General	79
24.2.2	Fuses	79
24.2.3	Cut-outs	79
24.2.4	Protective devices which only decrease the current (for example PTC resistors)	81
24.2.5	Fusing resistors	81
24.3	Capacitors	81
24.4	Resistors	82
25	EMC requirements.....	82
25.1	General.....	82
25.2	Immunity.....	82
25.2.1	General	82
25.2.2	Voltage dips and short interruptions.....	83
25.2.3	Surge immunity test.....	83
25.2.4	Electrical fast transient test	83
25.2.5	Electrostatic discharge test.....	84
25.2.6	Radiated electromagnetic field test.....	84
25.2.7	Power-frequency magnetic field test	85
25.3	Emission.....	85
25.3.1	Low-frequency emission	85
25.3.2	Radio-frequency emission	85
Annex A (normative)	Measurement of clearances and creepage distances	100
Annex B (informative)	Diagram for the dimensioning of clearances and creepage distances	105
Annex C (normative)	Proof tracking test.....	106
Annex D (informative)	Switch application guide.....	107
D.1	General.....	107
D.2	Resistive load current ratings.....	107
D.3	Resistive and/or motor load current ratings	107
D.4	Combination capacitive and resistive load ratings	108
D.5	Declared specific load ratings	108
D.6	Current ratings not exceeding 20 mA	108
D.7	General purpose load	108

Annex E (normative) Relation between rated impulse withstand voltage, rated voltage and overvoltage category	109
Annex F (normative) Pollution degree	110
Annex G (normative) Impulse voltage test.....	111
Annex H (normative) Altitude correction factors	112
Annex I (normative) Types of coatings for rigid printed board assemblies	113
Annex J (normative) Measuring the insulation distance of a coated printed board with type 1 coating	114
Annex K (normative) Routine tests.....	115
Annex L (informative) Sampling tests	116
L.1 General.....	116
L.2 General considerations	116
L.3 Tests	116
Annex M (normative) Switch families	118
M.1 Overview	118
M.2 General.....	118
M.3 Guidelines for selection of switches in switch families for testing	119
Annex N (informative) Dimensions of tabs forming part of a switch	120
Annex O (informative) Common end product standards.....	121
Annex P (informative) Background of DC arc extinction test (17.5.7 TC11)	122
P.1 General.....	122
P.2 Test current sequence	122
P.3 Arc extinction time	122
Bibliography.....	123
 Figure 1 – Examples of pillar terminals	 87
Figure 2 – Examples of screw terminals and stud terminals	88
Figure 3 – Examples of saddle terminals.....	89
Figure 4 – Examples of lug terminals	89
Figure 5 – Examples of mantle terminals	90
Figure 6 – Examples of screwless terminals.....	91
Figure 7 – Example of female (test) connector of flat quick-connect terminations.....	92
Figure 8 – Circuit for capacitive load test and simulated tungsten filament lamp load test for AC circuits	93
Figure 9 – Circuit for capacitive load test and simulated lamp load test for DC circuits.....	94
Figure 10 – Values of the capacitive load test circuit for test of switches rated 10/100 A 250 V AC	95
Figure 11 – Mounting device for the impact tests	96
Figure 12 – Continuous duty – Duty type S1 (see 7.18.1).....	97
Figure 13 – Short-time duty – Duty type S2 (see 7.18.2).....	97
Figure 14 – Intermittent periodic duty – Duty-type S3 (see 7.18.3).....	98
Figure 15 – Diagram for heating test.....	98
Figure 16 – Diagram for endurance test	99
Figure A.1 – Example 1	101
Figure A.2 – Example 2	101

Figure A.3 – Example 3	101
Figure A.4 – Example 4	101
Figure A.5 – Example 5	102
Figure A.6 – Example 6	102
Figure A.7 – Example 7	102
Figure A.8 – Example 8	103
Figure A.9 – Example 9	103
Figure A.10 – Example 10	104
Figure A.11 – Example 11	104
Figure B.1 – Diagram for the dimensioning of clearances and creepage distances	105
Figure J.1 – Measurement of the insulation distance	114
Figure P.1 – Circuit conditions for DC arc extinction testing	122
Table 1 – Test loads for multiway switches	24
Table 2 – Type and connection of switches	31
Table 3 – Switch information and loads placed in groups	38
Table 4 – Resistive current carried by the terminal and related cross-sectional areas of terminals for unprepared conductors	49
Table 5 – Terminal type test for prepared and unprepared conductors	51
Table 6 – Insertion and withdrawal force	53
Table 7 – Pulling forces for screw-type and push-in terminals	54
Table 8 – Minimum insulation resistance	61
Table 9 – Dielectric strength	62
Table 10 – Minimum values of pull force	65
Table 11 – Torque values	68
Table 12 – Torque values for screwed glands	68
Table 13 – Minimum clearances for basic insulation	71
Table 14 – Minimum creepage distances for basic insulation	73
Table 15 – Minimum creepage distances for functional insulation	73
Table 16 – Test levels and conditions	75
Table 17 – Test temperature for ball pressure test	77
Table 18 – Test Temperature for glow wire test	78
Table 19 – Minimum requirements for capacitors	82
Table 20 – Test levels and duration for voltage dips and short interruptions	83
Table 21 – Fast transient bursts	84
Table A.1 – Minimum values for distances with specific pollution degrees	100
Table E.1 – Rated impulse withstand voltage for switches energized directly from the low voltage mains	109
Table G.1 – Test voltages for verifying clearances at sea-level	111
Table H.1 – Altitude correction factors	112

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Switches for appliances - Part 1: General requirements

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 61058-1 has been prepared by subcommittee 23J: Switches for appliances, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2016. This edition constitutes a technical revision.

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

- a) Extension to 600 V in the scope;
- b) Add requirements on ground-fuse (Clause 17);
- c) DC arc extinction test (Annex P and Clause 17);
- d) Table 5 re-arranged to line-up with classifications;
- e) Table 6 correction due to inhomogeneous values;
- f) Deletion of X3 capacitors in classification and in Table 19.

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

Draft	Report on voting
23J/494/FDIS	23J/499/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.

A list of all parts in the IEC 61058 series, published under the general title *Switches for appliances*, can be found on the IEC website.

In this document, the following print types are used:

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

1 Scope

This part of IEC 61058 applies to switches or switching devices for appliances. The switches are intended to control electrical appliances and other equipment for household or similar purposes with a rated voltage not exceeding 600 V and a rated current not exceeding 63 A.

In the IEC 61058 series the terms "switching devices" and "switches" are used interchangeably.

Switches for appliances are intended to be operated by

- a person via an actuating member,
- indirect actuation,
- an actuating sensing unit.

Transmission of a signal between the actuating member or sensing unit and the switch can be connected by optical, acoustic, thermal, electrical or other relevant connection and can include remote controlled units.

This document applies to switches for appliances with additional control functions provided by the switch using electronic circuits.

This document applies to circuitry when evaluated with a switch and necessary for the switching function.

This part document applies in general to switches for appliances in conjunction with the following parts:

- Part 1-1: Requirements for mechanical switches, and/or
- Part 1-2: Requirements for electronic switches.

This document does not apply to switches covered by:

- IEC 60669 (all parts), *Switches for household and similar fixed-electrical installations*, and
- IEC 60730 (all parts), *Automatic electrical controls*.

NOTE 1 Attention is drawn to the fact that the end product standards for appliances can contain additional or alternative requirements for switches (see Annex O).

NOTE 2 Throughout this document, the word "appliance" means "appliance or equipment".

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 60127 (all parts), *Miniature fuses*

IEC 60269-3, *Low-voltage fuses - Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications) - Examples of standardized systems of fuses A to F*

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 60529:1989, *Degree of protection provided by enclosures (IP code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60617, *Graphical symbols for diagrams*

IEC 60664-3:2016, *Insulation coordination for equipment within low-voltage systems - Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60691, *Thermal-links - Requirements and application guide*

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

IEC 60695-10-2, *Fire hazard testing - Part 10-2: Abnormal heat - Ball pressure test method*

IEC 60695-11-10, *Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods*

IEC 60695-11-20, *Fire hazard testing - Part 11-20: Test flames - 500 W flame test method*

IEC 60730 (all parts), *Automatic electrical controls*

IEC 60730-1:2022, *Automatic electrical controls - Part 1: General requirements*

IEC 60730-2-9:2015, *Automatic electrical controls - Part 2-9: Particular requirements for temperature sensing controls*
IEC 60730-2-9:2015/AMD1:2018
IEC 60730-2-9:2015/AMD2:2020

IEC 60738-1, *Thermistors - Directly heated positive temperature coefficient - Part 1: Generic specification*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

IEC TS 61000-3-5, *Electromagnetic compatibility (EMC) - Part 3-5: Limits - Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 75 A*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

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

IEC 61058-1-1:2016, *Switches for appliances - Part 1-1: Requirements for mechanical switches*

IEC 61058-1-2:2016, *Switches for appliances - Part 1-2: Requirements for electronic switches*

IEC 61210, *Connecting devices - Flat quick-connect terminations for electrical copper conductors - Safety requirements*

IEC 62368-1:2023, *Audio/video, information and communication technology equipment - Part 1: Safety requirements*

CISPR 14-1, *Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission*

CISPR 15:2018, *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*

CISPR 15:2018/AMD1:2024

Bibliography

- [1] IEC 60068-2-20:2008, *Environmental testing - Part 2-20: Tests - Test T: Test methods for solderability and resistance to soldering heat of devices with leads*
- [2] IEC 61000 (all parts), *Electromagnetic compatibility (EMC)*
- [3] IEC 60085:2007, *Electrical insulation - Thermal evaluation and designation*
- [4] IEC 61140, *Protection against electric shock - Common aspects for installation and equipment*
- [5] IEC 60034-1:2010, *Rotating electrical machines - Part 1: Rating and performance*
- [6] IEC 60228:2023, *Conductors of insulated cables*
- [7] IEC 60050-151:2001, *International Electrotechnical Vocabulary - Part 151: Electrical and magnetic devices*
- [8] IEC 60335-1, *Household and similar electrical appliances - Safety - Part 1: General requirements*
- [9] IEC 60050-411:1996, *International Electrotechnical Vocabulary - Chapter 411: Rotating machinery*
- [10] IEC 60065:2014, *Audio, video and similar electronic apparatus - Safety requirements*
- [11] IEC 60335-2 (all parts), *Household and similar electrical appliances - Safety*
- [12] IEC 60050-441:1984, *International Electrotechnical Vocabulary - Chapter 441: Switchgear, controlgear and fuses - Amendment 1: 2000*
- [13] IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests*
IEC 60664-1:2020/AMD1:2025
- [14] IEC 60893-1:2004, *Insulating materials - Industrial rigid laminated sheets based on thermosetting resins for electrical purposes - Part 1: Definitions, designations and general requirements*
- [15] IEC 60050-826:2004, *International Electrotechnical Vocabulary - Part 826: Electrical installations*
- [16] IEC 60998-2-3:2002, *Connecting devices for low-voltage circuits for household and similar purposes - Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units*
- [17] IEC 60335 (all parts), *Household and similar electrical appliances - Safety*
- [18] IEC 60745 (all parts), *Hand-held motor-operated electric tools - Safety*
- [19] IEC 62368 (all parts), *Audio/video, information and communication technology equipment*
- [20] IEC 60038, *IEC standard voltages*

- [21] IEC 60060-1, *High-voltage techniques - Part 1: General definitions and test requirements*
 - [22] IEC 60068-2-75, *Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests*
 - [23] IEC 60112:2025, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
 - [24] IEC 60893-2, *Insulating materials - Industrial rigid laminated sheets based on thermosetting resins for electrical purposes - Part 2: Methods of test*
 - [25] IEC 62368 (all parts), *Audio/video, information and communication technology equipment*
 - [26] IEC 60335 (all parts), *Household and similar electrical appliances - Safety*
 - [27] IEC 60745(all parts), *Hand-held motor-operated electric tools -Safety*
 - [28] IEC 62368 (all parts), *Audio/video, information and communication technology equipment*
-