

Switches for appliances —

Part 1: General requirements

ICS 29.120.40

National foreword

This British Standard is the UK implementation of EN 61058-1:2002+A2:2008. It is derived from IEC 61058-1:2000, incorporating amendments 1:2001 and 2:2007 and corrigendum January 2009. It supersedes BS EN 61058-1:2002 (which incorporated IEC 61058-1:2000+A1:2001) which is withdrawn.

NOTE BS EN 61058-1:2002 superseded BS EN 61058-1:1992 which will be withdrawn on 2009-03-01.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee EPL/23, Switches for appliances and electronic equipment.

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

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

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 19 September 2002

© BSI 2009

ISBN 978 0 580 670121

Amendments/corrigenda issued since publication

Date	Comments
September 2002	Implementation of IEC amendment 1:2001 (incorporated as part of adoption of IEC 61058-1:2000+A1:2001 as EN 61058-1:2002)
30 June 2008	Implementation of IEC amendment 2:2007 with CENELEC endorsement A2:2008
31 May 2009	Implementation of IEC corrigendum January 2009. Replacement of Table 15

EUROPEAN STANDARD

EN 61058-1:2002+A2

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2008

ICS 29.120.40

Supersedes EN 61058-1:1992 + A1:1993

English version

Switches for appliances
Part 1: General requirements
(IEC 61058-1:2000)

Interrupteurs pour appareils
Partie 1: Règles générales
(CEI 61058-1:2000)

Geräteschalter
Teil 1: Allgemeine Anforderungen
(IEC 61058-1:2000)

This European Standard was approved by CENELEC on 2002-03-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

© 2002 CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Ref. No. EN 61058-1:2002 E



Documents
Document Sharing Hub

Foreword

The text of the International Standard IEC 61058-1:2000, prepared by SC 23J, Switches for appliances, of IEC TC 23, Electrical accessories, together with the common modifications prepared by CENELEC Reporting Secretariat SR 23J, was submitted to the formal vote and was approved by CENELEC as EN 61058-1 on 2002-03-05.

The text of document 23J/232/FDIS, future amendment 1 to IEC 61058-1:2000, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC on 2002-03-05 for inclusion into the European Standard.

This European Standard supersedes EN 61058-1:1992 + A1:1993.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2003-03-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2009-03-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A, C, D, E, K, L, M, N, P, Q, R and ZB are normative and annexes B, F, G, H, J, S, T and ZA are informative.

Annexes ZA and ZB have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61058-1:2000 + A1:2001 was approved by CENELEC as a European Standard with agreed common modifications.

NOTE The CENELEC common modifications to IEC 61058-1:2000+A1:2001 were the addition of Annexes ZA and ZB.

Foreword to amendment A2

The text of document 23J/298/FDIS, future amendment 2 to IEC 61058-1:2000, prepared by SC 23J, Switches for appliances, of IEC TC 23, Electrical accessories, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 61058-1:2002 on 2007-12-01.

The following dates were fixed:

- latest date by which the amendment has to be
implemented at national level by publication of
an identical national standard or by endorsement (dop) 2008-09-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2010-12-01

Annex ZB has been amended by CENELEC.

Endorsement notice

The text of amendment 2:2007 to the International Standard IEC 61058-1:2000 was approved by CENELEC as an amendment to the European Standard without any modification.

CONTENTS

1	Scope	7
2	Normative references.....	8
3	Definitions	12
3.1	General terms.....	12
3.2	Definitions relating to voltages, currents and wattage	15
3.3	Definitions relating to the different types of switches	17
3.4	Definitions relating to the operation of the switch.....	17
3.5	Definitions relating to connections to the switch	19
3.6	Definitions relating to terminals and terminations	20
3.7	Definitions relating to insulation	21
3.8	Definitions relating to pollution	23
3.9	Definitions relating to manufacturers' tests	23
4	General requirements	23
5	General notes on tests.....	24
6	Rating.....	27
7	Classification	28
7.1	Classification of switches	28
7.2	Classification of terminals	34
8	Marking and documentation	43
9	Protection against electric shock.....	52
10	Provision for earthing.....	54
11	Terminals and terminations	56
11.1	Terminals for unprepared copper conductors	56
12	Construction	65
12.1	Constructional requirements relating to protection against electric shock.....	65
12.2	Constructional requirements relating to safety during mounting and normal operation of the switch.....	66
12.3	Constructional requirements relating to the mounting of switches and to the attachment of cords.....	67
13	Mechanism	68
14	Protection against solid foreign objects, ingress of water and humid conditions.....	69
14.1	Protection against ingress of solid foreign objects	69
14.2	Protection against ingress of dust	70
14.3	Protection against ingress of water	71
15	Insulation resistance and dielectric strength	71
16	Heating.....	74
16.1	General requirements	74
16.2	Contacts and terminals	74
16.3	Other parts	76

17	Endurance	80
17.1	General requirements	80
17.2	Electrical endurance tests	84
18	Mechanical strength	92
19	Screws, current-carrying parts and connections	94
19.1	General requirements for electrical connections	94
19.2	Screwed connections	94
19.3	Current-carrying parts	97
20	Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies	98
20.1	Clearances	98
20.2	Creepage distances	101
20.3	Solid insulation	104
20.4	Coatings of rigid printed board assemblies	104
21	Fire hazard	105
21.1	Resistance to heat	105
21.2	Resistance to abnormal heat	106
22	Resistance to rusting	106
23	Abnormal operation and fault conditions for electronic switches	107
24	Components for electronic switches	111
24.1	Protective devices	112
24.2	Capacitors	114
24.3	Resistors	115
25	EMC requirements	115
25.1	Immunity	116
25.2	Emission	119
	Annex A (normative) Measurement of clearances and creepage distances	135
	Annex B (informative) Diagram for the dimensioning of clearances and creepage distances	140
	Annex C (Void)	141
	Annex D (normative) Proof tracking test	142
	Annex E (Void)	143
	Annex F (informative) Switch application guide	144
	Annex G (Void)	146
	Annex H (informative) Flat quick-connect terminations, method for selection of female connectors	147
	Annex J (Void)	148
	Annex K (normative) Relation between rated impulse withstand voltage, rated voltage and overvoltage category	149
	Annex L (normative) Pollution degree	150
	Annex M (normative) Impulse voltage test	151
	Annex N (normative) Altitude correction factors	152
	Annex P (normative) Types of coatings for rigid printed board assemblies	153
	Annex Q (normative) Measuring the insulation distance of a coated printed board with type A coating	154
	Annex R (normative) Routine tests	155

Annex S (informative) Sampling tests	156
Annex T (informative) Switch families	158
Annex U (normative) Dimensions of tabs forming part of a switch	160
Annex V (informative) Requirements and tests for resistance to abnormal heat for unattended appliances	161
Annex ZA (informative) Compliance checks to be carried out for switches for appliances complying with EN 61058-1:1992 + A1:1993	164
Annex ZB (normative) Normative references to international publications with their corresponding European publications	165
Bibliography	163
Figure 1 – Examples of pillar terminals	120
Figure 2 – Examples of screw terminals and stud terminals	121
Figure 3 – Examples of saddle terminals	122
Figure 4 – Examples of lug terminals	122
Figure 5 – Examples of mantle terminals	123
Figure 6 – Examples of screwless terminals	124
Figure 7 – (Void)	125
Figure 8 – Female (test) connector of flat quick-connect termination	126
Figure 9a – Circuit for capacitive load test and simulated tungsten filament lamp load test for a.c. circuits	127
Figure 9b – Circuit for capacitive load test and simulated lamp load test for d.c. circuits	127
Figure 10 – Values of the capacitive load test circuit for test of switches rated 10/100 A 250 V~	128
Figure 11 – Mounting device for the impact test	129
Figure 12 – Ball pressure apparatus	130
Figure 13 – Test pin	130
Figure 14 – Continuous duty – Duty type S1	131
Figure 15 – Short-time duty – Duty type S2	132
Figure 16 – Intermittent periodic duty – Duty-type S3	133
Figure 17 – Diagram for short-circuit test	133
Figure 18 – Diagram for heating test	134
Figure 19 – Diagram for endurance test	134
Figure Q.1 – Measurement of the insulation distance	154
Figure U.1 – Tabs of flat quick-connect terminations	160
Table 1 – Test specimens	26
Table 2 – Type and connection of switches	36
Table 3 – Switch information	44
Table 4 – Resistive current carried by the terminal and related cross-sectional areas of terminals for unprepared conductors	57
Table 5 – (Void)	57
Table 6 – Pulling forces for screw-type terminals	58

Table 7 – Material and plating for tabs.....	62
Table 8 – Push and pull forces for tabs.....	63
Table 9 – Test conditions for Ta	64
Table 10 – Test conditions for Tb	64
Table 11 – Minimum insulation resistance	72
Table 12 – Dielectric strength.....	73
Table 13 – Permissible maximum temperatures.....	78
Table 14 – Temperatures for thermosetting materials used for electronic switches.....	80
Table 15 – Electrical endurance tests for the different types of electronic switches with or without electrical contact(s).....	82
Table 16 – Test loads for multiway switches	84
Table 17 – Test loads for electrical endurance tests for a.c. circuits.....	86
Table 18 – Test loads for electrical endurance tests for d.c. circuits.....	87
Table 19 – Minimum values of pull force.....	93
Table 20 – Torque values.....	95
Table 21 – Torque values for screwed glands.....	96
Table 22 – Minimum clearances for basic insulation	100
Table 23 – Minimum creepage distances for basic insulation	102
Table 24 – Minimum creepage distances for functional insulation	103
Table 25 – Test levels and conditions.....	105
Table 26 – Conventional fusing current versus rated current.....	109
Table 27 – Requirements for capacitors	115
Table 28 – Test levels and duration for voltage dips and short interruptions	116
Table 29 – Fast transient bursts	117
Table H.1 – Insertion and withdrawal forces for flat quick-connect terminations.....	147
Table K.1 – Rated impulse withstand voltage for switches energized directly from the low voltage mains.....	149
Table M.1 – Test voltages for verifying clearances at sea level	151
Table N.1 – Altitude correction factors.....	152

SWITCHES FOR APPLIANCES –

Part 1: General requirements

1 Scope

1.1 This International Standard applies to switches (mechanical or electronic) for appliances actuated by hand, by foot or by other human activity, to operate or control electrical appliances and other equipment for household or similar purposes with a rated voltage not exceeding A_2 480 V A_2 and a rated current not exceeding 63 A.

These switches are intended to be operated by a person, via an actuating member or by actuating a sensing unit. The actuating member or sensing unit can be integral with or arranged separately, either physically or electrically, from the switch and may involve transmission of a signal, for example electrical, optical, acoustic or thermal, between the actuating member or sensing unit and the switch.

Switches which incorporate additional control functions governed by the switch function are within the scope of this standard.

This standard also covers the indirect actuation of the switch when the operation of the actuating member or sensing unit is provided by a remote control or a part of an appliance or equipment such as a door.

NOTE 1 Electronic switches may be combined with mechanical switches giving full disconnection or micro-disconnection.

NOTE 2 Electronic switches without a mechanical switch in the supply circuit provide only electronic disconnection. Therefore, the circuit on the load side is always considered to be live.

NOTE 3 For switches used in tropical climates, additional requirements may be necessary.

NOTE 4 Attention is drawn to the fact that the standards for appliances may contain additional or alternative requirements for switches.

NOTE 5 Throughout this standard, the word "appliance" means "appliance or equipment".

A_2 NOTE 6 This part of IEC 61058 is applicable when testing incorporated switches. When other types of switches for appliances are tested, this part is applicable together with the relevant Part 2 of IEC 61058.

This part of IEC 61058 may, however, be applied for other types of switches which are not mentioned in a relevant Part 2 of IEC 61058, provided that the electrical safety is not disregarded. A_2

1.2 This standard applies to switches intended to be incorporated in, on or with an appliance.

1.3 This standard also applies to switches incorporating electronic devices.

1.4 A_2 This standard also applies to switches for appliances such as

- switches intended to be connected to a flexible cable (cord switches) for which, however, particular requirements are given in IEC 61058-2-1;

NOTE In this document, the word "cable" means "cable or cord".

- switches integrated in an appliance (integrated switches);
- switches intended to be mounted separately from the appliance (independently mounted switches) other than those within the scope of IEC 60669-1, for which, however, particular requirements are given in IEC 61058-2-4;
- change-over selectors for which, however, particular requirements are given in IEC 61058-2-5. A_2

1.5 This standard does not contain requirements for isolating switches.

 Note deleted 

1.6 This standard does not apply to devices which control appliances and equipment not actuated intentionally by a person. These are covered by IEC 60730.

2 Normative references

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

IEC 60034-1:1996, *Rotating electrical machines – Part 1: Rating and performance* ¹⁾
Amendment 1 (1997)
Amendment 2 (1999)

IEC 60038:1983, *IEC standard voltages*

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 60050(411):1973, *International Electrotechnical Vocabulary (IEV) – Chapter 411: Rotating machinery*

IEC 60050(441):1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 60050(826):1982, *International Electrotechnical Vocabulary (IEV) – Chapter 826: Electrical installations of buildings*
Amendment 1 (1990)
Amendment 2 (1995)

IEC 60060-1:1989, *High-voltage techniques – Part 1: General definitions and test requirements*

 IEC 60065:2001, *Audio, video and similar electronic apparatus – Safety requirements* ²⁾
Amendment 1 (2005) 

IEC 60068-2-20:1979, *Environmental testing – Part 2-20: Tests – Test T: Soldering*

IEC 60068-2-75:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60085:1984, *Thermal evaluation and classification of electrical insulation*

IEC 60112:1979, *Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions*

¹⁾ There is a consolidated edition 10.2 (1999) that includes IEC 60034-1 and its amendments 1 (1997) and 2 (1999).

 ²⁾ A consolidated edition 7.1 (2005) exists, that includes IEC 60065 (2001) and its Amendment 1. 

IEC 60127 (all parts), *Miniature fuses*

IEC 60127-2:1989, *Miniature fuses – Part 2: Cartridge fuse-links*

IEC 60228:1978, *Conductors of insulated cables*

 Text deleted 

IEC 60269-1:1998, *Low-voltage fuses – Part 1: General requirements*

IEC 60269-3-1:1994, *Low-voltage fuses – Part 3-1: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) – Sections I to IV*

IEC 60335-1:1991, *Safety of household and similar electrical appliances – Part 1: General requirements*
Amendment 1 (1994)

IEC 60335 (all parts 2), *Safety for household and similar electrical appliances*

IEC 60384-14:1993, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic suppression and connection to the supply mains*

 IEC 60417, *Graphical symbols for use on equipment* 

IEC 60529:1989, *Degree of protection provided by enclosures (IP code)*

IEC 60617-2:1996, *Graphical symbols for diagrams – Part 2: Symbol elements, qualifying symbols and other symbols having general application*

IEC 60664-1:1992, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3:1992, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coatings to achieve insulation coordination of printed board assemblies*

IEC 60669-1:1998, *Switches for household and similar fixed electrical installations – Part 1: General requirements*

IEC 60691:1993, *Thermal-links – Requirements and application guide*

 IEC 60695-2-10:2000, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-2-12, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability test method for materials* 

 Footnote deleted 

IEC 60695-2-13, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignitability test method for materials*

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

IEC 60707:1999, *Flammability of solid non-metallic materials when exposed to flame sources – List of methods*

IEC 60730 (all parts), *Automatic electrical controls for household and similar use*

IEC 60730-1:1999, *Automatic electrical controls for household and similar use – Part 1: General requirements*

IEC 60730-2-9:2000, *Automatic electrical controls for household and similar use – Part 2-9: Particular requirements for temperature sensing controls*

IEC 60738-1:1998, *Thermistors directly heated positive step-function temperature efficient thermistors – Part 1: Generic specification*

IEC 60760:1989, *Flat, quick-connect terminations*

IEC 60893-1:1987, *Specification for industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 1: Definitions, designations and general requirements*

IEC 60998-2-3:1991, *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*

IEC 61000 (all parts), *Electromagnetic compatibility (EMC)*

IEC 61000-3-2:1995, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)* ⁵⁾
Amendment 1 (1997)
Amendment 2 (1998)

IEC 61000-3-3:1994, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 3: Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current ≤ 16 A*

IEC/TR2 61000-3-5:1994, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 5: Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 16 A*

IEC 61000-4-1:1992, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 1: Overview of immunity tests. Basic EMC publication*

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test. Basic EMC publication* ⁶⁾
Amendment 1 (1998)

⁵⁾ There is a consolidated edition 1.2 (1998) that includes IEC 61000-3-2 and its amendments 1 (1997) and 2 (1998).

⁶⁾ There is a consolidated edition 1.1 (1999) that includes IEC 61000-4-2 and its amendment 1 (1998).

IEC 61000-4-3:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test*⁷⁾
Amendment 1 (1998)

IEC 61000-4-4:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test. Basic EMC publication*

IEC 61000-4-6:1996, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 6: Immunity to conducted disturbances, induced by radio-frequency fields*

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

IEC 61000 4-11:1994, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 11: Voltage dips, short interruptions and voltage variations immunity tests*

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

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

IEC 61058-2-4, *Switches for appliances – Part 2-4: Particular requirements for independently mounted switches* 

 IEC 61058-2-5, *Switches for appliances – Part 2-5: Particular requirements for change-over selectors*

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61210:1993, *Connecting devices – Flat quick-connect terminations for electrical copper conductors - Safety requirements* 

ISO 1456:1988, *Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium*

ISO 2081:1986, *Metallic coatings – Electroplated coatings of zinc of iron or steel*

ISO 2093:1986, *Electroplated coatings of tin – Specification and test methods*

ISO 4046:1978, *Paper, board, pulp and related terms – Vocabulary*

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

CISPR 15:2005, *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*⁸⁾
Amendment 1 (2006) 

⁷⁾ There is a consolidated edition 1.1 (1998) that includes IEC 61000-4-3 and its amendment 1 (1998).

 ⁸⁾ A consolidated edition 7.1 (2007) exists, that includes CISPR 15 (2005) and its Amendment 1. 

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1 General terms

3.1.1

mechanical switching device

a switching device designed to close and open one or more electric circuits by means of separable contacts

[IEV 441-14-02]

3.1.2

switch (mechanical)

a mechanical switching device capable of making, carrying and breaking currents under normal circuit conditions which may include specified operating overload conditions and also carrying for a specified time currents under specified abnormal circuit conditions such as those of short circuit

NOTE A switch may be capable of making but not breaking short-circuit currents.

[IEV 441-14-10]

3.1.3

conductive part

part which is capable of conducting current although it may not necessarily be used for carrying service current

[IEV 441-11-09]

3.1.4

live part

a conductor or conductive part intended to be energized in normal use, including a neutral conductor, but, by convention, not a PEN conductor

[IEV 826-03-01]

3.1.5

pole of a switch

the part of the switch associated exclusively with one, electrically separated, conducting path of the switch

NOTE 1 Those parts that provide a means for mounting and operating all poles together are excluded from the definition of a pole.

NOTE 2 A switch is called "single-pole" if it has only one pole. If it has more than one pole, it may be called "multipole" (two-pole, three-pole, etc.) provided that the poles are coupled in such a manner as to operate together.

3.1.6

clearance

the shortest distance in air between two conductive parts

3.1.7

creepage distance

the shortest distance along the surface of the insulation material between two conductive parts

[IEV 151-03-37]

3.1.8

detachable part

part which is removable without the use of a tool when the switch is mounted as in normal use

3.1.9

tool

screwdriver, coin, or any other object which may be used to operate a nut, a screw, or a similar part

3.1.10

special purpose tool

tool which is unlikely to be readily available in a normal household, for example, a key for a three-angle headed screw

NOTE Tools such as coins, screwdrivers and spanners designed to operate square or hexagonal nuts are not special purpose tools.

3.1.11

normal use

use of the switch for the purpose for which it was made and declared

3.1.12

ambient air temperature

the temperature or temperatures, determined under prescribed conditions, of the air surrounding the switch when mounted as declared by the manufacturer

3.1.13

proof tracking index (PTI)

the numerical value of the proof voltage in volts, at which a material withstands 50 drops of test solution without tracking

3.1.14

unique type reference

identification marking on a switch such that by quoting it in full to the switch manufacturer the electrical, mechanical, dimensional and functional parameters of the original switch can be unequivocally specified

3.1.15

common type reference

identification marking on a switch which does not require any further specific information additional to that provided by the marking requirements of this standard for selection, installation and use in accordance with this standard

3.1.16

cover or cover plate

part which is accessible when the switch is mounted as in normal use but which can be removed with the aid of a tool

3.1.17

signal indicator

device associated with a switch to indicate the circuit state visually

NOTE The device may or may not be controlled by the switch.

3.1.18

unprepared conductor

conductor which has been cut and the insulation of which has been removed for insertion into a clamping unit

NOTE A conductor the shape of which is arranged for introduction into a clamping unit or the strands of which are twisted to consolidate the end, is considered to be an unprepared conductor.

3.1.19

prepared conductor

conductor, the stripped end of which is fitted with an eyelet, a terminal end, a cable lug, etc.

3.1.20

base material

insulating material, supporting electronic circuits

3.1.21

printed board

a sized base material including holes, if any, and bearing at least one conductive pattern

3.1.22

printed board assembly

printed board with electrical and mechanical components and/or other printed boards attached to it, with all manufacturing processes, soldering, coating etc. completed

3.1.23

insulation distance

the shortest distance of a coated printed board between conductive parts located on the base material.

See figure Q.1.

3.1.24

polarity reversal

change of the terminals connected to the load by a switching action

3.1.25

semiconductor switching device

a switching device designed to make, carry, break and/or control the current in an electric circuit by means of the controlled conductivity of a semiconductor

3.1.26

electronic step-down convertor (convertor)

unit inserted between the supply and one or more tungsten-halogen or other filament lamps which serves to supply the lamp(s) with its (their) rated voltage, generally at high frequency. The unit may consist of one or more separate components

3.1.27

electronic switch

a device capable of making, carrying, breaking and/or controlling currents under normal circuit conditions which may include specified operating overload conditions and also carrying for a specified time currents under specified abnormal circuit conditions such as those of a short circuit. The device contains actuating members, actuating means and switching devices which may be mechanical or electronic. At least one of these must be electronic

3.1.28

duty

the statement of the load(s) to which the electronic switch is subjected, including, if applicable, making, controlling and breaking and including their durations and sequence in time
[IEV 411-21-07, modified]

3.1.29

duty-type

a continuous, short-time or periodic duty, comprising one or more loads remaining constant for the duration specified, or a non-periodic duty in which generally the load varies within the permissible operating range
[IEV 411-21-13, modified]

3.1.30

cyclic duration factor

the ratio between the period of loading, including making and breaking, and the duration of the duty cycle, expressed as a percentage
[IEV 411-21-10, modified]

3.1.31

protective impedance

an impedance connected between live parts and accessible conductive parts, of such value that the current, in normal use and under likely fault conditions in the electronic switch, is limited to a safe value; it is so constructed that the reliability is maintained throughout the life of the electronic switch

NOTE Details of the likely fault conditions, the safe current and the requirements for reliability are as given in this IEC standard.

3.2 Definitions relating to voltages, currents and wattage

NOTE Where the terms "voltage" and "current" are used, they imply the r.m.s. values unless otherwise specified.

3.2.1

rated voltage, current, frequency, wattage etc.

voltage, current, frequency, wattage etc. assigned to a switch by the manufacturer and to which operation and performance characteristics are referred

3.2.2

SELV

voltage which does not exceed 50 V a.c. r.m.s. or 120 V d.c. between conductors or between any conductor and earth in a circuit which is insulated from the supply mains

NOTE SELV is an unearthed extra low voltage $\overline{A_2}$ (see IEC 61140). $\overline{A_2}$

3.2.3

over-current

a current exceeding the rated current
[IEV 441-11-06]

3.2.4

overload

operating conditions in an electrically undamaged circuit, which cause an over-current
[IEV 441-11-08]

3.2.5

short-circuit current

an over-current resulting from a short circuit due to a fault or an incorrect connection in an electric circuit
[IEV 441-11-07]

3.2.6

working voltage

highest r.m.s. value of the a.c. or d.c. voltage across any particular insulation which can occur when the switch is supplied at rated voltage

NOTE 1 Transients are disregarded.

NOTE 2 Both open-circuit conditions and normal operating conditions are taken into account.

3.2.7

overvoltage

any voltage having a peak value exceeding the corresponding peak value of maximum steady-state voltage at normal operating conditions

3.2.8

recurring peak voltage (U_{rp})

maximum peak value of periodic excursions of the voltage waveform resulting from distortion of an a.c. voltage or from a.c. components superimposed on a d.c. voltage

NOTE Random overvoltages, for example due to occasional switching, are not considered to be recurring peak voltages.

3.2.9

temporary overvoltage

overvoltage at a power frequency of relatively long duration

3.2.9.1

short-term temporary overvoltage

temporary overvoltage with a duration not exceeding 5 s

NOTE The voltage values for short-term temporary overvoltage are higher than the voltage value for long-term temporary overvoltage (see 3.3.3.2.2 of IEC 60664-1).

3.2.9.2

long-term temporary overvoltage

temporary overvoltage with duration exceeding 5 s

3.2.10

impulse withstand voltage

highest peak value of impulse voltage of prescribed form and polarity which does not cause breakdown of insulation under specified conditions

3.2.11

overvoltage category

numeral defining a transient overvoltage condition

NOTE Overvoltage categories I, II and III are used (see annex K).

3.2.12

rated load

type of load assigned to the switch by the manufacturer

3.2.13

minimum load

load at which the electronic switch still operates correctly

3.2.14

thermal current

the continuous resistive current which, under the test conditions declared by the manufacturer (may also include the ambient temperature), generates, without forced cooling, the same heating as when the electronic switch is operating under specified ambient conditions at rated load, and/or duty type in the appliance with forced cooling present, if any

NOTE The concept "thermal current" allows simplified testing of the electronic switches, which in normal application have complex cooling conditions. The thermal current will always be determined by tests of the switch positioned on a table or in a simple test rig and comparative tests in the appliance in question. Consequently, the thermal current will normally be lower than the rated current. This necessitates additional tests of the terminals, contacts, etc., in order to verify that they will be able to carry the rated current, when the electronic switch is mounted in the appliance. These additional tests are specified in clauses 16 and 17.

3.3 Definitions relating to the different types of switches

3.3.1

incorporated switch

switch intended to be incorporated in or fixed to an appliance, which however can be tested separately

3.3.2

integrated switch

switch, the function of which depends on its correct mounting and fixing in an appliance, and which can be tested only in combination with the relevant parts of that appliance

3.3.3

rotary switch

switch, the actuating member of which is a shaft or a spindle which has to be rotated to one or more indexed positions in order to achieve a change in contact state

NOTE The rotation of the actuating member may be unlimited or restricted in either direction.

3.3.4

lever switch

switch, the actuating member of which is a lever which has to be moved (tilted) to one or more indexed positions in order to achieve a change in contact state

3.3.5

rocker switch

switch, the actuating member of which is a low profile lever (rocker) which has to be tilted to one or more indexed positions in order to achieve a change in contact state

3.3.6

push-button switch

switch, the actuating member of which is a button which has to be pushed in order to achieve a change in contact state

NOTE The switch may be provided with one or more actuating members.

3.3.7

cord-operated switch

switch, the actuating member of which is a pull-cord which has to be pulled in order to achieve a change in contact state

3.3.8

push-pull switch

switch, the actuating member of which is a rod which has to be pulled or pushed to one or more indexed positions in order to achieve a change in contact state

3.3.9

biased switch

switch, the contacts and actuating member of which return to a predetermined position when the actuating member is released from the actuated position

3.4 Definitions relating to the operation of the switch

3.4.1

actuation

movement of the actuating member of the switch by hand, by foot, or by any other human activity

3.4.2

indirect actuation

movement of the actuating member of the switch provided indirectly by a part of an appliance into which the switch is incorporated or integrated, for example the door of an appliance

3.4.3

actuating member

part which is pulled, pushed, turned or otherwise moved to cause an operation

3.4.4

actuating means

any part which may be interposed between the actuating member and the contact mechanism in order to achieve contact operation

3.4.5

disconnection

interruption of an electrical circuit in a pole so as to provide insulation between the supply and those parts intended to be disconnected from the supply

3.4.6

micro disconnection

disconnection that provides correct functional performance by contact separation in the case of long-term temporary overvoltage

3.4.7

electronic disconnection

disconnection that provides a non-cycling correct functional performance by a semiconductor switching device in the case of long-term temporary overvoltage

3.4.8

full disconnection

disconnection that provides correct functional performance by contact separation in the case of short-term and long-term temporary overvoltage and impulse withstand voltage equivalent to basic insulation

3.4.9

all-pole disconnection

for single-phase a.c. appliances and for d.c. appliances, a disconnection of both supply conductors substantially at the same time by a single switching action or, for appliances to be connected to more than two supply conductors, a disconnection of all supply conductors, except the earthed conductor substantially at the same time by a single switching action

3.4.10

operation

transfer of the moving contact(s) from one position to an adjacent position

3.4.11

operating cycle

succession of operations from one position to another and back to the first position through all other positions, if any
[IEV 441-16-02]

3.4.12

electronic actuating member

part, component or component group, for example an optical or acoustic sensing unit, which controls the actuating means or the switching device

3.4.13

electronic actuating means

part, component or component group, which controls electronically the switching device

3.4.14

abnormal conditions

conditions which may occur in the appliance or in the switch during normal operation

3.4.15

sensing unit

unit that is activated by any physical phenomenon or combination of those

3.5 Definitions relating to connections to the switch

3.5.1

external conductor

any cable, cord, core or conductor, a part of which is external to a switch, or to an appliance in or on which the switch is mounted. Such a conductor may be a supply lead or interconnecting cord between separate parts of an appliance or it may form part of the fixed wiring

3.5.2

integrated conductor

conductor which is either inside a switch or is used to permanently interconnect terminals or terminations of a switch

3.5.3

internal conductor

any cable, cord, core or conductor which is internal to an appliance, but is neither an external conductor nor an integrated conductor

3.5.4 Methods of attachment for cords

3.5.4.1

type X attachment

method of attachment such that the cord can be replaced without the aid of special purpose tools by a cord not requiring special preparation

3.5.4.2

type Y attachment

method of attachment such that the cord can only be replaced with the aid of special purpose tools normally available to the manufacturer or his agent

NOTE Such a method of attachment may be used either with common cords or with special cords.

3.5.4.3

type Z attachment

method of attachment such that the cord cannot be replaced without destroying the integrity of the switch

3.6 Definitions relating to terminals and terminations

3.6.1

terminal

conductive part of a switch provided for reusable electrical connections without the use of a special purpose tool or a special process

3.6.2

screw type terminal

terminal for the connection and/or interconnection and subsequent disconnection of one or more conductors, the connection being made directly or indirectly by means of screws or nuts of any kind

3.6.3

pillar terminal

screw-type terminal in which the conductor(s) is (are) inserted into a hole or cavity, where it is (they are) clamped under the shank of the screw. The clamping pressure may be applied directly by the shank of the screw, or through an intermediate clamping member to which pressure is applied by the shank of the screw

Examples of pillar terminals are shown in figure 1

3.6.4

screw terminal

screw-type terminal in which the conductor(s) is (are) clamped under the head of the screw. The clamping pressure may be applied directly by the head of the screw or through an intermediate part, such as a washer, clamping plate or anti-spread device

Examples of screw terminals are shown in figure 2

3.6.5

stud terminal

screw-type terminal in which the conductor(s) is (are) clamped under a nut. The clamping pressure may be applied directly by a suitably shaped nut or through an intermediate part, such as a washer, clamping plate or anti-spread device

Examples of stud terminals are shown in figure 2

3.6.6

saddle terminal

screw-type terminal in which the conductor(s) is (are) clamped under a saddle by means of two or more screws or nuts

Examples of saddle terminals are shown in figure 3

3.6.7

lug terminal

screw-type terminal designed for clamping a cable lug or bar directly or indirectly by means of a screw or nut

Examples of lug terminals are shown in figure 4

3.6.8

mantle terminal

screw-type terminal in which the conductor(s) is (are) clamped against the base of a slot in a threaded stud by means of a nut. The conductor is clamped against the bottom of the slot by a suitably shaped washer under the nut, by a central peg if the nut is a cap nut, or by equally effective means for transmitting the pressure from the nut to the conductor within the slot

Examples of mantle terminals are shown in figure 5

3.6.9

screwless terminal

terminal for the connection and/or interconnection and subsequent disconnection of one or more conductors, the connection being made, directly or indirectly, by means other than screws

NOTE The following terminals are not regarded as screwless terminals:

- terminals requiring fixing of special devices to the conductors before clamping them into the terminal, for example flat quick-connect terminations;
- terminals requiring wrapping of the conductors, for example those with wrapped joints;
- terminals providing direct contact to the conductors by means of edges or points penetrating the insulation.

Examples of screwless terminals are shown in figure 6

3.6.10

termination

connection between two or more conductive parts which can only be made or replaced by either a special purpose tool or a special process

3.6.11

flat quick-connect termination

electrical connection consisting of a tab and a female connector which can be readily inserted and withdrawn without use of tools

3.6.12

tab

portion of a flat quick-connect termination which is inserted into the female connector and is a part integral with the switch

 Examples of tabs are shown in IEC 61210 and Annex U. 

3.6.13

female connector

portion of a flat quick-connect termination which is pushed onto the tab

An example of a female connector is shown in figure 8

3.6.14

solder terminal

conductive part of a switch provided to enable a termination to be made by means of solder

3.7 Definitions relating to insulation

3.7.1

basic insulation

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

3.7.2

supplementary insulation

independent insulation applied in addition to the basic insulation in order to provide protection against electric shock in the event of a failure of the basic insulation

3.7.3

double insulation

insulation comprising both basic insulation and supplementary insulation

3.7.4

reinforced insulation

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

NOTE The term "insulation system" does not imply that the insulation must be one homogeneous piece. It may comprise several layers which cannot be tested separately as supplementary or basic insulation.

3.7.5

functional insulation

insulation between live parts which is necessary only for the proper functioning of the switch

3.7.6

coating

solid insulating material laid on one or both sides of the surface of the printed board. Coating can be varnish, a dry film applied to the printed board or can be achieved by thermal deposition

NOTE Coating and base material of the printed board form an insulating system that may have properties similar to solid insulation.

3.7.7

solid insulation

insulation material interposed between two conductive parts

NOTE In the case of a printed board assembly with a coating, solid insulation consists of the printed board itself as well as the coating. In other cases, solid insulation consists of the encapsulating material.

3.7.8

class 0 appliance

appliance in which protection against electric shock relies upon basic insulation; this implies that there are no means for the connection of accessible conductive parts, if any, to the protective conductor in the fixed wiring of the installation, reliance in the event of a failure of the basic insulation being placed upon the environment

3.7.9

class I appliance

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

3.7.10

class II appliance

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

NOTE A Class II appliance may be provided with means for maintaining the continuity of protective circuits, provided that such means are within the appliance and are insulated from accessible surfaces according to the requirements of Class II.

3.7.11

class III appliance

appliance in which protection against electric shock relies on supply at SELV and in which voltages higher than those of SELV are not generated

3.8 Definitions relating to pollution

3.8.1

pollution

any addition of foreign matter, solid, liquid, or gaseous that can result in a reduction of dielectric strength or surface resistivity of the insulation

3.8.2

micro-environment

immediate environment of the insulation which particularly influences the dimensioning of creepage distances

NOTE For self-produced pollution in arc chambers of switches, see annex L.

3.8.3

macro-environment

environment of the room or other location in which the switch is installed or used

3.8.4

pollution degree

numeral characterizing the expected pollution of the micro-environment

NOTE Pollution degrees 1, 2 and 3 are used (see 7.1.6 and annex L).

3.9 Definitions relating to manufacturers' tests

3.9.1

routine test

a test to which each individual switch for appliances is subjected during and/or after manufacture to ascertain whether it complies with the relevant requirements of this standard

[IEV 151-04-16, modified]

NOTE Routine tests are specified in annex R

3.9.2

sampling test

a test on a number of switches taken at random from a batch

[IEV 151-04-17, modified]

NOTE Sampling tests are specified in annex S

3.9.3

type test

a test of one or more switches made to a certain design to show that the design meets certain specifications

[IEV 151-04-15, modified] 

4 General requirements

Switches shall be designed and constructed so that in normal use they function safely so as to cause no danger to persons or surroundings even in the event of such careless use as may occur in normal use, as specified in this part 1 of IEC 61058 and any appropriate part 2.

In general, compliance is checked by carrying out all the relevant tests.

5 General notes on tests

5.1 Tests according to this standard are type tests.

5.2 Unless otherwise specified in this standard, the specimens are tested as delivered, at an ambient temperature of $25\text{ °C} \pm 10\text{ °C}$. The specimens are mounted as declared by the manufacturer, but, if significant, using the most unfavourable method if more than one method is declared.

NOTE In case of doubt, the tests are made at an ambient temperature of $20\text{ °C} \pm 5\text{ °C}$.

5.3 Switches to be used with a non-detachable conductor are tested with the appropriate conductor connected.

5.4 If the switches are provided with tabs, for the tests according to clauses 16 and 17, new female connectors shall be used.

The envelope dimensions of female connectors for flat quick-connect terminations used for tests shall be in accordance with figure 8.

NOTE A method of selection of female test connectors for flat quick-connect terminations is given in annex H.

The female connectors shall be of a type suitable for the rated ambient temperature of the switch, and the crimped conductors shall be soldered or welded to the crimping area of the female connector, if any.

5.5 Unless otherwise specified the tests are carried out in the order of the clauses of this standard.

The number of test specimens required and the relevant clauses are as follows.

NOTE A survey of test specimens and related clauses is given in table 1.

5.5.1 Switches with the following ratings:

- d.c. only;
- both a.c. and d.c.,

$\square_{A2}$ the tests being carried out on d.c., provided that the d.c. voltage and current ratings for the classified type of load (see 7.1.2) are equal to, or greater than, the a.c. ratings. $\square_{A2}$

For these ratings, the following specimens are used:

- clauses 6 to 12 and 23: specimen No. 1;
- clauses 19 to 22: specimen No. 2; where clearances according to 20.1 are tested in accordance with annex M, three additional specimens are used;
- clauses 13 to 18:
 - with polarity marking: specimens Nos. 3 to 5;
 - without polarity marking: specimens Nos. 3 to 5 with one polarity and specimens Nos. 6 to 8 with the opposite polarity;
- clause 25: three additional specimens.

5.5.2 Switches with the following ratings:

- a.c. only;
- both a.c. and d.c., but not meeting the provisions of 5.5.1.

For these ratings, the following specimens are used:

- clauses 6 to 12 and 23: specimen No. 1;
- clauses 19 to 22: specimen No. 2; where clearances according to 20.1 are tested in accordance with annex M, three additional specimens are used;
- clauses 13 to 18:
 - for a.c. rating: specimens Nos. 3 to 5;
 - for d.c. rating with marked polarity: specimens Nos. 6 to 8;
 - for d.c. rating without marked polarity: specimens Nos. 6 to 8 with one polarity and specimens Nos. 9 to 11 with the opposite polarity;
- clause 25: three additional specimens.

5.5.3 Switches with more than one rated voltage and/or rated current combination within one nature of supply

For these ratings, the following specimens are used:

- clauses 6 to 12 and 23: specimen No. 1;
- clauses 19 to 22: specimen No. 2; where clearances according to 20.1 are tested in accordance with annex M, three additional specimens are used;
- clauses 13 to 18:
 - for the combination with the highest current rating: specimens Nos. 3 to 5;
 - for the second combination: specimens Nos. 6 to 8;
 - for further combinations: specimens Nos. 9 to 11, etc.

NOTE For switches having one rated current for more than one voltage rating, the switch shall be tested at the highest voltage rating for each type of load.

- clause 25: three additional specimens.



Table 1 – Test specimens

Clause		The number of the specimen which is submitted to the test ¹⁾	Notes
6	Rating	1	
7	Classification	1	
8	Marking and documentation	1	
9	Protection against electric shock	1	
10	Provision for earthing	1	
11	Terminals and terminations	1	2)
12	Construction	1	
13	Mechanism	3 4 5 6 7 8	3)
14	Protection against solid foreign objects, ingress of dust, water and humid conditions	3 4 5 6 7 8	3)
15	Insulation resistance and dielectric strength	3 4 5 6 7 8	2) 3)
16	Heating	3 4 5 6 7 8	
17	Endurance	3 4 5 6 7 8	3)
18	Mechanical strength	3 4 5	
19	Screws, current-carrying parts and connections	2	
20	Clearances, creepage distances solid, insulation and coatings of rigid printed board assemblies	2	4) 5) 6)
21	Resistance to heat and fire	2	6)
22	Resistance to rusting	2	
23	Abnormal operation and fault conditions for electronic switches	1	6)
25	EMC requirements	three additional samples	
1) For the purpose of selection of female test connectors according to annex H, additional specimens may be necessary. 2) Three additional new specimens may be required according to 11.1.3.4 or Table 12, Footnote 2). 3) The further specimens 9 to 11, etc., are tested in the same combination of clauses as specimens 6 to 8. 4) Three additional new specimens may be required according to 20.1 for the test according to annex M. 5) For testing coatings on printed boards according to 20.4, the following number of printed boards are needed: – 13 specimens for type A coating; – 17 specimens for type B coating. 6) Additional samples may be required for destructive tests in Clauses 20, 21 and 23.			



5.6 *Switches with a rated frequency are tested at that frequency. Switches without a rated frequency are tested at 50 Hz. Switches with a rated frequency range are tested at the most unfavourable frequency within that range.*

5.7 *If not more than one specimen fails during the tests of clauses 13 to 18 inclusive such as to cause non-compliance with the appropriate clause, the tests which caused the failure, and those preceding, which may have influenced the result of that test, are repeated on another set of identical specimens, all of which shall then comply with the repeated tests. No failure shall occur during the tests of clauses 6 to 12 inclusive and 19 to 22 inclusive.*

NOTE The applicant may submit, together with the first set of specimens, an additional set of specimens which may be needed in case one specimen fails.

The testing authorities will then, without further request, test the additional specimens and will only reject if a further failure occurs.

If the additional set of specimens is not submitted at the same time, a failure of one specimen will entail a rejection.

5.8 *If it is necessary to have parts with double insulation or reinforced insulation in switches for Class 0 or Class I appliances, such parts are checked for compliance with the requirements specified for switches for Class II appliances.*

Similarly, if it is necessary to have parts in switches operating at SELV, such parts are also checked for compliance with the requirements specified for switches for Class III appliances.

5.9 *For the tests of this standard, actuation may be performed by test equipment. Tests at high speed, however, have to be performed according to 17.2.4.*

For switches with electronic actuating members, actuation shall be performed according to the manufacturer's declarations.

5.10 *As far as possible, signal indicators shall be tested together with the switches.*

With the exception of the luminosity which can be disregarded, the lamp shall function unless otherwise specified. The test may be performed with test samples simulating the electrical, mechanical and thermal influences of the original indicator lamp. Replaceable indicator lamps may be replaced during the tests. Signal indicators, the function of which is independent from the function of the switch, are operated continuously.

The results of the tests for switches with indicator lamps shall be considered to apply to switches of equivalent construction without indicator lamps, or to indicator lamps of equivalent construction without the switching mechanism.

5.11 *Switches intended to be operated from a specific supply, are tested with that specific supply.*

5.12 *In all tests, the measuring instruments or the measuring means shall be such as not to affect appreciably the quantity being measured.*

5.13 *For electronic switches, it may be necessary to disconnect or short-circuit electronic components for the purpose of the tests.*

5.14 *For the tests of 23.1.1.1, additional specimens may be necessary.*

6 Rating

6.1  The maximum rated voltage is 480 V. 

6.2 Switches with signal indicators may have different rated voltages for the signal indicators.

6.3  The maximum rated current is 63 A.

Compliance of 6.1 to 6.3 is checked by inspection in conjunction with Clause 8. 

7 Classification

7.1 Classification of switches

7.1.1 According to nature of supply:

7.1.1.1 – switches for a.c. only;

7.1.1.2 – switches for d.c. only;

7.1.1.3 – switches for both a.c. and d.c.

7.1.2 According to type of load to be controlled by each circuit of the switch:

NOTE 1 A switch having more than one circuit need not have the same classification for each circuit.

NOTE 2 Annex F, may be used for determining whether a particular switch rating is suitable for controlling the circuit in the actual application.

7.1.2.1 – circuit for a substantially resistive load with a power factor of not less than 0,9;

7.1.2.2 – circuit for either a resistive load, a motor load with a power factor not less than 0,6, or a combination of both;

7.1.2.3 – circuit for a combination of resistive and capacitive a.c. loads;

7.1.2.4 – circuit for ordinary tungsten filament lamp load;

7.1.2.5 – circuit for a declared specific load;

7.1.2.6 – circuit for a current not exceeding 20 mA;

7.1.2.7 – circuit for specific lamp load;

7.1.2.8 – circuit for an inductive load with a power factor of not less than 0,6;

7.1.2.9 – circuit for specific load of motor with a locked rotor and with a power factor not less than 0,6.

7.1.2.10 – minimum load for electronic switches.

7.1.3 According to ambient temperature:

7.1.3.1 – switches at which the complete switch, including the actuating member, is intended to be used in an ambient temperature between a minimum value of 0 °C and a maximum value of 55 °C;

7.1.3.2 A_2 – switches at which the complete switch, including the actuating member, is intended to be used in an ambient temperature higher than 55 °C or lower than 0 °C, or both:

- preferred values of maximum ambient temperature are 85 °C, 100 °C, 125 °C and 150 °C;
- preferred values of minimum ambient air temperature are – 10 °C, – 25 °C and – 40 °C;
- values differing from these preferred values are allowed, as long as the values are multiples of 5 °C. A_2

7.1.3.3 – switches intended to be used with the actuating member and other accessible parts in an ambient temperature between 0 °C and 55 °C, and the remainder of the switch in an ambient temperature higher than 55 °C:

- preferred values of maximum ambient temperature are 85 °C, 100 °C, 125 °C and 150 °C;

 *Text deleted* 

- values differing from these preferred values are allowed, as long as the values are multiples of 5 °C.

7.1.3.4 Electronic cord switches and electronic independently mounted switches are classified for a maximum ambient temperature of 35 °C.

NOTE The classification using the ambient air temperature 35 °C may also be used for other electronic switches under the provision that they are properly marked according to No. 3.2 in table 3.

7.1.3.4.1 – electronic cord switches and electronic independently mounted switches, in which the complete switch, including the actuating member, is intended to be used in an ambient air temperature between a minimum value of 0 °C and a maximum value of 35 °C.

NOTE The decrease of ambient temperature from 55 °C to 35 °C is caused by the fact that components of electronic switches have a larger heat dissipation than components of mechanical switches.

7.1.3.4.2 – electronic cord switches and electronic independently mounted switches, in which the complete switch including the actuating member is intended to be used in an ambient air temperature higher than 35 °C, or a minimum value lower than 0 °C, or both:

- preferred values of maximum ambient air temperature are 55 °C, 85 °C, 100 °C and 125 °C;
- preferred values of minimum ambient air temperature are –10 °C, – 25 °C and – 40 °C;
- values differing from these preferred values are allowed, as long as the values are multiples of 5 °C.

7.1.4 According to number of operating cycles:

7.1.4.1 – 100 000 operating cycles;

7.1.4.2 – 50 000 operating cycles;

7.1.4.3 – 25 000 operating cycles;

7.1.4.4 – 10 000 operating cycles;

7.1.4.5 – 6 000 operating cycles;

7.1.4.6 – 3 000 operating cycles;

7.1.4.7 – 1 000 operating cycles;

7.1.4.8 – 300 operating cycles.

7.1.5 According to degree of protection provided by the switch, when mounted as declared, as part of an appliance enclosure

7.1.5.1 Degree of protection against solid foreign objects (according to IEC 60529):

- 7.1.5.1.1 – non-protected against solid foreign objects (IP0X);
- 7.1.5.1.2 – protected against solid foreign objects of 50 mm diameter and greater (IP1X);
- 7.1.5.1.3 – protected against solid foreign objects of 12,5 mm diameter and greater (IP2X);
- 7.1.5.1.4 – protected against solid foreign objects of 2,5 mm diameter and greater (IP3X);
- 7.1.5.1.5 – protected against solid foreign objects of 1,0 mm diameter and greater (IP4X);
- 7.1.5.1.6 – dust-protected (IP5X);
- 7.1.5.1.7 – dust-tight (IP6X).

7.1.5.2 Degree of protection against ingress of water (according to IEC 60529):

- 7.1.5.2.1 – non-protected against ingress of water (IPX0);
- 7.1.5.2.2 – protected against vertically falling water drops (IPX1);
- 7.1.5.2.3 – protected against vertically falling water drops when enclosure tilted up to 15° (IPX2);
- 7.1.5.2.4 – protected against spraying water (IPX3);
- 7.1.5.2.5 – protected against splashing water (IPX4);
- 7.1.5.2.6 – protected against water jets (IPX5);
- 7.1.5.2.7 – protected against powerful water jets (IPX6);
- 7.1.5.2.8 – protected against the effects of temporary immersion in water (IPX7).

7.1.5.3 Degree of protection against electric shock for an incorporated switch for use in:

- 7.1.5.3.1 – a Class 0 appliance;
- 7.1.5.3.2 – a Class I appliance;
- 7.1.5.3.3 – a Class II appliance;
- 7.1.5.3.4 – a Class III appliance.

NOTE Switches for use in Class II appliances may be used without additional protection in all other appliances, independently of class.

7.1.6 According to degree of pollution:

7.1.6.1 – pollution degree 1;

7.1.6.2 – pollution degree 2;

7.1.6.3 – pollution degree 3.

NOTE 1 Details for the pollution degrees are specified in annex L.

NOTE 2 A switch suitable for use in a particular situation may be used in a less polluted situation.

NOTE 3 A switch may be used in a more polluted situation than that for which it is designed if the appropriate additional protection is applied by the appliance.

7.1.7 According to the method of actuating the switch:

 NOTE This classification is not restrictive. 

7.1.7.1 – rotary switch;

7.1.7.2 – lever switch;

7.1.7.3 – rocker switch;

7.1.7.4 – push-button switch;

7.1.7.5 – cord-operated switch;

7.1.7.6 – push-pull switch;

7.1.7.7 – electronic switches operated via a sensing unit (for example touching, approaching, turning, optical, acoustic, thermal or any other influences).

7.1.8 According to marking:

7.1.8.1 – switch with limited marking U.T. (Unique Type Reference, U.T.);

7.1.8.2 – switch with full marking C.T. (Common Type Reference, C.T.).

7.1.9 According to the glow wire temperature:

7.1.9.1 – 650 °C;

7.1.9.2 – 750 °C;

7.1.9.3 – 850 °C.

NOTE When selecting the declared glow wire temperature, consideration should be given to the requirements of the relevant appliance or equipment standard. 

7.1.10 According to the rated impulse withstand voltage:

7.1.10.1 – 330 V;

7.1.10.2 – 500 V;

7.1.10.3 – 800 V;

7.1.10.4 – 1 500 V;

7.1.10.5 – 2 500 V;

7.1.10.6 – 4 000 V.

NOTE The relation between rated impulse withstand voltage, rated voltage and overvoltage category is given in annex K.

7.1.11 According to type of disconnection:

7.1.11.1 – electronic disconnection;

7.1.11.2 – micro disconnection;

7.1.11.3 – full disconnection.

7.1.12 According to the type of coating for rigid printed board assemblies:

7.1.12.1 – type A coating;

7.1.12.2 – type B coating.

NOTE Explanations for type A and type B coating are given in annex P.

7.1.13 According to type and/or connection of switches

Details for types of switches and connections are specified in table 2.

7.1.13.1 One-way switches:

7.1.13.1.1 – declared specific type and/or connection;

7.1.13.1.2 – single pole, single load (single-pole disconnection);

7.1.13.1.3 – double pole, single load (all-pole disconnection);

7.1.13.1.4 – double pole, double load (single-pole disconnection);

7.1.13.1.5 – double pole, double load (single-pole disconnection, load connected to opposite polarity);

7.1.13.1.6 – three pole, three loads, unswitched neutral (three-pole disconnection);

7.1.13.1.7 – four-pole, three-load switched neutral (four-pole disconnection);

7.1.13.1.8 – three pole, three load (three-pole disconnection).

7.1.13.2 Two-way switches:

7.1.13.2.1 – declared specific type and/or connection;

7.1.13.2.2 – single pole, single load (single-pole disconnection);

7.1.13.2.3 – single pole, double load (single-pole disconnection, for specific circuits and loads only);

7.1.13.2.4 – double pole, single load (all-pole disconnection);

7.1.13.2.5 – double pole, double load (all-pole disconnection, for specific circuits and loads only);

7.1.13.2.6 – double pole, single load with polarity reversal;

7.1.13.2.7 – double pole, four load (single-pole disconnection, load connected to opposite polarity, for specific circuits and loads only);

7.1.13.2.8 – double pole, double load (single-pole disconnection, load connected to opposite polarity);

7.1.13.2.9 – double pole, four load (single-pole disconnection for specific circuits and loads only).

7.1.13.3 Two-way switches with centre position for disconnection:

7.1.13.3.1 – declared specific type and/or connection;

7.1.13.3.2 – single pole, single load (single-pole disconnection);

7.1.13.3.3 – single pole, double load (single-pole disconnection);

7.1.13.3.4 – double pole, single load (all-pole disconnection);

7.1.13.3.5 – double pole, double load (all-pole disconnection);

7.1.13.3.6 – double pole, single load with polarity reversal (all-pole disconnection);

7.1.13.3.7 – double pole, four load (single-pole disconnection, load connected to opposite polarity);

7.1.13.3.8 – double pole, double load (single-pole disconnection, load connected to opposite polarity);

7.1.13.3.9 – double pole, four load (single-pole disconnection).

7.1.13.4 Multiway switches:

7.1.13.4.1 – the number of poles, type of connection and load as declared;

7.1.13.4.2 – single pole, four positions with polarity reversal (single-pole disconnection, for resistive load according to 7.1.2.1);

7.1.13.4.3 – double pole, four positions with polarity reversal (all-pole disconnection, for resistive load according to 7.1.2.1);

7.1.13.4.4 – double pole, five positions with polarity reversal (all-pole disconnection, for resistive load according to 7.1.2.1);

7.1.13.4.5 – double pole, seven positions with polarity reversal (all-pole disconnection, for resistive load according to 7.1.2.1).

NOTE Switches classified in 7.1.13.4.2 to 7.1.13.4.5 are designed for the step-wise increase or decrease of the resulting wattage of a combination of resistors (R_1 to R_3) according to table 2.

7.1.14 According to switching device for electronic switches:

7.1.14.1 – with semiconductor switching device;

7.1.14.2 – with mechanical switching device.

7.1.15 According to the condition of cooling for electronic switches:

7.1.15.1 – not requiring forced cooling;

7.1.15.2 – requiring forced cooling.

7.1.16 According to duty-type for electronic switches:

7.1.16.1 – continuous duty. Duty-type S1;

7.1.16.2 – short-time duty. Duty-type S2;

7.1.16.3 – intermittent periodic duty. Duty-type S3.

NOTE 1 The different types of duty-type are illustrated in figures 14 to 16.

NOTE 2 The concept duty-type is taken from IEC 60034-1.

7.1.17 According to test conditions:

7.1.17.1 – functional test conditions for electronic switches with thermal current or maximum rated resistive current;

NOTE This test condition reflects the proper functioning of the switch. This test does not simulate the actual load of the end application.

7.1.17.2 – simulated test conditions for electronic switches with type of load as classified in 7.1.2;

NOTE This test condition reflects the proper functioning of the switch. It also simulates all conditions of the end application.

7.1.17.3 – specific test conditions of end application for electronic switches, i.e. in or together with the appliance and under the cooling conditions of the appliance;

7.1.17.4 – test conditions for electronic switches according to duty-type;

7.1.17.5 – test conditions for switches having a contact making and breaking speed independent from the speed of actuation. 

7.1.18 According to built-in protection for electronic switches:

7.1.18.1 – with built-in protection;

7.1.18.2 – without built-in protection.

7.2 Classification of terminals

7.2.1 – terminals intended for the connection of unprepared conductors and not requiring the use of any special purpose tool;

NOTE Twisting of a stranded conductor to consolidate the end is not considered as special preparation.

7.2.2 – terminals intended for the connection of unprepared conductors and not requiring the use of any special purpose tool but with a restricted clamping range and /or wire type;

7.2.3 – terminals intended for the connection of prepared conductors and/or requiring the use of a special purpose tool;

7.2.4 – terminals suitable for the connection of supply cables or cords with unprepared conductors and not requiring the use of any special purpose tool;

7.2.5 – terminals suitable for the connection of supply cables or cords with prepared conductors and/or requiring the use of a special purpose tool; 

 **7.2.6** – terminals suitable for the interconnection of two or more conductors;

7.2.7 – terminals intended for the connection of rigid, solid conductors;

7.2.8 – terminals intended for the connection of rigid, solid and stranded conductors;

7.2.9 – terminals intended for the connection of flexible conductors;

7.2.10 – terminals suitable for the connection of both flexible and rigid (solid and stranded) conductors;

7.2.11 – solder terminals intended for soldering by hand with a soldering iron;

7.2.12 – solder terminals intended for soldering with a solder bath;

7.2.13 – solder terminals with provisions for securing the conductor by mechanical means and providing circuit continuity by soldering;

7.2.14 – solder terminals without provisions for securing the conductor by mechanical means. The circuit continuity is ensured by soldering solely.

7.2.15 – According to the resistance to soldering heat:

7.2.15.1 – solder terminals type 1;

7.2.15.2 – solder terminals type 2. 

Table 2 – Type and connection of switches

Classification	Code ¹⁾	Type of switch	Type of connection	Test circuit ³⁾
		One-way switch		
7.1.13.1		Principle of one-way switches with one to n poles		
7.1.13.1.1	1.1	The number of poles, type of connection and load as declared		
7.1.13.1.2	1.2	Single pole	Single load (single-pole disconnection)	S = Specimen
7.1.13.1.3	1.3	Double pole	Single load (all-pole disconnection)	S = Specimen
7.1.13.1.4	1.4 [1.2]	Double pole	Double load (single-pole disconnection)	S = Specimen
7.1.13.1.5	1.5 [1.2] [1.4]	Double pole	Double load (single-pole disconnection, load connected to opposite polarity)	S = Specimen

Table 2 (continued)

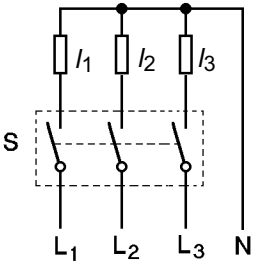
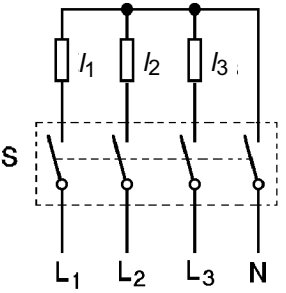
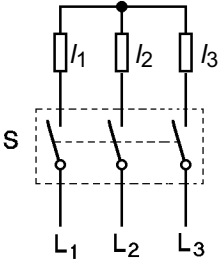
Classification	Code ¹⁾	Type of switch	Type of connection	Test circuit ³⁾
7.1.13.1.6	1.6	Three pole	Three loads unswitched neutral, (three-pole disconnection)	 S = Specimen
7.1.13.1.7	1.7	Four pole	Three loads switched neutral (four-pole disconnection)	 S = Specimen
7.1.13.1.8	1.8	Three pole	Three loads (three-pole disconnection)	 S = Specimen

Table 2 (continued)

Classification	Code ¹⁾	Type of switch	Type of connection	Test circuit ³⁾
		Two-way switch		
7.1.13.2		Principle of two-way switches with one to n poles		
7.1.13.2.1	2.1	The number of poles, type of connection and load as declared		
7.1.13.2.2	2.2 [1.2]	Single pole	Single load (single-pole disconnection)	S = Specimen, A = Auxiliary switch
7.1.13.2.3 ²⁾	2.3	Single pole	Double load (single-pole disconnection)	S = Specimen
7.1.13.2.4	2.4 [1.3]	Double pole	Single load (all-pole disconnection)	S = Specimen, A = Auxiliary switch
7.1.13.2.5 ²⁾	2.5	Double pole	Double load (all-pole disconnection)	S = Specimen

Table 2 (continued)

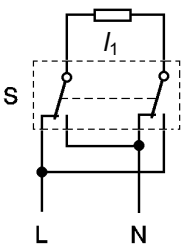
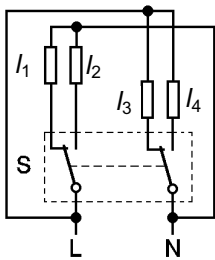
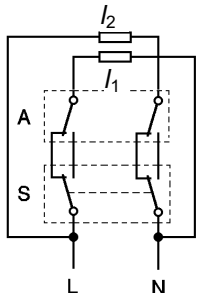
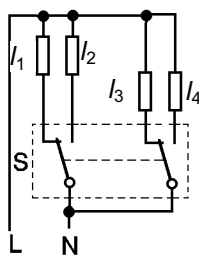
Classification	Code ¹⁾	Type of switch	Type of connection	Test circuit ³⁾
7.1.13.2.6 ²⁾	2.6	Double pole	Single load with polarity reversal	 S = Specimen
7.1.13.2.7 ²⁾	2.7	Double pole	Four load (single-pole disconnection, load connected to opposite polarity)	 S = Specimen
7.1.13.2.8	2.8	Double pole	Double load (single-pole disconnection, load connected to opposite polarity)	 S = Specimen, A = Auxiliary switch
7.1.13.2.9 ²⁾	2.9	Double pole	Four load (single-pole disconnection)	 S = Specimen

Table 2 (continued)

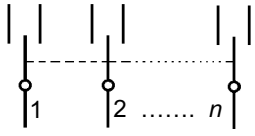
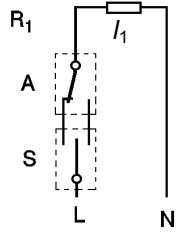
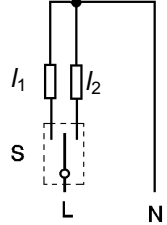
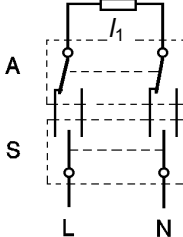
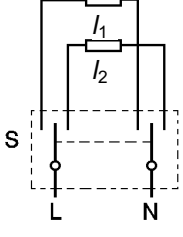
Classification	Code ¹⁾	Type of switch	Type of connection	Test circuit ³⁾
		Two-way switch with centre position for disconnection		
7.1.13.3		Principle of two way switches with centre position and one to n poles		
7.1.13.3.1	3.1	The number of poles, type of connection and load as declared		
7.1.13.3.2	3.2	Single pole	Single load (single-pole disconnection)	 S = Specimen A = Auxiliary switch
7.1.13.3.3	3.3	Single pole	Double load (single-pole disconnection)	 S = Specimen
7.1.13.3.4	3.4	Double pole	Single load (all-pole disconnection)	 S = Specimen A = Auxiliary switch
7.1.13.3.5	3.5	Double pole	Double load (all-pole disconnection)	 S = Specimen

Table 2 (continued)

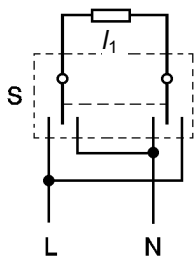
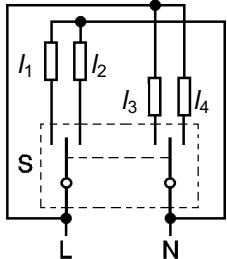
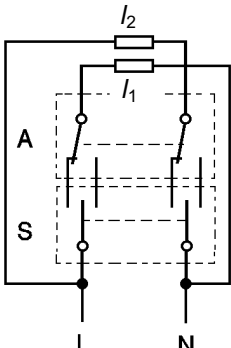
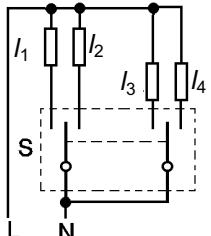
Classification	Code ¹⁾	Type of switch	Type of connection	Test circuit ³⁾
7.1.13.3.6	3.6	Double pole	Single load with polarity reversal (all-pole disconnection)	 S = Specimen
7.1.13.3.7	3.7 [3.3]	Double pole	Four load (single-pole disconnection, load connected to opposite polarity)	 S = Specimen
7.1.13.3.8	3.8	Double pole	Double load (single-pole disconnection, load connected to opposite polarity)	 S = Specimen A = Auxiliary switch
7.1.13.3.9	3.9 [3.3]	Double pole	Four load (single-pole disconnection)	 S = Specimen A2 Text deleted A2

Table 2 (continued)

Classification	Code ¹⁾	Type of switch	Type of connection	Test circuit ³⁾
		Multiway switches		
7.1.13.4		Principle of multiway switches with 3 to n ways and 1 to n poles		
7.1.13.4.1	4.1	The number of poles, type of connection and load as declared		
7.1.13.4.2	4.2	Single pole Four positions with polarity reversal (single-pole disconnection)		
7.1.13.4.3	4.3	Double pole Four positions with polarity reversal (all-pole disconnection)		
7.1.13.4.4	4.4	Double pole Five positions with polarity reversal (all-pole disconnection)		
7.1.13.4.5	4.5	Double pole Seven positions with polarity reversal (all-pole disconnection)		
¹⁾ For switches of the same basic design, the test is considered to cover the tests for the code of switch given in square brackets. Switches are considered to be of the same basic design if – all parts are the same, except those which have to be different because of the different poles and number of contact paths; – the basic dimensions and mechanical constructions are the same; – multipole switches are either composed of single-pole switches or build up from the same components as the single-pole switches, having the same overall dimensions per pole. A separate test on a switch with momentary action (monostable switch) is not necessary, if it can be shown that the contact function is equivalent to a bistable switch of equivalent construction. ²⁾ For specific circuits and loads only. ³⁾ The indication L and N only symbolizes the connection to the mains.				

8 Marking and documentation

8.1 The switch manufacturer shall provide adequate information to ensure that

- the appliance manufacturer can select and install a switch;
- the end-user can use a switch as intended by the switch manufacturer;
- the corresponding tests can be performed in accordance with this standard.

This information shall be provided in one or more of the following ways, as detailed in table 3.

8.1.1 By Marking (Ma)

The information shall be provided by marking on the switch itself.

8.1.2 By Documentation (Do)

The information shall be provided by separate documentation, which may consist of a leaflet, a specification sheet, or a drawing, etc.

The content of the documentation shall be made available to the appliance manufacturer or end-user as appropriate in any suitable format.

NOTE 1 Where Ma/Do is indicated, the information can be provided by either marking or documentation.

NOTE 2 The format in which this information is presented is not within the scope of this standard.

Table 3 – Switch information

No.	Characteristic	Subclause	Means of information	
			Common type reference C.T.	Unique type reference U.T.
1 SWITCH IDENTIFICATION				
1.1	Manufacturer's name or trade mark		Ma	Ma
1.2	Type reference		Ma	Ma
2 SWITCH ENVIRONMENT/MOUNTING				
2.1	Degree of protection provided for the switch when mounted according to documentation (IP code of IEC 60529) NOTE Additional letters listed in IEC 60529 are not used.	7.1.5.1 and 7.1.5.2	Do	Do
2.2	Degree of protection against electric shock, from outside an appliance	7.1.5.3	Do	Do
2.3	Method of mounting and actuating the switch and method of providing earthing if appropriate. The intended method(s) of mounting and the intended orientation(s) shall be declared. The declared methods of mounting, together with any earthing terminal, are deemed to be the methods of earthing conductive parts unless otherwise specified	7.1.7 and 7.1.7.7	Do	Do
2.4	Pollution degree	7.1.6	Do	Do
3 TEMPERATURE				
3.1	Ambient temperature limits if different from 0 °C to 55 °C	7.1.3	Ma	Do
3.2	 Ambient air temperature for electronic switches – cord switches and independently mounted switches if different from 0 °C to 35 °C – other switches, if different from 0 °C to 55 °C	7.1.3.4.1 or 7.1.3.4.2 7.1.3.2 or 7.1.3.3	Ma Ma	Do Do 
4 ELECTRICAL LOAD/CONNECTION				
4.1	Rated voltage or rated voltage range	6.1	Ma	Do
4.2	Nature of supply if the switch is not intended for both a.c. and d.c. or if the rating is different for a.c and d.c.	7.1.1	Ma	Do
4.3	Frequency or frequency range if different from 50 Hz or 50 Hz to 60 Hz		Ma	Do
4.4	For circuits of substantially resistive loads, the rated current of the rated load	7.1.2.1	Ma	Do
4.5	 For circuits for resistive and motor load with a power factor not less than 0,6, the rated resistive current and rated motor current and, for electronic switches, the minimum current (or power) 	7.1.2.2	Ma/Do	Do
4.6	For circuits for resistive and capacitive load, the rated current and rated peak surge current and, for electronic switches, the minimum current (or power)	7.1.2.3	Ma/Do	Do
4.7	 For circuits for tungsten filament lamp load, the rated resistive current and alternatively either the peak inrush lamp current or the rated lamp current, and, for electronic switches, the minimum current (or power)	7.1.2.4	Ma/Do	Do 
4.8	For circuits for declared specific loads, relevant details of the appliance to be controlled, or other specific load	7.1.2.5		Do
4.9	For switches for more than one circuit, the current applicable to each circuit and to each terminal. If these are different from each other, then it shall be made clear to which circuit or which terminal the information applies		Ma/Do	Do



Table 3 (continued)

No.	Characteristic	Subclause	Means of information	
			Common type reference C.T.	Unique type reference U.T.
4.10	Rated impulse withstand voltage	7.1.10	Do	Do
4.11	For electronic switches, the thermal current	8.4.7	Ma	Do
4.12	For electronic switches, the duty-type	7.1.16	Do	Do
4.13	For electronic switches, the ON/OFF-time for the relevant duty-type		Do	Do
4.14	Type and/or connection of switch	7.1.13	Do	Do
4.15	For circuits for specific lamp load, the rated current and the inrush current	7.1.2.7	Do	Do
4.16	 For circuits for an inductive load with a power factor not less than 0,6	7.1.2.8	Do	Do
4.17	For circuits for specific load of motor with a locked rotor and with a power factor not less than 0,6	7.1.2.9	Do	Do 
5 TERMINALS/CONDUCTORS				
5.1	All terminals shall be suitably identified, or their purpose self-evident, or the switch circuitry visually apparent. For terminals intended for the connection of supply conductors, the identification may take the form of a letter L, a number or of an arrow		Ma	Ma
5.2	 Terminals for the connection of earthing conductors shall be marked with the protective earth symbol	8.3	Ma	Ma 
5.3	Information for the connection of a conductor to the terminal if this needs prepared conductors or the use of a special-purpose tool	7.2	Do	Do
5.4	The method of connection and disconnection for screwless terminals		Do	Do
5.5	The type of conductor to be connected to the terminal	7.2.6 to 7.2.9	Do	Do
5.6	The suitability of the terminal for interconnection of two or more conductors	7.2.5	Do	Do
5.7	The type of solder terminal	7.2.10 to 7.2.14	Do	Do
5.8	The suitability of the terminal for connection of unprepared supply conductors	7.2.3	Do	Do
5.9	The suitability of the terminal for connection of prepared supply conductors	7.2.4	Do	Do
 5.10	For tabs with dimensions other than those according to IEC 61210, the appropriate female connector (size, material, insulation if applicable, etc).	11.2.5.1	Do	Do 
6 OPERATING CYCLES/SEQUENCE				
6.1	Number of operating cycles	7.1.4	Ma	Do
6.2	Operating sequence for switches with more than one circuit, if significant. For multi-circuit switches the operating sequence of the pairs of contacts shall be declared if this is of importance for the safety of the user. Contacts which "make before break" or "break before make" are examples		Do	Do
6.3	Forces applied to end stops or full travel of actuating member	17.2.3.4	Do	Do

Table 3 (continued)

No.	Characteristic	Subclause	Means of information	
			Common type reference C.T.	Unique type reference U.T.
7 SIGNAL INDICATORS				
7.1	Maximum power of tungsten filament signal lamps. The marking shall be visible when replacing the lamp		Ma	Ma
7.2	Intended function or operation of the signal indicator		Do	Do
8 CIRCUIT DISCONNECTION				
8.1	Electronic disconnection	7.1.11.1	Ma	Do
8.2	Micro-disconnection	7.1.11.2	Ma	Do
8.3	Full disconnection	7.1.11.3	Do	Do
9 INSULATING MATERIALS				
9.1	Proof tracking index PTI	20.2	Do	Do
A2 9.2	Glow-wire temperature, 650 °C	7.1.9.1	---	Do
9.3	Glow-wire temperature, 750 °C	7.1.9.2	---	Do
9.4	Glow-wire temperature, 850 °C	7.1.9.3	---	Do A2
10 COOLING CONDITION				
10.1	Not requiring forced cooling	7.1.15.1	Do	Do
10.2	Requiring cooling	7.1.15.2	Do	Do
10.3	Direction of air for forced cooling		Do	Do
10.4	Speed of air for forced cooling		Do	Do
10.5	Thermal resistance of heat sink		Do	Do
10.6	Incoming temperature, density and other details of the air stream		Do	Do
11 PROTECTIVE DEVICE				
11.1	Rated current/fusing characteristic/breaking capacity of replaceable built-in protection	7.1.18.1	Ma	Do
11.2	Type/function of non-replaceable built-in protection	7.1.18.1	Do	Do
11.3	External protective device rated current, fusing characteristic, breaking capacity	7.1.18.2	Do	Do
12 TEST CONDITIONS		7.1.17	Do	Do
A2 12.1	Test conditions for electronic switches	7.1.17.1 – 7.1.17.4	Do	Do
12.2	Test condition for switches having a contact making and breaking speed independent from the speed of actuation	7.1.17.5	Do	Do A2

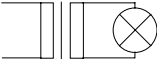
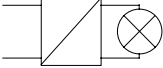
8.2 (vacant)

8.3 When symbols are used, they shall be as follows (see note 1):

Amperes.....	A
Volts.....	V
Watts	W
Volt-amperes	VA
Alternating current (single-phase)	
	or a.c.
	or  a.c.
Alternating current (three-phase)	3 
	or 3 a.c.
	or 3  a.c.
Alternating current (three-phase with neutral).....	3 N 
	or 3 Na.c.
	or 3 N  a.c.
Direct current	
	or d.c.
	or  d.c.

 Text deleted 

Protective earth symbol	
Non-protected against solid foreign solid objects.....	IP0X
Protected against solid foreign objects of 50 mm Ø and greater	IP1X
Protected against solid foreign objects of 12 mm Ø and greater	IP2X
Protected against solid foreign objects of 2,5 mm Ø and greater	IP3X
Protected against solid foreign objects of 1,0 mm Ø and greater	IP4X
Dust-protected.....	IP5X
Dust-tight	IP6X
Non-protected against ingress of water	IPX0
Protected against vertically falling water drops	IPX1
Protected against vertically falling water drops when enclosure tilted up to 15°	IPX2
Protected against spraying water	IPX3
Protected against splashing water.....	IPX4
Protected against water jets.....	IPX5
Protected against powerful water jets.....	IPX6
Protected against the effects of temporary immersion of water	IPX7
Ambient temperature limit(s) of switch	T
Frequency of supply	Hz
Number of operating cycles	See 8.7
Symbol for micro-disconnection	μ
 Symbol for tungsten filament lamp load.....	 

Symbol for the “OFF” position or the direction of actuation to the “OFF” position (a circle)	
Symbol for the “ON” position or the direction of actuation to the “ON” position (a straight bar)	
Electronic disconnection	ε (Greek epsilon)
Type of load: Incandescent lamp load	
Fluorescent lamp load	
Transformer connection	
Iron core transformer with low-voltage tungsten filament lamp load	
Electronic step-down converter with low-voltage tungsten filament lamp load	
Direction of air for forced cooling	
Speed of air for forced cooling	m/s
Thermal resistance of heat sink	K/W
Cyclic duration factor	%
Terminal for regulated load	

NOTE 1 The symbols used shall be in accordance with  IEC 60417 , IEC 60529 and IEC 60617-2.

 Note deleted 

8.4 Information about rated current and rated voltage may be provided by using figures alone, the figure for the rated current preceding or being placed above that for the rated voltage and separated from it by a line.

In cases where the switch is rated for more than one type of load as specified in 7.1.2.2, 7.1.2.3 and 7.1.2.4, several different current figures given in appropriate brackets are permitted.