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Part 1. General requirements

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



23J/470/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER: IEC 61058-1/AMD1 ED4	
DATE OF CIRCULATION: 2023-05-05	CLOSING DATE FOR COMMENTS: 2023-07-28
SUPERSEDES DOCUMENTS: 23J/469/RR	

IEC SC 23J : SWITCHES FOR APPLIANCES	
SECRETARIAT: Germany	SECRETARY: Mr Axel Klingberg
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 23B, SC 23G, SC 23H, TC 116	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	

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TITLE:

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

NOTE FROM TC/SC OFFICERS:

Please refer to 23J/471/INF for the track change version.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SWITCHES FOR APPLIANCES –

Part 1: General requirements

FOREWORD

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

This fourth edition cancels and replaces the third edition published in 2000, Amendment 1:2001 and Amendment 2:2007. This edition constitutes a technical revision.

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

~~a) requirements for mechanical switches are now given in IEC 61058-1-1;~~

~~b) requirements for electronic switches are now given in IEC 61058-1-2.~~

235 The text of this standard is based on the following documents:

FDIS	Report on voting
23J/401/FDIS	23J/405/RVD

236
237 Full information on the voting for the approval of this standard can be found in the report on
238 voting indicated in the above table.

239 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

242 In this part, the following print types are used:

- 243 • requirements proper: roman type;
- 244 • test specifications: *italic type*;
- 245 • notes: smaller roman type.

246 The committee has decided that the contents of this publication will remain unchanged until the
247 stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to
248 the specific publication. At this date, the publication will be

- 249 • reconfirmed,
- 250 • withdrawn,
- 251 • replaced by a revised edition, or
- 252 • amended.

253

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SWITCHES FOR APPLIANCES –

Part 1: General requirements

1 Scope

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

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 may be connected by optical, acoustic, thermal, electrical or other relevant connection and may include remote controlled units.

This part of IEC 61058 applies to switches for appliances with additional control functions provided by the switch using electronic circuits.

This part of IEC 61058 applies to circuitry when evaluated with a switch and necessary for the switching function.

This part of IEC 61058 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 part of IEC 61058 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*.
- IEC 60650 Safety Isolating switches

.

NOTE 1 Attention is drawn to the fact that the end product standards for appliances may contain additional or alternative requirements for switches.

NOTE 2 Throughout this part of IEC 61058, the word "appliance" means "appliance or equipment".

2 Normative references

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

IEC 60038, *IEC standard voltages*

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

- 295 IEC 60065:2014, *Audio, video and similar electronic apparatus – Safety requirements*
- 296 IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*
- 297 IEC 60112:2003, *Method for the determination of the proof and the comparative tracking*
298 *indices of solid insulating materials*
299 Amendment 1:2009
- 300 IEC 60127 (all parts), *Miniature fuses*
- 301 IEC 60127-2, *Miniature fuses – Part 2: Cartridge fuse-links*
- 302 IEC 60269-3, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by*
303 *unskilled persons (fuses mainly for household or similar applications) – Examples of*
304 *standardized systems of fuses A to F*
- 305 IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional*
306 *specification – Fixed capacitors for electromagnetic interference suppression and connection*
307 *to the supply mains*
- 308 IEC 60417, *Graphical symbols for use on equipment* (available at: [http://www.graphical-](http://www.graphical-symbols.info/equipment)
309 [symbols.info/equipment](http://www.graphical-symbols.info/equipment))
- 310 IEC 60529:1989, *Degree of protection provided by enclosures (IP code)*
311 Amendment 1:1999
312 Amendment 2:2013
- 313 IEC 60617, *Graphical symbols for diagrams* (available at: <http://std.iec.ch/iec60617>)
- 314 IEC 60664-3:2003, *Insulation coordination for equipment within low-voltage systems – Part 3:*
315 *Use of coating, potting or molding for protection against pollution*
316 Amendment 1:2010
- 317 IEC 60691, *Thermal-links – Requirements and application guide*
- 318 IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-*
319 *wire flammability test method for end-products*
- 320 IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*
- 321 IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical*
322 *flame test methods*
- 323 IEC 60695-11-20, *Fire hazard testing – Part 11-20: Test flames – 500 W flame test method*
- 324 IEC 60730 (all parts), *Automatic electrical controls*
- 325 IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*
- 326 IEC 60730-2-9:2015, *Automatic electrical controls – Part 2-9: Particular requirements for*
327 *temperature sensing control*
- 328 IEC 60738-1, *Thermistors – Directly heated positive temperature coefficient – Part 1: Generic*
329 *specification*
- 330 IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3.2: Limits – Limits for harmonic*
331 *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*

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

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

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

IEC 61210:2010, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

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

CISPR 15:2013, *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*

3 Terms and definitions

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

3.1 General terms and definitions

3.1.1 mechanical switching device

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

Note 1 to entry: Any mechanical switching device may be designated according to the medium in which its contacts open and close, e.g. air, SF₆, oil.

[SOURCE: IEC 60050-441:1984, 441-1402]

Note 2 to entry: In the IEC 61058 series the terms “switching devices” and “switches” are used interchangeably.

3.1.2**conductive part**

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

[SOURCE: IEC 60050-441: 1984, 441-11-09]

3.1.3**live part**

conductive part intended to be energized under normal operating conditions, including the neutral conductor and mid-point conductor, but excluding the PEN conductor, PEM conductor and PEL conductor

[SOURCE: IEC 60050-195: 2021, 195-02-19]

3.1.4**pole of a switching device**

the portion of a switching device associated exclusively with one electrically separated conducting path of its main circuit and excluding those portions which provide a means for mounting and operating all poles together

Note 1 to entry: 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.

[SOURCE: IEC 60050-441:1984, 441-15-01]

3.1.5**detachable part**

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

3.1.6**tool**

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

3.1.7**normal use**

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

3.1.8**unique type reference****UT**

identification marking on a switch such that by quoting it in full to the switch manufacturer a unique switch model can be identified

Note 1 to entry: This note applies to the French language only.

3.1.9**common type reference****CT**

identification marking on a switch which does not require any further specific information additional to that provided by the marking requirements of this part of IEC 61058 for selection, installation and use in accordance with this part of IEC 61058

Note 1 to entry: This note applies to the French language only.

3.1.10**cover****cover plate**

cover made of insulating material, used to cover live parts in order to avoid accidental electric contact and which is accessible when the switch is mounted as in normal use.

3.1.11**signal indicator**

device associated with a switch to indicate the circuit state visually

3.1.12**unprepared conductor**

a conductor which has been cut and the insulation of which has been removed for insertion into a terminal.

[SOURCE: IEC 60050-442:1998, 442-01-26]

3.1.13**prepared conductor**

a conductor the end of which is fitted with an attachment such as eyelet, sleeve or cable lug

Note – A conductor the shape of which is arranged for introduction into a terminal or the strands of which are twisted to consolidate the end is considered as an unprepared conductor

[SOURCE: IEC 60050-442:1998, 442-01-27]

3.1.14**polarity reversal**

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

3.1.15**semiconductor device****SD**

device the essential electric characteristics of which are due to the flow of charge carriers within one or more semiconductor materialsdevice whose essential characteristics are due to the flow of charge carriers within a semiconductor

C[SOURCE: IEC 60050-521:2002, 521-04-01]

3.1.16**semiconductor circuit**

circuit containing multiple components, where at least one is a semiconductor device

3.1.17**electronic switch**

switch for appliances provided with a semiconductor device or a semiconductor circuit in its intended load path

Note 1 to entry: The electronic switch may be provided with series and/or parallel mechanical contacts.

3.1.18**duty**

statement of the load to which the switch is subjected, including, if applicable, making, controlling and breaking and including their durations and sequence in time

3.1.19**duty-type**

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

[SOURCE: IEC 60050-411:1996, 411-51-13, modified – "speed" is deleted]

3.1.20**protective impedance**

component or assembly of components whose impedance and construction are intended to limit steady-state touch current and electric charge to non-hazardous levels

[SOURCE: IEC 60050-826:2004, 826-12-35, modified – "device" is deleted]

3.2 Terms and definitions relating to voltage and current**3.2.1****rated voltage**

voltage assigned by the manufacturer for a specified operating condition

[SOURCE: IEC 60050-442:1996, 442-01-03, modified – "accessory" is deleted]

.

Note 1 to entry: This value is the maximum value and covers all lower values.

3.2.2**safety extra-low voltage****SELV**

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

Note 1 to entry: SELV is an unearthed extra low voltage (see IEC 61140).

3.2.3**rated current**

current assigned by the manufacturer for a specified operating condition

[SOURCE: IEC 60050-442:1998, 442-01-02]

Note 1 to entry: This value is the maximum value and covers all lower values.

3.2.4**rated load**

type of load assigned by the manufacturer, according to classifications

3.2.5**over-current**

current exceeding the rated current

[SOURCE: IEC 60050-441:2000, 441-11-06]

3.2.6**working voltage**

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

[SOURCE: IEC 60050-851:2008, 851-12-31]

501 Note 1 to entry: Transients are disregarded.

502 Note 2 to entry: Both open-circuit conditions and normal operating conditions are taken into account.

503 **3.2.7**

504 **overvoltage**

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

507 **3.2.8**

508 **overvoltage category**

509 numeral defining a transient overvoltage condition

510 [SOURCE: IEC60050-851:2008, 851-21-02]

511 Note 1 to entry: See Annex E.

512 **3.2.9**

513 **impulse withstand voltage**

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

516 [SOURCE: IEC60050-442:2014, 442-09-18]

517

518 **3.2.10**

519 **minimum load**

520 load at which when declared, the electronic switch still operates correctly

521 **3.2.11**

522 **thermal current**

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

527 Note 1 to entry: The concept "thermal current" allows simplified testing of electronic switches, which in normal
528 application have complex cooling conditions. The thermal current will always be determined by tests of the switch
529 positioned on a table or in a simple test rig and comparative tests in the appliance in question. Consequently, the
530 thermal current will normally be lower than the rated current. This necessitates additional tests of the terminals,
531 contacts, etc., in order to verify that they will be able to carry the rated current, when the electronic switch is mounted
532 in the appliance. These additional tests are specified in Clause 17 in IEC IEC 61058-1-2:2016.

533 **3.3 Terms and definitions relating to the different types of switches**

534 **3.3.1**

535 **incorporated switch**

536 a switch intended for incorporation in or on an appliance, which however can be tested
537 separately

538 [SOURCE: IEC 60050-442:1998, 442-04-01]

539 **3.3.2**

540 **integrated switch**

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

543 [SOURCE: IEC 60050-442:1998, 442-04-02]

3.3.3**rotary switch**

switch where the actuating member 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

[SOURCE: IEC 60050-442:1998, 442-04-04]

Note 1 to entry: The rotation of the actuating member may be unlimited or restricted in either direction.

3.3.4**lever switch**

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

[SOURCE: IEC 60050-442:1998, 442-04-05]

3.3.5**rocker switch**

a switch where the actuating member 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

[SOURCE: IEC 60050-442:1998, 442-04-06]

3.3.6**push-button switch**

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

[SOURCE: IEC 60050-442:1998, 442-04-07]

Note 1 to entry: The switch may be provided with one or more actuating members.

3.3.7**cord-operated switch**

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

[SOURCE: IEC 60050-442:1998, 442-04-08, modified — "operating means" changed to "actuating member"]

3.3.8**push-pull switch**

a switch where the actuating member 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

[SOURCE: IEC 60050-442:1998, 442-04-09]

3.3.9**a biased switch**

switch where the contacts and actuating member return to a predetermined position when the actuating member is released following actuation

[SOURCE: IEC 60050-442:1998, 442-04-10]

3.4 Terms and 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

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

[SOURCE: IEC 60050-442:1998, 442-04-13]

Note 1 to entry: For example, a switch can be incorporated or integrated in the door of an appliance.

3.4.3

actuating member

part which is pulled, pushed, turned or otherwise influenced to cause an operation part which is pulled, pushed, turned or otherwise moved to cause an operation of the switch

[SOURCE: IEC 60050-442:1998, 442-04-14]

3.4.4

actuating means

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

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

[SOURCE: IEC 60050-442:1998, 442-04-15]

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 device (SD) 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 single-phase**

concurrent disconnection of all supply conductors, except the earthed conductor, by a single switching action for AC and DC appliances

3.4.10**operating cycle**

succession of operations from one position to another and back to the first position through all other positions, if any

[SOURCE: IEC 60050-441:2000, 441-16-02]

3.4.11**electronic actuating member**

part, component or component group which controls the actuating means or the switching device

Note 1 to entry: An optical or acoustic sensing unit is an example of a component group.

3.4.12**electronic actuating means**

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

3.4.13**abnormal conditions**

conditions leading to reduced safety, which may occur in the appliance or in the switch during normal operation

Note 1 to entry: These conditions (e.g. rise in temperature, lack of protection against shock) may be the consequence of faults of the switch or related ambient conditions, which in case of defects or deteriorated operation of other components of the application are foreseeable. (Intended) misuse is not covered.

3.4.14**sensing unit**

unit adjustable by other than mechanical means containing electronic components and controlling the output via electronic components or unit that is activated by any physical phenomenon or combination of phenomena

3.4.15**fault conditions**

abnormal conditions which are caused by a failure within the switch, which can be simulated by modifications of the switch

3.5 Terms and definitions relating to connections to the switch**3.5.1****external conductor**

cable, cord or conductor which is external to a switch

3.5.2**integrated conductor**

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

3.6 Terms and definitions relating to terminals and terminations**3.6.1****terminal**

conductive part of a switch, provided for connecting the switch to one or more external conductors

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

Note 1 to entry: Examples of screw type terminals include those in Figures 1 through 5.

3.6.3**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 1 to entry: Examples of screwless type terminals are shown in Figure 6.

Note 2 to entry: Push-in terminals, which are wire terminals that lock a stripped conductor when inserted in the terminal, are covered by the definition of screwless terminals.

3.6.4**termination**

arrangement provided for making the connections between the switch internal leads and the external conductors

3.6.5**flat quick-connect termination**

electrical connection consisting of a male tab and a female connector which can be inserted and withdrawn with or without the use of a tool

[SOURCE: IEC 60050-442:1998, 442-06-07]

3.6.6**tab**

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

Note 1 to entry: Examples of tabs are shown in IEC 61210.

3.6.7**female connector**

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

Note 1 to entry: An example of a female connector is shown in Figure 7.

3.6.8**solder terminal**

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

3.7 Terms and 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

insulation comprising both basic insulation and supplementary insulation

[SOURCE: IEC 60050-195:2021 [195-06-08](#)]

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 1 to entry: The term "insulation system" does not imply that the insulation is one homogeneous piece. It may consist of 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

Note 1 to entry: Coating can be varnish, a dry film applied to the printed board or can be achieved by thermal deposition.

Note 2 to entry: 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

solid insulating material, or a combination of solid insulating materials, placed between two conductive parts or between a conductive part and a body part

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

[SOURCE: IEC IEC 60050-903:2015, 903-04-14]

3.7.8

class 0 appliance

appliance in which protection against electric shock relies upon basic insulation, which 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

774 Note 1 to entry: A class II appliance may be provided with means for maintaining the continuity of protective circuits,
775 provided that such means are within the appliance and are insulated from accessible surfaces according to the
776 requirements of class II.

777 3.7.11

778 class III appliance

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

781 3.7.12

782 comparative tracking index

783 CTI

784 numerical value of the maximum voltage in volts which a material can withstand without tracking
785 and without a persistent flame occurring under specified test conditions

786 [SOURCE: IEC 60050-212: 2010, 212-11-59]

787 3.8 Terms and definitions relating to pollution

788 3.8.1

789 pollution

790

791

792 any addition of foreign matter, solid, liquid or gaseous that can produce a permanent reduction
793 of dielectric strength or surface resistivity of the insulation

794

795 Note – Ionized gases of a temporary nature are not considered as to be a pollution.

796

797 [SOURCE: IEC 60050-442:1998, 442-01-28] 1998-11

798

799

800 3.8.2

801 micro-environment

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

804 [SOURCE: IEC 60050-851: 2008, 851-15-16]

805 Note 1 to entry: For self-produced pollution in arc chambers of switches, see Annex F.

806 3.8.3

807 macro-environment

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

809 3.8.4

810 pollution degree

811 numeral characterizing the expected pollution of the micro-environment

812 [SOURCE: IEC 60050-581: 2008, 581-21-07, modified without the note]

813 Note 1 to entry: Pollution degree 1, 2 and 3 are used (see 7.8, 7.9 and Annex F).

814 3.9 Terms and definitions relating to manufacturers' tests

815 3.9.1

816 routine test

817 test to which each individual switch for appliances is subjected during and/or after manufacture
818 to ascertain whether it complies with the relevant requirements of this part of IEC 61058 (see
819 Annex K).

3.9.2**sampling test**

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

Note 1 to entry: Sampling tests are specified in Annex L.

3.9.3**type test**

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

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 the IEC 61058-1 series.

Compliance is checked by carrying out all the relevant tests.

5 General information on tests**5.1 Testing shall be performed according to the general guideline information provided in Clause 5**

5.1.1 *In general, the test conditions for higher ratings of a switch may represent test conditions for lower ratings. See 5.2.*

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

5.1.3 *If only one of the specimen does not satisfy the requirements of a test in Clauses 14, 15, 16 and 17 (Clause 17 in IEC 61058-1-1:2016 or IEC 61058-1-2:2016), that test and any preceding which may have influenced the results of the test shall be repeated and also the tests which follow shall be carried out in the required sequence with new specimens, all of which shall comply with the requirements.*

5.1.4 *Unless otherwise specified in this standard, the specimens are tested as delivered, at an ambient temperature of $25\text{ °C} \pm 10\text{ °C}$.*

5.1.5 *The specimens are mounted as declared by the manufacturer, but, if significant, using the most unfavourable method if more than one method is declared.*

5.1.6 *For the tests of this standard, actuation may be performed by test equipment. Actuation may be applied to either the actuating member or the actuating means. A switch is not required to provide the actuating member if it is declared to be detachable.*

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

5.1.8 *If the switches are provided with tabs, for the tests according to Clauses 16 (in IEC 61058-1) and 17 (in IEC 61058-1-1:2016 or IEC 61058-1-2:2016), new female connectors shall be used. 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.*

5.1.9 *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.

5.1.10.1 During the endurance test of Clause 17 (Clause 17 in CAN/CSA-C22.2 No. 61058-1-1/UL 61058-1-1 and CAN/CSA-C22.2 No. 61058-1-2/UL 61058-1-2), all exposed dead metal parts shall be connected through a fuse to earth. Dead metal parts can include frame, enclosures, and actuators. The potential between live parts and dead metal parts shall be the full test potential. The purpose of the fuse is to detect hazardous earth arcs shorting from live parts to exposed dead metal.

5.1.10.2 The fuse amperage rating shall not be greater than 15 A, but shall be less than the available output amperage of the electrical supply source. The fuse voltage rating shall be equal to or greater than the maximum potential to earth.

5.1.10.3 Compliance is checked by inspection of the fuse. During the test, the fuse shall remain intact and not open.

Secr Note: 4 – digit numbering to be considered not following IEC rules

5.2 Electrical information

5.2.1 When more than one rating is combined or represented by testing as described below, the following applies to all testing.

Dielectric strength test (Clause 15 and TE3) – based on the highest voltage.

Heating/temperature rise (Clause 16 and TE2) – based on the highest current rating.

5.2.2 Representative endurance testing for the same classified load type (see 7.2) is allowed according to the following conditions:

a) Voltage – testing required for ratings at a higher voltage represents testing required for ratings at a lower voltage.

NOTE For example 5 A, 125 V AC and 5 A, 250 V AC is tested as 5 A, 250 V AC.

b) Current – testing at a higher current represent testing at a lower current.

NOTE For example 10 A, 250 V AC and 5 A, 250 V AC is tested as 10 A, 250 V AC.

5.2.3 Switches with 2 or more ratings are endurance tested for each rating on an additional 3 specimens unless permitted to use representative testing.

5.2.4 DC polarity rated switches without polarity markings are endurance tested with 3 specimens with one polarity and an additional 3 specimens with the opposite polarity.

5.2.5 DC and AC rated switches are endurance tested with DC voltage to represent AC if the DC voltage and current ratings for the classified load type (see 7.2) are equal to or greater than the AC ratings.

NOTE For example AC and DC rating 4 A 48 V AC as well as 4 A 48 V DC are endurance tested 4 A 48 V DC.

5.2.6 AC only rated switches for each type of load with 2 or more current ratings, rated nominal 100 – 600 V AC, at the same power, are tested at the highest voltage.

NOTE For example AC rating 10 A 125 V AC as well as 5 A 250 V AC as well as 4,5 A 277 V AC are tested at 4,5 A 277 V AC.

5.2.7 AC only rated switches for each type of load, with 2 or more current ratings, rated nominal 20 up to 100 V AC, at the same power, are endurance tested at the highest current.

NOTE For example AC rating 10 A 24 V AC / 5 A 48 V AC is endurance tested at 10 A 24 V AC.

5.2.8 *Switches with a rated frequency are endurance 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.*

NOTE For example a switch classified as 50 Hz to 60 Hz is tested at 50 Hz.

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

5.3 Test loads on multiway switches

Multiway switches are loaded according to Table 1. The load for the other switch positions is that resulting from the loads necessary to achieve the conditions specified above.

Table 1 – Test loads for multiway switches

Operating cycles	Switch position of	Load
First half	Highest load	I_R
	Next lower load	$0,8 \times I_R$
	Further next lower load	$0,533 \times I_R$
Second half	Highest load	I_R
	Next lower load	$0,5 \times I_R$
	Further next lower load	$0,333 \times I_R$

5.4 Test specimens

The minimum number of test specimens shall be according to IEC 61058-1-1 or IEC 61058-1-2. Unless otherwise stated testing may be carried out in any order.

6 Rating

6.1 The maximum rated voltage is 600V.

6.2 The maximum rated current is 63 A.

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

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

6.4 A switch having more than one circuit needs not have the same classification for each circuit. Annex D may be used for determining whether a particular switch rating is suitable for controlling the circuit in the actual application.

7 Classification

7.1 According to nature of supply

7.1.1 switches for AC only

7.1.2 switches for DC only;

7.1.3 switches for both AC and DC

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

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

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

7.2.3 circuit for a combination of resistive and capacitive loads;

7.2.4 circuit for ordinary tungsten filament lamp load;

7.2.5 circuit for a declared specific load;

7.2.6 circuit for a current not exceeding 20 mA.

7.2.7 circuit for specific lamp load;

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

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

7.2.10 general purpose load with a power factor of not less than 0,75;

7.3 According to ambient temperature

7.3.1 Switches with all parts intended to be used $0\text{ °C} \leq T \leq 55\text{ °C}$.

7.3.2 Switches not classified as 7.3.1 and 7.3.3.

7.3.3 Switches with accessible parts in one ambient temperature and non-accessible parts in a different ambient temperature according to

– accessible member and parts $0\text{ °C} \leq T \leq 55\text{ °C}$, and

– other parts of the switch not classified to the range of $0\text{ °C} \leq T \leq 55\text{ °C}$.

7.4 According to number of operating cycles

7.4.1 100 000 operating cycles;

7.4.2 50 000 operating cycles;

7.4.3 25 000 operating cycles;

7.4.4 10 000 operating cycles;

7.4.5 6 000 operating cycles;

7.4.6 3 000 operating cycles;

7.4.7 1 000 operating cycles;

7.4.8 300 operating cycles.

7.4.9 operating cycles – as declared for a specific application.

7.5 Degree of protection against solid foreign objects

NOTE Determined according to IEC 60529 with the switch mounted as declared.

7.5.1 if no declaration, the switch is non-protected against solid foreign objects (IP0X);

7.5.2 protected against solid foreign objects of 50 mm diameter and greater (IP1X);

7.5.3 protected against solid foreign objects of 12,5 mm diameter and greater (IP2X);

7.5.4 protected against solid foreign objects of 2,5 mm diameter and greater (IP3X);

7.5.5 protected against solid foreign objects of 1,0 mm diameter and greater (IP4X);

7.5.6 dust-protected (IP5X);

7.5.7 dust-tight (IP6X).

7.6 Degree of protection against ingress of water

NOTE Determined according to IEC 60529 with the switch mounted as declared.

7.6.1 if no declaration, the switch is non-protected against ingress of water (IPX0);

7.6.2 protected against vertically falling water drops (IPX1);

7.6.3 protected against vertically falling water drops when enclosure tilted up to 15° (IPX2);

7.6.4 protected against spraying water (IPX3);

7.6.5 protected against splashing water (IPX4);

7.6.6 protected against water jets (IPX5);

7.6.7 protected against powerful water jets (IPX6);

7.6.8 protected against the effects of temporary immersion in water up to 1 m (IPX7).

7.6.9 protected against the effects of immersion in water greater than 1 m (IPX8).

7.6.10 protected against the effects of high pressure water (IPX9).

7.7 According to degree of protection against electric shock for an incorporated switch for use in

7.7.1 a class 0 appliance;

7.7.2 a class I appliance;

7.7.3 a class II appliance;

7.7.4 a class III appliance.

NOTE Explanations of classes are given in 3.7.8, 3.7.9, 3.7.10 and 3.7.11.

7.8 According to degree of pollution inside the switch

7.8.1 Micro-environment pollution degree 1

991 **7.8.2** Micro-environment pollution degree 2

992 **7.8.3** Micro-environment pollution degree 3

993 **7.9 According to degree of pollution outside the switch**

994 **7.9.1** Macro-environment pollution degree 1

995 **7.9.2** Macro-environment pollution degree 2

996 **7.9.3** Macro-environment pollution degree 3

997 NOTE Details for the micro and macro pollution degrees are specified in 3.8 and Annex F.

998 **7.10 According to marking**

999 **7.10.1** Switch with limited marking UT (unique type reference, UT);

1000 **7.10.2** Switch with full marking CT (common type reference, CT).

1001 NOTE Explanations of type references are given in 3.1.8 and 3.1.9.

1002 **7.11 According to resistance to ignitability by the glow wire temperature**

1003 **7.11.1** 650 °C;

1004 **7.11.2** 750 °C;

1005 **7.11.3** 850 °C;

1006 **7.11.4** 960 °C.

1007 The resistance to abnormal heat for the switch represents the lowest glow wire temperature of
1008 the materials of parts which are in contact with, maintain or retain in position electrical
1009 connections including those parts which maintain an electrical connection under spring force.

1010 **7.12 According to the rated impulse withstand voltage**

1011 **7.12.1** 330 V;

1012 **7.12.2** 500 V;

1013 **7.12.3** 800 V;

1014 **7.12.4** 1 500 V;

1015 **7.12.5** 2 500 V;

1016 **7.12.6** 4 000 V.

1017 NOTE The relation between rated impulse withstand voltage, rated voltage and overvoltage category is given in
1018 Annex E.

1019 **7.13 According to the rated overvoltage category**

1020 **7.13.1** Category I

1021 **7.13.2** Category II

1022 **7.13.3** Category III

1023 NOTE The relation between rated impulse withstand voltage, rated voltage and overvoltage category is given in
1024 Annex E.

1025 **7.14 According to type of disconnection**

1026 **7.14.1** electronic disconnection;

1027 **7.14.2** micro disconnection;

1028 **7.14.3** full disconnection.

1029 **7.14.4** switches with a combination of disconnections shall be declared specifically depending
1030 on their construction.

1031 NOTE Explanations of disconnections are given in 3.4.6, 3.4.7 and 3.4.8.

1032 **7.15 According to the type of coating for rigid printed board assemblies**

1033 **7.15.1** type 1 coating;

1034 **7.15.2** type 2 coating.

1035 NOTE Explanations for type 1 and type 2 coating are given in Annex I.

1036 **7.16 According to type and/or connection of switches**

1037 **7.16.1** number of poles

1038 **7.16.2** number of ways

1039 **7.16.3** polarity reversal

1040 **7.16.4** all-pole disconnection

1041 **7.16.5** number of non-switchable through connections

1042 **7.16.6** according to code of switch type given in Table 2

1043 NOTE Details for types of switches and connections are specified in Table 2.

1044 **7.17 According to configuration of switching device**

1045 **7.17.1** electronic switch with SD without mechanical switching device;

1046 **7.17.2** electronic switch with SD with series mechanical switching device;

1047 **7.17.3** electronic switch with SD with parallel mechanical switching device;

1048 **7.17.4** electronic switch with SD with series and parallel mechanical switching device;

1049 **7.17.5** electronic switch with only mechanical switching device without SD. SD to be provided
1050 in the end application;

1051 **7.17.6** mechanical switch with or without electronics, which does not impact the safety of the
1052 switch;

1053 **7.17.7** mechanical switch with electronics, which impacts the safety of the switch.

1054 **7.18 According to duty type**

1055 **7.18.1** continuous duty – Duty type S1 (see Figure 12);

1056 **7.18.2** short-time duty – Duty type S2 with defined ON and OFF times (see Figure 13);

1057 **7.18.3** intermittent periodic duty – Duty type S3 with defined ON and OFF times
1058 (see Figure 14).

1059 **7.18.4** as declared for a specific application.

1060 NOTE The concept duty-type is taken from IEC 60034-1.

1061 **7.19 According to linkage between contact and actuator speed**

1062 **7.19.1** Speed of contact closure or opening is dependent on the actuator speed.

1063 **7.19.2** Speed of contact closure and opening is independent of the actuator speed.

1064 **7.20 According to the type of terminals**

1065 **7.20.1** Terminals intended for the connection of unprepared conductors,

1066 **7.20.2** Terminals intended for the connection of prepared conductors;

1067 NOTE Twisting of a stranded conductor to consolidate the end is not considered as special preparation.

1068 **7.20.3** Terminals intended for the connection of flexible stranded conductors;

1069 **7.20.4** Terminals intended for the connection of rigid stranded conductors;

1070 **7.20.5** Terminals intended for the connection of solid conductors,

1071 **7.20.6** Terminals intended for conductor size range according to Table 4;

1072 **7.20.7** Terminals intended for a declared limited conductor size range;

1073 **7.20.8** Terminals intended for the connection of only one conductor;

1074 **7.20.9** Terminals intended for the interconnection of two or more conductors;

1075 **7.20.10** Terminals intended for assembling one time.

1076 **7.20.11** Terminals intended for assembling and disassembling more than one time.

1077 NOTE A push-in terminal intended for only one insertion (no disconnection means) is considered to be intended for
1078 assembling one time. A push-in terminal with a disconnect means or screw terminal is considered to be intended for
1079 assembling and disassembling more than one time.

1080 **7.20.12** Screw terminals and connections;

1081 **7.20.13** Push-in terminals and connections;

1082 **7.20.14** Flat quick-connect termination;

1083 NOTE Standard termination dimensions are found in IEC 61210.

1084 **7.20.15** Solder terminals

1085 **7.20.16** Welding or ridged terminals

1086 **7.20.17** Wires for connections;

1087 **7.20.18** Terminals for piercing conductors

1088 **7.20.19** Terminals as declared by the manufacturer.

1089 NOTE Terminals may have multiple characteristics.

1090 **7.21 According to the type of built in protection**

1091 **7.21.1** Built in protection provided

1092 **7.21.2** None provided

1093 NOTE Explanations of testing for Built in Protection are given in Clause 23.

1094 **7.22 According to the type of forced cooling**

1095 **7.22.1** Not requiring forced cooling.

1096 **7.22.2** Forced cooling required, with description of forced cooling.

1097 NOTE Explanations of testing for forced cooling are given in Clause 23.

1098 **7.23 According to the capacitor provided with the switch**

1099 **7.23.1** Capacitor class X1,

1100 **7.23.2** Capacitor class X2,

1101 **7.23.3** Capacitor class X3,

1102 **7.23.4** Capacitor class Y2,

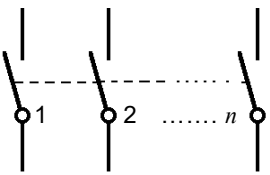
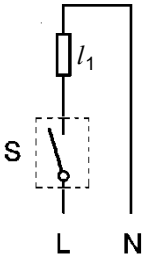
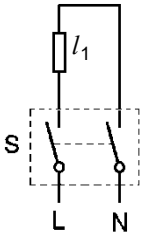
1103 **7.23.5** Capacitor class Y4.

1104 NOTE 1 Capacitor class definitions are given in IEC 60384-14.

1105 NOTE 2 Explanations of capacitor requirements are given in 24.3.

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Table 2 – Type and connection of switches (1 of 8)

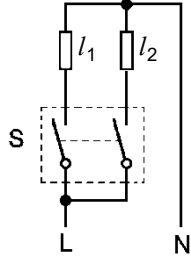
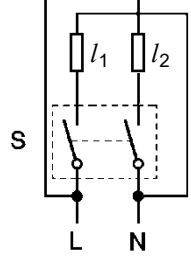
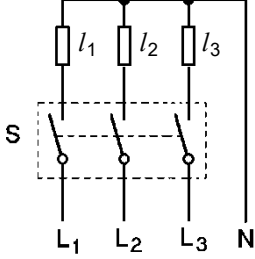
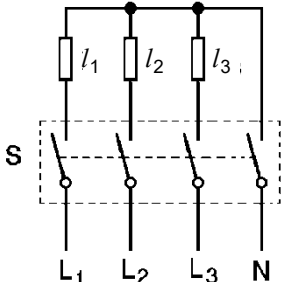
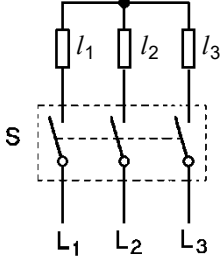
Code ¹⁾	Type of switch	Type of connection	Test circuit ²⁾
	One-way switch		
	Principle of one-way switches with one to n poles		
1.1	The number of poles, type of connection and load as declared		
1.2	Single pole	Single load (single-pole disconnection)	 S = Specimen
1.3	Double pole	Single load (all-pole disconnection)	 S = Specimen

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Table 2 (2 of 8)

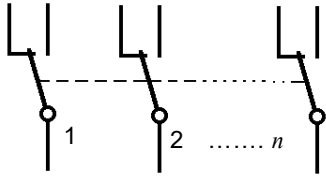
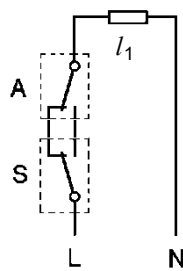
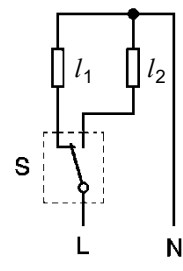
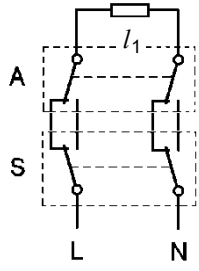
Code ¹⁾	Type of switch	Type of connection	Test circuit ²⁾
1.4 [1.2]	Double pole	Double load (single-pole disconnection)	 S = Specimen
1.5 [1.2] [1.4]	Double pole	Double load (single-pole disconnection, load connected to opposite polarity)	 S = Specimen
1.6	Three pole	Three loads unswitched neutral. (three-pole disconnection)	 S = Specimen
1.7	Four pole	Three loads switched neutral. (four-pole disconnection)	 S = Specimen
1.8	Three pole	Three loads (three-pole disconnection)	 S = Specimen

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Table 2 (3 of 8)

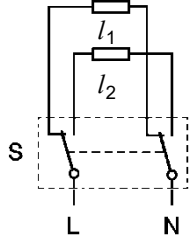
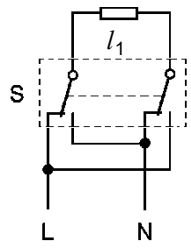
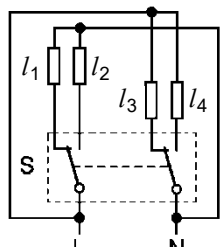
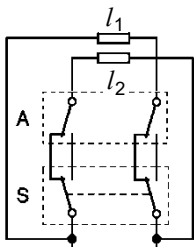
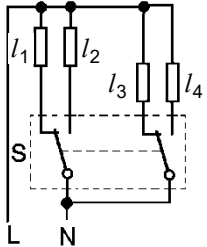
Code ¹⁾	Type of switch	Type of connection	Test circuit ²⁾
One-way switch			
	Principle of one-way switches with one to n poles		
2.1	The number of poles, type of connection and load as declared		
2.2 [1.2]	Single pole	Single load (single-pole disconnection)	 S = Specimen A = Auxiliary switch
2.3	Single pole	Double load (single-pole disconnection)	 S = Specimen
2.4 [1.3]	Double pole	Single load (all-pole disconnection)	 S = Specimen A = Auxiliary switch

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Table 2 (4 of 8)

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

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Table 2 (5 of 8)

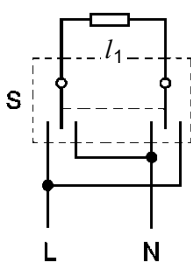
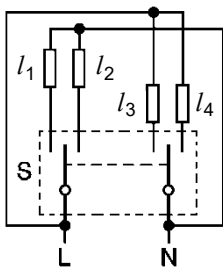
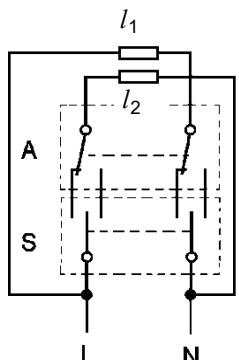
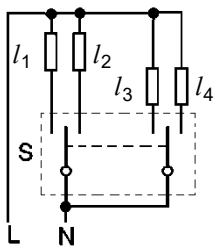
Code ¹⁾	Type of switch	Type of connection	Test circuit ²⁾
Two-way switch with centre position for disconnection			
	Principle of two-way switches with center position and one to n poles		
3.1	The number of poles, type of connection and load as declared		
3.2	Single pole	Single load (single-pole disconnection)	S = Specimen A = Auxiliary switch
3.3	Single pole	Double load (single-pole disconnection)	S = Specimen
3.4	Double pole	Single load (all-pole disconnection)	S = Specimen A = Auxiliary switch
3.5	Double pole	Double load (all-pole disconnection)	S = Specimen

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Table 2 (6 of 8)

Code ¹⁾	Type of switch	Type of connection	Test circuit ²⁾
3.6	Double pole	Single load with polarity reversal (all-pole disconnection)	 S = Specimen
3.7 [3.3]	Double pole	Four load (single-pole disconnection, load connected to opposite polarity)	 S = Specimen
3.8	Double pole	Double load (single-pole disconnection, load connected to opposite polarity)	 S = Specimen A = Auxiliary switch
3.9 [3.3]	Double pole	Four load (single-pole disconnection)	 S = Specimen

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