

Switches for appliances —

Part 1: General requirements

The European Standard EN 61058-1:1992 has the status of a
British Standard

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National Foreword

This British Standard has been prepared under the direction of the Light Electrical Engineering Standards Policy Committee and is the English language version of EN 61058-1:1992 *Switches for appliances — Part 1: General requirements*, including amendment A1, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC Publication 1058-1 (1990) first edition as amended by amendment No. 1:1993, which has the same title as the European Standard.

The foreword of the EN makes reference to the “date of withdrawal (dow) of conflicting national standards” as “1995-07-01”. In this case the conflicting national standard is BS EN 61058-1:1992 but the “dow” relates only to those parts of the British Standard subject to amendment No. 1. Certificates and marks will not be awarded after this date with respect to the British Standard not incorporating amendment No. 1. They will be awarded with respect only to the amended British Standard. However, such certificates and marks already awarded with respect to the British Standard not incorporating amendment No. 1 may continue to apply for production until 2000-07-01.

Product approval. Attention is drawn to the fact that products conforming to this British Standard may be approved by the British Electrotechnical Approvals Board for the purposes of participation in the CENELEC Certification Agreement and in the CB Scheme of the IECEE. (Details of the BEAB Approval Scheme are given on the inside back cover).

In this standard, the following type sizes are used:

requirements proper: roman type;

test specifications: *italic type*;

notes: smaller roman type.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 68, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Household equipment, switch, definition, classification, requirement, construction, test

English version

Switches for appliances Part 1: General requirements

(include amendment A1:1993)

(IEC 1058-1:1990)

Interrupteurs pour appareils
Partie 1: Règles générales
(inclut l'amendement A1:1993)
(CEI 1058-1:1990)

Geräteschalter
Teil 1: Allgemeine Festlegungen
(enthält Änderungen A1:1993)
(IEC 1058-1:1990)

This European Standard was approved by CENELEC on 1991-06-25. 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.

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CENELEC

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

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Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 1058-1:1990 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 61058-1 on 25 June 1991.

The following dates were fixed:

- latest date of publication (dop) 1992-07-01 of an identical national standard
- latest date of withdrawal (dow) 1995-07-01 of conflicting national standards

For products which have complied with the relevant national standard before 1995-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-07-01.

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given only for information. In this standard, Annex A, Annex B, Annex C, Annex D, Annex E and Annex ZA are normative and Annex F, Annex G Annex H and Annex J are informative.

Foreword of Amendment No. 1

The text of document 23J(C0)15, as prepared by subcommittee 23J: Switches for appliances, of IEC technical committee No. 23, Electrical accessories, was submitted to the IEC-CENELEC parallel vote in October 1991.

The reference document was approved by CENELEC as amendment A1 to EN 61058-1 on 16 June 1992.

The following dates were fixed:

- latest date of publication (dop) 1994-04-01 of an identical national standard
- latest date of withdrawal (dow) 1995-07-01 of conflicting national standards

For products which have complied with EN 61058-1:1992 before 1995-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1995-07-01.

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1 Scope

1.1 This International Standard IEC 1058 applies to switches for appliances actuated by hand, by foot or by other human activity for use in, on or with appliances and other equipment for household and similar purposes, with a rated voltage not exceeding 440 V and a rated current not exceeding 63 A. It also covers the indirect actuation of the switch when the function of the actuating member is provided by a part of an appliance or equipment such as a door.

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

NOTE 1 For switches used in tropical climates, additional requirements may be necessary.

NOTE 2 Attention is drawn to the fact that the standards for appliances and equipment may contain additional or alternative requirements for switches.

NOTE 3 Throughout this standard the word "appliance" means appliance or equipment.

1.3 This part also applies to switches for appliances such as:

- switches intended to be connected to a cord (cord switches);
- switches integrated in an appliance (integrated switches);
- switches incorporating electronic components (electronic switches);
- switches intended to be mounted apart from the appliance (independently mounted switches) other than those within the scope of IEC 669;
- voltage selector switches.

for which, however, particular requirements are given in Part 2.

NOTE Part 1 is applicable when testing incorporated switches. When other types of switches for appliances are tested, this Part 1 is applicable together with the relevant Part 2.

Part 1 may, however, be applied for other types of switches which are not mentioned in Part 2, provided that the electrical safety is not disregarded.

1.4 IEC 1058 is not applicable to switches integrated with an automatic control. Such switches are within the scope of IEC 730-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of IEC 1058. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of IEC 1058 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

2.1 IEC Standards

50 (441):1984, *International Electrotechnical Vocabulary — Chapter 441: Switchgear, controlgear and fuses*.

50 (826):1982, *International Electrotechnical Vocabulary — Chapter 826: Electrical installations of buildings*.

65:1985, *Safety requirements for mains operated electronic and related apparatus for household and similar general use*.

68-2-20:1979, *Environmental testing — Part 2: Tests — Test T: Soldering*.

112:1979, *Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions*¹⁾.

228A:1982, *Conductors of insulated cables. First supplement: Guide to the dimensional limits of circular conductors*.

335-1, *Safety of household and similar electrical appliances — Part 1: General requirements*.

417:1973, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets*.

529:1976, *Classification of degrees of protection provided by enclosures*¹⁾²⁾.

617-2:1983, *Graphical symbols for diagrams — Part 2: Symbol elements, qualifying symbols and other symbols having general application*.

664:1980, *Insulation co-ordination within low-voltage systems including clearances and creepage distances for equipment*.

664A:1981, *First supplement*¹⁾.

669-1:1981, *Switches for household and similar fixed electrical installations — Part 1: General requirements*.

685-2-3:1983, *Connecting devices (junction and/or tapping) for household and similar fixed electrical installations — Part 2: Particular requirements — Insulation piercing connecting devices for insulated copper conductors*.

¹⁾ Basic safety publication.

²⁾ For practical reasons, the 1976 edition of IEC 529:1976, has been included below.

695-2-1:1980, *Fire hazard testing — Part 2-1: Test methods — Glow-wire test and guidance*³⁾.

707:1981, *Methods of test for the determination of the flammability of solid electrical insulating materials when exposed to an igniting source*.

730-1:1986, *Automatic electrical controls for household and similar use — Part 1: General requirements*.

760:1983, *Flat, quick-connect terminations*.

817:1984, *Spring-operated impact-test apparatus and its calibration*.

2.2 ISO standards

1456:1988, *Metallic coatings — Electrodeposited coatings of nickel plus chromium and of copper plus nickel*.

2081:1986, *Metallic coatings — Electroplated coatings of zinc on iron or steel*.

2093:1986, *Metallic coatings — Electroplated coatings of tin — Specification and test methods*.

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 to open one or more electric circuits by means of separable contacts [IEV 441-14-02]

3.1.2 switch (mechanical)

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 [IEV 441-14-10]

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

3.1.3 operation

transfer of moving contact(s) from one position to an adjacent position [IEV 441-16-01]

3.1.4 conductive part

part which is capable of conducting current although it may not necessarily be used for carrying service current [IEV 441-11-09]

3.1.5 live part

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]

3.1.6 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.

3.1.7 clearance

shortest distance through air between two conductive parts, or between a conductive part and metal foil placed in contact with any accessible surface of insulating material

3.1.8 creepage distance

shortest distance along the surface of the insulating material between two conductive parts, or between a conductive part and metal foil placed in contact with any accessible surface of insulating material

3.1.9 detachable part

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

3.1.10 tool

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

3.1.11 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.

3.1.12 normal use

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

³⁾ Basic safety publication.

3.1.13**ambient air temperature**

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

3.1.14**proof tracking index (PTI)**

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

3.1.15**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

3.1.16**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

3.1.17**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

3.1.18**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.

3.1.19**unprepared conductor**

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

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

3.1.20**prepared conductor**

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

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 or wattage**

voltage, current, frequency or wattage assigned to a switch by the manufacturer. For three-phase supply the rated voltage is the line voltage

3.2.2**SELV**

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

3.2.3**over-current**

any 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]

3.3 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**switch of micro-gap construction**

switch with a contact separation according to micro-disconnection

3.3.4**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.

3.3.5 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

3.3.6 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

3.3.7 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.

3.3.8 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

3.3.9 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

3.3.10 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 full-disconnection

contact separation in a pole so as to ensure the equivalent of basic insulation between the supply mains and those parts intended to be disconnected

3.4.6 micro-disconnection

adequate contact separation in a pole so as to ensure functional correct performance

NOTE 1 There is a requirement for the dielectric strength of the contact gap.

NOTE 2 Micro-disconnection ensures that the function controlled by disconnection is correct.

3.4.7 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 (grounded) conductor substantially at the same time by a single switching action

3.4.8 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]

3.5 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 antispread 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 Figure 7

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 are 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 operational insulation

insulation between live parts which have a potential difference between them and which are necessary for the correct operation of the switch during its life

3.7.6 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

3.7.7 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

3.7.8 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.

3.7.9 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 may produce a permanent reduction of dielectric strength or surface resistivity

3.8.2 micro-environment

ambient conditions which immediately surround the clearance and creepage distance under consideration excluding self-produced pollution including ionized gases of a temporary nature resulting from normal operation of the switch

NOTE The micro-environment of the creepage distance or clearance and not the environment of the equipment determines the effect on the insulation. It may be better or worse than the environment of the equipment.

3.8.3 Degrees of pollution in the micro-environment:

NOTE These definitions are under consideration in SC 28A and for the time being are taken from IEC 664.

3.8.3.1 clean situation

no pollution or only dry, non-conductive pollution occurs. The pollution has no influence

3.8.3.2 normal situation

normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected

3.8.3.3 situation

conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected

4 General requirement

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 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 $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$. 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 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

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 (informative).

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 in this part 1, the tests are carried out in the order of the clauses of this part.

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.

the tests being carried out on d.c., provided that the d.c. voltage and current ratings are equal to, or greater than, the a.c. ratings.

For these ratings the following specimens are used:

- clauses 6 to 12: specimen No. 1;
- clauses 19 to 22: specimen No. 2;
- 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.

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: specimen No. 1;
- clauses 19 to 22: specimen No. 2;
- 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.

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: specimen No. 1;
- clauses 19 to 22: specimen No. 2;
- 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.

Table 1 — Test specimens

Clause		Specimen to be tested	Notes
6	Rating	1	
7	Classification	1	
8	Marking	1	
9	Protection against electric shock	1	
10	Provision for earthing	1	
11	Terminals and terminations	1	1)
12	Construction	1	
13	Mechanism	3 4 5 6 7 8	2)
14	Protection against ingress of solid objects, dust, water and protection against humid conditions	3 4 5 6 7 8	2)
15	Insulation resistance and dielectric strength	3 4 5 6 7 8	1)2)
16	Heating	3 4 5 6 7 8	
17	Endurance	3 4 5 6 7 8	2)
18	Mechanical strength	3 4 5	
19	Screws, current-carrying parts and connections	2	
20	Clearances, creepage distances and distances through insulation	2	
21	Resistance to heat, fire and tracking	2	
22	Resistance to rusting	2	

1) Three additional new specimens may be required according to 11.1.1.3.4 and/or Table 11, note 3.

2) The further specimens 9 to 11 etc. are tested in the same combination of clauses as specimens 6 to 8.

3) For the purpose of selection of female test connectors according to Annex H, additional specimens may be necessary.

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 manufacturer 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, except for the high speed test of 17.2.6.*

5.10 *Whenever possible, signal indicators are tested together with the switches.*

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.*

6 Rating

6.1 The maximum rated voltage is 440 V.

NOTE Preferred values are 50 V, 130 V, 250 V, 400 V, 440 V. Rated voltages differing from the preferred values are allowed.

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

6.3 The maximum rated current is 63 A.

Compliance with the requirements of 6.1 to 6.3 is checked by inspection of marking and documentation.

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 (informative), 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 not less than 0,95;

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 a 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.

7.1.3 According to ambient air temperature:

7.1.3.1 — switches at 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 55 °C;

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

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

— Preferred values of maximum ambient air 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.

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.

NOTE When IEC standards refer to switches for frequent and infrequent operation, “switches for frequent operation” are switches with 50 000 operating cycles and “switches for infrequent operation” are switches with 10 000 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 ingress of solid objects and dust (according to IEC 529:1976):

7.1.5.1.1 — non-protected (IP0X);

7.1.5.1.2 — protected against ingress of solid objects greater than 50 mm (IP1X);

7.1.5.1.3 — protected against ingress of solid objects greater than 12 mm (IP2X);

7.1.5.1.4 — protected against ingress of solid objects greater than 2.5 mm (IP3X);

7.1.5.1.5 — protected against ingress of solid objects greater than 1.0 mm (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 harmful ingress of water (according to IEC 529:1976):

7.1.5.2.1 — non-protected (IPX0);

7.1.5.2.2 — protected against dripping water (IPX1);

7.1.5.2.3 — protected against dripping water when 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 heavy seas (IPX6);

7.1.5.2.8 — protected against effects of immersion (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 situation for which the switch, without additional protection, is suitable:

7.1.6.1 — switch suitable for use in a clean situation;

7.1.6.2 — switch suitable for use in a normal situation;

7.1.6.3 — switch suitable for use in a dirty situation.

NOTE 1 A switch suitable for use in a particular situation may be used in a less polluted situation.

NOTE 2 A switch may be used in a more polluted situation than that for which it is designed if the appropriate additional protection is provided by the appliance.

NOTE 3 Within a switch designed for a particular pollution situation, additional enclosures or sealing may be provided to enable the enclosed parts to use creepage distances and clearances appropriate to the protection provided for the micro-environment. Thus within a switch classified for normal situation, some parts may be in a clean situation by virtue of a suitable cover.

NOTE 4 A “clean situation” corresponds to the “normal duty condition” as defined in IEC 335-1.

NOTE 5 A “normal situation” corresponds to the “severe duty condition” as defined in IEC 335-1.

NOTE 6 A “dirty situation” corresponds to the “extra-severe duty condition” as defined in IEC 335-1.

7.1.7 According to the method of actuating the switch:

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.

NOTE This classification is not restrictive. Push-button switches may have more than one push-button.

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 application category for resistance to heat and fire:

7.1.9.1 — Category A switch;

7.1.9.2 — Category C switch;

7.1.9.3 — Category D switch;

NOTE For guidance concerning the use of categories, see Annex B (normative).

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 prepared conductors and/or requiring the use of a special purpose tool;

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

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

7.2.5 — terminals suitable for the interconnection of two or more conductors;

7.2.6 — terminals intended for the connection of rigid, solid conductors;

7.2.7 — terminals intended for the connection of rigid, solid and stranded conductors;

7.2.8 — terminals intended for the connection of flexible conductors;

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

7.2.10 — solder terminals intended for soldering by hand with a soldering iron;

7.2.11 — solder terminals intended for soldering with a solder bath;

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

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

7.2.14 According to the resistance to soldering heat:

7.2.14.1 Solder terminals type 1;

7.2.14.2 Solder terminals type 2.

8 Marking and documentation

8.1 The switch manufacturer shall provide adequate information to ensure that the appliance manufacturer and/or end user can select, install and use a switch as intended by the switch manufacturer, and that 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 2.

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 2 — Switch information

No.		Subclause		
	Switch with Unique Type Reference		U.T.	
	Switch with Common Type Reference		C.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 529:1976)	7.1.5	Do	Do
2.2	Degree of protection against electric shock from outside of the switch and the 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	Do	Do
3	TEMPERATURE			
3.1	Ambient temperature limits if different from 0 °C to 55 °C	7.1.3	Ma	Do
4	ELECTRICAL LOAD			
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	Rated frequency or frequency range if different from 50 Hz or 60 Hz or 50 to 60 Hz			
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 current	7.1.2.2	Ma	Do
4.6	For circuits for resistive and capacitive load, the rated current and rated peak surge current	7.1.2.3	Ma	Do
4.7	For circuits for tungsten filament lamp load, the rated current	7.1.2.4	Ma	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 2 — Switch information

No.		Subclause		
	Switch with Unique Type Reference		U.T.	
	Switch with Common Type Reference		C.T.	
5	TERMINALS/CONDUCTORS			
5.1	All terminals shall be suitably identified, or their purpose self-evident, or the switch circuitry visually apparent		Ma	Ma
5.2	Terminals for the connection of earthing conductors shall be marked with the earth symbol		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
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
7	SIGNAL INDICATORS			
7.1	Maximum power of tungsten filament signal lamps. The marking shall be visible when replacing the lamp	6.1	Ma	Ma
7.2	Intended function or operation of the illuminated indicator		Do	Do
8	CIRCUIT DISCONNECTION			
8.1	Micro-disconnection		Ma	Do
9	INSULATING MATERIALS			
9.1	Proof tracking index, PTI		Do	Do
10	SWITCH CATEGORY			
10.1	If applicable, category of appliance according to IEC standards for appliances, i.e. IEC 335 (see Annex B)	7.1.10	Do	Do

8.2 The information on the degree of protection consists of the characteristic letters “IP” followed by two numerals (the “characteristic numerals”) indicating conformity with the appropriate requirements of IEC 529:1976. The first numeral indicates the degree of protection against contact with or approach to live parts and protection against ingress of solid foreign bodies. The second numeral indicates the degree of protection against harmful ingress of water. Additional letters listed in IEC 529:1976 are not used for switches.

NOTE 1 Additional requirements concerning ingress of solid foreign bodies, dust and water are given in clause 14.

NOTE 2 Additional requirements concerning the protection against electric shock are given in clause 9.

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) (see note 2)	~
Alternating current (three-phase) (see note 2)	3~
Alternating current (three-phase with neutral) (see note 2)	3 N ~

Direct current (see note 2)	
Earth symbol (see note 3)	
Protective earth symbol (see note 3)	
Non-protected against ingress of solid objects	IP0X
Protected against ingress of solid objects greater than 50 mm	IP1X
Protected against ingress of solid objects greater than 12 mm	IP2X
Protected against ingress of solid objects greater than 2,5 mm	IP3X
Protected against ingress of solid objects greater than 1,0 mm	IP4X
Dust-protected	IP5X
Dust-tight	IP6X
Non-protected against harmful ingress of water	IPX0
Protected against dripping water	IPX1
Protected against dripping water (enclosure tilted up to 15°)	IPX2
Protected against spraying water	IPX3
Protected against splashing water	IPX4
Protected against water jets	IPX5
Protected against heavy seas	IPX6
Protected against effects of immersion	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 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)	

NOTE 1 The symbols used shall be in accordance with IEC 417, 529:1976 and 617-2.

NOTE 2 Additional marking or information is allowed (e.g. "a.c." or "d.c.") if it does not give rise to misunderstanding. The symbol or additional marking or information may be placed in front of or after the marking of the current and voltage.

NOTE 3 Preferably the protective earth symbol in a circle should be used.

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.

8.4.1 For circuits for resistive load and for motor load, the rated current for motor load is placed between round brackets and immediately follows the rated current for resistive load. The symbol for the nature of the supply is placed after or before the current and voltage ratings.

Current, voltage and nature of supply may accordingly be indicated as follows:

$$16(3) \text{ A } 250 \text{ V } \sim$$

$$\text{or } 16(3) / 250 \sim$$

$$\text{or } \frac{16(3)}{250} \sim$$

8.4.2 For circuits for resistive load and for capacitive load, the marking of the peak surge current is separated from the marking of the rated current for resistive load by a stroke and follows immediately the rated current for resistive load. The symbol for the nature of the supply is placed after the current and voltage ratings.

Resistive current, peak surge current, voltage and nature of supply may be indicated accordingly as follows:

$$2/8 \text{ A } 250 \text{ V } \sim$$

$$\text{or } \frac{2/8}{250} \sim$$

8.4.3 For circuits for resistive load and for tungsten filament lamp load, the peak surge current for tungsten filament lamp load is placed between square brackets and follows immediately the rated current for resistive load. The symbol for the nature of supply is placed after the current and voltage ratings.

Resistive current, peak surge current, voltage and nature of supply may be indicated accordingly as follows:

$$6[3] \text{ A } 250 \text{ V } \sim$$

$$\text{or } 6[3] / 250 \sim$$

$$\text{or } \frac{6[3]}{250} \sim$$

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.

8.4.4 Information concerning declared specific loads may be given by reference to drawings or to types, for example:

“Electric motor, drawing number , parts list No. , made by ”, or “5 × 80 W fluorescent lamp load”.

8.5 Information about rated ambient temperature shall be provided by indicating the lower temperature value preceding the letter “T”, the higher temperature value following the letter “T”. If no lower temperature value is given, the lower temperature value is 0 °C:

25 T 85 (meaning – 25 °C up to + 85 °C)

T 85 (meaning 0 °C up to + 85 °C)

If no information is given, the rated ambient temperature range is 0 °C up to 55 °C.

8.5.1 For switches only partially suitable for a rated ambient temperature higher than 55 °C (according to **7.1.3.3**), the information shall be provided as follows:

T 85/55 (meaning up to 85 °C for the switch body and up to 55 °C for the actuating member)

8.6 The symbol for Class II construction shall not be used for switches.

8.7 Information about the rated operating cycles shall be provided in a scientific manner by using symbol “E”, indicating the exponent. For switches for 10 000 operating cycles according to **7.1.4.4**, this information is not necessary:

1E3 = 1 000 25E3 = 25 000 1E5 = 100 000

8.8 Required marking on a switch shall preferably be on the body of the switch. It may, however, be placed on non-detachable parts but not on screws, removable washers or other parts which might be removed when connecting conductors and during installation of the switch.

For switches of small dimensions, the marking may be on different surfaces.

8.9 The required marking shall be legible and durable.

Compliance with the requirements of 8.1 to 8.8 is checked by inspection and by rubbing the marking by hand as follows

15 back-and-forth movements in about 15 s with a piece of cloth soaked with distilled water followed by

15 back-and-forth movements in about 15 s with a piece of cloth soaked with petroleum spirit.

During the tests the soaked piece of cloth shall be pressed on the marking with a pressure of about 2 N/cm².

After these tests the marking shall still be easily legible.

NOTE The petroleum spirit used is defined as an aliphatic solvent hexane with a content of aromatics of maximum 0,1 volume %, a kauributanol-value of 29, initial boiling point approximately 65 °C, dry point approximately 69 °C and specific gravity of 0,68.

8.10 For switches with an own enclosure and not intended to be incorporated in an appliance, the “OFF”-position shall be clearly indicated. For switches where the marking of the switch position is impossible or leads to misunderstanding e.g. rocker switches or push-button switches with more than one biased push-button, the direction of actuation(s) shall be marked. For switches having more than one actuating member, this marking shall indicate, for each of the actuating members, the effect achieved by its operation.

NOTE This requirement does not apply to push-button switches with a single button.

9 Protection against electric shock

9.1 Switches shall be constructed so that there is adequate protection against contact with live parts in any position of use when the switch is mounted and operated as in normal use, and after any detachable parts have been removed, except lamps with caps.

For switches for Class II appliances, this requirement applies also to contact with metal parts separated from live parts by basic insulation only, or with basic insulation itself.

Compliance is checked by inspection and by the following test:

a) the test is applied to those parts of the switch which are accessible when it is mounted in any position in accordance with the manufacturer's documentation, with any detachable parts, except lamps with caps, removed;

b) the standard test finger of IEC 529:1976 is applied without force in every possible position. Apertures preventing the entry of the finger are further tested by means of a straight unjointed test finger of the same dimensions which is applied with a force of 20 N; if this finger enters, the test with the standard test finger is repeated, the finger being introduced through the aperture. If the unjointed test finger does not enter, the force applied is increased to 30 N. If the guard is then so displaced or the aperture so distorted that the standard test finger can be inserted without force, the test with the latter finger is repeated. An electrical contact indicator is used to show contact;

c) in addition, openings in insulating material and in unearthed metal parts are tested by applying the test pin according to Figure 13 without force in every possible position;

d) In case of doubt the tests are repeated under the conditions for the test of 16.2.2.

It shall not be possible with either the standard test finger or the test pin to touch bare live parts.

For switches which have any parts of double insulation construction it shall not be possible to touch with the standard test finger unearthed metal parts which are only separated from live parts by basic insulation, or by the basic insulation itself.

The insulating properties of lacquer, enamel, paper, cotton, oxide film on metal parts, beads and sealing compounds which soften in heat shall not be relied upon to give the required protection against contact with live parts.

Unless otherwise specified, parts connected to a SELV supply not exceeding 24 V are not considered to be live parts.

NOTE It is recommended to use a lamp for the indication of contact at a voltage not less than 40 V.

9.2 An actuating member shall be fixed adequately if the removal of the actuating member gives access to live parts. An actuating member is considered to be fixed adequately if access to live parts can be gained only by breaking or cutting or by the use of a tool other than a tool applied to a screw or threaded part.

Compliance is checked by inspection and by applying the standard test finger of IEC 529:1976 without force.

9.3 For switches for appliances other than those of Class III, accessible parts of actuating members shall be either of insulating material or of metal separated from parts with basic insulation by supplementary insulation or from live parts by double or reinforced insulation.

Compliance is checked by inspection, by measurement and by test as appropriate.

9.4 Capacitors shall not be connected to unearthed metal parts which are accessible when the switch is mounted in accordance with the manufacturer's declarations. Metal casing of capacitors shall be separated by supplementary insulation from accessible unearthed metal parts, when the switch is mounted in accordance with the manufacturer's declarations.

Compliance is checked by inspection and according to the requirements in clauses 15 and 20.

10 Provision for earthing

10.1 Switches for Class II appliances shall have no provision for earthing the switch or parts thereof. Interconnections for maintaining the earthing circuit are permitted.

Compliance is checked by inspection.

10.2 Earthing terminals, earthing terminations and other earthing means shall not be connected electrically to any neutral terminal.

Compliance is checked by inspection.

10.3 Accessible metal parts of switches for Class I appliances which may become live in the event of an insulation fault shall have provision for earthing.

Compliance is checked by inspection.

10.3.1 Parts separated from live parts by double insulation or reinforced insulation, and parts screened from live parts by metal parts connected to an earthing terminal, earthing termination, or other earthing means, are not regarded as likely to become live in the event of an insulation fault.

10.3.2 Accessible metal parts of switches may be connected to earth through their fixing means, provided that provision is made for clean metallic surfaces at the connection points.

10.4 The connection between an earthing terminal, earthing termination or other earthing means, and parts required to be connected thereto, shall be of low resistance.

Compliance is checked by the following test:

a) A current of 1,5 times the rated current but not less than 25 A, and, derived from an a.c. source, with a no-load voltage not exceeding 12 V, is passed between the earthing terminal, earthing termination, or other earthing means, and each of the parts in turn;

b) The voltage drop between the earthing terminal, earthing termination, or other earthing means, and each part connected thereto is measured when steady state conditions have been achieved and the resistance is calculated on the basis of the current and this voltage drop.

In no case shall the resistance exceed 50 mΩ.

NOTE Care has to be taken that the contact resistance between the tip of the measuring probe and the metal part under test does not influence the test results.