

Switches for household and similar fixed-electrical installations —

Part 1: General requirements

ICS 29.120.40

National foreword

This British Standard is the UK implementation of EN 60669-1:1999+A2:2008, incorporating corrigendum January 2007. It is derived from IEC 60669-1:1998, incorporating amendments 1:1999 and 2:2006. It supersedes BS EN 60669-1:2000+A1:2002, which is withdrawn.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags **[C]** **[C]**. Where a common modification has been introduced by CENELEC amendment, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC amendment A11 are indicated by **[C11]** **[C11]**.

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National Annex NA (informative) reproduces CENELEC interpretation sheet 1 (June 2009). National Annex NB (informative) reproduces IEC interpretation sheet (February 2012).

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

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English version

Switches for household and similar fixed-electrical installations — Part 1: General requirements

(IEC 60669-1:1998, modified)

Interrupteurs pour installations électriques
fixes domestiques et analogues —
Partie 1: Prescriptions générales
(CEI 60669-1:1998, modifiée)

Schalter für Haushalt und ähnliche ortsfeste
elektrische Installationen
Teil 1: Allgemeine Anforderungen
(IEC 60669-1:1998, modifiziert)

This European Standard was approved by CENELEC on 1999-01-01. 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.

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CENELEC

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

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

Foreword

The text of the International Standard IEC 60669-1:1998, prepared by SC 23B, Plugs, socket-outlets and switches, of IEC TC 23, together with the common modifications prepared by the Technical Committee CENELEC TC 23B, Switches for household and similar fixed-electrical installations, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60669-1 on 1999-01-01.

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Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, Annex A, Annex B, Annex ZA and Annex ZB are normative, Annex ZC is informative.

Annex ZA, Annex ZB and Annex ZC have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60669-1:1998 was approved by CENELEC as a European Standard with agreed common modifications.

Foreword to amendment A1

The text of amendment 1:1999 to the International Standard IEC 60669-1:1998, prepared by SC 23B, Plugs, socket-outlets and switches, of IEC TC 23, Electrical accessories, together with the common modifications prepared by the Technical Committee CENELEC TC 23B, Switches for household and similar fixed-electrical installations, was submitted to the CENELEC Unique Acceptance Procedure and was approved as amendment A1 to EN 60669-1:1999 on 2002-09-01.

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Annexes designated “normative” are part of the body of the standard.

In this standard, Annex A, Annex B, Annex ZA and Annex ZB are normative.

Annex ZA and Annex ZB have been added by CENELEC.

Endorsement notice

The text of amendment 1:1999 to the International Standard IEC 60669-1:1998 was approved by CENELEC as an amendment to the European Standard with agreed common modifications.

NOTE This amendment also includes a number of additional modifications to EN 60669-1:1999.

Foreword to amendment A2

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SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED-ELECTRICAL INSTALLATIONS –

Part 1: General requirements

1 Scope

This part of EN 60669 applies to manually operated general purpose switches, for a.c. only with a rated voltage not exceeding 440 V and a rated current not exceeding 63 A, intended for household and similar fixed electrical installations, either indoors or outdoors.

For switches provided with screwless terminals the rated current is limited to 16 A.

Switches covered by this standard are intended for the control in normal use of e.g.:

- a circuit for a tungsten filament lamp load, or
- a circuit for a fluorescent lamp load (including electronic ballast), or
- a circuit for a substantially resistive load with a power factor not less than 0,95, or
- a monophasic circuit for motor load with a rated current up to 10 A and a power factor not less than 0,6, or
- a circuit for extra low voltage (ELV) tungsten halogen lamp load with electronic convertor or magnetic transformer, or
- a combination of these.

NOTE 1 An extension of the scope to switches for rated voltages higher than 440 V is under consideration.

Unless otherwise specified in subsequent parts, this standard applies to switches intended to be used at 50 Hz.

NOTE 2 Switches according to Part 2-4 are intended for isolating purposes. All other switches according to EN 60669 series are intended for functional purposes only.

NOTE 3 An increase of the rated current of 10 A for motor load is under consideration.

NOTE 4 For the time being, switches with a rated current more than 10 A are considered as a 10 A current for motor load switch.

NOTE 5 Switches with a rated current up to and including 10 A are suitable for single-phase motor loads not exceeding the rated current of the switch and a power factor not less than 0,6.

The standard also applies to boxes for switches, with the exception of mounting boxes for flush type switches.

NOTE 6 General requirements for boxes for flush-type switches are given in EN 60670-1.

It also applies to switches such as:

- switches incorporating pilot lights;
- electromagnetic remote control switches (particular requirements are given in the relevant Part 2);

- switches incorporating a time-delay device (particular requirements are given in the relevant Part 2);
- combinations of switches and other functions (with the exception of switches combined with fuses);
- electronic switches (particular requirements are given in the relevant Part 2);
- switches having facilities for the outlet and retention of flexible cables (see Annex B);
- isolating switches (particular requirements are given in the relevant Part 2).

NOTE 7 The minimum length of the flexible cable used with these switches may be governed by National Wiring Rules.

Switches complying with this standard are suitable for use at ambient temperatures not normally exceeding 25 °C, but occasionally reaching 35 °C.

NOTE 8 Switches complying with this standard are suitable only for incorporation in equipment in such a way and in such a place that it is unlikely that the surrounding ambient temperature exceeds 35 °C.

In locations where special conditions prevail, such as in ships, vehicles and the like and in hazardous locations, for example where explosions are liable to occur, special constructions may be required.

Ⓒ2

2 Normative references

Ⓒ NOTE - Normative references to international publications are listed in Annex ZA (normative). Ⓒ

3 Definitions

For the purpose of this part of IEC 60669 the following definitions apply.

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

3.1

switch

device designed to make or break the current in one or more electric circuits

3.1.1

push-button switch

control switch having one actuator intended to be operated by force exerted by a part of human body, usually the finger or the palm of the hand, having stored energy return, for instance a spring

3.1.2

momentary contact switch

switching device which returns automatically to the initial state after operation

NOTE – Momentary contact switches are intended to operate bells, electromagnetic remote control switches or time-delay switches.

3.1.3

Ⓒ2 void Ⓒ2

3.1.4

cord-operated switch

switch the operating means of which is a cord which has to be pulled in order to change its contact state

3.1.5

void

3.1.6

void

3.1.7

void

3.1.8**switch without-gap construction**

switch having a semiconductor switching device which has no gap

3.2**one operation**

the transfer of the moving contacts from one operating position to another

3.3**terminal**

the conductive part of one pole, composed of one or more clamping unit(s) and insulation if necessary

3.4**clamping unit**

part or parts of a terminal necessary for the mechanical clamping and the electrical connection of the conductor(s)

3.5**terminal with screw clamping**

terminal intended for the connection, by clamping only, of (an) external rigid or flexible conductor(s)

3.6**pillar terminal**

terminal with screw clamping in which the conductor is inserted into the hole or cavity, where it is clamped under the end of the screw or screws. The clamping pressure may be applied directly by the end of the screw or through an intermediate clamping member to which pressure is applied by the end of the screw

NOTE – Examples of pillar terminals are shown in figure 1.

3.7**screw terminal**

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

NOTE – Examples of screw terminals are shown in figure 2.

3.8**stud terminal**

terminal with screw clamping in which the conductor is 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

NOTE – Examples of stud terminals are shown in figure 2.

3.9**saddle terminal**

terminal with screw clamping in which the conductor is clamped under a saddle by means of two or more screws or nuts

NOTE – Examples of saddle terminals are shown in figure 3.

3.10

lug terminal

screw terminal or stud terminal, designed for clamping a cable lug or bar by means of a screw or nut

NOTE – Examples of lug terminals are shown in figure 4.

3.11

mantle terminal

terminal with screw clamping in which the conductor is clamped against the base of a slot in a threaded stud by means of a nut. The conductor is clamped against the base 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

NOTE – Examples of mantle terminals are shown in figure 5.

3.12

screwless terminal

connecting device for the connection and subsequent disconnection of a rigid (solid or stranded) or flexible conductor or the interconnection of two conductors capable of being dismantled, the connection being made, directly or indirectly, by means of springs, parts of angled, eccentric or conical form, etc., without special preparation of the conductor concerned, other than removal of insulation

3.13

thread-forming screw

screw having an uninterrupted thread which, by screwing in, forms a thread by displacing material

NOTE – An example of a thread-forming screw is shown in figure 6.

3.14

thread-cutting screw

screw having an interrupted thread which, by screwing in, forms a thread by removing material

NOTE – An example of a thread-cutting screw is shown in figure 7.

3.15

mechanical time-delay device

device which, through a mechanical auxiliary, operates some time after the instant at which the conditions which cause it to operate are established

3.16

base

part of the switch retaining current-carrying parts and, in general, the mechanism in position

3.17

rated voltage

voltage assigned to the switch by the manufacturer

3.18

rated current

current assigned to the switch by the manufacturer

3.19

operating member

part of a cord-operated switch which connects the internal mechanism with a pull cord. It is usually attached to the actuating member of the switch

3.20

pole (of a switch)

part of a switch associated with one conductive path (way) of its circuit(s) provided with contacts intended to connect and disconnect the circuit itself and excluding those portions which provide a means for connecting and operating the poles together

A conducting path may be constituted by portions common to other conducting paths of the switch

3.21

type test

(IEV 151-04-15) test of one or more switches made to a certain design to show that the design meets certain specifications

NOTE Any separable part added to an actuating member, in order to facilitate its operation, is dealt with as a separable cover.

3.Z1

switch of normal gap construction

switch construction having a clearance between the contacts in the open position not less than 3 mm

3.Z2

switch of mini-gap construction

switch construction having a clearance between the contacts which is less than 3 mm but is at least 1,2 mm

3.Z3

switch of micro-gap construction

switch construction having a clearance between the contacts in the open position less than 1,2 mm

3.Z4

switch without gap construction

switch having a semiconductor switching device which has no contact gap

3.Z5

surface-type switch

switch, which when mounted, projects wholly above the surface on which it is mounted

3.Z6

flush-type switch

switch mainly intended to be mounted in a flush-type box

3.Z7

semi flush-type switch

switch mainly intended to be mounted in a semi flush-type box

3.Z8

panel-type switch

switch mainly intended for mounting to a panel having an aperture through which the intended accessible surface of the switch protrudes

3.Z9

architrave-type switch

switch having a cover plate of such proportions that it may be accommodated within an architrave

3.Z10

live part

[IEV 826-03-01] conductor or conductive part intended to be energised in normal use, including a neutral conductor but, by convention not a PEN conductor

NOTE A protective conductor (PE) is not a live part.

3.Z11

type test

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

3.Z12

routine test

test to which each individual switch is subjected during and/or after manufacture to ascertain whether it complies with certain criteria C2

3.22

routine test

(IEV 151-04-16) test to which each individual switch is subjected during and/or after manufacture to ascertain whether it complies with certain criteria

3.23

surface-type switch

switch, which when mounted, projects wholly above the surface on which it is mounted

3.24

flush-type switch

switch mainly intended to be mounted in a flush-type box

3.25

semi flush-type switch

switch mainly intended to be mounted in a semi flush-type box

3.26

panel-type switch

switch mainly intended for mounting to a panel having an aperture through which the intended accessible surface of the switch protrudes

3.27

architrave-type switch

switch having a cover plate of such proportions that it may be accommodated within an architrave

3.28

live part

IEV 826-03-01) conductor or conductive part intended to be energised in normal use, including a neutral conductor but, by convention not a PEN conductor

NOTE - A protective conductor (PE) is not a live part.

3.29

actuating member

(IEV 442-04-16) part which is pulled, pushed, or turned or otherwise moved to cause an operation C1

C1 NOTE - Any separable part added to an actuating member, in order to facilitate its operation, is dealt with as a separable cover. C1

A1 **3.30**

actuating member

a part which is pulled, pushed, turned or otherwise moved to cause an operation of the switch (IEV 442-04-14)

3.31

pilot light

device incorporating a light source either integral or designed to be installed with the switch and intended to give for example an indication of the switch state or to indicate the switch location A1

4 General requirements

Switches and boxes shall be so designed and constructed that, in normal use, their performance is reliable and without danger to the user or the surroundings.

Ⓒ Where tolerances are not specified in this standard the values are to be regarded as nominal. Ⓒ

Compliance is checked by meeting all the relevant requirements and tests specified.

5 General notes on tests

5.1 Tests according to this standard are type tests.

5.2 Unless otherwise specified, the specimens are tested as delivered and under normal conditions of use.

Ⓐ Switches having provision for pilot lights shall be tested with pilot lights fitted, unless otherwise stated. The results of the tests shall be considered to apply to switches of the same type which do not have this facility. Ⓐ

Flush-type switches which do not comply with any accepted standard sheet are tested together with the corresponding boxes.

5.3 Unless otherwise specified, the tests are carried out in the order of the clauses, at an ambient temperature between 15 °C and 35 °C.

In case of doubt, the tests are made at an ambient temperature of 20 °C ± 5 °C.

5.4 For switches which are marked with one rated voltage and one rated current, nine specimens are necessary.

Three specimens are subjected to all the relevant tests, except the tests of 19.2, where one further set of three specimens is used (or two further sets for switches of pattern number 2), and the test of clause 24, where another three specimens are used.

For the test of 24.2, three additional specimens may be required.

For the tests of 12.3.2, three additional specimens of switches are necessary.

For the tests of 12.3.11, additional specimens of switches having in total at least five screwless terminals are required.

For the tests of 12.3.12, three additional specimens of switches are necessary; in each specimen, one clamping unit is tested.

For each of the tests of 13.15.1 and 13.15.2, three additional specimens of separate membranes, or of switches incorporating membranes, are required.

Ⓒ For the tests of clauses 15, 16, 17.1, 18, 19, 20, 21, 22 and 23 three additional specimens may be required in the case of switches fitted with pilot lights which are not able to be disconnected and reconnected.

For these tests one pole of the pilot light is disconnected. The disconnection shall be done in a way which does not adversely affect the test results. Ⓒ

For cord-operated switches, three further specimens are used for the test of 20.9.

For switches marked with two rated voltages and corresponding rated currents, fifteen specimens are necessary.

For each of the two combinations of rated voltages and rated currents marked on the switch, three specimens are subjected to all the relevant tests except the test of 19.2, where two (or four for switches of pattern number 2) further sets of three specimens are used.

[C] Switches marked with a dual voltage are tested at the higher voltage.

Momentary contact switches are not to be submitted to the tests of 18.2 and 19.2. **[C]**

NOTE – A table showing the number of specimens needed for the tests is given in annex A.

5.5 *The specimens are submitted to all the relevant tests and the requirements are satisfied if all the tests are met.*

If one specimen does not satisfy a test due to an assembly or a manufacturing fault, that test and any preceding one which may have influenced the results of the test shall be repeated and also the tests which follow shall be made in the required sequence on another full set of specimens, all of which shall comply with the requirements.

NOTE – The applicant may submit, together with a number of specimens specified in 5.4, the additional set of specimens which may be wanted, should one specimen fail. The testing station will then, without further request, test additional specimens and will reject only if a further failure occurs. If the additional set of specimens is not submitted at the same time, the failure of one specimen will entail rejection.

6 Ratings

[C] **6.1** Switches shall preferably have rated voltages of 250 V and 400 V.

The values 230 V, 380 V and 440 V may be used.

For momentary contact switches the preferred rated voltages are 130 V and 250 V. **[C]**

If any other voltage rating is used, it shall be not less than 120 V.

6.2 Switches shall preferably have rated currents of 6 A, 10 A, 16 A, 20 A, 25 A, 32 A, 40 A **[C]** 45A **[C]** **[C]** 50A **[C]** and 63 A.

[C] The rated current shall be not less than 6 A, except that rated currents of 1 A, 2 A and 4 A are allowed for momentary contact switches, electromagnetic remote control switches and time-delay switches. **[C]**

Switches with a rated current not exceeding 16 A, except switches of pattern numbers 3 and 03 and momentary contact switches, shall have fluorescent lamp current rating equal to the rated current.

For switches with a rated current above 16 A and up to 25 A inclusive the test with fluorescent lamps can be carried out optionally.

Compliance with the requirements of 6.1 and 6.2 is checked by inspection of the marking.

[A] **6.3** Switches shall preferably have a degree of protection IP20, IP40, IP44, IP54 or IP55. **[A]**

7 Classification

7.1 Switches are classified:

7.1.1 according to the possible connections (see figure 8):

	Pattern number
– single-pole switches	1
– double-pole switches	2
– three-pole switches	3
– three-pole plus switched neutral switches	03
– two-way switches	6
– two-circuit switches with a common incoming line	5
– two-way switches with one off-position	4
– two-way double-pole switches	6/2
– two-way reversing switches (or intermediate switches)	7

NOTE 1 – Two or more switches having the same or different pattern numbers may be mounted on a common base.

NOTE 2 – For the pattern number for which an off-position is considered, the above classification refers also to push-button switches and momentary contact switches.

7.1.2 according to the contact opening:

- switches of normal gap construction;
- switches of mini-gap construction;
- switches of micro-gap construction;
- switches without contact gap (semiconductor switching devices).

NOTE 1 – Switches of mini-gap construction have a distance between contacts in the open position between 3 mm and 1,2 mm.

NOTE 2 – Switches of micro-gap construction have a distance between contacts in the open position less than 1,2 mm.

NOTE 3 – Switches having a semiconductor switching device have no contact gap.

NOTE 4 – Switches according to this standard are intended for functional purposes.

7.1.3  Void 

 7.1.4 according to the degree of protection against harmful effects due to the ingress of water:

- IPX0: switches not protected against ingress of water;
- IPX4: switches protected against splashing water;
- IPX5: switches protected against water jets. 

 NOTE – For IP codes see EN 60529. 

7.1.5 according to the method of actuating the switch:

- rotary;
- tumbler;
- rocker;
- push-button;
- cord-operated.

7.1.6 according to the method of mounting the switch:

- surface-type;
- flush-type;
- semi flush-type;
- panel-type;
- architrave-type.

7.1.7 according to the method of installation, as a consequence of the design of the switch:

- switches where the cover or cover plate can be removed without displacement of the conductors (design A);
- switches where the cover or cover plate cannot be removed without displacement of the conductors (design B);

NOTE 1 – If a switch has a base (main part) which cannot be separated from the cover or cover plate, and requires a supplementary plate to meet the standard, which can be removed for redecorating the wall without displacement of the conductors, it is considered to be of design A, provided the supplementary plate meets the requirements specified for covers and cover-plates.

Ⓒ NOTE 2 – See Annex ZB for special national conditions. Ⓒ

7.1.8 according to the type of terminal:

- switches with screw-type terminals;
- switches with screwless terminals for rigid conductors only;
 - switches with screwless terminals for rigid and flexible conductors.

Ⓐ **7.1.9** according to the degree of protection against access to hazardous parts and against harmful effects due to the ingress of solid foreign objects:

- IP2X: switches protected against access to hazardous parts with a finger and against harmful effects due to ingress of solid foreign objects of 12,5 mm diameter and greater;
- IP4X: switches protected against access to hazardous parts with a wire and against harmful effects due to ingress of solid foreign objects of 1,0 mm diameter and greater;
- IP5X: switches protected against access to hazardous parts with a wire and protected against dust. Ⓐ

7.2 Preferred combinations of number of poles and ratings are shown in table 1.

Table 1 – Preferred combinations of numbers of poles and ratings

Rated current A	Number of poles	
	Rated voltage from 120 V to 250 V inclusive	Rated voltage over 250 V
1, 2 and 4	1	–
6	1 2	1 2
10	1 2	1 2 3 4
16, 20, 25, 32, 40 Ⓒ 45 Ⓒ Ⓒ 50 Ⓒ and 63	1 2 3 4	1 2 3 4

8 Marking

8.1 Switches shall be marked with:

- rated current in amperes (A) or rated fluorescent load in amperes (AX), or a combination of both if the two ratings are different (see 6.2 and examples of marking in 8.2);
- rated voltages in volts;
- symbol for nature of supply;
- manufacturer's or responsible vendor's name, trade mark or identification mark;
- type reference, which may be a catalogue number;
- symbol for mini-gap construction, if applicable;
- symbol for micro-gap construction, if applicable;
- symbol for semiconductor switching device, if applicable;
- A_1 – first characteristic numeral for the degree of protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects, if declared higher than 2, in which case the second characteristic numeral shall also be marked;
- second characteristic numeral for the degree of protection against harmful effects due to the ingress of water, if declared higher than 0, in which case the first characteristic numeral shall also be marked. A_1

NOTE 1 – Marking of the pattern number given in 7.1.1 is recommended if the connections are not clear from an inspection of the switch; this pattern number may be part of the type reference.

NOTE 2 – If a base carries two or more switches with separate operating devices, marking with the pattern numbers is recommended, for example 1+6 or 1+1+1.

In addition, switches with screwless terminals shall be marked with an indication of the suitability to accept rigid conductors only, for those switches having this restriction. This information may be put on the switch and/or the packaging unit.

C NOTE 3 – See Annex ZB for special national conditions. C

8.2 When symbols are used, they shall be as follows:

Amperes (fluorescent lamp current)	AX
(other currents)	A
Volts	V
Alternating current	~
Neutral	N
Line	L
Earth	
"open" position (off)	O
"closed" position (on)	I
Mini-gap construction	m
Micro-gap construction	μ
A_1 Without contact gap (semiconductor switching device)	ε A_1

NOTE 1 – The symbol "O" shall only be used for switches of normal gap construction.

A_1 Degree of protection, when relevant

NOTE 2 – Details of construction of certain symbols are given in IEC 60417.

 NOTE deleted. 

 NOTE 3 – In the IP code the letter "X" is replaced by the relevant number. 

NOTE  4  – Lines formed by the construction of the tool are not considered as part of the marking.

For the marking with fluorescent lamp current the symbol "AX" may be replaced by the symbol "X". For the marking with rated current and rated voltage the figures may be used alone.

The marking for the nature of supply shall be placed next to the marking for rated current and rated voltage.

NOTE  5  – The marking for current, voltage and nature of supply may be, for example, as follows:

10 AX 250 V ~	or	10 X/250 ~	or	$\frac{10 X}{250} \sim$
20 A - 16 AX 250 V ~	or	20 -16 X/250 ~	or	$\frac{20 - 16 X}{250} \sim$
10 AX 400 V ~	or	10 X/400 ~	or	$\frac{10 X}{400} \sim$
25 AX 400 V ~	or	25 X/400 ~	or	$\frac{25 X}{400} \sim$
25 A 250 V ~	or	25/250 ~	or	$\frac{25}{250} \sim$
25 AX 440 V ~	or	25 X/440 ~	or	$\frac{25 X}{440} \sim$

8.3 The following marking shall be placed on the main part of the switch:

- rated current, rated voltage and nature of supply;
- either the name, trade mark or identification mark, of the manufacturer or of the responsible vendor;
- length of insulation to be removed before the insertion of the conductor into the screwless terminal, if any;
- if applicable, symbol for mini-gap construction, micro-gap construction or semiconductor switching device;
- the type reference.

NOTE 1 – The type reference may be the series reference only.

Parts such as cover-plates, which are necessary for safety purposes and are intended to be sold separately, shall be marked with the manufacturer's or responsible vendor's name, trade mark or identification mark and type reference.

 The IP code, when applicable, shall be marked so as to be easily discernible when the switch is mounted and wired as in normal use. 

Ⓒ The marking shall be clearly visible with normal or corrected vision, without additional magnification, marked either on the front of the switch or on the inner part of its associated enclosure, or on the main part of the switch so that it is easily legible during installation. These markings shall be placed on parts which cannot be removed without the use of a tool.

NOTE See Annex ZB for special national conditions.

Ⓒ

8.4 Terminals intended for the connection of phase conductors (supply conductors) shall be identified unless the method of connection is of no importance, is self-evident or is indicated on a wiring diagram. Such identification may take the form of a letter L or in the case of more than one of such terminals, the letters L1, L2, L3, etc. which may be accompanied by an arrow or arrows pointing to the relevant terminal or terminals.

These indications shall not be placed on screws or any other easily removable part.

Alternatively, the surface of such terminals shall be bare brass or copper, other terminals being covered with a metallic layer of another colour.

For switches of pattern numbers 2, 3, 03 and 6/2, terminals associated with any one pole shall have similar identification, if applicable, differing from that of the terminals associated with the other poles, unless the relationship is self-evident.

NOTE 1 – The wiring diagram may be an instruction sheet which accompanies the switch.

NOTE 2 – "Easily removable parts" are those parts which can be removed during the normal installation of the switch.

8.5 Terminals intended exclusively for the neutral conductor shall be indicated by the letter N.



Earthing shall be indicated by the symbol .

These markings shall not be placed on screws or any other easily removable part.

Terminals provided for the connection of conductors not forming part of the main function of the switch shall be clearly identified unless their purpose is self-evident, or indicated in a wiring diagram which shall be fixed to the accessory.

The identification of switch terminals may be achieved by:

- their marking with graphical symbols according to IEC 60417 or colours and/or alpha-numeric system;
- their physical dimension or relative location.

Leads of neons or indicators are not considered to be conductors for the purpose of this subclause.

Ⓒ **8.6** If switches of pattern numbers 2, 3, 03 and switches having a rated voltage exceeding 250 V and rated current exceeding 16 A are marked to indicate the switch position, they shall be so marked that the direction of the movement of the actuating member to its different positions or the actual switch position is clearly indicated. Ⓒ For switches having more than one actuating member, this marking shall indicate, for each of the actuating members, the effect achieved by its operation

The marking shall be clearly visible on the front of the switch when fitted with its cover or cover plate.

If this marking is placed on the cover, cover plate, or removable actuating members, it shall not be possible to fix them in a position such that the marking is incorrect.

The symbols for "on" and "off" shall not be used for the indication of the switch positions unless, at the same time, they clearly indicate the direction of the movement of the actuating members.

Ⓒ NOTE – Other suitable means for the indication of the switch position may be used, e.g. indicator lamps. Ⓒ

The short straight line indicating the "on" position, shall be radial for rotary switches, perpendicular to the axis of rotation of the dolly for tumbler switches and rocker switches and vertical for push-button switches when mounted vertically.

Ⓒ *Text deleted.* Ⓒ

Compliance with the requirements of 8.1 to 8.6 is checked by inspection.

8.7 A push-button shall be coloured red only if it serves to open the circuit to be controlled. In addition, it may serve to close auxiliary contacts for control circuits, pilot lamps, etc.

8.8 If it is necessary to take special precautions when installing the switch, details of these shall be given in an instruction sheet which accompanies the switch.

Instruction sheets shall be written in the official language(s) of the country in which the switch is to be sold.

Compliance with the requirements of 8.7 and 8.8 is checked by inspection.

Ⓒ₁ NOTE – Special precautions may, for example, be necessary for switches with a degree of protection lower than IP 20. Ⓒ₁

Ⓒ If special precautions are necessary in order to ensure that, after installation, the conditions necessary to meet the requirements of this standard are achieved, the instruction sheet shall include clear information with regard to the following: Ⓒ

- dimensions of the space to be provided for each switch;
- dimensions and position of the means for supporting and fixing the switch within this space;
- minimum clearance between the various parts of the switch and the surrounding parts where fitted;
- minimum dimensions of ventilating openings, if needed, and their correct arrangement.

Ⓐ₁ – details of lamps to be used in cases where switches have replaceable pilot lamps. Ⓐ₁

8.9 Marking shall be durable and easily legible.

Compliance is checked by inspection and by the following test.

The marking is rubbed by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

NOTE 1 – Marking made by impression, moulding, pressing or engraving is not subjected to this test.

NOTE 2 – It is recommended that the petroleum spirit used consist of a solvent hexane with an aromatic content of maximum 0,1 in volume percentage, a kauributanol value of approximately 29, an initial boiling point of approximately 65 °C, a dry point of approximately 69 °C and a density of approximately 0,68 g/cm³.

9 Checking of dimensions

Switches and boxes shall comply with the appropriate standard sheets, if any.

☐ The manufacturer of the switch shall specify in his catalogue the type of boxes (flush or surface, etc.) in which his switches are to be mounted. ☐

Compliance is checked by measurement.

10 Protection against electric shock

10.1 Switches shall be so designed that when they are mounted and wired as in normal use, live parts are not accessible even after removal of parts which can be removed without the use of a tool.

☐₁ Text deleted. ☐₁

Compliance is checked by inspection and, if necessary, by the following test:

The specimen is mounted as in normal use and fitted with conductors of the smallest cross-sectional area specified in clause 12; the test is repeated using conductors of the largest cross-sectional area specified in clause 12.

☐₁ The standard test finger shown in figure 1 of IEC 60529 is applied in every possible position, an electrical indicator with a voltage between 40 V and 50 V being used to show contact with the relevant part. ☐₁

Switches, having enclosures or covers in thermoplastic or elastomeric material, are subjected to the following additional test, which is carried out at an ambient temperature of 35 °C ± 2 °C, the switches being at this temperature.

During the additional test, the switches are subjected for 1 min to a force of 75 N, applied through the tip of a straight unjointed test finger of the same dimensions as the standard test finger.

This finger, with an electrical indicator as described above, is applied to all places where yielding of insulating material could impair the safety of the switch, but is not applied to membranes or the like and is applied to thin-walled knock-outs with a force of only 10 N.

During this test, switches with their associated mounting means shall not deform to such an extent that live parts can be touched with the unjointed test finger.

NOTE – Membranes or the like are tested according to 13.15.1 only.

10.2 Knobs, operating levers, push-buttons, rockers and the like shall be of insulating material, unless their accessible metal parts are separated from the metal parts of the mechanism by double insulation or reinforced insulation, or as an alternative, they are reliably connected to earth.

Compliance is checked by inspection and by the tests of clauses 16 and 23.

NOTE 1 – This requirement does not apply to removable keys or intermediate parts, such as chains or rods.

☐ NOTE 2 – See Annex ZB for special national conditions. ☐

10.3  Accessible parts of switches shall be made of insulating material with the exception of the following: 

- a)  small screws and the like which are isolated from live parts and which are used for fixing bases and covers, cover-plates and other parts of the enclosure;
- b) actuating members complying with 10.2;
- c) the covers, cover-plates and other parts of the enclosure of metal which comply with the requirements of 10.3.1 or 10.3.2.

NOTE – See Annex ZB for special national conditions.

10.3.1 Covers, cover-plates and other parts of the enclosure of metal shall be protected by additional insulation made by insulating linings or insulating barriers. The insulating linings or insulating barriers shall:

- either be fixed to covers, cover-plates and other parts of the enclosure or the body of the switches in such a way that they cannot be removed without being permanently damaged; 
- or are so designed that:
 - they cannot be replaced in an incorrect position;
 - if they are omitted, the accessories are rendered inoperable or manifestly incomplete;
 -  there is no risk of accidental contact between live parts and metal covers, cover-plates, and other parts of the enclosure, for example through their fixing screws, even if a conductor should come away from its terminal; 
 - precautions are taken in order to prevent creepage distances or clearances becoming less than the values specified in clause 23.

Compliance is checked by inspection.

The above linings or barrier shall comply with the tests of clauses 16 and 23.

 NOTE – Insulating coating sprayed on the inside or on the outside of the metal covers, cover-plates, and other parts of the enclosure is not deemed to be an insulating lining or barrier for the purpose of this subclause.

10.3.2 The earthing of metal covers, cover-plates, and other parts of the enclosure is made while fixing the covers, cover-plates, and other parts of the enclosure and may be made without requiring the use of means other than the fixing means; the resulting connection shall be of low resistance. 

NOTE 1 – Fixing screws or other means are allowed.

Compliance is checked by inspection and by the tests of 11.4.

 NOTE 2 – See Annex ZB for special national conditions. 

10.4 Metal parts of the mechanism, such as the spindle or the pivot of the dolly or rocker, that are not insulated from live parts, shall not protrude from the enclosure.

However, for switches operated by means of a removable key or similar device, such metal parts of the mechanism shall be insulated from live parts.

Compliance is checked by inspection, if necessary, after the actuating member has been removed or broken.

NOTE – If the actuating member has to be broken, compliance is checked by the test of clause 23.

10.5 Metal parts of the mechanism, such as the spindle or the pivot of the dolly or rocker, shall not be accessible when the switch is fixed as in normal use.

In addition, they shall be insulated from accessible metal parts, including metal frames supporting the base of flush-type switches, liable to be mounted in a metal box, and from screws for fixing the base to its support.

The additional requirement does not apply if the metal parts of the mechanism are separated from live parts in such a way that the creepage distances and clearances have at least twice the values specified in clause 23, or, as an alternative, if they are reliably connected to earth.

Ⓒ NOTE 1 – See Annex ZB for special national conditions. Ⓒ

Compliance is checked by inspection, if necessary, by measurement and by the tests of clauses 10 and 16.

NOTE 2 – When checking the inaccessibility of metal parts of the mechanism of unenclosed switches or architrave-type switches, the protection provided by the normal way of mounting the switch is taken into account.

NOTE 3 – For unenclosed stack-type switches having a metal spindle pivoting in a metal base plate, the additional requirement means that the creepage distances and clearances between live parts and the spindle, and between metal parts of the mechanism and base plate, should have at least twice the values specified in clause 23.

10.6 Switches operated by means of a removable key or by means of an intermediate part, such as a cord, a chain or a rod, shall be so designed that the key or intermediate part can only touch parts which are insulated from live parts.

The key or intermediate part shall be insulated from metal parts of the mechanism, unless the creepage distances and clearances between live parts and metal parts of the mechanism have at least twice the values specified in clause 23.

Compliance is checked by inspection, by the test of 16.2 and, if necessary, by measurement.

NOTE – Lacquer or enamel is not considered to be insulating material for the purposes of 10.1 to 10.6.

10.7 Where cord-operated switches are provided with a pull cord, which can be fitted or replaced by the user, they shall be so designed that it is impossible to touch live parts when fitting or replacing the pull cord in the normal way.

Compliance is checked by inspection.

11 Provision for earthing

11.1 Accessible metal parts, which can become live in the event of an insulation fault, shall be provided with, or permanently and reliably connected to, an earthing terminal.

Ⓒ This requirement does not apply to the metal cover-plates mentioned in 10.3.1.

For the purpose of this requirement, small screws and the like, isolated from live parts, for fixing bases, covers or cover-plates, are not considered as accessible parts which can become live in the event of an insulation fault. Ⓒ

11.2 Earthing terminals shall be terminals with screw clamping A_1 or screwless terminals A_1 and shall comply with the appropriate requirements of clause 12.

C They shall have a capacity not less than that of the corresponding terminals for the supply conductors.

NOTE - See Annex ZC for A-deviations. C

A_1 **11.3** Surface-type switches with an enclosure of insulating material, having an IP code higher than IPX0 and more than one cable inlet, shall be provided with either an internal fixed earthing terminal or adequate space for a floating terminal allowing the connection of an incoming and outgoing conductor for the continuity of the earthing circuit.

Clause 12 does not apply to floating terminals.

Compliance with 11.1 to 11.3 is checked by inspection and by the tests of clause 12. Compliance for adequate space for floating terminals is checked by performing a test connection using the type of terminal specified by the manufacturer. A_1

11.4 The connection between the earthing terminal and accessible metal parts to be connected thereto shall be of low resistance.

Compliance is checked by the following test:

A current derived from an a.c. source having a no-load voltage not exceeding 12 V and equal to 1,5 times rated current or 25 A, whichever is the greater, is passed between the earthing terminal and each of the accessible metal parts in turn.

The voltage drop between the earthing terminal and the accessible metal part is measured, and the resistance calculated from the current and this voltage drop.

In no case shall the resistance exceed 0,05 Ω .

NOTE – Care should 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.

12 Terminals

12.1 General

Switches shall be provided with terminals having screw clamping or with screwless terminals.

The means for clamping the conductors in the terminals shall not serve to fix any other component, although they may hold the terminals in place or prevent them from turning.

All the tests on terminals, with the exception of 12.3.11, shall be carried out after the test of 15.1.

Compliance is checked by inspection and by the tests of 12.2 or 12.3, as applicable.

12.2 Terminals with screw clamping for external copper conductors

12.2.1 Switches shall be provided with terminals which shall allow the proper connection of copper conductors having cross-sectional areas as shown in table 2.

Table 2 – Relationship between rated currents and connectable cross-sectional areas of copper conductors

Ranges of rated currents A	Rigid conductors (solid or stranded) ³⁾	
	Nominal cross-sectional areas mm ²	Diameter of largest conductor mm
up to and including 4 ¹⁾	–	–
above 4 up to and including 6	From 0,75 up to 1,5 inclusive	1,45
above 6 up to and including 10 ²⁾	From 1 up to 2,5 inclusive	2,13
above 10 up to and including 16 ²⁾	From 1,5 up to 4 inclusive	2,72
above 16 up to and including 25	From 2,5 up to 6 inclusive	3,34
above 25 up to and including 32	From 4 up to 10 inclusive	4,34
above 32 up to and including $\boxed{C_1}$ 50 $\boxed{C_1}$	From 6 up to 16 inclusive	5,46
above $\boxed{C_1}$ 50 $\boxed{C_1}$ up to and including 63	From 10 up to 25 inclusive	6,85
¹⁾ For special purposes such as ELV applications, where flexible conductors are used (from 0,5 mm ² up to 1 mm ² inclusive). ²⁾ Each supply terminal of switches, other than those of pattern numbers 3, 03 and 7, shall allow the connection of two 2,5 mm ² conductors. For switches having a rated voltage not exceeding 250 V a round hole is sufficient for the connection of two 2,5 mm ² conductors. ³⁾ The use of flexible conductors is permitted.		

The conductor space shall be at least that specified in figures 1, 2, 3, 4 and 5.

Compliance is checked by inspection and by fitting conductors of the smallest and largest cross-sectional areas specified.

12.2.2 Terminals with screw clamping shall allow the conductor to be connected without special preparation.

Compliance is checked by inspection.

NOTE – The term "special preparation" covers soldering of the wires of the conductor, use of cable lugs, formation of eyelets, etc., but not the reshaping of the conductor before its introduction into the terminal or the twisting of a flexible conductor to consolidate the end.

12.2.3 Terminals with screw clamping shall have adequate mechanical strength.

Screws and nuts for clamping the conductors shall have a metric ISO thread or a thread comparable in pitch and mechanical strength.

Screws shall not be of metal which is soft or liable to creep, such as zinc or aluminium.

Compliance is checked by inspection and by the tests of 12.2.6 and 12.2.8.

NOTE – Provisionally SI, BA, and UN threads are considered to be comparable in pitch and mechanical strength to metric ISO thread.

12.2.4 Terminals with screw clamping shall be resistant to corrosion.

$\boxed{C}$ Terminals the body of which is made of materials as detailed in 22.5, are considered as complying with this requirement. $\boxed{C}$

12.2.5 Screw-type terminals shall be so designed and constructed that they clamp the conductor(s) without undue damage to the conductor(s).

Compliance is checked by the following test:

The terminal is placed in the test apparatus according to figure 10 and fitted with rigid (solid or stranded) conductor(s), according to table 2, first with the smallest and then with the largest cross-sectional area, the clamping screw(s) or nut(s) being tightened with the torque according to table 3.

Table 3 – Tightening torque for the verification of the mechanical strength of screw-type terminals

Nominal diameter of thread mm	Torque Nm					
	1	2	3	4	5	6
Up to and including 2,8	0,2	–	0,4	–	0,4	–
Over 2,8 up to and including 3,0	0,25	–	0,5	–	0,5	–
Over 3,0 up to and including 3,2	0,3	–	0,6	–	0,6	–
Over 3,2 up to and including 3,6	0,4	–	0,8	–	0,8	–
Over 3,6 up to and including 4,1	0,7	1,2	1,2	1,2	1,2	–
Over 4,1 up to and including 4,7	0,8	1,2	1,8	1,8	1,8	–
Over 4,7 up to and including 5,3	0,8	1,4	2,0	2,0	2,0	–
Over 5,3 up to and including 6,0	–	1,8	2,5	3,0	3,0	–
Over 6	–	–	–	–	–	0,8

NOTE 1 – Column 1 applies to screws without heads if the screw when tightened does not protrude from the hole, and to other screws which cannot be tightened by means of a screwdriver with a blade wider than the diameter of the screw.

Column 2 applies to nuts of mantle terminals which are tightened by means of a screwdriver.

Column 3 applies to other screws which are tightened by means of a screwdriver.

Column 4 applies to nuts of mantle terminals in which the nut is tightened by means other than a screwdriver.

Column 5 applies to screws or nuts, other than nuts of mantle terminals, which are tightened by means other than a screwdriver.

Column 6 applies to nuts of switches with central hole fixing.

Where a screw has a hexagonal head with a slot for tightening with a screwdriver and the values of columns 3 and 5 are different, the test is made twice, first applying to the hexagonal head the torque specified in column 5 and then applying the torque specified in column 3 by means of a screwdriver. If the values of columns 3 and 5 are the same, only the test with the screwdriver is made.

NOTE 2 – For mantle terminals the specified nominal diameter is that of the slotted stud.

NOTE 3 – The shape of the blade of the test screwdriver should suit the head of the screw to be tested.

NOTE 4 – The screws and nuts should not be tightened in jerks.

NOTE 5 – The values in table 3 are provisional.

The length of the test conductor shall be 75 mm longer than the height (H) specified in table 4.

The end of the conductor is passed through an appropriate bushing in a platen positioned at a height (H) below the equipment as given in table 4. The bushing is positioned in a horizontal plane so that its centre line describes a circle of 75 mm diameter, concentric with the centre of the clamping unit in the horizontal plane; the platen is then rotated at a rate of (10 ± 2) rev/min.

The distance between the mouth of the clamping unit and the upper surface of the bushing shall be within ± 15 mm of the height in table 4. The bushing may be lubricated to prevent binding, twisting, or rotation of the insulated conductor.

A mass as specified in table 4 is suspended from the end of the conductor. The duration of the test is approximately 15 min.

During the test, the conductor shall neither slip out of the clamping unit nor break near the clamping unit, nor shall the conductor be damaged in such a way as to render it unfit for further use.

☐ Text deleted. ☐

Table 4 – Test values for flexion and pull out for copper conductors

Conductor cross-sectional area ¹⁾ mm ²	Diameter of bushing hole ²⁾ mm	Height H ³⁾ mm	Mass for conductor kg
0,5	6,5	260	0,3
0,75	6,5	260	0,4
1,0	6,5	260	0,4
1,5	6,5	260	0,4
2,5	9,5	280	0,7
4,0	9,5	280	0,9
6,0	9,5	280	1,4
10,0	9,5	280	2,0
16,0	13,0	300	2,9
25,0	13,0	300	4,5
¹⁾ ☐ Void. ☐ ²⁾ If the bushing hole diameter is not large enough to accommodate the conductor without binding, a bushing having the next larger hole size may be used. ³⁾ Tolerance for height $H = \pm 15$ mm.			

12.2.6 Terminals with screw clamping shall be so designed that they clamp the conductor reliably between metal surfaces.

Compliance is checked by inspection and by the following test:

The terminals are fitted with rigid stranded conductors of the smallest and largest cross-sectional area specified in table 2, the terminal screws being tightened with a torque equal to two-thirds of the torque shown in the appropriate column of table 3.

If the screw has a hexagonal head with a slot, the torque applied is equal to two-thirds of the torque shown in column 3 of table 3.

Each conductor is then subjected to a pull as specified in table 5, applied without jerks, for 1 min, in the direction of the axis of the conductor space.

Table 5 – Test values for pulling out test

Cross-section of conductors accepted by the terminal mm ²	From 0,5 up to 1 inclusive	From 0,75 up to 1,5 inclusive	From 1,5 up to 2,5 inclusive	From 2,5 up to 4 inclusive	From 4 up to 6 inclusive	From 6 up to 10 inclusive	From 10 up to 16 inclusive	From 16 up to 25 inclusive
Pull N	30	40	50	50	60	80	90	100

If the clamp is provided for two conductors, the appropriate pull is applied consecutively to each conductor.

During the test, the conductor shall not move noticeably in the terminal.

If the clamp is intended for connection of more than two conductors, reference is made for the testing to the requirements given in the appropriate Part of IEC 60998.

The test is repeated with rigid solid conductors [C] if any, according to HD 21.3, [C] if the first test has been made with rigid stranded conductors. In the case where rigid stranded conductors do not exist, the test is made with rigid solid conductors only.

[C] NOTE – See Annex ZB for special national conditions. [C]

12.2.7 Terminals with screw clamping shall be so designed or placed that neither a rigid solid conductor nor a wire of a stranded conductor can slip out while the clamping screws or nuts are tightened.

This requirement does not apply to lug terminals.

Compliance is checked by the following test:

The terminals are fitted with conductors having the largest cross-sectional area specified in table 2.

The terminals are checked both with solid conductors and with stranded conductors.

Terminals intended for the looping-in of two or three conductors are checked, being fitted with the permissible number of conductors.

The terminals are fitted with conductors having the composition shown in table 6.

Table 6 – Composition of conductors

Cross-sectional area mm ²	Number of wires and nominal diameter of wires mm	
	Solid conductor	Stranded conductor
1	1 × 1,13	7 × 0,42
1,5	1 × 1,38	7 × 0,52
2,5	1 × 1,78	7 × 0,67
4	1 × 2,25	7 × 0,86
6	1 × 2,76	7 × 1,05
10	1 × 3,57	7 × 1,35
16	–	7 × 1,70
25	–	7 × 2,14

Before insertion into the clamping means of the terminal, wires of rigid (solid or stranded) conductors are straightened and rigid stranded conductors may, in addition, be twisted to restore them approximately to their original shape.

The conductor is inserted into the clamping means of the terminal for the minimum distance prescribed or, where no distance is prescribed, until it just projects from the far side of the terminal and in the position most likely to allow the wire to escape. The clamping screw is then tightened with a torque equal to two-thirds of the torque shown in the appropriate column of table 3.

After the test no wire of the conductor shall have escaped outside the clamping unit thus reducing creepage distances and clearances to values lower than those indicated in clause 23.

12.2.8 Terminals with screw clamping shall be so fixed or located within the switch that, when the clamping screws or nuts are tightened or loosened, the terminals shall not work loose from their fixing to the switch.

NOTE 1 – These requirements do not imply that the terminals should be so designed that their rotation or displacement is prevented, but any movement should be sufficiently limited so as to prevent non-compliance with this standard.

NOTE 2 – The use of sealing compound or resin is considered to be sufficient for preventing a terminal from working loose, provided that:

- the sealing compound or resin is not subject to stress during normal use, and
- the effectiveness of the sealing compound or resin is not impaired by temperatures attained by the terminal under the most unfavourable conditions specified in this standard.

Compliance is checked by inspection, by measurement and by the following test:

A solid rigid copper conductor of the largest cross-sectional area specified in table 2 is placed in the terminal.

Screws and nuts are tightened and loosened five times by means of a suitable test screwdriver or spanner, the torque applied when tightening being equal to the torque shown in the appropriate column of table 3 or in the table of the appropriate figures 1 to 4, whichever is the highest.

The conductor is moved each time the screw or nut is loosened.

During the test, terminals shall not work loose and there shall be no damage, such as breakage of screws or damage to the heads, slots, threads, washers or stirrups that will impair the further use of the terminals.

12.2.9 Clamping screws or nuts of earthing terminals with screw clamping shall be adequately locked against accidental loosening and it shall not be possible to loosen them without the aid of a tool.

Compliance is checked by manual test.

In general, the designs of terminals shown in figures 1, 2, 3, 4 and 5 provide sufficient resiliency to comply with this requirement; for other designs, special provisions, such as the use of an adequately resilient part which is not likely to be removed inadvertently, may be necessary.

12.2.10 Earthing terminals with screw clamping shall be such that there is no risk of corrosion resulting from contact between these parts and the copper of the earthing conductor, or any other metal that is in contact with these parts.

The body of the earthing terminals shall be of brass or other metal no less resistant to corrosion, unless it is a part of the metal frame or enclosure, when the screw or nut shall be of brass or other metal no less resistant to corrosion.

If the body of the earthing terminal is a part of a frame or enclosure of aluminium alloy, precautions shall be taken to avoid the risk of corrosion resulting from contact between copper and aluminium or its alloys.

Compliance is checked by inspection.

NOTE – Screws or nuts of plated steel withstanding the corrosion test are considered to be of a metal no less resistant to corrosion than brass.

12.2.11 For pillar terminals, the distance between the clamping screw and the end of the conductor, when fully inserted, shall be at least that specified in figure 1.

NOTE – The minimum distance between the clamping screw and the end of the conductor applies only to pillar terminals in which the conductor cannot pass right through.

For mantle terminals, the distance between the fixed part and the end of the conductor, when fully inserted, shall be at least that specified in figure 5.

Compliance is checked by measurement, after a solid conductor of the largest cross-sectional area specified, for the appropriate rated current in table 2, has been fully inserted and fully clamped.

12.2.12 Lug terminals shall be used only for switches having a rated current of 40 A or greater; if such terminals are provided, they shall be fitted with spring washers or equally effective locking means.

Compliance is checked by inspection.

12.3 Screwless terminals for external copper conductors

12.3.1 Screwless terminals may be of the type suitable for rigid copper conductors only or of the type suitable for both rigid and flexible copper conductors.

For the latter type, the tests are carried out with rigid conductors first and then repeated with flexible conductors.

NOTE 1 – This subclause is not applicable to switches provided with:

- screwless terminals requiring the fixing of special devices to the conductors before clamping in the screwless terminal, for example flat push-on connectors;
- screwless terminals requiring twisting of the conductors, for example those with twisted joints;
- screwless terminals providing direct contact to the conductors by means of edges or points penetrating the insulation.

NOTE 2 – The tests of 12.3.12 are carried out using rigid solid conductors only.

12.3.2 Screwless terminals shall be provided with clamping units which allow the proper connection of rigid or of rigid and flexible copper conductors having nominal cross-sectional areas as shown in table 7.

Table 7 – Relationship between rated currents and connectable cross-sectional areas of copper conductors for screwless terminals

Rated current A	Conductors		
	Nominal cross-sectional areas mm ²	Diameter of largest rigid conductor mm	Diameter of largest flexible conductor mm
Up to and including 4	0,75 - 1	1,19	-
Above 4 and including 6	1 - 1,5	1,45	1,73
Above 6 and including 16 ¹⁾	1,5 - 2,5	2,13	2,21

¹⁾ Each supply terminal of switches other than those of pattern numbers 3, 03 and 7 shall allow the connection of 2 x 2,5 mm² conductors. In such cases terminals for rated current 10A with separate independent clamping means for each conductor shall be used.

Compliance is checked by inspection and by fitting conductors of the smallest and largest cross-sectional areas specified.