

# INTERNATIONAL STANDARD

# IEC 60669-1

Edition 3.1  
2000-03

Edition 3:1998 consolidated with amendment 1:1999

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## Switches for household and similar fixed-electrical installations –

### Part 1: General requirements

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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED-ELECTRICAL  
INSTALLATIONS –****Part 1: General requirements**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 60669-1 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories.

This consolidated version of IEC 60669-1 is based on the third edition (1998) [documents 23B/535/FDIS and 23B/539/RVD] and its amendment 1 (1999) [documents 23B/580/FDIS and 23B/590/RVD].

It bears the edition number 3.1.

A vertical line in the margin shows the texts amended by amendment 1.

Annexes A and B form an integral part of this standard.

In this standard the following print types are used:

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

# SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED-ELECTRICAL INSTALLATIONS –

## Part 1: General requirements

### 1 Scope

This part of IEC 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.

The rated current is limited to 16 A maximum for switches provided with screwless terminals.

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

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

NOTE 2 General requirements for boxes for flush-type switches are given in IEC 60670.

It also applies to switches such as:

- switches incorporating pilot lights;
- electromagnetic remote control switches (particular requirements are given in part 2);
- switches incorporating a time-delay device (particular requirements are given in part 2);
- combinations of switches and other functions (with the exception of switches combined with fuses);
- electronic switches (particular requirements are given in part 2);
- switches having facilities for the outlet and retention of flexible cables (see annex B).

NOTE 3 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 4 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 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60669. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 60669 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050-442:1998, *International Electrotechnical Vocabulary – Part 442: Electrical accessories*

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

IEC 60212: 1971, *Standard conditions for use prior to and during the testing of solid electrical insulation materials*

IEC 60227-1: 1993, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60227-3: 1993, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 3: Non-sheathed cables for fixed wiring*

IEC 60227-4: 1992, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 4: Sheathed cables for fixed wiring*

IEC 60227-5 1979, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)*  
Amendment 1 (1987)

IEC 60245-1: 1994, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60245-4: 1994, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 4: Cords and flexible cables*

IEC 60364-4-46: 1981, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 46: Isolation and switching*

IEC 60417: 1973, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets*

IEC 60529: 1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60670: 1989, *General requirements for enclosures for accessories for household and similar fixed-electrical installations*

IEC 60695-2-1: 1991, *Fire hazard testing – Part 2: Test methods – Section 1: Glow-wire test and guidance*

IEC 60998: *Connecting devices for low voltage circuits for household and similar purposes*

IEC 60998-1: 1990, *Connecting devices for low voltage circuits for household and similar purposes – Part 1: General requirements*

IEC 60998-2-1: 1990, *Connecting devices for low voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

IEC 60998-2-2: 1991, *Connecting devices for low voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units*

IEC 60999-1: 1990, *Connecting devices – Safety requirements for screw type and screwless-type clamping units for electrical copper conductors – Part 1: General requirements and particular requirements for conductors from 0,5 mm<sup>2</sup> up to 35 mm<sup>2</sup> (included)*

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

ISO 2039-2: 1987, *Plastics – Determination of hardness – Part 2: Rockwell hardness*

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

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

### 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

##### **momentary push-button switch**

push-button switch which returns automatically to the initial state after operation

#### 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

#### **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

NOTE Switches of mini-gap construction are for functional purposes and they are not intended to be used for safety isolation purposes (see IEC 60364-4-46).

### 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

#### **actuating member**

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

### 3.22

#### **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

## 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.

*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 clause 16, three additional specimens may be required in the case of switches fitted with pilot lights.*

*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.*

*A switch marked 250/380 V is tested as a 380 V switch.*

*Momentary contact switches intended to operate bells, electromagnetic remote control switches or time-delay switches, are not to be submitted to the tests of 18.2 and 19.2.*

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**

**6.1** Switches shall preferably have rated voltages of 130 V, 230 V, 250 V, 277 V, 380 V, 400 V, 415 V and 440 V.

For momentary contact switches intended to operate bells, electromagnetic remote control switches or time-delay switches, the standard rated voltages are 130 V and 250 V.

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 and 63 A.

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 intended to operate bells, electromagnetic remote control switches or time-delay switches.

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.